Operator's Manual

Trimble® Roadworks Asphalt Paver

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Trimble

Contents

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Controls and Guidance

In this chapter:

You need to set up and control the guidance system and understand the guidance information the system provides. This chapter describes, in general terms, how these components are used.

1.1 Transferring Files

The File Transfer screen is available in the System Settings menu . It lets you do the following:

- Synchronize the files on the EC520 controller (the machine) with those on Connected Community.
- Import files to the machine from the display's hard drive, or, an external storage device.
- Export files from the machine to the display's hard drive, or, an external storage device.
- Custom select, if enabled, the files you want to import from the display's hard drive, or, an external storage device.

If you have an Operator Plus account you can perform further file management functions via the Advanced button on either the File Transfer screen or the Project screen.

Note – To transfer files via a USB flash drive, you must have a TD520 display and a FAT32 format USB flash drive.
Any USB flash drive larger than 32GB may require a third-party application to format it as FAT32.

1.1.1 File categories

Each time you import or export files to or from the machine, you need to choose the files that you want to transfer. To do this, select the checkbox next to the category.

- Earthworks Data: You can transfer all data files or none.
- Projects: You can transfer the project files of your choice. Expand the Projects file to show each project with its own checkbox.

TIP – Within the expanded project, select Infield Data to only export the infield designs for the project.

- Production Data: You can transfer data files for use in VisionLink, WorksOS or both.

1.1.2 File structure for external storage devices

When using Import Files TO Machine files on external storage devices, the files must be saved within the folder structure below:

Path	Description of Contents
<Root>:\ProjectLibrary	Top-level folder containing the data sub-folders.

Path	Description of Contents
<Root>:\ProjectLibrary\ EarthworksData	Top-level folder for data files.
<Root>:\ProjectLibrary\GeoData	Geographical data which is used in one or more projects.
<Root>:\ProjectLibrary\Projects	Project folders containing project-specific data such as designs.

Note – Place files only within the sub-folders of the top-level folders.

Note – Custom File Import TO Machine does not require the above folder structure on the external storage device.

1.1.3 Syncing files with the Connected Community

Transfer files between the machine and Connected Community to ensure the machine has the latest files and that the office has access to the data recorded on the machine.

If your machine is configured for syncing, an option to Sync Files with Connected Community Sync appears in the File Transfer screen. All relevant files within the current project are synchronized.

Automatic file sync

When automatic file sync is enabled in the Web Interface, files will automatically synchronize to Connected Community every 15 minutes, whenever the machine is powered and has an active internet connection. You are not told when the sync is in progress, or if it was successful or not.

Manual file sync

You can initiate a manual file sync to Connected Community at the end of the day; for example, if automatic file sync is not enabled or to ensure that all of the files from the last 15 minutes have been synced and are available in the office.

1. Access the File Transfer screen.
2. Confirm Sync Files with Connected Community is selected in Transfer Type.
3. Tap Sync. The File Transfer screen grays-out and a progress meter displays. Once the system connects with Connected Community, the progress meter indicates the file categories that are transferring.

   To stop the sync, tap Cancel. The file transfer stops and any partial transfers (categories that did not completely transfer) are deleted. Any categories that did completely transfer are kept.

When the file transfer is complete a success notification appears.

If you initiate a sync with Connected Community and an automatic file sync is already in progress you are asked if you would like to continue. If you choose:

- Yes, the sync that is currently in progress stops and the sync that you initiated starts.
- No, the automatic sync that is currently in progress continues and the Transfer Files screen reappears.

1.1.4 Transferring files via an external storage device

Note – The TD520 display only supports USB flash drives that are FAT32 format. Any USB flash drive larger than 32GB may require a third-party application to format it as FAT32.

Import Files TO Machine

Before you can use the Import Files TO Machine option, you must create a folder structure on your external storage device that matches the machine's file organization structure. This enables the machine to place your files in the correct location during the transfer process.

TIP – Export the machine's existing folder structure to your external storage device to quickly create the necessary folder structure for transfers. For more information, see 1.1.6 Exporting files from the machine.

Preparing your external storage device for file transfer

1. Format your USB flash drive in the FAT32 format, if using a USB flash drive.
2. Create the top-level folder, or folders, required for the data to be transferred on your external storage device. For more information, see 1.1.2 File structure for external storage devices.
3. Copy your files to the appropriate folder on the external storage device (for example, copy your project files to *ProjectLibrary* > *Projects*).

Connecting your external storage device for file transfer

1. Log in to the display.
2. Connect your external storage device to the display. The File Transfer screen appears.
3. Import or export the files of your choice.

ATTENTION - When transferring files to or from an external storage device, an Android OS screen appears. The first time the screen appears, it is blank, apart from three vertical dots in the upper right-hand corner. Select the dots and then select Show SD Card. The Android screen changes. From the left-hand panel, select your external storage device and then select SELECT in the lower right-hand corner. (Do not select any files or folders from the right-hand panel.)

1.1.5 Importing files to your machine

1. Access the File Transfer screen.
2. Select Import Files TO Machine from the *Transfer Type* field.
3. Select the source type from the *From* field.
4. Tap Next. The Import Files screen appears.
5. Select the files that you want to import.
6. Tap Import to start the file transfer. Tap Cancel to exit the screen without applying any changes.

The import process

After you tap Import a progress meter appears and the File Transfer screen is grayed-out.

First the system checks the available storage on the machine. Once sufficient space is confirmed the progress meter indicates the files that are transferring.

If you tap Cancel the file transfer stops.

When the file transfer is complete a success notification appears.

Files are overwritten with newest versions

When transferring files from an external storage device to the machine, all files on machine that have the same name as the files on the external storage device will be overwritten with the external storage device files. This includes the user preferences file userdata.pref.xml, which saves the settings; for example, the text items that are configured.

To keep the user preferences saved on a machine, either:

- Perform a File Transfer of the EarthworksData to the USB flash drive first, then perform a File Transfer from the USB flash drive to the machine

OR

- Untick the EarthworksData box when transferring files from the USB flash drive to the machine

Note – The userdata.pref.xml file is stored at ProjectLibrary > EarthworksData > [Machine Name Folder]

1.1.6 Exporting files from the machine

1. Access the File Transfer screen.
2. In the *Transfer Type* field, select Export Files FROM Machine.
3. In the *To* field, select the destination.
4. Tap Next. The Export Files screen appears.
5. The available files to export are listed. Select the files that you want to export.
6. To initiate the file transfer, tap Export; to exit the screen without applying any changes, tap Cancel.

The export process

After you tap Export a progress meter appears and the File Transfer screen is grayed-out.

The system checks the available storage on the destination device. Once sufficient space is confirmed the progress meter indicates the files that are transferring.

If you tap Cancel the file transfer stops.

When the file transfer is complete a success notification appears.

Note – If a full backup of all files on the machine is required this can only be performed via the Web Interface "Back up all" option on the File Management page.

1.1.7 Using custom file import

1. Access the File Transfer screen.
2. Select Custom File Import TO Machine from the *Transfer Type* field.
3. Select the project to import the files into, or add a new project, from the *Project* field.
4. Tap Next. If adding a new project, enter a project name in Project Name and tap Save.
5. Find the file or files you want to import on the file list screen.
    a. Tap a single file to select it.
    b. Tap and hold to select multiple files and tap Open in the upper right corner.
6. Confirm the files you want to import on the Import Files screen and tap Import.

1.1.8 Troubleshooting

The following notices may appear when you are transferring files:

Unsuccessful Connection

This message appears if the system cannot connect to the Connected Community. Tap OK to return to the File Transfer screen. Check the Connected Community settings and the Internet Connection Status in the Web Interface.

Insufficient Storage

This message appears if sufficient space is not available in the destination device. Tap OK to return to the File Transfer screen. From here you can choose a different destination device (if available) and then retry, or tap Cancel.

Failed File Export

This notice appears if for any other reason a file export fails (for example if the USB flash drive is disconnected during a transfer).

1.2 Network

Action bar icons

The Network icons that appear on the action bar show the high-level status of the associated network feature. The icons are:

	Connection Status (cell)	A warning (orange) shows if the connection is not yet established on start-up, or lost during operation.
	Connection Status (Wi-Fi)	
	Cloud Services	A warning (orange) shows if any of the underlying services fail to connect, or if cell/Wi-Fi connection is lost.

Tap an icon to open the Network screen.

Network screen

The connection icons on the Network screen show the 3 parts of the connection:

1. Gateway Device ( ) – the hardware acting as the connection device on your system
   - Error state (red) – device not found
   - Warning state (orange) – the device is configuring or there is an issue with the device configuration
2. Connection – a cell ( ) or Wi-Fi ( ) icon, depending on the gateway configuration
   - Warning state (orange) – there is a missing or unconfigured device, or a problem with the connection to the internet
3. Cloud Services ( ) – the parts of the cloud service
   - Only configured services show in the list
   - Warning state – the last attempt to connect or transfer data failed

Note – The warnings are sequential, so if there is a warning for the Gateway Device, there will also be a warning for Connection Status and Cloud Services.

2

Using Design Guidance

In this chapter:

To generate guidance information, the system measures the screed's position relative to a three dimensional (3D) digital map of the design surface. This is called Design guidance. 3D sensors such as UTS instruments allow the system to always know the machine's three dimensional location.

2.1 Using Design Mode

Design mode lets you select and load a design surface to get guidance to.

Use .dsz and .vcl design files that are created in the office and exported from Business Center Heavy Construction Edition.

Cat elevation design files have one surface and a recommended size limit of 1 Mb or less.

When you select a .vcl design file that contains multiple surfaces, you must further select an individual surface from the file and a master alignment for that surface.

The system supports filled linework in .vcl files. The fill reflects the color set in Business Center Heavy Construction Edition.

2.1.1 Selecting Design mode

1. From the Dashboard, tap the Machine Setup tile.
2. From the Machine Setup screen, select the 3D positioning source that you require and tap Apply.
   Note – The positioning source you select will determine the modes that you can select from the Job Setup screen.
3. From the Dashboard, tap the Job Setup tile.
4. From the Job Setup screen select Design as the mode. Also select a project, and design file along with a surface and master alignment (if available). To add reference surfaces, tap to open Surfaces Manager. Tap Apply.
5. From the Dashboard, tap Start. The work screen appears.

Note – If you select extra linework in Infield mode or Depth and Slope mode, and then change to Design mode, the linework's design will be the default design.

2.1.2 The work screen

In Design mode, this icon (and the name of the selected design) appears at the top left-hand side of the work screen:

Touch and hold the icon to open the Job Setup screen.

The Design offset icons

The offset icons always appear in the same order left to right on the guidance bar, as shown below:

Horizontal offset	Vertical elevation offset	Perpendicular elevation offset

Note – Either the vertical elevation offset or *perpendicular elevation offset icon appears, depending on which offset type is in use.*

Use the offset icons in the following ways:

- Tap to cycle through the configured offset memories.
- Touch and hold to access the respective offset configuration screens.

The offset settings screens

- Use the horizontal offset screen to select a line and configure an offset value.
- Use the elevation offset screen to configure a vertical or perpendicular offset.

2.1.3 Overlays

The overlays icon is in the top right-hand corner of the guidance bar: 

Use this icon to directly access the Overlays screen, which controls what appears on the guidance view.

The guidance view

The guidance view displays the machine relative to the surface being worked. You can set up to three different views to display at once, from the following view types:

- 3D
  Note – The 3D view only renders the design surface for a radius of 300 m (about 1000 feet) from the current machine position.
- Cross-section
- Profile
- Plan
- Raise/Lower Left
- Raise/Lower Right

Text items

Use the text ribbon (across the bottom of the guidance view) to display text items of your choice. By default, the system displays ribbon items appropriate for your machine. Useful text items for Design mode are:

- Raise/Lower Left
- Raise/Lower Right
- Offline
- MA Offset

Touch and hold any text item in the text ribbon to open the corresponding context menu:

- Tap Add to select a new text item to add to the text ribbon.
- Tap Replace to select another text item to replace the current one.
- Tap Remove to remove the current text item from the text ribbon.

At the bottom of the context menu, you can tap Go to Text Ribbon . Alternatively you can access it from the System Settings menu . The Text Ribbon screen allows you to:

- Drag-and-drop items to reorder your list. Alternatively, you can drag a text item in the text ribbon to shuffle it.
- Tap Edit to select which items appear.
- Tap Default to reload the default ribbon items for your machine.
- Enable or disable the display of the text ribbon in the work screen.

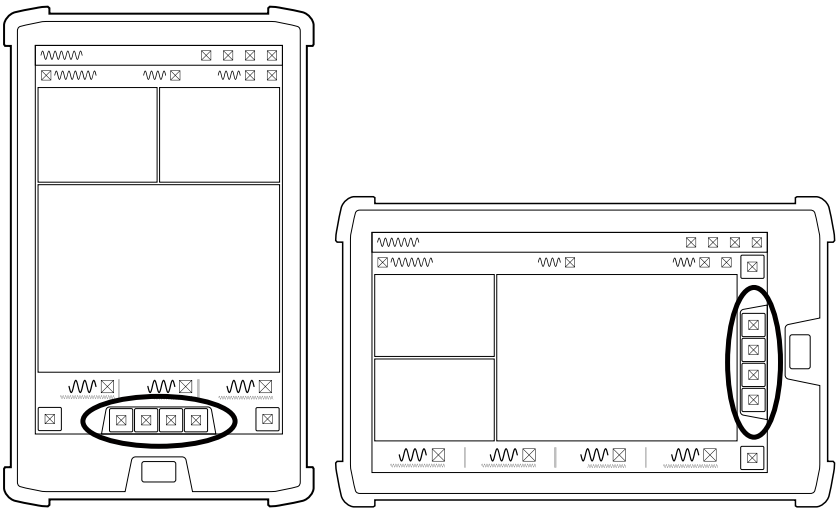
2.1.4 System settings

The System Settings icon is on the work screen:

Use System Settings to access and configure various functions, including (but not limited to):

- Dark Background
- Units
- File Transfer

The shortcut bar



2.1.5 The Back icon

The Back icon is in the top left-hand side of the title bar:

You can tap the icon or title to return to the previous screen; either the Dashboard or work screen.

Work settings

The Work Settings icon is in the lower right-hand side of the work screen: 

Use the Work Settings menu to access and configure those settings that change according to the requirements of each individual task, including (but not limited to):

- Elevation Offset
- Record Point

2.2 Using Elevation Offsets

Often, it is not possible to reach the design surface in a single pass, because the elevation of the current ground is too far away from the design surface.

The system lets you apply elevation offsets to the design to create target surfaces that are achievable in a single pass.

You can also use a working surface offset to shift the design surface to a known distance above or below the design surface, for example a subgrade at a known distance below the finished level design.

2.2.1 Accessing the Elevation Offset screen

Perform one of the following actions to access the Elevation Offset screen:

- Open the Work Settings menu  .
- Touch and hold the elevation offset field in the guidance bar.

The elevation offset icon on the guidance bar appears differently according to the type and value of the current elevation offset:

Offset type	Icon	Offset value
Vertical		Negative elevation offset
		Zero elevation offset
		Positive elevation offset
Vertical + Working Surface		Zero elevation offset Zero working surface offset
		Zero elevation offset Positive working surface offset

Offset type	Icon	Offset value
		Zero elevation offset Negative working surface offset
		Positive elevation offset Positive working surface offset
		Negative elevation offset Negative working surface offset
		Positive elevation offset Negative working surface offset
		Negative elevation offset Positive working surface offset
Perpendicular		Negative elevation offset
		Zero elevation offset
		Positive elevation offset
Perpendicular + Working Surface		Zero elevation offset Zero working surface offset
		Zero elevation offset Positive working surface offset
		Zero elevation offset Negative working surface offset
		Positive elevation offset Positive working surface offset
		Negative elevation offset Negative working surface offset
		Positive elevation offset Negative working surface offset
		Negative elevation offset Positive working surface offset

2.2.2 The Elevation Offset screen

Use the Elevation Offset screen to:

- Apply or edit a elevation offset
- Select or edit an existing Elevation Offset memory

- Apply or edit a Working Surface offset

You can also access the Offset Memories screen, which you can use to create elevation offset values that the system saves and can be selected for later use.

When you work in Design mode, you can use elevation offsets to do the following tasks:

- Add an offset to the design surface.
- Select an offset from the offset memories.
- Apply a new working surface that is a offset above or below the design surface that you want to achieve at the end of the current task (this is done under Advanced Options).

  For example, create a working surface that is 300 mm (1 ft) below the design and bulk shift to that working surface. Then, add material back in offset increments of 50 mm (2 in) each to build back up to the design surface.
- Choose the offset direction (vertical or perpendicular) that applies to both the elevation offset and any working surface offset.

2.2.3 Applying an elevation offset

Use either of the following methods:

- Access the Elevation Offset screen, enter the following data and then tap Apply:
  - Offset value
  - Focus for guidance
  - Offset direction (optional item under Advanced Options):
    - Vertical - typically for a known elevation
    - Perpendicular - typically for a known thickness, particularly on a sloping surface
- Open the work screen and tap the elevation offset field in the guidance bar to cycle through the saved offset memories.

2.2.4 Creating, editing or deleting memories

In the Elevation Offset screen:

- Tap the Save button to save an entered offset value as a memory.
- Tap the Memories icon on the right-hand side of the memory to open the Offset Memories screen.

In the Offset Memories screen:

- Tap the overflow icon to edit or delete a memory.
- Tap the Create button to create a new memory.
- Touch and hold on a memory to select multiple memories for deletion.

Note – The Save button saves the offset value only. The Working Surface offset and offset direction are not saved.

2.3 Horizontal Guidance

You can receive horizontal guidance relative to the following design features:

- Lines within Office Designs
- Design surface boundaries

Setting a horizontal offset moves the horizontal guidance away from the selected line. You add or subtract an offset square to the selected horizontal line.

2.3.1 Access the Horizontal Guidance screen

Perform one of the following actions to access the Horizontal Guidance screen:

- Open the Work Settings menu .
- Touch and hold the horizontal offset field in the guidance bar.

The horizontal offset icon on the guidance bar appears differently according to the value of the current horizontal offset:

Offset type	Icon	Offset value
Negative		Negative/left of line
None		Zero
Positive		Positive/right of line

TIP – The arrows on the selected line indicate the direction of the line. A positive offset is to the right-hand side of the selected line, relative to the direction of the line. A negative offset is to the left-hand side of the selected line, relative to the direction of the line when you look along the line in the direction of the arrows.

2.3.2 The Horizontal Guidance screen

Use the Horizontal Guidance screen to:

- Select a horizontal line to guide to
- Optionally apply an offset

Select a line for horizontal guidance

1. Access the Horizontal Guidance screen.
2. If you have not already done so, select a line to guide to. Either select a line from the drop-down list or tap a line on the plan view.
3. Tap Apply.

In the Horizontal Guidance screen, the plan view draws the selected line in red. Arrows indicate the direction of the line.

Alternatively, you can also select a line for horizontal guidance from the context menu in the work screen:

1. From the plan view guidance pane, press and hold anywhere near the line you want to select. A context menu appears.
2. Tap Choose Line and select an available line.
3. Tap Use for guidance.

Note – If you selected a design in the Job Setup menu that contains 3D lines, from the work screen use the shortcut key or Work Settings menu to open the 3D Line Guidance screen and select a 3D line for guidance.

Apply a horizontal offset

The horizontal offset is the offset distance left (–) or right (+) of the selected line.

1. Access the Horizontal Guidance screen.
2. Optionally, select a line to guide to.
3. Optionally, enter the value of the offset or tap the ▲ or ▼ buttons to increase or decrease the value.
4. To save this as a memory, tap Save.
5. Tap Apply.

When an offset is entered (other than zero), in the Horizontal Guidance screen, the plan view draws the original selected line in cyan. Arrows indicate the direction of the line. A positive offset is to the right-hand side of the selected line, relative to the direction of the line. A negative offset is to the left-hand side of the selected line, relative to the direction of the line when you look along the line in the direction of the arrows.

The guidance line is drawn in red, it is offset from the selected line by the offset value and is the line guidance is provided to.

Tap Memories to select an existing horizontal offset memory or to create the new offset memory values that the system saves for later use.

Applying a horizontal increment

1. Access the Increments screen from the System Settings menu .
2. Optionally, enter the value of the increment in the Horizontal Distance field.
3. Tap Apply.

The horizontal increment value is the amount the horizontal offset changes each time the ▲ or ▼ buttons are tapped in the Horizontal Guidance screen.

2.3.3 Horizontal position information

The center lightbar provides horizontal guidance from the focus to the guidance line. For more information, refer to the *On-screen Lightbars* guide or the *External Lightbars* guide.

The following text items are available:

- MA Offset: Shows the horizontal distance from the master alignment to the current focus, measured perpendicular to the closest point on the master alignment.

2.3.4 Creating, editing or deleting memories

In the Horizontal Guidance screen:

- Tap the Save button to save an entered offset value as a memory.
- Tap the Memories button to open the Horizontal Offset Memories screen.

In the Horizontal Offset Memories screen:

- Tap the overflow icon ⋮ to edit or delete a memory.
- Tap the Create button to create a new memory.
- Touch and hold on a memory to select multiple memories for deletion.

2.4 Working with Points

You can create points in the office or in the field.

2.4.1 Displaying points

To control the appearance of infield points on the work screen, adjust the settings in the Overlays screen. To open the Overlays screen, tap in the top right-hand corner of the guidance bar. The Points drop-down on the Overlays screen enables you to hide on-screen points, or show combinations of the icon, *Name* and *Code* field.

If you choose to show points with their *Name* and *Code*, the system may truncate the onscreen text so the important parts of the name fit on the screen.

Office points that are included in a layer in a .vcl file are managed the same way as linework within the layer. When you use the Layers Manager screen to:

- Show the layer, the points also display.
- Hide the layer, the points are also hidden. Infield points remain visible.

2.4.2 Filtering points

On the Points Manager screen, you can filter to limit which points appear in the list. You can show:

- All points
- Only points created in the office
- Only points created in the field (all Measured Data stores)
- Only points contained in a specific Measured Data store

2.4.3 Deleting a point

In the Operator app, you can only delete a point that was created in the field. A point created in the office must be deleted from the office software.

When you delete a point created in the field, the system preserves the point so the data is still available to the office. The point is moved from the Measured Data file to a file named *<Measured_Data_name>.<machine_name>.deleted*.

To delete a point:

- From the Points Manager screen, tap the overflow icon ⋮ on the right-hand side of the point and select Delete.
- On the work screen:
  a. Press and hold the point name. The pop-up menu displays.
  b. Tap > and then tap Delete.

2.4.4 Recording a point

Use Record Point to save the 3D position (Northing, Easting and Elevation) of a point. It is useful for recording points of interest on site, such as the location of a manhole.

Your machine does not have to be stationary to record a point. Whether your machine is moving or stationary, the system records the current position of the focus point ***when***:

- you enter the Record Point screen
- you use the Record Point shortcut key

You can access the Record Point screen from the Work Settings menu . The Record Point screen lets you set up how the system logs the points that you record. It allows you to

set specific identifiers for the points, as required for the current job and environment. There are three types of identifiers for points: name, code, and Measured Data.

The Edit Point screen has the same fields as the Record Point screen. It enables you to modify an existing point.

Name

In the Record Point screen, tap in the *Name* field to enter a name for the point.

If a point in the system already has this name (for example Manhole) the system alerts you with a message and adds a numeric suffix to the new point (for example Manhole 3). The suffix automatically increases with each new point that has the same name. This lets you quickly and repeatedly record points via the shortcut key or record point switch without having to enter anything into the Record Point screen.

If you do not enter anything into the *Name* field the name is just the numeric suffix. If you do not specify a suffix, the system generates one automatically. You can edit the name and the suffix as required.

Use this icon ▪▪▪ (next to the *Name* field) to select from a list of previously used names.

Code

The *Code* field is a string of text that helps describe the point, for example Mainfall 1. In the Record Point screen, you can manually enter a *Code* string when you record the point, or you can use this icon ▪▪▪ to select a string that was predefined in the office software. The predefined *Code* strings are exported from the office software in a .flx file.

If you do not enter anything into the *Code* field, the code will be undefined.

Measured Data

See Measured Data.

Northing, Easting, and Elevation

If the Northing, Easting, and Elevation coordinates are available at the time you access the Record Point screen, they will appear. The coordinates do not change if you move the focus point. You can use the on-screen keypad to enter or change coordinates if required.

The Always Prompt toggle

If Always Prompt is on, the Record Point screen appears each time you tap the Record Point icon in the Work screen. Do this if you want to change the point name, code, or work order for each point you record.

If you want to record a number of points with the same name, code, and Measured Data, set the Always Prompt toggle to off.

Cancel

To discard your changes, tap Cancel. The screen closes and the Work screen appears.

Save

To record the new point, tap Save. The screen closes and the Work screen appears.

2.4.5 How to record a point

1. Place the focus point onto the point that you want to record.

2. To record the point, do one of the following:

- Access the Record Point screen, enter a name, code, and Measured Data, tap Here and then Save.
- Touch and hold the Record Point icon in the shortcuts bar ; this opens the Record Point screen. Enter a name, code, and Measured Data, tap Here and then Save.
- Tap the Record Point icon to record a point that inherits the last used name (the system adds a numeric suffix to the new point).

2.4.6 Point files

Infield points are stored in a .pnt file. There is a separate .pnt file for each Measured Data, using the naming convention *<measured data>.<machine name>.V01.pnt*.

2.4.7 Navigating to a point

The system can provide navigation to an infield or office point. On the Points Manager screen, tap the overflow menu icon beside the appropriate point and select Navigate To Point.

When the system provides guidance to a point, the work screen border turns blue and shows a blue line between the focus and the point. The text ribbon shows:

- Nav Direction: the direction to the point relative to the machine direction
- Nav Distance: the horizontal distance to the point
- Nav Depth: the vertical distance to the point

Press this icon to stop navigation.

2.4.8 Troubleshooting

If the record point icon does not appear in the shortcuts bar, and the Record Point option is not in the Work Settings menu, check that you are in Design mode and that your system includes a 3D sensor.

2.5 Measured Data

Measured Data are containers for points. They enable you to group related points together so you can sort through many points. For example, you might use a Measured Data to group together all points created on a specific day. You can then set filtering to display only the points in that Measured Data.

Measured Data are created in the field.

2.5.1 Creating a Measured Data

You can access the Measured Data screen from the Work Settings menu .

1. From the Measured Data screen, tap Add. The New Measured Data screen appears.
2. Enter a name for the Measured Data and then tap Save. The new Measured Data appears in the list.

Measured Data naming conventions

Measured Data names can be up to 90 characters long.

Avoid using the following in Measured Data names:

- , : * | \ / ?
- Emojis
- Duplicate names

2.5.2 Deleting a Measured Data

You can only delete a Measured Data created in the field. When you delete the Measured Data, the system preserves the points that are contained within it so the office still has access to the data.

You can access the Measured Data screen from the Work Settings menu .

1. On the Measured Data screen, select the Measured Data to delete.
2. Press this icon ▪▪▪ and tap Delete. A confirmation dialog appears.
3. Tap Yes to confirm the deletion.

2.5.3 Changing the Measured Data of a point

When you create a point, it is assigned to a Measured Data. You can access the Points Manager screen from the Work Settings menu .

To move a point from one Measured Data to another:

1. On the Points Manager screen, select the point.
2. Press this icon ▪▪▪ and tap Edit. The Edit Point screen appears.
3. Select the new Measured Data from the Measured Data drop-down list.
4. Tap Save to save the point and return to the Points Manager screen.

2.6 Lane Guidance

Lane guidance enables you extend a lane sideways so the you can pave beyond the boundaries of the lane.

Lane guidance is available when:

- You are in design mode
- You have a .dsz design loaded
- A master alignment is present

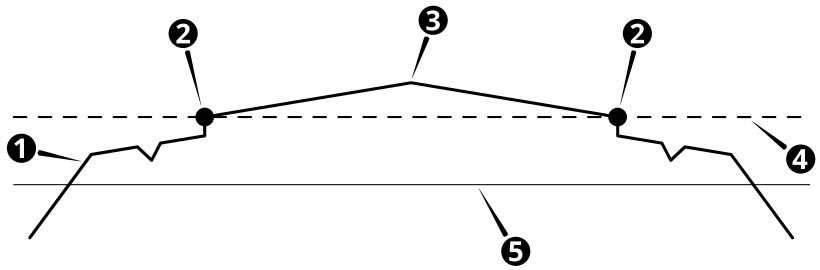
Working surface, vertical and perpendicular lifts and horizontal guidance all work with lane guidance.

Note – When you show cut/fill mapping while using lane guidance, you see a subset of the entire mapped ground surface. This is most noticeable when using lane guidance on a horizontal curve. Toggle lane guidance off to display the ground surface mapping over the complete design reference.

2.6.1 Extending a lane sideways

Lane guidance lets you select a lane or two lines and extend the surface of the lane or the grade between the two lines out to the left and right, to suit different situations.

For example, you can select a lane for guidance and extend it to the side to either meet the cut or fill batter or sideslope of the road. This is often also offset in height as well so that the design is built up in layers. See the figure below:



1	Original design	2	Lane side	3	Master alignment
4	Lane surface	5	Lane surface for guidance (offset by 1 meter)		

2.6.2 The shortcut key

When you are in the work screen, you can use the shortcut key to select a lane:

1. Position the machine with the screed focus point between the required lane sides.
2. Tap .

You can also touch and hold the shortcut key to open the Lane Guidance screen.

If your design does not have a master alignment, and you try to enable Lane Guidance via the shortcut key, the Select Master Alignment screen appears. In the plan view, tap the line that you want to use or select a named alignment from the drop-down list. Once you have selected a master alignment, the work screen appears.

2.6.3 The Lane Guidance screen

To open the Lane Guidance screen:

- Touch and hold the shortcut key , or;
- Go to the Work Settings menu > Lane Guidance.

The Lane Guidance screen contains a plan view of the machine on a design. You can pan and zoom this view as required.

If the .dsz file contains named lines, you can select them from the Line A and Line B drop-down lists.

The master alignment

The lane surface is calculated at right angles to the master alignment.

If the .dsz file contains a master alignment, it appears in the plan view as a solid blue line. You must use this master alignment and cannot change it.

If the .dsz file does not contain a master alignment, you must select one before you select the lane sides:

1. Touch and hold . The Select Master Alignment screen appears.
2. In the plan view, tap the alignment that you want to use as the master alignment. Or, select an alignment from the drop-down list.

   The master alignment is stored with the design indefinitely. If the design is unloaded and reloaded then the last selected master alignment is used.

   Note – Think of the two lane sides and master alignment as a group. If you change the master alignment, but not the lane sides, this changes the lane surface and the guidance to it.

You can use the master alignment itself as one of the sides of the lane.

Creating a lane surface

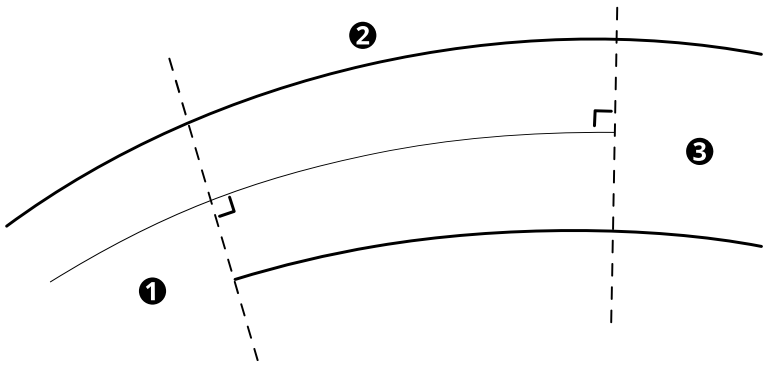
To create a lane surface from the Lane Guidance screen, do one of the following:

- Select the alignments from the drop-down lists.
- Tap each lane side on the plan view.
- Touch and hold the area between two lane sides.

2.6.4 Lane Guidance limits

- The lane must be a minimum of 300mm (12in) wide.
- The lane sides must not turn more than 90° away from the master alignment.
- Lane Guidance starts only when all three lines (the master alignment, left-hand lane

side and right-hand lane side) have started. See the figure below:



❶	Lane guidance unavailable: only one lane side is present	❷	Lane guidance available: two lane sides and the master alignment are present	❸	Lane guidance unavailable: no master alignment present

2.6.5 Troubleshooting

Lane guidance is unavailable when:

- You are more than 100 meters extension (left/right) of the guidance lane sides.
- Either lane side does not lie above the design surface.

3

Using 3D Guidance

In this chapter:

A UTS system is able to provide higher accuracy positioning than GNSS, and can continue to work in circumstances that would usually degrade GNSS performance.

3.1 Using UTS for guidance

Configure the machine to connect to one or two Universal Total Station (UTS) instruments for machine guidance.

To enable UTS guidance, select a UTS option as the positioning source in the Machine Setup screen.

3.1.1 The UTS Settings screen

The UTS Settings screen enables you to set the radio network ID and channel that both the system and UTS instrument communicate over. Ensure that the Channel and Network ID settings chosen on the machine match those set on the UTS instrument.

Note – Ensure that the UTS instrument has been set up in Machine Control mode using Trimble SCS900 or Siteworks and that the small screen on the front of the UTS instrument displays "Waiting for connection".

Ensure that each machine using UTS guidance in the same area of a site has unique Target IDs for its MT900 Machine Targets.

TIPS:

- Look at the small screen on the front of the UTS instrument to check which Channel and Network ID it is using.
- In the UTS Settings screen, toggle Auto Search off if you prefer to move the machine back to the last tracked position where the MT900 Machine Target was lost and manually start a search.

If you have an Operator Plus account you can configure the UTS tolerance thresholds via the Advanced button on the UTS Settings screen.

3.1.2 The UTS Management screen

The UTS Management screen enables you to select and use UTS instruments that are on the same radio channel and network as the machine and within radio range of the machine.

The system supports connection to a maximum of five UTS instruments.

TIPS:

- For best accuracy, select an instrument to use for guidance that is less than 200 m from the machine
- Set a custom name for your Trimble SPSx30 Total Station using Trimble SCS900 or Siteworks software.

Note – Use Trimble SCS900 or Siteworks software to connect to and set up UTS instruments in Machine Control mode before connecting to them from the machine. The accuracy of guidance on the machine depends on an accurate UTS instrument setup.

Note – The system will clear the bench and transition offsets if you stop the UTS instrument currently being used for guidance and start it again in a different position, or if you start using a different UTS instrument. A confirmation message ***Bench and Transition Offsets will be Cleared*** *is displayed before you can use the UTS instrument for guidance.*

Note – Tap within the UTS Name or Status column area to start or use the UTS instrument for guidance. Tapping on a UTS instrument row in any other areas will not be recognized. This prevents unintentional activation when your fingers are close to the screen in those columns.

Understanding UTS statuses

Item	Function
Configuring	Appears after you have tapped a UTS instrument to start it and while a radio connection is being established with it.
Searching	Appears when the UTS instrument is searching for the target.
Tracking	Appears when a UTS instrument is tracking the target.
Used for Guidance	Appears instead of the status of Tracking for the UTS instrument that you have tapped to use for guidance. The UTS instrument providing guidance is listed at the top and is highlighted orange.
Target Lost	Appears when the UTS instrument is not tracking the machine target and a search has failed to find the machine target, or when auto search is disabled and the UTS instrument is not tracking the machine target ***and*** you have not started a search.
UTS out of level	Appears when a UTS instrument reports that it is out of level. To correct this, stop the connection to that UTS instrument using the overflow menu ⋮, re-level it and redo the UTS Instrument setup using Trimble SCS900 or Siteworks before starting it again from the machine.
Configuration failed	Appears after you tap to start a UTS instrument but the radio connection to it from the machine fails to be successfully established. To correct this, stop the connection to that UTS instrument using the overflow menu ⋮ and redo the UTS Instrument setup using Trimble SCS900 or Siteworks before starting it again from the machine.
Out of Range	Appears if your UTS instrument is positioned at a distance greater than the Maximum Distance limit set for UTS tolerances. For more information, see Understanding UTS tolerances.

Understanding Horizontal and Vertical Differences

UTS guidance accuracy decreases as the distance increases from the UTS instrument used for guidance. Some jobs require using more than one UTS instrument to ensure accurate guidance over the length of a pass. In this case, you must transition between UTS instruments as the machine moves along the pass.

When multiple UTS instruments are used for a pass, the horizontal and vertical difference values displayed in the UTS Management screen are the differences between the target position reported by the UTS instrument used for guidance and the positions reported by any other UTS instruments tracking that target. The horizontal and vertical difference values provide an indication of the quality of the UTS instrument setup along a pass.

The first UTS instrument to track a target is assumed to have zero error. At each transition between UTS instruments, the horizontal and vertical differences between the previous UTS instrument and the new UTS instrument are compensated for by the system. These compensations accumulate with each transition into a value referred to as the transition offsets.

ATTENTION – If an action is performed that resets the transition offsets to zero during a pass, then there may be significant changes to the elevation of the formed surface and to horizontal guidance.

Understanding UTS information

Several icons appear in the UTS Management and work screens.

Icon	Description
	Left target
	Right target
	These icons identify the current target selected for a UTS instrument. *Note – Only for systems that have two masts installed and measured up.*
	Swap to left target
	Swap to right target
	These icons identify the new target for a UTS instrument, if a "swap target" button is tapped. "Swap target" buttons are displayed: • In the context menu displayed when a UTS instrument is started. • In the overflow menus for UTS instruments that are not currently used for guidance. *Note – Only for systems that have two masts installed and measured up.*

Icon	Description
	Displays when the distance to the UTS instrument has exceeded the warning threshold. For more information, see Understanding UTS tolerances.
	Displays when the distance to the UTS instrument is outside of the distance or position tolerances. For more information, see Understanding UTS tolerances.
	Tap to display the overflow menu for an instrument in the list. Use the overflow options as follows: • Tap  to establish the radio connection to a UTS instrument and move it to the Connected Instruments list. *Note – Once a UTS instrument is started by a machine it is not available for other machines or surveyors to connect to.* • Tap  to use a connected UTS instrument for guidance. *Note – Not available when the UTS instrument is out of range or is outside of the distance or position tolerances.For more information, see Understanding UTS tolerances.* • Tap  to stop using the UTS instrument. This makes it available for other machines or surveyors on site to use. • Tap  to activate a search for the UTS instrument to find the MT900 target if it has lost tracking. • Tap  to cancel a search in progress. • Tap  to view diagnostic information for the UTS instrument and the machine target.
	Displays when the UTS instrument is connected to an external power source.

Understanding UTS diagnostics

The Diagnostics pop-up information box displays status information for the UTS instrument and the MT900 machine target. Use this information to troubleshoot errors during operation.

The information box displays the name of the UTS instrument and its current status.

UTS

The fields in this area display status information for the UTS instrument.

Field	Explanation
Northing	The setup location of the UTS instrument.

Field	Explanation
Easting Elevation	
Compensator	The instrument's compensator status. For best results, ensure that this is enabled.
Instrument height	The setup height of the UTS instrument above a known control point.
Scale factor	The scale factor set on the UTS instrument.
PPM	The offset that corrects the error in the UTS instrument's Electronic Distance Meter (EDM) caused by temperature and pressure.
Point Name	The name of the point at which the UTS instrument was set up.

Machine Target

The fields in this area display the status of the machine target.

Field	Explanation
Northing Easting Elevation	The location of the center of the machine target as measured by the UTS instrument, but adjusted for mast lean.
Search window	The position of the machine target relative to the search window specified during UTS instrument set up.
Slope distance Horizontal angle Vertical angle	The observed location of the machine target relative to the UTS instrument.

Understanding UTS tolerances

If you are using more than one UTS instrument and are transitioning between them, you can configure the acceptable thresholds for the distance and position differences between the UTS instruments in the Web Interface. Use the thresholds to disable transitions between UTS instruments outside tolerances.

In the work screen, the following information is displayed for UTS instruments:

- The text ribbon can be configured to display a text item that shows which MT900 machine target on the machine is currently being tracked and its distance from the UTS instrument.

- The plan view displays the location of UTS instruments available on site. An orange icon indicates the UTS instrument in use.

Bench UTS

Benching matches the screed elevation to a known elevation on site. It *does not* match the Northing or Easting horizontal position.

TIP – You can access the Bench UTS screen from the work settings menu or by tapping the Bench button in the UTS Management screen.

To bench:

1. Load the required design, and if necessary, select a design surface and set the vertical offset.
2. Adjust the tow point heights so that the screed is approximately level.
   Lower the rear edge of the screed onto starting blocks so that the screed elevation is approximately the same as the initial design elevation.

   TIP – The design elevation is shown in the Design Elevation text item.

4. On the 2D system, check the following:
   - Make sure the screed slope sensor is calibrated correctly.
   - Make sure any 2D offsets are cleared.
5. Pull off the starting blocks. If using:
   - 2D sensors: Select 2D sensors and engage Autos on the 2D system.
   - 3D sensors: Select 3D sensors and engage Manual controls on the 2D system.
6. Monitor the cut/fill values as the machine moves forward. When the values stabilize, and with the machine moving forwards:
   a. If Autos are engaged, engage Manual controls on the 2D system.
   b. If Positioning Source is set to:
      - Single UTS: Open the Bench UTS screen
      - Dual UTS: Open the Bench Left UTS or Bench Right UTS screen as required.
   c. Using the grade-checking instrument, measure the mat elevation at the screed tip to be benched.
   d. Enter the elevation of the screed tip into the Elevation field, and tap Bench.

   TIP – It is good practice to go back into the benching screen and check that the Bench Offset is within the expected limits.

   e. For dual UTS guidance, repeat these steps for the opposite screed tip. Both tips *must* be benched.
7. Make sure that 3D sensors are selected on the 2D system, and then engage Autos.

Common UTS problems

Problem	Action
UTS instrument not displayed in UTS Management screen	Check that the radio channel and network on the machine are set correctly to match those of the UTS instrument.
UTS instrument tracks the Machine Target on another machine	In the UTS Settings screen, change the target ID on the machine. Ensure that each machine using UTS guidance in the same area of a site has a unique Target ID for its MT900 Machine Target.
Surveyor checking grade behind the machine finds that it does not match	Ensure the following: • Machine has been benched. For more information, see Bench UTS. • The same design is being used on the machine and by the surveyor. • The same vertical offset is being used by the machine and the surveyor. • The surveyor has set up their instrument position accurately and agrees with the elevation on the benchmark used by the machine. For more information, see Bench UTS. • The surveyor has the correct pole height set.  TIP – Ask the surveyor to bench and adjust their pole height to agree with the same benchmark that the machine has been benched on.

3.1.3 Troubleshooting UTS guidance

The table below lists some of the error messages that may appear in the work screen and common error states during operation.

Operational State	Problem	Solution
Move Machine	Not enough information to calculate the machine heading.	Drive the machine in any direction until the message no longer displays.
UTS Out of Level	The tilt compensator on the UTS instrument is out of	1. Stop the UTS instrument. 2. Repeat the position setup for

Operational State	Problem	Solution
	range.	the instrument using Trimble SCS900 or Siteworks, making sure that the tripod is secure and the instrument is level. 3. Start the UTS instrument from the UTS Management screen.
Target Lost. Searching...	The UTS instrument used for guidance has lost line of sight to the machine target and Auto Search is enabled.	1. If required, tap Cancel to cancel the search. 2. Move the machine or remove any obstruction to the line of sight. 3. Start a search for the UTS instrument from the UTS Management screen. 4. Optionally, hold and point the UTS instrument at the target to regain the lock.
UTS - Low Battery xx% of battery remaining	This message appears briefly on screen, first when the UTS battery level is at 15%, and then when the UTS battery level reaches 5%.	You can choose to carry on working or select another instrument from the UTS Management screen. Guidance is still provided. Check the remaining battery level of the UTS instrument in the UTS Management screen.

3.2 Best Practices When Using 3D Guidance

The following best practices are recommended:

- Maintain the machine in good condition to remove the play in joints that is caused by excessive wear.
- Ensure that the system has an accurately calculated orientation by moving the machine when prompted to do so. If the machine direction is wrong, tap the direction shortcut key to change it (press and hold the shortcut key to open the Direction of Travel screen). An accurately calculated orientation is required for accurate guidance.

3.2.1 UTS

- Place the UTS on a tripod, free from vibrations caused by passing machinery or the wind.

- For best accuracy, place the UTS between 15 meters (50 feet) and 200 meters (650 feet), up to a maximum of 300 meters (1000 feet), from the MT900 target.
- Set up UTS instruments accurately using a minimum of three survey control points in a good geometric pattern.
- For UTS guidance, check the screed tip elevation against an independent known elevation before starting work and remove any differences by benching.
- Ensure that the UTS has a continuous line of sight to the MT900 target. Check that the line of sight is maintained for all machine positions across the work area.

Legal and Regulatory

In this chapter:

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- File sync and GNSS data
- Operator Key

The Connected Information may be transferred to your Connected Services providers through the networking and telematics systems installed on your Equipment (whether utilizing cellular, satellite, local area networks, ethernet or other similar systems, the "Telematics System") or manual file transfer (e.g., USB). The actual Connected Information collected and received will vary based on, among other things, the configuration of your Product and Equipment (including your Telematics Systems) and the related Connected Services that you separately elect to access and use. Please carefully review any agreements and documentation relating to such Connected Services to understand how the Connected Service provider may store and use the Connected Information.

In addition, Trimble or its affiliated companies may collect, store and receive data and information ("User Information") relating to your use of the Software, Product and Equipment, including without limitation:

- Device/Company Identity Data includes machine ID, machine sensor configuration, and software configuration
- Location includes Global Navigation Satellite System and beacon-based location
- Analytics Data includes Software versions, display model, stack trace system configuration, current design, features in use, time in each screen, button pushes, and Software bug and crash reports.

The actual User Information collected and received will vary based on, among other things, the configuration of your Product and Equipment and the related product(s) that you separately elect to access and use. You acknowledge and agree that Trimble or its affiliated companies may, directly or indirectly through the services of third parties, use User Information for its internal business purposes, including but not limited to: (i) making the Software and Products available and providing services to you; (ii) improving the performance of the Software and Products, researching and developing updates and other products and services, and analyzing adoption and usage of the Software and Products; and (iii) verifying your compliance with the terms of this Agreement and enforcing Trimble's rights, including all intellectual property rights in and to the Software and the Product(s). In order to provide you with the full range of benefits made possible by the Product(s) and our services, and in connection with the uses described above, Trimble may share the User Information with its affiliated companies. The affiliated companies may use the User Information for their own internal purposes in a manner consistent with the uses described above. Trimble and its affiliated companies may also disclose User Information if we have a good faith belief that (1) the disclosure is necessary or useful to our provision of services; (2) the disclosure is necessary to protect our rights, interests, or property; (3) the disclosure is necessary or useful to protect your safety or the safety of others, to investigate fraud, or to respond to a government request; (4) the disclosure is required by law, such as to comply with a subpoena, search warrant, court order, or similar legal or administrative process; or (5) Trimble or its affiliated company is or will be purchased or otherwise acquired, in which User Information will likely be among the assets transferred. Trimble and its affiliated companies and third parties acting on Trimble's or its affiliate's behalf may analyze User Information to analyze and create performance metrics, collect and evaluate other information relating to the Software and Product(s), and track anonymized and technical information to improve the Software and Product(s) ("Machine Performance Data"). Any information Trimble or its affiliated companies track in this manner is anonymous and limited to usage and volume statistics. Trimble and its affiliated companies may make the Machine Performance Data commercially available to third parties to the extent that it is aggregated or otherwise de-identified so that it cannot be used to identify you. By accepting this Agreement, you acknowledge and agree to the collection and use of the Connected Information, User Information and Machine Performance Data as provided above.

The Software may also automatically provide Software bug and crash reports via your Equipment's Telematics Systems to Trimble or its vendors for purposes of maintaining, supporting, or improving the Software.

You may incur additional charges for the transfer of Connected Information, User Information and Machine Performance Data, or Software bug and crash reports by your telecommunications service providers or your Connected Services providers, as applicable.

4 GENERAL

4.1 – This Agreement shall be governed by the laws of the State of California and applicable United States Federal law without reference to "conflict of laws" principles or provisions. The United Nations Convention on Contracts for the International Sale of Goods will not

apply to this Agreement. Jurisdiction and venue of any dispute or court action arising from or related to this Agreement or the Software shall lie exclusively in or be transferred to the courts located in Santa Clara County, California, and/or the United States District Courts for California. You hereby consent and agree not to contest, such jurisdiction, venue and governing law.

4.2 - Notwithstanding Section 4.1, if you acquired the Product in Canada, this Agreement is governed by the laws of the Province of Ontario, Canada. In such case each of the parties to this Agreement irrevocably attorns to the jurisdiction of the courts of the Province of Ontario and further agrees to commence any litigation that may arise under this Agreement in the courts located in the Judicial District of York, Province of Ontario.

4.3 - Official Language. The official language of this Agreement and of any documents relating thereto is English. For purposes of interpretation, or in the event of a conflict between English and versions of this Agreement or related documents in any other language, the English language version shall be controlling.

4.4 - Trimble reserves all rights not expressly granted by this Agreement.

A.2 Copyright Information

Trimble and the Globe & Triangle logo are trademarks of Trimble Inc., registered in the United States and in other countries.

CMR and CMR+ are trademarks of Trimble Inc.

Android is a trademark of Google Inc.

Wi-Fi, WPA and WPA2 are trademarks of the Wi-Fi Alliance, registered in the United States and other countries. Developed under a License of the European Union and the European Space Agency.

The Bluetooth word mark and logos are owned by the Bluetooth SIG, Inc. and any use of such marks by Trimble Inc. is under license.

All other trademarks are the property of their respective owners.

A.3 Compliance notices

A.3.1 US FCC regulations

The following statement applies to these devices:

- EC520 electronic control module (FCC ID: K7T-WIFIHU2S and FCC ID: TLZ-NM230NF)
- TD520 display (FCC ID: TLZ-NM230NF)

- GS520 grade sensor
- AA510 audible alarm
- CI510 CAN interface

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

A.3.2 Canadian license-exempt RSS standards

The following statement applies to these devices:

- EC520 electronic control module (IC: 2377A- WIFIHU2S and IC: 6100A- NM230NF)
- TD520 display (IC: 6100A- NM230NF)
- GS520 grade sensor
- AA510 audible alarm
- CI510 CAN interface

CAN ICES-3 (B)/NMB-3(B)

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions:

1. This device may not cause interference, and;
2. This device must accept any interference, including interference that may cause undesired operation of the device.

Cet appareil est conforme avec Industrie Canada RSS standard exempts de licence (s). Son fonctionnement est soumis aux deux conditions suivantes:

1. Cet appareil ne peut pas provoquer d'interférences; et
2. Cet appareil doit accepter toute interférence, y compris les interférences pouvant entraîner un mauvais fonctionnement de la appareil.

A.3.3 European Union CE compliance

The following statement applies to these devices:

- EC520 electronic control module
- TD520 display
- GS520 grade sensor
- AA510 audible alarm
- CI510 CAN interface
- VM510 valve module

These devices are compliant with the following Directives and standards

- Machinery 2006/42/EC
- RoHS 2015/863/EU
- ISO 13766:2006
- ISO 13309:2010

The EC520 electronic control module and the TD520 display are also compliant with the following additional Directives and standards:

- Radio Equipment Directive 24/53/EU
- IETSI EN 300-328 V2.1.1
- ETSI EN 301-489-1 V2.1.0
- ETSI EN 301-489-17 V3.1.1

A.3.4 European Union recycling compliance

These products comply with the WEEE Directive 2012/19/EU. For recycling in Europe call:

+31 479 53 24 30

To request instructions by writing:

Trimble Europe BV

C/O Menlo Worldwide Logistics

Meerheide 45

5521 CZ Eersel, NL

A.3.5 Australian and New Zealand AS/NZS 55022 compliance

AS/NZS 55022 compliance applies to these devices:

- EC520 electronic control module
- TD520 display
- GS520 grade sensor
- AA510 audible alarm
- CI510 CAN interface

A.3.6 Japan Radio Type Approval

Construction Design Certificates apply to these devices:

- EC520 electronic control module (208-160089, R - 201-16379 and T- D 160 253 201)
- TD520 display (R - 201-16379 and T- D 160 253 201)

A.3.7 RoHS Statement

This device conforms to RoHS (Reduction Of Hazardous Sub-stances) European Union regulations that set maximum concentration limits on hazardous materials used in electrical and electronic equipment.

RoHS COMPLIANT 2015/863/EU

CAUTION: RISK OF EXPLOSION IF BATTERY IS DISPOSED OF INCORRECTLY. DISPOSE OF THE DEVICE AND THE BATTERY ACCORDING TO INSTRUCTIONS FOR ELECTRONIC WASTE.

A.3.8 Taiwan

低功率電波輻射性電機管理辦法
第十二條：經型式認證合格之低功率射頻電機，非經許可，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。
第十四條：低功率射頻電機之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。低功率射頻電機需忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。
SAR 標準值2.0W/Kg，送測產品實測值為0.545w/Kg

A.4 Safety information

Most accidents that involve product operation, maintenance and repair are caused by failure to observe basic safety rules or precautions. An accident can often be avoided by recognizing potentially hazardous situations before an accident occurs. A person must be alert to potential hazards. This person should also have the necessary training, skills and tools to perform these functions properly.

Improper operation, lubrication, maintenance or repair of this product can be dangerous and could result in injury or death.

Do not operate or perform any lubrication, maintenance or repair on this product, until you have read and understood the operation, lubrication, maintenance and repair information.

Safety precautions and warnings are provided in this manual and on the product. If these hazard warnings are not heeded, bodily injury or death could occur to you or to other persons.

The hazards are identified by the “Safety Alert Symbol” and followed by a “Signal Word” such as “DANGER”, “WARNING” or “CAUTION”. The Safety Alert “WARNING” label is shown below.

WARNING — This alert warns of a potential hazard which, if not avoided, can cause severe injury.

The meaning of this safety alert symbol is as follows:

Attention! Become Alert! Your Safety is Involved.

The message that appears under the warning explains the hazard and can be either written or pictorially presented.

Operations that may cause product damage are identified by “NOTICE” labels on the product and in this publication.

Trimble cannot anticipate every possible circumstance that might involve a potential hazard. The warnings in this publication and on the product are, therefore, not all inclusive. If a tool, procedure, work method or operating technique that is not specifically recommended by Trimble is used, you must satisfy yourself that it is safe for you and for others. You should also ensure that the product will not be damaged or be made unsafe by the operation, lubrication, maintenance or repair procedures that you choose.

The information, specifications, and illustrations in this publication are on the basis of information that was available at the time that the publication was written. The specifications, torques, pressures, measurements, adjustments, illustrations, and other items can change at any time. These changes can affect the service that is given to the product. Obtain the complete and most current information before you start any job. Dealers have the most current information available.

A.4.1 Laser Safety

As with any bright light source, such as the sun, electric welding arcs or arc lamps, common sense applies:

- DO NOT look into the laser aperture when the laser is on.
- Viewing laser output with telescopic optical instruments (for example, telescopes and binoculars) may pose an eye hazard.
- Do not remove any warning signs from the laser.
- Use of a laser transmitter by personnel that are not trained on the product may result in exposure to hazardous laser light.

For further information regarding safe use of lasers, refer to the IEC 60825-1 2007, or the manufacturer's documentation supplied with your laser transmitter.

A.4.2 Magnet Safety

The neodymium magnets supplied with the magnetic display mount are very strong. Handling them with care is necessary to prevent personal injuries, and property damage:

- Pacemakers may be damaged or switch to "Test Mode" in the presence of a strong magnetic force. If a pacemaker is in use, keep a minimum of 30 cm (1 foot) distance.
- Be extremely careful when handling the magnets near other magnets or ferrous metal. Losing control of a magnet may result in damage to intervening objects, such as a finger or a cab window.
- Do not remove any warning signs from the magnets.
- The strong magnetic fields of the magnets can damage electronic devices such as hearing aids, items that rely on magnetic storage media such as credit cards, bank cards, and computers, and items containing ferromagnetic components such as mechanical watches.

A.4.3 Crushing prevention and cutting prevention

Support the equipment properly when you work beneath the equipment. Do not depend on the hydraulic cylinders to hold up the equipment. An attachment can fall if a control is moved, or if a hydraulic line breaks.

Unless you are instructed otherwise, never attempt adjustments while the machine is moving. Also, never attempt adjustments while the engine is running.

Whenever there are attachment control linkages, the clearance in the linkage area will increase or the clearance in the linkage area will decrease with movement of the attachment. Stay clear of all rotating and moving parts.

Keep objects away from moving fan blades. The fan blade will throw objects or cut objects.

Do not use a kinked wire cable or a frayed wire cable. Wear gloves when you handle wire cable.

When you strike a retainer pin with force, the retainer pin can fly out. The loose retainer pin can injure personnel. Make sure that the area is clear of people when you strike a retainer pin. In order to avoid injury to your eyes, wear protective glasses when you strike a retainer pin.

Chips or other debris can fly off objects when you strike the objects. Make sure that no one can be injured by flying debris before striking any object.

A.4.4 Operation

Clear all personnel from the machine and from the area.

Clear all obstacles from the machine's path. Beware of hazards (wires, ditches, etc).

Be sure that all windows are clean.

Secure the doors and the windows in the open position or in the shut position.

Adjust the rear mirrors (if equipped) for the best visibility close to the machine.

Make sure that the horn, the travel alarm (if equipped), and all other warning devices are working properly.

Fasten the seat belt securely.

Warm up the engine and the hydraulic oil before operating the machine.

Only operate the machine while you are in a seat.

The seat belt must be fastened while you operate the machine. Only operate the controls while the engine is running.

While you operate the machine slowly in an open area, check for proper operation of all controls and all protective devices. Before you move the machine, you must make sure that no one will be endangered.

Do not allow riders on the machine unless the machine has the following equipment:

- Additional seat
- Additional seat belt
- Rollover Protective Structure (ROPS)

Note any needed repairs during machine operation. Report any needed repairs.

Avoid any conditions that can lead to tipping the machine. The machine can tip when you work on hills, on banks and on slopes. Also, the machine can tip when you cross ditches, ridges or other unexpected obstructions.

Avoid operating the machine across the slope. When possible, operate the machine up the slopes and down the slopes.

Maintain control of the machine.

Do not overload the machine beyond the machine capacity.

Be sure that the hitches and the towing devices are adequate.

Never straddle a wire cable. Never allow other personnel to straddle a wire cable.

Before you maneuver the machine, make sure that no personnel are between the machine and the trailing equipment.

Always keep the Rollover Protective Structure (ROPS) installed during machine operation.

Monitor the location of mounted components. Ensure that the components do not come into contact with other parts of the machine during operation.

A.4.5 Exposure to radio frequency (RF) signals

This system uses devices that contain radio transmitters and receivers. The radiated output power is far below the international radio frequency exposure limits. These limits are part of comprehensive guidelines and establish permitted levels of RF energy for the general population. The guidelines are based on the safety standards previously set by international standards bodies:

- American National Standards Institute (ANSI) IEEE. C95.1-1992.
- National Council on Radiation Protection and Measurement (NCRP). Report 86. 1986.
- Int'l Commission on Non-Ionizing Radiation Protection (ICNIRP) 1996.
- Ministry of Health (Canada), Safety Code 6. The standards include a substantial safety margin designed to assure the safety of all persons, regardless of age and health.

Use of unauthorized or modified antennas may impair signal quality and damage a device, causing loss of performance. To assure optimal performance, and ensure human exposure to RF energy is within the guidelines set forth in the relevant standards, always use a device in its normal-use position.

Maintain a minimum 20 cm distance from radio transmitters when they are in use. Avoiding contact with the antenna area when a device is IN USE optimizes the antenna performance.

Exposure to radio frequency radiation from Bluetooth and WLAN transmitters

Devices are approved as a portable devices with respect to Radio Frequency (RF) exposure compliance. The radiated output power of the internal wireless radio transmitters is less than 100 milliwatt, which results in exposure levels far below the FCC radio frequency exposure limits, even when operated in close proximity to the body. The internal wireless radios operate within guidelines found in international radio frequency safety standards and recommendations, which reflect the consensus of the international scientific community. Trimble therefore believes the internal wireless radios are safe for use by users. The level of electromagnetic energy emitted is hundreds of times lower than the electromagnetic energy emitted by wireless devices such as mobile phones. However, the use of wireless radios may be restricted in some situations or environments, such as on aircraft. If you are unsure of restrictions, you are encouraged to ask for authorization before turning on the wireless radios.

Exposure to radio frequency radiation from cellular wireless transmitters

Devices equipped with wireless cellular modem radios have been designed and manufactured to meet safety requirements for limiting exposure to radio waves. When used in accordance with the instructions set forth in this manual, the equipment has been

independently verified to not exceed the emission limits for safe exposure to radio frequency (RF) energy as specified by the Federal Communications Commission of the U.S. Government in 47 CFR §2.1093. These limits are part of comprehensive guidelines and establish permitted levels of RF energy for the general population. The guidelines are based on standards that were developed by independent scientific organization through periodic and thorough evaluation of scientific studies. The standards include a substantial safety margin designed to assure the safety of all persons, regardless of age and health.

A.4.6 Telecommunications & Internet Association (TIA) information

Hearing Aids: Some digital wireless phones may interfere with some hearing aids. In the event of such interference, you may want to consult your wireless service provider, or call customer service to discuss alternatives.

Pacemakers and Other Medical Devices: The Health Industry Manufacturers Association recommends a minimum separation of six inches be maintained between a handheld wireless phone and a pacemaker to avoid potential interference with the pacemaker. These recommendations are consistent with the independent research by and recommendations of Wireless Technology Research. Persons with pacemakers should use the ear opposite the pacemaker to minimize the potential for interference. Persons with pacemakers should exercise great caution if using a hands-free device such as a headset, as these persons may be at greater risk of the device not maintaining the recommended minimum six inches of separation from the pacemaker. If you have any reason to suspect that interference is taking place, turn the device OFF immediately.

If you use any other personal medical device, consult the manufacturer of your device to determine if they are adequately shielded from external RF energy. Your physician may be able to assist you in obtaining this information.

Turn the device OFF in health care facilities when any regulations posted in these areas instruct you to do so. Hospitals or health care facilities may be using equipment that could be sensitive to external RF energy.

A.4.7 Warnings

WARNING — When replacement parts are required for this product Trimble recommends using Trimble replacement parts or parts with equivalent specifications including, but not limited to, physical dimensions, type, strength and material. Failure to heed this warning can lead to premature failures, product damage, personal injury or death.

WARNING — Disconnect the negative battery terminal before commencing any welding. Ensure that power is removed from the system by disconnecting the power input cable(s). Failure to follow this warning may result in electric shock.

WARNING – Do not weld on or drill into any part of the machine's Roll Over Protection Structure (ROPS) as this could weaken its structural integrity.

WARNING — When transporting machines with removable sensors such as GNSS receivers or UTS targets installed, if the sensor mounting bracket clamp loosens, then the sensor may be dislodged from the machine which may result in injury or death. Always remove and store removable sensors prior to transport.

WARNING — When removing or installing removable sensors such as GNSS receivers or UTS targets, if the sensor is accessed improperly, then a fall may result in injury or death. Always follow site, state or national Health and Safety guidelines when removing or installing removable sensors.

WARNING — The magnets on the magnetic display mount are strong. If parts of your hands get between two magnets when you move them, the magnets may suddenly move and pinch or clamp the skin. When the magnets are close together, position your hands so they are not between the two magnets.

WARNING — If you have a pacemaker and handle the magnetic display mount, the magnet can affect the function of the pacemaker and cause physical harm. Remain at least 30 cm (1 foot) from the magnetic display mount if you have a pacemaker.

WARNING — Before disconnecting electrical components, disconnect the battery cable and attach a Do Not Operate tag in the operator's compartment to inform personnel that the equipment is being worked on. Accidental engine starting can cause injury or death to personnel working on the equipment. To avoid accidental engine starting, place and lock a lock-out box onto the battery terminal.

WARNING — The screed may move without warning when Autos is engaged. These sudden movements could cause injury to anyone near the screed, or damage to an unattended machine. Always put the system in Manual and engage the machine's park brake before you leave the machine, or when somebody is working near the screed.

WARNING – The TD520 display screen is designed to minimize glare in a wide variety of environments. However, when using the display in direct sunlight, there is still the possibility of sun-strike on the screen leading to loss of visibility.

WARNING — Entering an avoidance zone could cause personal injury or damage to the machine. Always be aware of nearby avoidance zones when operating a machine.

WARNING — You are responsible for observing safe operating practices. This product does not guarantee error-free avoidance zone guidance.

Notices

See https://heavyindustry.trimble.com/earthworksreleases for the latest:

- Terms and conditions.
- Important safety information.
- Warranty and compliance information.

To provide feedback on this document, email feedback_documentation@trimble.com.