TRIMBLE ACCESS™

# TRIMBLE ACCESS PROJECTS AND JOBS GUIDE

Version 2018.00
Revision A
June 2018

TRANSFORMING THE WAY THE WORLD WORKS

# Contents

# 1

# Projects & jobs

A **project** is a folder for grouping Trimble Access jobs and the files used by those jobs, including control points, road or alignment RXL files, background images or surfaces, and reference files for the project such as site or health and safety information.

A **job** contains the raw survey data from one or more surveys, and the configuration settings for the job including coordinate system, calibration, and measurement unit settings. Scan data and media images captured during the survey are stored in separate files and linked to the job. A job may also contain control points if you have imported them into the job instead of using a linked file from the project folder.

To start a survey you must have at least one project and one job.

Projects and jobs can be local to the controller or they can reside on the Trimble Connect cloud collaboration platform, from which they can be downloaded to the controller. On the controller, jobs are stored in the appropriate project folder in the **Trimble Data** folder. For more information on how files and folders are organized on the controller, see Trimble data folders, page 8.

When creating a job, you can save the settings as a template and then create subsequent jobs using the template. Jobs in the same project usually have the same settings but this is not essential.

## Project and job creation

Who creates the project and jobs and how they do this depends on your organization. The options are:

- **Projects and jobs** are created **in the office** using Trimble Sync Manager and sent to the cloud, from which they are downloaded to the controller. Project and job data on the controller can be uploaded to the cloud at any time.

  If required, new jobs can be created locally on the controller and then uploaded to the cloud.
- **Projects** are created **in the office** using Trimble Sync Manager and sent to the cloud, from which they are downloaded to the controller. **Jobs** are created **locally** on the controller and uploaded to the cloud. Project and job data on the controller can be uploaded to the cloud at any time.
- **Projects and jobs** are created **locally** on the controller.

  In this scenario, project and job data cannot be uploaded to the cloud because the project does not reside in Trimble Connect.

## Working with cloud projects and jobs

### Creating projects and jobs in the office

Use Trimble Sync Manager to create projects and jobs using data from Trimble Business Center, AutoCAD Civil 3D, 12d Model, Bentley civil software and other survey and civil engineering software. The software sends the projects and jobs to Trimble Connect. For more information refer to the *Trimble Sync Manager Help*.

### Working on cloud projects and jobs on the controller

To work with projects and jobs that reside in the Trimble Connect cloud collaboration platform you must have a current Trimble Access Software Maintenance agreement. To see projects and jobs from the cloud, the controller must be connected to the Internet and you must be signed in to Trimble Connect using your Trimble ID in Trimble Access.

When you are signed in to Trimble Connect, projects and jobs that reside in the Trimble Connect cloud collaboration platform and assigned to you are shown in the **Projects** and **Jobs** screens of the Trimble Access software. You are also notified by email when a job is assigned to you from Trimble Connect.

You can download individual projects and jobs as required. During project download, the <project> folder is created on the controller and any project files are downloaded. Once you have downloaded a project, you can download jobs in the project.

The cloud icons next to the project or job name indicate if there are changes to be uploaded or downloaded:

indicates there are changes in the project or job in the cloud to be downloaded to the controller

indicates there are changes in the project or job on the controller to be uploaded to the cloud

indicates the project or job in the cloud is exactly the same as the project or job on the controller

You can upload data to the cloud at any time, by uploading changes in the job or by uploading changes to all jobs in the project at once. New jobs created locally on the controller have the Upload option available when they are in projects that reside in the cloud and so can be uploaded to the cloud in the same way.

When you change the status of a job to **Fieldwork complete**, changes to the job are automatically uploaded to the cloud.

## Working with local projects and jobs

### Creating local projects

You can create local projects on the controller, as required. You cannot upload a project you have created on the controller to the cloud.

You will need to manually transfer data files that you want to use to the project folder on the controller. See File transfer, page 8 and Trimble data folders, page 8.

## Creating local jobs

You can create local jobs on the controller as required.

**TIP –** The process for creating a local job is the same, whether the job is part of a local project or a project that resides in the cloud. As long as a local job is in a cloud project you can upload the local job to the cloud at any time after you have created it. To do this, tap ⋮ in the details panel and select **Upload**.

You can create local jobs from:

- the last used job in the current project
- a template, including templates you have created from previous jobs
- a JobXML or DC file in one of these formats:
  - Trimble JobXML
  - SDR33 DC
  - Trimble DC v10.7
  - Trimble DC v10.0
  - SC Exchange

***NOTE –*** *Importing from a JobXML file to a Trimble job file is mainly used to transfer the coordinate system definition and design information. A JobXML file generated from a Trimble job contains all the raw data in the FieldBook section, and "the best" coordinate for each point from the job in the Reductions section. Only the data from the Reductions section is read into the new Trimble job file, raw observations are not imported.*

# 2

# Managing projects

The **Projects** screen appears each time you start the Trimble Access software. To view the **Projects** screen at any time, tap ≡ and select **Project**.

The main part of the screen lists the projects in the **Projects** folder on the controller. If you are signed in to Trimble Connect, projects that are shared with you but are not yet downloaded from Trimble Connect are shown in gray text.

***NOTE –*** *To download projects that reside in the Trimble Connect cloud collaboration platform or to upload changes to jobs in those projects, you must be signed in to Trimble Connect. The Trimble Connect icon in the title bar is grayed out if you are not signed in.*

Tap a project to select it. The details panel shows information about the selected project.

## To sign in to Trimble Connect

***NOTE –*** *To be able to sign in, you must have configured an Internet connection.*

1. To sign in, tap .
2. In the **Sign in to Trimble Connect** screen, enter your Trimble ID username and password. Your username is the email address you use to sign in to Trimble Connect.

   If you have forgotten your password, tap **Forgot password?** If you do not have a Trimble ID, click **Create new Trimble ID**.
3. If you are the only person who uses Trimble Access on the controller, select the **Stay signed in** check box so that you do not have to sign in when you start Trimble Access.
4. Tap **Sign in**.

   The software returns to the **Projects** screen, where the Trimble Connect icon indicates you are signed in.

## To open a project

Tap a project to select it and tap **Open**.

If the project is not yet downloaded onto the device, the **Download** button is available when you select the project. Tap **Download** and when prompted, tap **Yes** to download the data from Trimble Connect. All project data and all jobs in the project that are assigned to you are downloaded.

When you open a project, the **Jobs** screen appears. See Managing jobs, page 18.

### To create a project

To create a new local project, tap **New**. See To create a local project, page 7.

### To find a project in the list

To search for part of the project name, enter the text to search for in the **Filter project** field. Project names that contain the entered letters are listed.

To show only projects on the controller, tap ▼ and select **Controller**.

To show only projects in the cloud, tap ▼ and select **Cloud**.

To refresh the list of projects, tap ↻.

**TIP –** The projects screen checks for changes when you first open it but it does not refresh automatically. Tap ↻ to see new projects, for example projects recently shared with you in Trimble Connect or if you have used File Explorer to create a new folder in the **Projects** folder.

### To edit a project

To edit the project properties, tap **Properties**. Make your changes and tap **Accept**.

To delete a project from the controller, in the details panel tap ⋮ and select **Delete**.

**TIP –** If the project resides in Trimble Connect, the project is only removed from the controller. Nothing is removed from Trimble Connect. You cannot delete projects that you have not yet downloaded.

### To upload data to the cloud

When you change the status of a job to **Complete**, changes to the job are automatically uploaded to the cloud.

To upload changes to a job at any time, in the **job**, select the job in the **Jobs** screen and then tap ⋮ in the details panel for the job and select **Upload**.

To upload changes to **all** jobs in the **project**, for example at the end of each day, select the project in the **Projects** screen and then tap ⋮ in the details panel for the project and select **Upload**.

***NOTE –*** *Reports and files created using the **Export** function in the **Jobs** screen are not uploaded to the cloud with the job.*

**TIP –** If there are no **Upload** or **Download** options in the **Details** menu, the current project is a local project only and does not reside in the cloud.

## To create a local project

1. Tap ≡ and select **Project**. The **Projects** screen is shown.
2. Tap **New**.
3. Enter the **Name** of the project.
4. If required, enter **Description**, **Reference**, and **Location** details.

This information will appear with the project name in the **Projects** screen.

5. If required, select an image for the project. To select a file on the controller or your network, tap 🗁.

   The selected image will appear next to the project name in the **Projects** screen.

6. Tap **Create**.

   The project folder is created on the controller and the **New job** screen appears.

# File transfer

Trimble Access supports the following methods transferring files between your controller and an office computer or network, or between controllers.

## Working with cloud data

Download data from and uploading data to the cloud is the simplest method of transferring data to and from the device. When you are signed in to Trimble Connect, projects and jobs that reside in the Trimble Connect cloud collaboration platform and assigned to you appear automatically in the **Projects** and **Jobs** screens of the Trimble Access software. Use the Trimble Access software to download projects and jobs to the controller and then upload changes to the cloud. See Projects & jobs, page 3.

***NOTE –*** *To sign in to Trimble Connect, you must have configured an Internet connection.*

## Copying files from your organization's network

You can configure an internet connection to your organization's computer network and then log in to the network to view files and folders on the network. If you are transferring job files, you can use the **Copy** job function in Trimble Access to transfer the job between the USB stick and the project folder. See To copy job files, page 22. If you are transferring project files, use **File Explorer** to copy files to and from the memory stick. To open **File Explorer** from the Trimble Access software, tap ≡ and select **Job data** / **File Explorer**.

## Using a USB memory stick to transfer files

You can use a USB memory stick to transfer files from one computer to another. A memory stick, also called a flash drive, plugs into the USB port of the controller. If you are transferring job files, you can use the **Copy** job function in Trimble Access to transfer the job between the USB stick and the project folder. See To copy job files, page 22. If you are transferring project files, use **File Explorer** to copy files to and from the memory stick. To open **File Explorer** from the Trimble Access software, tap ≡ and select **Job data** / **File Explorer**.

# Trimble data folders

All data used by the Trimble Access software must be stored in the appropriate folder in the **C:\ProgramData\Trimble\Trimble Data\System Files** folder.

Trimble Access expects data to be organized in a specific folder structure inside this folder.

To view this folder from the Trimble Access software, tap ≡ and select **Job data** / **File Explorer**.

**TIP –** To pin the **Trimble Data** folder to your **Favorites** list in Windows Explorer, select **File explorer** from the **Job data** menu in Trimble Access. In Windows Explorer, scroll up to the **Favorites** list at the top of the left pane. Right click **Favorites** and select **Add current location to Favorites**. To see the **System Files** folder, select **View** at the top of the window and select the **Hidden items** check box.

## System files folder

All system type files are stored in the **C:\ProgramData\Trimble\Trimble Data\System Files** folder. System files are files that can be used by any project or job, such as survey styles, coordinate system files, and feature library files.

***NOTE –*** *System files cannot be accessed if they reside in another folder.*

The following files must be stored in the **System Files** folder:

| File type | File extension |
|---|---|
| Feature Library files (TBC) | .fxl |
| Survey Style files | .sty |
| Geoid Grid files | .ggf |
| Combined Datum Grid files | .cdg |
| Configuration | .cfg |
| Projection grid files | .pjg |
| Shift grid files | .sgf |
| UK National Grid files | .pgf |
| Broadcast RTCM transformation files | .rtd |
| Antenna files | .dat |
| GNSS Contacts file | .xml |
| Custom ASCII Import file definitions | .ixl |
| XSLT Custom ASCII Export Stylesheet files | .xsl |
| XLST Custom Stakeout Stylesheet files | .sss |
| Measure Codes Database files | .mcd |
| Coordinate System Database files | .csd |

***NOTE –***

- *Language files (.lng) and sound files (.wav) are stored in the appropriate language folder, stored in* ***Program Files x86\Trimble\Trimble Access\General Survey\Languages\<language>****.*
- *Stakeout stylesheet files (.sss) and Custom Export stylesheet files (.xsl) can be located in the language folder or* ***System Files****. Translated Stakeout stylesheet files and translated Custom Export stylesheet files are typically stored in the appropriate language folder.*

## Project folders

Each project is stored in its own folder in the **C:\ProgramData\Trimble\Trimble Data\Projects** folder. The **Projects** folder is created the first time you run the Trimble Access application.

Project files are stored in the appropriate **<project>** folder and can be used by any job in that project. Project files are typically map files, alignments, or control point files.

The following files are stored in the **<project>** folder:

| File type | File extension |
|---|---|
| Job files | .job |
| Comma Delimited (CSV) files | .csv |
| Comma Delimited (TXT) files | .txt |
| Digital Terrain Model files | .dtm |
| Triangulated Terrain Model files | .ttm |
| Map files | .dxf |
| Surpac files | .str |
| ESRI map Shapefiles | .shp |
| GENIO road files | .crd .inp .mos |
| LandXML road files or XML Documents | .xml |
| JobXML files | .jxl |
| Trimble road or alignment files | .rxl |
| Tunnel file | .txl |

Htm reports (.htm) and comma delimited files (.csv) that are created when you export data using the **Export** function in the **Jobs** screen are also stored in the **<project>** folder.

## Job folders

Each job is stored as a .job file in the appropriate **<project>** folder. Each job has a **<job name> Files** folder which contains files such as image or GNSS data files that are created as work is done on the job.

The following files are stored in the **<job name> Files** folder:

| File type | File extension | Subfolder |
|---|---|---|
| GNSS data files | .t01 .t02 | |
| Image files | .jpg | |
| VX or S series scan files | .tsf | |
| Original image files | .jpg | **<project>\<job name> Files\Original Files** |
| SX10 scan files | .rwcx | **<project>\<job name> Files\SdeDatabase.rwi** |

**TIP –** When a scan point measured using a Trimble SX10 scanning total station is used in the job, for example in a Cogo calculation, a point is created in the job at the same position as the scan point.

Auto-generated folders are created as required, inside the **<job name> Files** folder:

- **<project>\<job name> Files\Original Files** is created when you draw on or annotate an image file. The original, unedited image is copied to the **Original Files** folder.
- **<project>\<job name> Files\SdeDatabase.rwi** is created to store .rwcx scan files if you scan using a Trimble SX10 scanning total station.

To easily copy jobs and associated files from one folder to another, or from one controller to another using an external drive such as a USB stick, tap **Copy** in the Jobs screen.

# Multiple device setup

To streamline the process for setting up multiple controllers, you can modify some of the files in the **C:\ProgramData\Trimble\Trimble Data\System Files** folder in a text editor to meet your requirements and then copy those files to the other controllers.

***NOTE –*** *Trimble recommends saving any modified system files with a custom name. If you keep the original name, then the files will be replaced when you upgrade the controller and any custom changes are lost. For more information, refer to the topic* ***Trimble Access data files*** *in the Trimble Installation Manager Help.*

## To set up default job properties

To streamline the process of creating a job, create a job and configure the job properties that you want to reuse and then save the job as a template.

To set default values for the **Reference, Description, Operator**, or **Notes** fields, or to set these fields as "required" so that values must be entered in these fields, edit the **JobDetails.scprf** file in the **C:\ProgramData\Trimble\Trimble Data\System Files** folder. The settings in the **JobDetails.scprf** file are

read each time the Trimble Access application is run. For more information on editing the file, refer to the notes provided at the top of the **JobDetails.scprf** file.

To modify the list of descriptions used, edit the **descriptions.xml** file in the **C:\ProgramData\Trimble\Trimble Data\System Files** folder. the **descriptions.xml** file is created when you enter descriptions for points. The description stack is unique for each description field.

## To share groups of codes

To share groups of codes between controllers, create the code groups on one controller using the **Measure codes** screen. Code groups, and the codes within each group, are stored in a Measure Codes Database (MCD) file in the **C:\ProgramData\Trimble\Trimble Data\System Files** folder.

If you do not use a feature library, the software creates a **Default.mcd** file and this file is used whenever a job has no assigned feature library. Once you have set it up, you can copy the **Default.mcd** file to other controllers.

If you use a feature library, the MCD file is tied to that feature library and has a matching name. You can copy the MCD file to other controllers, but to use it in the software the associated feature library must also be on the controller and assigned to the job.

## To lock a survey style

To prevent a survey style from being edited in the field, use File Explorer to navigate to the **C:\ProgramData\Trimble\Trimble Data\System Files** folder. Right-click the required survey style file and select **Properties**. In the **General** tab, select **Read-only** and tap **OK**.

In Trimble Access, the lock symbol to the left of the style name indicates that you cannot edit this style.

***NOTE –*** *A locked style will be updated to reflect any changes made during the auto-connect cycle when connecting to an instrument.*

## To customize the coordinate system database

To customize the coordinate system database used by the Trimble Access software, you must use the Coordinate System Manager software to modify the Coordinate System Database (CSD) and then transfer the modified database to the **System Files** folder on the controller. When a **custom.csd** file exists in the **C:\ProgramData\Trimble\Trimble Data\System Files** folder, the Trimble Access software uses the **custom.csd** database instead of the coordinate system database built into the software.

For more information, see To customize the coordinate system database, page 43.

## To edit the list of GNSS contacts

You can create and edit profiles by editing the **GNSSContacts.xml** file that is stored in the **C:\ProgramData\Trimble\Trimble Data\System Files** folder.

You can also edit the **ServiceProviders.xml** file, so that it is easier to select the correct service provider when you configure a network connection using a mobile phone or Internet connection. The **ServiceProviders.xml**

file appears when you tap ▸ in the **APN** field of the **Network connection** screen and select the **Select Access Point Name** option.

### To edit the list of antennas

The Trimble Access software includes an **Antenna.ini** file that contains a list of antennas that you can choose from when creating a survey style. You cannot edit this list in the Trimble Access software. To shorten the list or add a new antenna type, edit the **Antenna.ini** file in the **C:\Program Files (x86)\Common Files\Trimble\Config** folder.

***NOTE –*** *When you transfer an Antenna.ini file, it overwrites any existing file of that name. The information in this file is also used in preference to the antenna information built into the Trimble Access software.*

### To edit the content and format of the delta display or reports

The content and format of the delta display that is shown during stakeout or when measuring a point relative to a 3D axis is controlled by XSLT style sheets. XSLT style sheets are also used to control the output and format of reports generated during export or to create custom import file formats. You can edit the existing style sheets or create new formats in the office and then copy them to the **C:\ProgramData\Trimble\Trimble Data\System Files** folder on the controller. For more information on editing style sheets, see Custom import & export formats, page 28.

## Internet connection setup

You can connect to the Internet by:

- Using the cellular modem and the SIM card in the controller (if available) to connect to a 3G or 4G mobile broadband network.
- Connecting the controller to a smartphone and then using the smartphone's connection to a 3G or 4G mobile broadband network to connect to the Internet.
- Connecting the controller to an external modem or to a mobile phone that supports dial-up networking.

***NOTE –*** *To use the Internet connection for a **real-time Internet data link**, you must also create a GNSS contact that specifies the internet address from which to obtain the correction data. See **To create a GNSS contact for a rover Internet data link**.*

### To use mobile broadband on the controller

To use the cellular modem in the controller to connect to a 3G or 4G mobile broadband network:

1. Make sure a SIM card is inserted in the controller. Refer to the documentation for your controller.
2. Press the Windows key to display the Windows taskbar and tap the **Wireless network icon** .
3. Tap the **Cellular** tile to enable it. The tile changes to blue.

4. To configure options for the cellular connection, tap and hold the **Cellular** tile and select **Go to Settings**.
   a. To automatically connect to the cellular network whenever the controller is in range, select **Let Windows manage this connection**.
   b. Select whether Windows can automatically switch to the cellular network if the Wi-Fi connection is poor.

   For more information, refer to the documentation for your controller.

## To connect the controller to the Internet using a smartphone

You can connect the controller to the Internet using a smartphone. Connect the smartphone to the controller using a Wi-Fi or Bluetooth connection. The controller then uses the smartphone's connection to the 3G or 4G mobile broadband network to connect to the Internet.

In general, Wi-Fi connections have faster data connections but use more battery power on both devices than Bluetooth connections.

**TIP –** You can have only one Wi-Fi connection active at a time so if you have connected the controller to the SX10 using Wi-Fi you will need to connect to the smartphone using Bluetooth.

## To connect using Wi-Fi

1. On the phone, enable the **Mobile hotspot** or **Portable hotspot** setting.

   This turns off Wi-Fi on your phone so that the phone is now in **Access Point** mode. A notification shows the name of the created AP and the required passkey.

   **TIP –** To locate this setting on your phone, open the main **Settings** app and enter **hotspot** in the **Search** field.

2. On the controller, press the Windows key to display the Windows taskbar and tap the **Wireless network icon** .
   a. If the **Wi-Fi** tile is gray, tap it to enable it. The tile changes to blue.
   b. In the list of Wi-Fi networks, select the name of your phone's Access Point and enter the required passkey.
   c. Tap **Connect**.
3. Open your Internet browser and enter a URL to confirm the controller can connect to the Internet.
4. To use this Internet connection for an Internet RTK data link, when configuring the GNSS contact in Trimble Access, tap in the **Network connection** field and select **Operating system – Wi-Fi, Cellular**. See To create a GNSS contact for a rover Internet data link.
5. To disconnect the controller from your smartphone, tap the **Wireless network icon** in the Windows taskbar, select the phone access point and tap **Disconnect**.

**TIP –** The next time you want to use the phone's Internet connection, re-enable the **Mobile hotspot** or **Portable hotspot** setting on the phone and then on the controller select the wireless network and tap **Connect**.

## To connect using Bluetooth

1. Pair the smartphone with the controller.
   a. On the controller, press the Windows key to display the Windows taskbar and tap the system tray arrow. Tap the **Bluetooth** icon and select **Add a Bluetooth Device**. Make sure **Bluetooth** is set to **On**.

      **TIP –** The name of the controller is shown just below the **Bluetooth On** switch.

   b. On the controller, tap **Add Bluetooth or other device**. Select **Bluetooth** as the device type. In the list of devices on the controller, select the name of your phone.

   c. When prompted, tap **OK** or **Connect** on each device to confirm the passkey is correct.

      ***NOTE –*** *If there is a long list of Bluetooth devices on the controller, swipe down (scroll) to see the passkey confirmation prompt and buttons. The prompt times out after a few seconds, so if you miss it, tap **Cancel** and repeat steps (c) and (d).*

   d. On the controller, tap **Done**.
2. On the phone, enable the **Bluetooth tethering** or **Internet tethering** setting to allow your phone's Internet connection to be shared with another device.

   **TIP –** To locate this setting on your phone, open the main **Settings** app and enter **tethering** in the **Search** field.
3. To use the phone's Internet connection on the controller:
   a. Press the Windows key to display the Windows taskbar and tap the arrow to display the system tray. Tap the **Bluetooth** icon and select **Join a Personal Area Network**.

      The Windows **Devices and Printers** window opens. Wait for a moment for the connected phone to appear.

   b. Tap the phone and from the options at the top of the window, select **Connect using** / **Access point**.
4. Open your Internet browser and enter a URL to confirm the controller can connect to the Internet.
5. To use this Internet connection for an Internet RTK data link, when configuring the GNSS contact in Trimble Access, tap in the **Network connection** field and select **Operating system – Wi-Fi, Cellular**. See To create a GNSS contact for a rover Internet data link.
6. To stop using the phone's Internet connection, return to the Windows **Devices and Printers** window, select the phone and tap **Disconnect from device network**.

   **TIP –** The next time you want to use the phone's Internet connection, connect the devices using Bluetooth and then repeat the steps in step (3) above.

## To connect the controller to the Internet using an external modem or mobile phone

To connect to the Internet by connecting the controller to an external modem or a mobile phone that supports dial-up networking:

1. In Trimble Access, tap ≡ and select **Settings** / **Connections** / **GNSS contacts**.
2. Tap **New**.
3. In the **Edit GNSS contact** screen, tap ▸ next to the **Network connection** field.

   The **Network connection** screen appears.
4. Tap **Add**. The **Create new network connection** screen appears.
5. Enter a **Name** for the network connection.
6. a. Tap **Config**. The Windows **Bluetooth** settings screen opens.

   b. Make sure **Bluetooth** is set to **On**. and then tap **Add Bluetooth or other device**.

   c. Select **Bluetooth** as the device type. In the list of devices on the controller, select the name of your phone.

   d. When prompted, tap **OK** or **Connect** on each device to confirm the passkey is correct.

   ***NOTE –*** *If there is a long list of Bluetooth devices on the controller, swipe down (scroll) to see the passkey confirmation prompt and buttons. The prompt times out after a few seconds, so if you miss it, tap* ***Cancel*** *and repeat steps (c) and (d).*

   e. On the controller, tap **Done**.

   f. Return to the **Create new network connection** screen and configure the connection settings for the connected modem
7. In the **Bluetooth modem** field, select the modem or phone the controller is connected to.
8. Specify the **Access Point Name (APN)** for the Internet service provider. This is the service provider that provided the SIM card in the phone or modem.

   To use the **Select Access Point Name (APN)** wizard, tap ▸ and select your country in the **Location** field, and then select your **Provider and plan**. Tap **Accept**. The **APN** field is updated.
9. In the **Number to dial** field, enter *99***1#. The *99***1# is a standard access code for mobile Internet. If you are unable to connect using *99***1#, contact your mobile Internet provider.
10. If required, enter a **Username** and **Password**.
11. Tap **Accept**.

    **TIP –** If a message appears warning that details of the dial-up networking service for the Bluetooth device could not be resolved, then the phone or modem may not support dial-up networking. Try connecting creating a connection to the phone using the steps for a smartphone.

The software returns to the **Network connection** screen, where you can select the connection you just created and add it to the GNSS contact you will use for the RTK Internet data link. See To create a GNSS contact for a rover Internet data link.

# 3

# Managing jobs

The **Jobs** screen appears each time you open a project or create a local project. To view the **Jobs** screen at any time, tap ≡ and select **Job**.

The main part of the screen lists the jobs in the selected project. If you are signed in to Trimble Connect, jobs that are assigned to you but are not yet downloaded from Trimble Connect are shown in gray text.

***NOTE –*** *To download or upload jobs and job data, you must be signed in to Trimble Connect. The Trimble Connect icon in the title bar is grayed out if you are not signed in.*

Tap a job to select it. The details panel shows information about the selected job.

## To sign in to Trimble Connect

***NOTE –*** *To be able to sign in, you must have configured an Internet connection.*

1. To sign in, tap .
2. In the **Sign in to Trimble Connect** screen, enter your Trimble ID username and password. Your username is the email address you use to sign in to Trimble Connect.

   If you have forgotten your password, tap **Forgot password?** If you do not have a Trimble ID, click **Create new Trimble ID**.
3. If you are the only person who uses Trimble Access on the controller, select the **Stay signed in** check box so that you do not have to sign in when you start Trimble Access.
4. Tap **Sign in**.

   The software returns to the **Projects** screen, where the Trimble Connect icon indicates you are signed in.

## To open a job

Tap a job to select it and then tap **Open**.

If the job you are opening has no defined project height, the **Project height** screen appears. Key in the project height, or tap **Here** to define the height using the current GNSS position. If there is no position available, the **Here** button is disabled.

When the job opens, the map appears. If no data appears in the map, or you cannot see the data you expect to see, tap in the map toolbar. See To make features in the map visible and selectable, page 50.

## To create a job

To create a new local job, tap **New**. See To create a local job, page 20.

If you create a local job in a cloud project, then to upload the job to the cloud, tap ⋮ in the details panel for the job and select **Upload**. Alternatively, tap ⋮ in the details panel for the project and select **Upload** to upload all changes to the project included changes to jobs. Any new local jobs are uploaded at the same time.

## To find a job in the list

To search for part of the job name, enter the text to search for in the **Filter job** field. Job names that contain the entered letters are listed.

To change the default filters, tap ▼ and select the filter type. A check mark next to the filter means that filter is being applied. Select the item again to disable the filter.

***NOTE –*** *By default, only jobs in the cloud that are assigned to you, and any local jobs are shown.*

To see jobs that are not assigned to you, tap ▼ and if there is a check mark next to **Cloud: Assigned to me** then select that item so that the check mark disappears. Jobs that are not assigned to you and can be downloaded from Trimble Connect are shown in gray text. To download a job, select it and tap **Download**.

To hide completed jobs from the **Jobs** screen, tap ▼ above the job list and select **Status: Completed** so that there is no check mark next to it. The next time you change the status of a job to **Complete**, it will also disappear from the jobs list.

To refresh the list of jobs, tap ↻.

**TIP –** The projects screen checks for changes when you first open it but it does not refresh automatically. Tap ↻ to see new jobs, for example jobs recently shared with you in Trimble Connect or if you have used File Explorer to copy a job into the **Projects** folder.

## To edit a job

To change the status of a job, tap the job to select it and in the details panel, select the new **Status** from the list. The status of a job can be **New**, **In progress** or **Fieldwork complete**.

To edit the job properties, tap **Properties**. Make your changes and tap **Accept**. See Job properties, page 31.

To delete a job and all associated data files such as scan files from the controller, in the details panel tap ⋮ and select **Delete**. Tap **Yes** to confirm.

**TIP –** Files in the project folder are not affected when you delete a job. If the job resides in Trimble Connect, the job is only removed from the controller. Nothing is removed from Trimble Connect. You cannot delete jobs that you have not yet downloaded.

## To upload data to the cloud

When you change the status of a job to **Fieldwork complete**, changes to the job are automatically uploaded to the cloud.

To upload changes to a job at any time, in the **job**, select the job in the **Jobs** screen and then tap ⋮ in the details panel for the job and select **Upload**.

To upload changes to **all** jobs in the **project**, for example at the end of each day, select the project in the **Projects** screen and then tap ⋮ in the details panel for the project and select **Upload**.

***NOTE –*** *Reports and files created using the **Export** function in the **Jobs** screen are not uploaded to the cloud with the job.*

**TIP –** If there are no **Upload** or **Download** options in the **Details** menu, the current project is a local project only and does not reside in the cloud.

## To create a local job

1. Tap ≡ and select **Job**.

   Jobs for the current project are shown. The name of the current project is indicated at the top of the **Jobs** screen.

2. Tap **New**.

   **TIP –** The **New Job** screen appears automatically when you create a project.

3. To create a job from a template or the last used job:
   a. Select the **Create from template** option.
   b. Enter the **Job name**.
   c. In the **Template** field, select:
      - **Default** to create the job from the default template provided with the software.
      - **<Template name>** if you have created a job template. See Job templates, page 21.
      - **Last used job**.

      All the job properties from the selected template or job are copied into the job.

      The button next to each property field shows a summary of the current properties.

4. To create a job from a JobXML or DC file:
   a. Select the **Create from JobXML or DC file** option.
   b. Enter the **Job name**.
   c. Select the **File format**.

      **TIP –** If you are unsure of the file format, select any format and the software will check this when it imports the file.

   d. In the **From file** field, select the file. Tap 🗀 to navigate to a folder.
   e. Tap **Accept**.
   f. Tap **OK**.

5. To define or change the job properties, tap the appropriate button. Tap:
   - **Coord. sys.** to choose the coordinate system for the job. See Coordinate system, page 31.
   - **Units** to select the units and formats for numerical values. See Units, page 45.

- **Linked files** to link CSV, TXT or job files so that you have access to the points in those files without adding them to the job (for example, a file containing control points). See Linked files, page 48
- **Map files** to add data to the job and make the data visible and selectable in the map. See Active map layers, page 50.
- **Feature library** to associate a feature library with the job. See Feature library, page 52.
- **Cogo settings** to set the coordinate geometry settings for the job. See Cogo settings, page 58.
- **Additional settings** to set additional settings for the job. See Additional settings, page 66.
- **Media file** button to link media files to the job or to points in the job. See Media files, page 67.
- If required, enter **Reference, Description** and **Operator** details, and any **Notes**.

  TIP – To set default values for the **Reference, Description, Operator**, or **Notes** fields, use a text editor to modify the **JobDetails.scprf** file in the **C:\ProgramData\Trimble\Trimble Data\System Files** folder.

6. Tap **Accept**.

# Job templates

A template makes it faster and easier to create jobs with the same settings. Create a template with the job properties configured as required and then create jobs from the template.

***NOTE –*** *Templates are used only to import a set of job properties as you create the job. Editing or deleting a template has no effect on jobs previously created from the template.*

Tap ≡ and select **Settings / Templates**. The **Templates** screen shows the **Default** template provided with the software and any templates you have created.

## To create a template

1. Tap **New**.
2. Enter the template name.
3. To create the template from another template or the last used job, select the template or **Last used job** in the **Copy from** field.

   The properties from the selected template or job are copied into the job. Edit the properties as required.
4. Tap **Accept**.

## To Import a template from another job

1. Tap **Import**.
2. In the **Select job** screen, select the job. Tap **OK**.
3. Enter the **Template name**. Tap **Accept**.

   The new template appears in the **Templates** screen.

### To edit the job properties configured in the template

1. To edit a template, select it and tap **Edit**.
2. To define or change the job properties, tap the appropriate button. Tap:
   - **Coord. sys.** to choose the coordinate system for the job. See Coordinate system, page 31.
   - **Units** to select the units and formats for numerical values. See Units, page 45.
   - **Linked files** to link CSV, TXT or job files so that you have access to the points in those files without adding them to the job (for example, a file containing control points). See Linked files, page 48
   - **Map files** to add data to the job and make the data visible and selectable in the map. See Active map layers, page 50.
   - **Feature library** to associate a feature library with the job. See Feature library, page 52.
   - **Cogo settings** to set the coordinate geometry settings for the job. See Cogo settings, page 58.
   - **Additional settings** to set additional settings for the job. See Additional settings, page 66.
   - **Media file** button to link media files to the job or to points in the job. See Media files, page 67.
   - If required, enter **Reference, Description** and **Operator** details, and any **Notes**.

     TIP – To set default values for the **Reference, Description, Operator**, or **Notes** fields, use a text editor to modify the **JobDetails.scprf** file in the **C:\ProgramData\Trimble\Trimble Data\System Files** folder.

## To copy job files

To copy jobs into or out of the project folder, or to copy items between jobs, tap ≡ and select **Job**, and then tap **Copy**. The **Copy** screen appears.

The **Copy** function is especially useful when copying job files to a USB drive so that you can transfer jobs from one controller to another. Files associated with the job that were collected during the survey (for example, image and scan files) can be copied at the same time.

***NOTE –*** *Broadcast RTCM transformation (RTD) files associated with the job are not copied with the job. Users of RTD files should ensure the grid file on the controller that the data is being copied to contains grid data that covers the area of the copied job.*

If you choose to copy specific items between jobs, you can select from:

- Calibration
- All control points
- Calibration and control
- Local transformations
- Points
- RTX-RTK offset

## To copy job files to a location outside the project folder

1. In the **Copy** screen, select **Copy job files to**.
2. Browse to and select the **Job to copy**.
3. Select the **Destination folder** for the copied job.
4. To include all files starting with the same job name in the **<project>****Export** folder, select the **Include exported files** check box.
5. To create a JobXML file, select the **Create JobXML file** check box.
6. To copy project files associated with the job, select the appropriate check box(es).
7. Tap **Accept**.

## To copy job files into the project folder

1. In the **Copy** screen, select **Copy job files from**.
2. Browse to and select the **Job to copy**.
3. To include all files starting with the same job name in the **<project>****Export** folder, select the **Include exported files** check box.
4. To copy project files associated with the job, select the appropriate check box(es).
5. Tap **Accept**.

## To copy items between jobs

***NOTE –*** *You can only copy information between jobs that are in the current project folder.*

1. In the **Copy** screen, select **Copy between jobs**.
2. Browse to and select the **Job to copy**.
3. Select the job that the data will be copied to.
4. Select the type of data to be copied and select whether duplicate points should be copied. Duplicate points in the job you are copying to will be overwritten.

   ***NOTE –***

   - *When copying points between jobs, make sure that the points you are copying use the same coordinate system as the job that the files are being brought into.*
   - *When copying local transformations between jobs, all transformations are copied, and the copied transformations are not editable. To modify or update a copied transformation, update the original transformation and then copy it again.*

5. Tap **Accept**.

## To import data to the job

1. Tap ≡ and select **Job**.
2. In the **Jobs** screen, select the job to import data to.
3. Tap **Import**. The **Import** screen appears.
4. Select the **File format** of the file you are importing.

   The options are CSV or TXT formats, or Surpac files.

   **TIP –** To create a job from a DC or JobXML file, see To create a local job, page 20.
5. Enter the **File name** or tap 🗁 to select the file.
6. To import points as control points, select the **Import points as control** check box.
7. If the selected file is a comma delimited CSV or TXT file:
   a. Use the **Point name**, **Point code**, **Northing**, **Easting** and **Elevation** fields to map each field to the appropriate field in the file.
   b. If the file contains null elevations, enter the **Null elevation** value.
   c. In the **Duplicate point action** field, select the action the software should take if the file contains points of the same name as existing points in the job. Select:
      - **Overwrite** to store the imported points and delete all existing points of the same name.
      - **Ignore** to ignore the imported points of the same name so that they are not imported.
      - **Store another** to store the imported points and keep all existing points of the same name.
8. If the **Advanced geodetic** check box is enabled in the **Cogo settings** screen, and you select a CSV or TXT file, you must specify the **Coordinate type** of the points in the file. Select **Grid points** or **Grid (local) points**.
9. If the points in the file are **Grid (local) points**, select the transformation to use to transform them to grid points:
   - To assign the transformation later, select **Not applied, this will be defined later**. Tap **Accept**.

     ***NOTE –*** *If you select this option and you later decide to assign an input transformation to this file, you must unlink and then relink the file.*
   - To create a new display transformation, select **Create new transformation**. Tap **Next** and complete the required steps. See Transformations.
   - To select an existing display transformation, select **Select transformation**. Select the display transformation from the list. Tap **Accept**.
10. Tap **Accept**.
11. Tap **OK**.

## To export data from the job

1. Tap ≡ and select **Job**.
2. In the **Jobs** screen, select the job to import data to.
3. Tap **Export**. The **Export** screen appears.
4. In the **File format** field, select the type of file to create.

   By default, the **File name** field shows the name of the current job and the file extension is the file extension for the selected file type.
5. If required, edit the file name. Tap 🗀 to select an existing folder or create a new one. The default folder is **<project>\Export**.
6. If the file format you selected is:
   - **Comma Delimited (*.CSV, *.TXT)**, select a field for each value. When you tap **Accept**, you will be able to select the points to export. See Selecting points.
   - **DXF**, select the **DXF file format** and the entity types to export.

     If a point has features and attributes assigned to it then all the attributes are added as attributes of the inserted point in the DXF file.

     When a feature library (*.fxl) created by the Trimble Business Center software's Feature Definition Manager is used, the FXL defined layers and colors are used in the DXF.
   - **ESRI Shapefiles**, set the **Coordinates** to **Grid** (northing/easting/elevation) or **Lat/Long coordinates** (local latitude/longitude/height).
   - **Grid local coordinates**, select whether to output the original entered grid (local) coordinates or the computed display grid (local) coordinates.

     ***NOTE –*** *The computed grid (local) coordinates are derived by taking the keyed-in or computed grid coordinates and then applying the display transformation. You must set the required display transformation* ***before*** *you export the file. To do this in* ***Review job****, select a point, go to* ***Options****, set the* ***Coordinate view*** *to* ***Grid (local)*** *and then select a* ***Transformation for grid (local) display****.*
   - **Stakeout report**, specify the acceptable stakeout tolerances in the **Stakeout horizontal tolerance** and the **Stakeout vertical tolerance** fields. Any stakeout delta greater than the defined tolerances appears in color in the generated report.
   - **Survey report**, select whether to generate a detailed report and the format for reporting GNSS deltas.
   - **Traverse report**, specify the traverse deltas limit. Values that exceed this limit are highlighted in the generated report.
   - **Trimble JobXML**, select the appropriate version number.
   - **Utility Survey DXF**, configure the options for creating lines and generating text.

7. To automatically view the file after you create it, select the **View created file** check box.
8. Tap **Accept**.

# Import and export file formats

Predefined import and export file formats are defined using XSLT style sheet (*.xsl) definition files. They are typically located in the **C:\ProgramData\Trimble\Trimble Data\System Files** folder.

The predefined style sheet definitions are provided in English. Translated stylesheet files are typically stored in the **Program Files x86\Trimble\Trimble Access\General Survey\Languages\<language>** folder.

You can import and export data using the predefined file formats, or you can create your own formats.

## Import file formats

You can use the predefined formats or create a comma delimited CSV or TEXT file.

**TIP –** DC and JobXML files are not imported; instead create a job from these files. See To create a local job, page 20.

### Predefined file formats

Select from the following predefined formats:

- CSV Grid points E-N

  The data must be in the format Name, Easting, Northing, Elevation, Code
- CSV Grid points N-E

  The data must be n the format Point Name, Northing, Easting, Elevation, Code
- CSV Lines

  The data must be in the format Start Point Name, End Point Name, Start Station,
- CSV WGS84 Lat-long points
- Surpac

***NOTE –*** *To be successfully imported, points in WGS-84 and local geographic coordinates must have a height.*

### Comma delimited CSV or TXT files

If the Comma Delimited (*.CSV, *.TXT) option is selected, you can specify the format of the data that is received. Five fields appear: **Point name, Point code, Northing, Easting**, and **Elevation**. If description fields are enabled for the job, there are two additional fields to configure. Select **Unused** if a particular value is not present in the file being received.

### Null elevations

If the comma-delimited file you are importing contains 'null elevations' that are defined as something other than null, for example a 'dummy' elevation such as -99999, you can configure the format of the **Null elevation** and the Trimble Access software converts these 'null elevations' to real null elevations inside the

job.

The **Null elevation** value is also used when points are imported or copied from linked CSV files.

### Coordinate type and local transformations

If **Advanced geodetics** is enabled, then for most file formats you must specify the **Coordinate type** of the points in the file.

You can create a transformation when you import grid local points, but you cannot use the grid local points from the file you are about to import unless that file has already been liked to the current job.

## Export file formats

Data can be exported as machine-readable files for use in other software applications, or as human-readable reports in Word or HTML format.

Use these files to check data in the field, or to produce reports, which you can transfer from the field to your client or to the office for further processing with the office software.

### Predefined file formats

The predefined export file formats available on the controller include:

- Check shot report
- CSV WGS-84 lat longs
- CSV with attributes
- DXF
- ESRI Shapefiles
- GDM area
- GDM job
- Grid (local) coordinates
- ISO rounds report
- Locator to CSV
- Locator to Excel
- M5 coordinates
- Road-line-arc stakeout report
- SC Exchange
- SDR33 DC
- Stakeout report
- Survey report
- Traverse adjustment report

- Traverse deltas report
- Trimble DC v10.0
- Trimble DC v10.7
- Trimble JobXML
- Utility Survey DXF
- Volume computation report

## Comma delimited CSV or TXT files

If the Comma Delimited (*.CSV, *.TXT) option is selected, you can select the points to export and specify the format of the data that is received. Five fields appear: **Point name, Point code, Northing, Easting**, and **Elevation**. If description fields are enabled for the job, there are two additional fields to configure. Select **Unused** if a particular value is not present in the file being received.

When you tap **Accept**, you will be able to select the points to export. See Selecting points.

## Additional predefined formats available for download

The following predefined formats are available for download:

- CMM coordinates
- CMM elevations
- KOF
- SDMS

To download these formats, go to https://geospatial.trimble.com/product-and-solutions/access and click **Downloads**. Copy them to the **C:\ProgramData\Trimble\Trimble Data\System Files** folder on the controller.

If you have measured depths using an echo sounder, you can also download the following custom report formats to generate reports with depths applied:

- **Comma Delimited with elevation and depths.xsl**
- **Comma Delimited with depth applied.xsl**

For more information, see To generate reports that include depths.

# Custom import & export formats

You can modify a predefined format to meet your specific requirements, or use it as a template to create a completely new custom import or export format.

You can use any text editor, such as Microsoft Notepad, to make minor changes to the predefined formats.

***NOTE –*** *Trimble recommends saving any modified XSLT files with a new name. If you keep the original name, predefined XSLT files are replaced when you upgrade the controller, so any custom changes are lost.*

To create a completely new custom ASCII format, you need some basic programming knowledge to modify the XSLT file. XSLT style sheet definition files are XML format files. Style sheets must be created according to the XSLT standards as defined by the World Wide Web Consortium (W3C). For details, go to www.w3.org.

You cannot easily modify or create a style sheet on the controller. To successfully develop new style sheet definitions, work on an office computer using a suitable XML file utility program.

To develop your own XSLT style sheets, you need:

- An office computer.
- Basic programming skills.
- An XML file utility program with good debugging facilities.
- The JobXML file schema definition that provides the details of the JobXML format required to create a new XSLT style sheet.
- A job or JobXML file that contains the source data.

The predefined XSLT style sheets, JobXML file schema and the ASCII File Generator utility are all available for download. Go to https://geospatial.trimble.com/product-and-solutions/access and click **Downloads**. The predefined style sheet definitions are provided in English. Modify these files as required to your own language.

The basic steps are:

1. Source a Job file or JobXML file from your controller.
2. Create the new format using a predefined XLST style sheet as a starting point and the JobXML schema as a guide.
3. To create the new custom ASCII file on the office computer, use the ASCII File Generator utility to apply the XSLT style sheet to the Trimble Job or JobXML file. For information on using this utility, refer to the *ASCII File Generator Help*.
4. To create the custom ASCII files on the controller, copy the file to the **System Files** folder on the controller.

For information on how to create your own custom import formats, refer to the *Import Custom Format Files* document available for download from https://geospatial.trimble.com/product-and-solutions/access.

## Repairing jobs

The **Job repair** wizard runs when Trimble Access detects damage in the job file. You can cancel the wizard at any point or go back to any previous step.

The wizard retrieves job data up to the point of the damage, discards anything beyond this point, and informs you of the time and date of the last good item in the job.

As a safety measure, the wizard can make a copy of the job before anything is discarded. Before proceeding with the copy, check that the file system has enough space for a copy of the entire job.

Once the repair is completed, ≡ and select **Job data** / **Review job** to check if anything has been discarded from the end of the job. Because the job is stored in chronological order, anything discarded is timed later than the last good record reported by the wizard.

Be aware that discarded data may include changes made to the job such as deletions (the item may no longer be deleted), changes to antenna or target heights, coordinate systems, and new items such as points, observations, and lines.

Damage to Job files may be caused by a hardware problem, failure to properly shut down the software, or an unexpected power failure due to a flat battery. When the Job wizard reports a problem, review the controller's operating procedure, and/or check the hardware. If you repeatedly experience corruption problems, there may be a fault in your controller hardware. For more information, contact your local Trimble reseller.

# 4

# Job properties

Job properties are configured when a job is created.

To edit the job properties at any time:

1. Tap ≡ and select **Job**. The current job is already selected.
2. Tap **Properties**.
3. To define or change the job properties, tap the appropriate button. Tap:
   - **Coord. sys.** to choose the coordinate system for the job. See Coordinate system, page 31.
   - **Units** to select the units and formats for numerical values. See Units, page 45.
   - **Linked files** to link CSV, TXT or job files so that you have access to the points in those files without adding them to the job (for example, a file containing control points). See Linked files, page 48
   - **Map files** to add data to the job and make the data visible and selectable in the map. See Active map layers, page 50.
   - **Feature library** to associate a feature library with the job. See Feature library, page 52.
   - **Cogo settings** to set the coordinate geometry settings for the job. See Cogo settings, page 58.
   - **Additional settings** to set additional settings for the job. See Additional settings, page 66.
   - **Media file** button to link media files to the job or to points in the job. See Media files, page 67.
   - If required, enter **Reference, Description** and **Operator** details, and any **Notes**.

     TIP – To set default values for the **Reference, Description, Operator**, or **Notes** fields, use a text editor to modify the **JobDetails.scprf** file in the **C:\ProgramData\Trimble\Trimble Data\System Files** folder.
4. Tap **Accept**.

## Coordinate system

CAUTION – Do not change the coordinate system or calibration after you have staked out points, or computed offset or intersection points. If you do, the previously staked out or computed points will be inconsistent with the new coordinate system and any points computed or staked out after the change.

To configure or edit coordinate system settings for the job:

1. Tap ≡ and select **Job**. The current job is already selected.
2. Tap **Properties**.
3. Tap **Coord sys.**
4. Select one of the methods below.

## Scale factor only

Use this projection type when the job will contain observations only from a conventional instrument and you are using a local scale factor to reduce distances to the local coordinate system.

**TIP –** If you are working in a small area and are not sure which coordinate system to use, select the **Scale factor only** projection and enter a scale factor of 1.000.

1. In the **Select coordinate system** screen, select **Scale factor only**.
2. Enter a value in the **Scale factor** field.
3. Tap **Store**.

## Select from library

Use this method for jobs that will contain conventional or GNSS observations or both.

**TIP –** To customize the list of coordinate systems available, see To customize the coordinate system database, page 43

1. In the **Select coordinate system** screen, select **Select from library**. Tap **Next**.
2. From the lists, select the required **System** and **Zone**.

   **TIP –** Drag your finger up the list to scroll, or press the first letter of the country name on the keypad to jump to that section of the list.
3. If the job will contain GNSS observations and you want to use a geoid model or datum grid file, you must have copied these files to the controller.
   a. To select a geoid model, enable the **Use geoid model** switch. Select the file in the **Geoid model** field.
   b. To select a datum grid file, enable the **Use datum grid** switch. Select the file in the **Datum grid** field.

      The semi-major axis and flattening values for the selected datum grid file are displayed. These details overwrite any already provided by a specified projection.
4. Select the type of **Coordinates** to use. The default is grid. To use ground coordinates, see To set up a ground coordinate system, page 42.
5. Enter the **Project height**. See Project height, page 40.
6. Tap **Store**.

## Key in parameters

Use this method to key in your own parameters, particularly if you have your own projection files you want to

use or if the job will contain GNSS observations and you want to key in a site calibration adjustment.

1. In the **Select coordinate system** screen, select **Key in parameters**. Tap **Next**.
2. Tap **Projection**.
   a. Fill out the details for the projection.

      **TIP –** Drag your finger up the list to scroll, or press the first letter of the country name on the keypad to jump to that section of the list.

   b. Select the type of **Coordinates** to use. The default is grid. To use ground coordinates, see To set up a ground coordinate system, page 42.
   c. Enter the **Project height**. See Project height, page 40.
   d. Tap **Accept**.
3. If the job will contain only observations from a conventional instrument, tap **Store**.
4. If the job will contain GNSS observations, or a combination of conventional and GNSS observations:
   a. To specify the datum transformation, tap **Datum trans**.

      To use a datum grid file, select **Datum grid** in the **Type** field and select the **Datum grid** file to use.

      The semi-major axis and flattening values for the selected datum grid file are displayed. These details overwrite any already provided by a specified projection.

   b. To use a geoid model file, tap **Vert. adjustment** and select **Geoid model** and select the **Geoid model** file.

      The remaining fields in the Horizontal adjustment and Vertical adjustment screens are filled out when you perform a site calibration. See GNSS observations and local coordinate systems, page 36 and Site calibration.

   c. Tap **Store**.

## No projection / no datum

Use this method if you want to measure points using GNSS observations using a coordinate system with an undefined projection and datum, or if you do not know what the coordinate system settings should be.

1. In the **Select coordinate system** screen, select **No projection/no datum**. Tap **Next**.
2. To use ground coordinates after a site calibration, set the **Coordinates** field to **Ground** and enter the average site height in the **Project height** field. Alternatively, set the **Coordinates** field to **Grid**.
3. To calculate a geoid vertical adjustment after a site calibration, select the **Use geoid model** check box and then select the geoid model file.

Any points measured using GNSS are displayed only as WGS-84 coordinates.

When you perform a site calibration, the software calculates a Transverse Mercator projection and a Molodensky three-parameter datum transformation using the supplied control points. The project height is

used to compute a scale factor for the projection so that ground coordinates can be computed at elevation. See Site calibration.

## Broadcast RTCM

Use this projection type when the **Broadcast format** is set to RTCM RTK and the broadcast datum definition messages are broadcast by the VRS network.

1. In the **Select coordinate system** screen, select **Broadcast RTCM**.
2. Select the appropriate projection parameters for your location.
3. Select the type of **Broadcast RTCM** messages to include. See Broadcast RTCM messages, page 44.
4. Select the type of **Coordinates** to use. The default is grid. To use ground coordinates, see To set up a ground coordinate system, page 42.
5. Enter the **Project height**. See Project height, page 40.
6. Tap **Store**.

## Coordinate system name

The name of the coordinate system indicates whether the coordinate system was selected from the library, was later modified, or whether the coordinate system is user defined.

When the coordinate system is:

- Selected from the library:
  - The **Coordinate system** field displays "Zonename (SystemName)".

    Changing the geoid model or project height does not change the name of the coordinate system
  - Editing any projection or datum parameters changes the coordinate system name to "Local site". To remove these changes and revert to the original name of the coordinate system, you must reselect it from the library. If you overlay a GNSS site calibration over this “Local site” the name of the coordinate system remains “Local site”.
  - Completing a GNSS site calibration changes the coordinate system name to "Zonename (Site)". If you disable the site calibration (by keying in parameters) the coordinate system name reverts to the original name.
  - Editing any horizontal adjustment or vertical adjustment parameters changes the coordinate system name to "Zonename (Site)". If you remove these changes, the coordinate system name reverts to the original name.
- Defined using **No projection/no datum**, completing a GNSS site calibration changes the coordinate system name to "Local site".
- Defined using **Key in parameters**, the coordinate system name is "Local site".

## Choosing the coordinate system

Before starting a survey, it is important to choose a suitable coordinate system. The parameters you must configure depend on whether the job contains observations from a conventional instrument or from a GNSS receiver.

**CAUTION –** Do not change the coordinate system or calibration after you have staked out points, or computed offset or intersection points. If you do, the previously staked out or computed points will be inconsistent with the new coordinate system and any points computed or staked out after the change.

### Conventional observations only

If the job will contain observations from only a conventional instrument, you can specify the coordinate system and zone by **selecting them from the library** or by **keying in the parameters**. With either method you can use grid or ground coordinates. Grid coordinates are computed at the grid level, which is usually at the ellipsoid level.

Because in a conventional survey measurements are usually made at ground level, you can choose to **use ground coordinates** and then key in the scale factor or calculate the scale factor the software will use when converting ground observations to grid. To use ground coordinates, see To set up a ground coordinate system, page 42.

**TIP –** If you are working in a small area and are not sure which coordinate system to use, select the **Scale factor only** projection and enter a scale factor of 1.000.

### GNSS observations only

If the job will contain GNSS observations, the coordinate system settings will consist of a projection and a datum transformation. You can specify the map projection and datum transformation by **selecting them from the library** or by **keying in the parameters**.

When you have chosen a coordinate system, search your survey archives for any horizontal and vertical control points in that coordinate system that are in the area to be surveyed. You can use these to calibrate a GNSS survey. Calibration is the process of adjusting projected (grid) coordinates to fit the local control. Slight discrepancies can exist between local control and GNSS-derived coordinates. These discrepancies can be reduced using minor adjustments. Trimble Access calculates these adjustments when you use the **Site calibration** function. They are called horizontal and vertical adjustments. See Site calibration.

If you are surveying with VRS and the RTCM broadcast includes coordinate system parameters, you can set the job to use the settings included in the **Broadcast RTCM** messages.

With any of these methods you can use grid or ground coordinates. Grid coordinates are computed at the grid level, which is usually at the ellipsoid level. Because during a survey measurements are usually made at ground level, you can choose to **use ground coordinates** and then key in the scale factor or calculate the scale factor the software will use when converting ground observations to grid. To use ground coordinates, see To set up a ground coordinate system, page 42.

**TIP –** If you are not sure which coordinate system to use, select the **No projection/no datum** option.

### Combining conventional observations with GNSS observations

If you intend to combine conventional observations with GNSS observations, choose a coordinate system that lets you view GNSS observations as grid points. This means that you must define a projection and a datum transformation.

***NOTE –*** *You can complete the field work for a combined survey without defining a projection and a datum transformation, but you will not be able to view the GNSS observations as grid coordinates.*

To combine GNSS measurements with two-dimensional conventional observations, specify a project height for the job.

## Coordinate system parameters

A coordinate system locates points in two dimensional or three dimensional space. The coordinate system transforms measurements from a curved surface (the earth) onto a flat surface (a map or plan). A coordinate system consists of at least a map projection and a datum.

### Map projection

A map projection transforms locations from the surface of an ellipsoid into locations on a plane or map using a mathematical model. Transverse Mercator and Lambert are examples of common map projections.

***NOTE –*** *Positions on a map projection are commonly called "grid coordinates". Trimble Access abbreviates this to "Grid".*

### Ellipsoid (local datum)

Because an exact model of the earth's surface cannot be created mathematically, localized ellipsoids (mathematical surfaces) have been derived to best represent specific areas. These ellipsoids are sometimes referred to as local datums. NAD-83, GRS-80, and AGD-66 are examples of local datums.

### GNSS observations and local coordinate systems

GNSS measurements are referenced to the 1984 World Geodetic System reference ellipsoid, known as WGS-84. However, for most survey tasks, results in terms of WGS-84 have little value. It is better to display and store results in terms of a local coordinate system. Before you start a survey, choose a coordinate system. Depending on the requirements of the survey, you can choose to give the results in the national coordinate system, a local coordinate grid system, or as local geodetic coordinates.

In additional to a map projection and local datum, a **local coordinate system** for a GNSS survey consists of:

- datum transformation
- horizontal and vertical adjustments calculated after a site calibration

When WGS-84 coordinates are transformed onto the local ellipsoid using a datum transformation, local geodetic coordinates result. Local geodetic coordinates are transformed into local grid coordinates using the map projection. The result is northing and easting coordinates on the local grid. If a horizontal adjustment is defined, it is applied next, followed by the vertical adjustment.

**TIP –** When keying in a point or when viewing point details in **Review job** or **Point manager**, you can change the coordinates shown. In the **Coordinate view** field, select **Local** to display local geodetic coordinates. Select **Grid** to display local grid coordinates. See Coordinate view.

***NOTE –*** *To conduct a real-time survey in terms of local grid coordinates, define the datum transformation and map projection before starting the survey.*

## Datum transformation

GNSS is based on the WGS-84 ellipsoid, which is sized and positioned to best represent the entire earth.

To survey in a local coordinate system, the WGS-84 GNSS positions must first be transformed onto the local ellipsoid using a datum transformation. Three types of datum transformation are commonly used. Alternatively, you can choose not to use a transformation at all.

Available datum transformations are:

- **Three-parameter** – This assumes that the rotational axis of the local datum is parallel with the rotational axis of WGS-84. The three-parameter transformation involves three simple translations in X, Y, and Z. The three-parameter transformation that Trimble Access uses is a Molodensky transformation, so there may also be a change in ellipsoid radius and flattening.

  The U.S. State Plane 1927 and the U.S. State Plane 1983 coordinate systems use three-parameter transformations.

- **Seven-parameter** – This is the most complex transformation. It applies translations **and** rotations in X, Y, and Z, as well as a scale factor.

- **Datum grid** – This uses a gridded data set of standard datum shifts. By interpolation, it provides an estimated value for a datum transformation at any point on that grid. The accuracy of a datum grid depends on the accuracy of the gridded data set it uses.

  A **datum grid transformation** uses interpolative methods to estimate the value of the datum transformation at any point in the area covered by the datum grid files. Two gridded datum files are required for this interpolation – a latitude datum grid file and a longitude datum grid file. When you export a datum grid using Trimble Business Center, the two datum grid files associated with the current project are combined into a single file for use in the Trimble Access software.

  ***NOTE –*** *If you use the Canadian NTv2 datum grid please note the data is provided on an "as is" basis. The Department of Natural Resources Canada (NRCan) makes no guarantees, representations, or warranties respecting the data.*

## Calibration

Calibration is the process of adjusting projected (grid) coordinates to fit the local control. A calibration calculates parameters for transforming WGS-84 coordinates into local grid coordinates (NEE).

You should calculate and apply a calibration before:

- staking out points
- computing offset or intersection points

If you calibrate a project and then survey in real time, the General Survey software gives real-time solutions in terms of the local coordinate system and control points.

You can reuse the calibration from a previous job if the new job is completely encompassed by the initial calibration. If a portion of the new job lies outside the initial project area, introduce additional control points to cover the unknown area. Survey these new points and compute a new calibration, and then use this as the calibration for the job.

To copy the calibration from an existing job to a new job, select the existing job as the current job and then create a new job and in the **Template** field select **Last used job**. Alternatively, use the **Copy between jobs** function to copy the calibration from one job to another.

## Horizontal and vertical adjustments

If published datum transformation parameters are used, slight discrepancies can exist between local control and GNSS-derived coordinates. These discrepancies can be reduced using minor adjustments. Trimble Access calculates these adjustments when you use the **Site calibration** function, if the coordinate system settings for the job include a projection and a datum transformation. They are called horizontal and vertical adjustments.

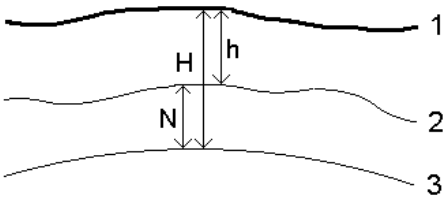
If required, you can use a geoid model file as part of the vertical adjustment calculation.

## Geoid models

Trimble recommends that you use a geoid model to obtain more accurate orthometric heights from your GNSS measurements than from the ellipsoid. If required you can then perform a site calibration to adjust the geoid model by a constant value.

The geoid is a surface of constant gravitational potential that approximates mean sea level. A geoid model or Geoid Grid file (*.ggf) is a table of geoid-ellipsoid separations that is used with the GNSS ellipsoid height observations to provide an estimate of elevation.

The geoid-ellipsoid separation value (N) is obtained from the geoid model and is subtracted from the ellipsoid height (H) for a particular point. The elevation (h) of the point above mean sea level (the geoid) is the result. This is illustrated in the following diagram:




| | |
|---|---|
| 1 – | Ground |
| 2 – | Geoid |
| 3 – | Ellipsoid |

***NOTE –*** *For correct results, the ellipsoid height (H) must be based on the WGS-84 ellipsoid.*

When you select geoid model as the vertical adjustment type, the software takes the geoid-ellipsoid separations from the geoid file chosen, and uses them to display elevations on the screen.

The benefit using the geoid model for the vertical adjustment is that you can display elevations without having to calibrate on elevation benchmarks. This is useful when local control or benchmarks are not available, as it makes it possible to work "on the ground" rather than on the ellipsoid.

***NOTE –*** *If you are using a geoid model in a Trimble Business Center project, make sure you transfer that geoid file (or the relevant part of it) when transferring the job to a controller.*

## Projection

A projection is used to transform local geodetic coordinates into local grid coordinates. GNSS coordinates are relative to the WGS-84 ellipsoid. To work in local grid coordinates during a GNSS survey, you must specify a projection and datum transformation.

You can specify a projection:

- when a job is created and you have to choose a coordinate system (select from a list, or key in)
- during a survey (you calculate values by performing a calibration)
- in the Trimble Business Center software, when the data is transferred.

***NOTE –*** *Enter an appropriate default height value for the software to correctly calculate a sea level correction and then apply it to the grid coordinate.*

**TIP –** If a projection and datum transformation are specified, you can reduce any discrepancies between the WGS-84 coordinates and the local grid coordinates by performing a site calibration.

### Projection grids

Use a projection grid to handle projection types that are not directly supported by the Trimble coordinate system routines. A projection grid file stores local latitude and longitude values that correspond to regular northing/easting positions. Depending on the direction of the conversion, either projection or local latitude/longitude positions are interpolated from the grid data for points within the grid extents.

Use the Coordinate System Manager to generate the defined projection grid (*.pjg) file. For more information, refer to the **Coordinate System Manager Help**. Transfer the projection grid file to the controller.

To use the projection grid, in the **Projection** screen, select **Projection grid** in the **Type** field and then select the **Projection grid file**. If required, select a shift grid.

## Shift grids

Initial projection coordinates are projections that are computed using specified projection routines. Some countries use shift grids to apply corrections to these coordinates. The corrections are generally used to fit the initial coordinates to local distortions in the survey framework, and so cannot be modeled by a simple transformation. You can apply a shift grid to any type of projection definition. Coordinate systems that use shift grids include the Netherlands RD zone, and the United Kingdom OS National Grid zones. The OS National Grid zones are treated as a standard Transverse Mercator projection plus shift grid.

Shift grid files are installed to the desktop computer running the Coordinate System Manager utility, which is installed with Trimble Business Center. Shift grid files can be transferred from the desktop computer to the controller using your favorite file transfer method.

To apply a shift grid to a projection definition, in the **Projection** screen, enable the **Use shift grid** switch and then select the **Shift grid file**.

## SnakeGrid

**SnakeGrid** is a coordinate system with minimal scale factor and height distortion, even when projects extend for many hundreds of kilometers.

A job using a SnakeGrid coordinate system must use a custom SnakeGrid parameter file. These files are obtained through a licensing arrangement from the UCL Department of Civil, Environmental and Geomatic Engineering. Each SnakeGrid parameter file is customized for a specific project alignment envelope. Go to www.SnakeGrid.org for details.

***NOTE –*** *The SnakeGrid parameter file name must be named SnakeXXXXX.dat and placed in the* ***C:\ProgramData\Trimble\Trimble Data\System Files*** *folder on the device.*

To choose a SnakeGrid projection, in the **Projection** screen, select **Snakegrid** in the **Type** field and then select the **SnakeGrid parameter file**.

## Project height

The project height can be defined as part of the coordinate system definition when creating a new job. To edit the Project height:

1. Tap ≡ and select **Job**.
2. Tap Coord Sys.
3. Select the Select from **library** or **Key in parameters** option. Tap **Next**.
4. Enter the **Project height**.

**TIP –** To automatically complete the **Project height** field when defining or editing the coordinate system, tap **Here** to use the current autonomous height derived by the GNSS receiver, or tap **Point** to use the height of a point in the job or in a linked file.

If a point has no elevation, the Trimble Access software uses the project height in Cogo calculations. If you combine GNSS and 2D conventional observations, set the **Project height** field to approximate the height of the site. This height is used with 2D points to calculate grid and ellipsoid distances from measured ground distances.

In 2D surveys where a projection has been defined, enter a value for the project height that approximates the height of the site. You need this value to reduce measured ground distances to ellipsoid distance, and to compute coordinates.

If you edit the project height (or any other local site parameter) after calibrating, the calibration becomes invalid and must be reapplied.

## Horizontal adjustment

If published datum transformation parameters are used, slight discrepancies can exist between local control and GNSS-derived coordinates. These discrepancies can be reduced using minor adjustments. Trimble Access calculates these adjustments when you use the **Site calibration** function, if the coordinate system settings for the job include a projection and a datum transformation. They are called horizontal and vertical adjustments.

If required, you can use a geoid model file as part of the vertical adjustment calculation.

You can reuse the calibration from a previous job if the new job is completely encompassed by the initial calibration. If a portion of the new job lies outside the initial project area, introduce additional control points to cover the unknown area. Survey these new points and compute a new calibration, and then use this as the calibration for the job.

To copy the calibration from an existing job to a new job, select the existing job as the current job and then create a new job and in the **Template** field select **Last used job**. Alternatively, use the **Copy between jobs** function to copy the calibration from one job to another.

## Vertical adjustment

If published datum transformation parameters are used, slight discrepancies can exist between local control and GNSS-derived coordinates. These discrepancies can be reduced using minor adjustments. Trimble Access calculates these adjustments when you use the **Site calibration** function, if the coordinate system settings for the job include a projection and a datum transformation. They are called horizontal and vertical adjustments.

If required, you can use a geoid model file as part of the vertical adjustment calculation.

You can reuse the calibration from a previous job if the new job is completely encompassed by the initial calibration. If a portion of the new job lies outside the initial project area, introduce additional control points to cover the unknown area. Survey these new points and compute a new calibration, and then use this as the calibration for the job.

To copy the calibration from an existing job to a new job, select the existing job as the current job and then create a new job and in the **Template** field select **Last used job**. Alternatively, use the **Copy between jobs** function to copy the calibration from one job to another.

## To set up a ground coordinate system

If you need coordinates to be at ground level instead of projection level (for example, in areas of high elevation), use a ground coordinate system.

When you set up a ground coordinate system in a job, the software applies a ground scale factor to the coordinate system projection definition so that grid distances equal ground distances.

1. Tap ≡ and select **Jobs.**
2. In the **Job properties** screen, tap **Coord Sys**.
3. In the **Select coordinate system** screen:
   - Choose the **Select from library** option to select a coordinate system from the library provided. Tap **Next**.
   - Choose the **Key in parameters** option to key in the coordinate system parameters. Tap **Next** and then select **Projection**.
4. To use ground coordinates with the selected coordinate system, from the **Coordinates** field, do one of the following:
   - To key in a scale factor, select **Ground (Keyed in scale factor)**. Enter a value in the **Ground scale factor** field.
   - To let the Trimble Access software calculate the scale factor, select **Ground (Calculated scale factor)**.
5. If you selected **Ground (Calculated scale factor)**, enter the **Project location**.

   Alternatively, do one of the following:
   - Tap **Here** to enter the current autonomous position derived by the GNSS receiver. The autonomous position is displayed in terms of WGS-84.
   - Tap **Point** and then select a point from in the job or in a linked file to use the coordinates of that position.

     ***NOTE –*** *The Point softkey is not available until there are positions in the job. When creating a new job, you must create the job, then link files to the job or measure a new point, and then return to the Job properties and edit the coordinate system settings. The Point softkey is now available.*

   The project height is used with 2D points to reduce ground distances in Cogo calculations. For more information, see Project height.

   These fields are used to calculate the ground scale factor. The computed ground scale factor is displayed in the **Ground scale factor** field. It allows for the projection scale factor at the **Project location** to ensure

that the combined factor (point scale factor multiplied by the sea level factor) at the **Project location** equals 1.

The software applies the ground scale factor to the projection.

6. To add offsets to the coordinates to differentiate ground coordinates from unmodified grid coordinates, enter a value in the **False northing offset** and **False easting offset** field.

***NOTE –*** *When working with a ground coordinate system the reported ground distance may not be the same as the reported grid distance. The reported ground distance is simply the ellipsoid distance corrected for the average height above the ellipsoid. However the grid distance is computed between the ground coordinates of the points, and is therefore based on a coordinate system that provides a combined scale factor of 1 at the Project Location.*

## To customize the coordinate system database

You can customize the coordinate system database used by the Trimble Access software. This enables you to:

- Reduce the number of coordinate systems available so that it includes only the ones you need.
- Customize existing coordinate systems definitions or add new coordinate system definitions.
- Include GNSS site calibrations in the coordinate system library.

You must use the Coordinate System Manager software to modify the Coordinate System Database (CSD) and then transfer the modified database to the **System Files** folder on the controller. When a **custom.csd** file exists in the **C:\ProgramData\Trimble\Trimble Data\System Files** folder, the Trimble Access software uses the **custom.csd** database instead of the coordinate system database built into the software.

***NOTE –*** *The Coordinate System Manager software is installed at the same time as your Trimble Office software, for example, Trimble Business Center.*

### To reduce the coordinate system library to one or more coordinate systems, zones, or sites

1. Run the Coordinate System Manager software on your office computer.
2. To hide the required element:
   - **Coordinate system**: In the left pane of the **Coordinate Systems** tab, select the coordinate system(s) that you do not want, right click and then select **Hide**.
   - **Zone**: In the left pane of the **Coordinate Systems** tab, select a coordinate system, from the right pane, select the Zone(s) you do not want, right click and then select **Hide**.
   - **Site**: From the **Sites** tab, right click the site(s) you do not want and then select **Hide**.
3. Select **File / Save As**.
4. Name the file **custom.csd** and then click **Save**.

By default, the file is saved in **C:\Program Files\Common Files\Trimble\GeoData** with the extension *.csd.

### To export only user-defined coordinate systems

1. Run the Coordinate System Manager software on your office computer.

2. Select **File / Export**.
3. Select **User-defined records only** and then click **OK**.
4. Name the file **custom** and then click **Save**.

By default, the file is saved in **C:\Program Files\Common Files\Trimble\GeoData** with the extension *.csw.

***NOTE –*** *If a GNSS site calibration has been saved using your Trimble Office software, a site with the assigned name is added to the **Sites** tab and a Site group is created in the **Coordinate Systems** tab, if required. When you create a customized coordinate system that includes sites saved by the Trimble Office software, include those sites created in the **Sites** tab. The Site group in the **Coordinate Systems** tab contains the coordinate system details **referenced** by the sites saved in the **Sites** tab, but the calibration details are **only** stored in the site in the **Sites** tab.*

### To transfer custom coordinate systems

Transfer the custom coordinate system file to the controller. The file must be called **custom.csd** For the Trimble Access software to use it, the file must be in the **C:\ProgramData\Trimble\Trimble Data\System Files** folder and named **custom.csd**.

### To select a custom site

1. In the **Select coordinate system** screen, select **Select from library**. Tap **Next**.
2. If this is a new **custom.csd** file, a warning appears. Tap **OK**.
3. In the **System** field, select **[User sites]**.
4. In the **Site** field, select the required site.
5. If required, select a geoid model.
6. Tap **Store**.

## Broadcast RTCM messages

A Network RTK provider can configure a VRS network to broadcast RTCM messages that include some of the coordinate system definition parameters. When the **Broadcast format** is set to **RTCM RTK** in the **Rover options** screen of the survey style, and the broadcast datum definition messages are broadcast by the VRS network, Trimble Access can use this to provide the datum and ellipsoid definition for a job. See Coordinate system, page 31.

Trimble Access supports a subset of the RTCM transformation parameters, as shown below:

| Transformation message | Details | Supported |
|---|---|---|
| 1021 | Helmert/Abridged Molodensky (Control) | Yes |
| 1022 | Molodensky-Badekas Transformation (Control) | Yes |
| 1023 | Ellipsoidal Datum Shift Grid Residual | Yes |
| 1024 | Plane Grid Residual | No |

| Transformation message | Details | Supported |
|---|---|---|
| 1025 | Projection | No |
| 1026 | Projection Lambert Conformal Conic Two Parallel | No |
| 1027 | Projection Oblique Mercator | No |
| 1028 | Local Transformation | No |

The broadcast RCTM message must contain either the 1021 or the 1022 control message. This defines what other messages will be present. All other messages are optional.

Datum shift grid values are broadcast at fixed time intervals for a grid surrounding the area you are working in. The size of the grid that is broadcast depends on the density of the source grid data. To perform coordinate system transformations, the grid file that is built by Trimble Access must include shift grids covering the location of points you are transforming. When you move to a new location, a new set of datum shift grid values is broadcast and there may be a slight delay until the appropriate values are received from the VRS network server.

The broadcast transformation messages include a unique identifier for the broadcast parameters. If the broadcast parameters change, the identifier changes, and the Trimble Access creates a new grid file to store the new datum grid shift values. A message warns if the broadcast RTCM transformation changes and you are prompted to continue. If you select:

- **Yes** the system creates a new grid file, or, if it exists, uses another grid file that matches the newly broadcast transformation. If you change grid files, the new grid file may not cover the same area as the old grid file, so Trimble Access may not be able to transform points where there are 'holes' in the grid file.
- **No** you cannot continue surveying. Create a new job and start the survey again. If you need access to data in the old job, link that job.

If you copy a job that is defined to use a Broadcast RTCM datum onto a different controller, you should copy the appropriate grid file so that the software can transform grid coordinates on the other controller.

***NOTE –*** *When a job with broadcast RTCM data is exported as a DC file, the GNSS observations are output as grid positions.*

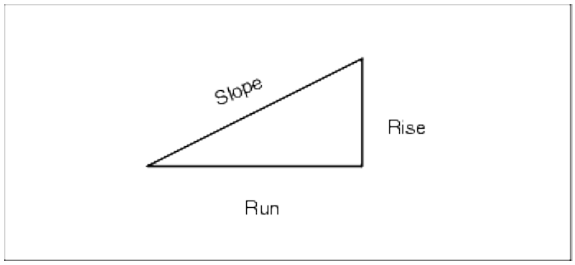
## Units

To configure units and formats for numerical values for the job:

1. Tap ≡ and select **Job**. The current job is already selected.
2. Tap **Properties**.
3. Tap **Units.**
4. Change the fields as required.

**TIP –** Some fields in the Trimble Access software allow you to enter a value in units other than the system units. When you enter a value in one of these fields (for example **Azimuth**) and tap **Enter**, the value is converted to the system units.

## Units

| This setting | Specifies how the following values are displayed |
|---|---|
| **Distance and grid coords** | Distance and northing/easting coordinates |
| **Height** | Height and elevation |
| **Angles** | Angles |
| **Quadrant bearings** | Bearing values are automatically converted to quadrant bearings when this check box is enabled.<br>For example, to enter the quadrant bearing N25° 30' 30"E in a bearing field, key in **25.3030** and then tap ▸ and select **NE**. |
| **Temperature** | Temperature |
| **Pressure** | Pressure |
| **Grade** | Grade<br>The grade of a slope can be displayed as an angle, percent, or ratio.<br>The ratio can be displayed as **Rise:Run** or **Run:Rise**.<br>  |
| **Area** | Supported area units include:<br>• Square meters<br>• Square miles<br>• Square international feet<br>• Square US survey feet<br>• Square international yards<br>• Square US survey yards<br>• Acres<br>• Hectares |

| This setting | Specifies how the following values are displayed |
|---|---|
| **Volume** | Supported volume units include:<br>• Cubic meters<br>• Cubic international feet<br>• Cubic US survey feet<br>• Cubic international yards<br>• Cubic US survey feet<br>• Acre feet<br>• US acre feet |

## Formats for numerical values

| This setting | Specifies how the following values are displayed |
|---|---|
| **Distance display** | The number of decimal places in all distance fields. When the **Distance and grid coordinates** field is set to US survey feet or international feet you can configure the distance display to be in feet and inches. Supported fractions of an inch include: 1/2", 1/4", 1/8", 1/16" and 1/32". |
| **Coordinate display** | The number of decimal places in all northing/easting coordinate fields |
| **Area display** | The number of decimal places for a computed area |
| **Volume display** | The number of decimal places for a computed volume |
| **Angle display** | The number of decimal places for a computed angle. |
| **Lat / Long** | Latitude and longitude |
| **Coordinate order** | The order for the displayed grid coordinates. Select from:<br>• North-East-Elev<br>• East-North-Elev<br>• Y-X-Z (equivalent to East-North-Elev – field prompts changed)<br>• X-Y-Z (equivalent to North-East-Elev – field prompts changed)<br>For the Y-X-Z and X-Y-Z options, the convention used defines that the Y axis is the East axis and the X axis is the North axis. |

| This setting | Specifies how the following values are displayed |
|---|---|
| **Station display** | (Also known as Chainage in some countries.)<br>This defines the distance along a line, arc, alignment, road or tunnel.<br>The station values can be displayed as:<br>• 1000.0 where the values are displayed as entered<br>• 10+00.0 where the + separates the hundreds from the remaining values<br>• 1+000.0 where the + separates the thousands from the remaining values<br>• **Station index**<br>The **Station index** display type uses an extra **Station index increment** field value as part of its definition. The station value is displayed as per the 10+00.0 option, but the value before the + is the station value divided by the **Station index increment**. The remainder is displayed after the +. For example if the **Station index increment** is set to 20, a station value of 42.0 m is displayed as 2 + 02.0 m. This display option is used in Brazil but may have application in other markets. |
| **Station index increment** | If the **Station display** is set to **Station index** the **station index increment** field appears enabling an appropriate station index increment to be entered. See details above. |
| **Laser VA display** | Laser vertical angles<br>Can be vertical angles measured from the zenith, or inclinations measured from horizontal. |
| **Time format** | The format for date and time. Select from:<br>• Local date/time<br>• UTC time<br>• GPS weeks and seconds |

# Linked files

You can link CSV, TXT or job files so that you have access to the points in those files without adding them to the job (for example, a file containing control points). Data in linked files appears in the map.

## Using linked files

You can use points from a linked file to:

- stake out without having the design points in the job
- enter values into **Point name** fields, such as for Cogo functions

- navigate to control or check shots from previous surveys

When using points from linked files, make sure that they use the same coordinate system as the job that they are being brought into. The coordinate order (northing and easting ordinates) in the comma delimited file must be the same as the setting in the **Coordinate order** field in the **Units** screen. Make sure the data in the file is in the format: Point name, First ordinate (Northing or Easting), Second ordinate (Northing or Easting), Elevation, Point code.

Linked CSV points appear as a comma ( **,** ). Linked points from another job appear with their original point symbol. All linked points appear blue.

***NOTE –***

- *In a linked job, you cannot access lines, or arcs.*
- *You can link multiple files. When the point does not exist in the current job, but does exist in multiple linked files, the point in the first linked file is used. If multiple points of the same name exist in a linked job, the* ***search rules*** *work within that job to find the best point.*
- *You can only review points in a linked file from the map. Once you select a linked point and copy it into the current job, it appears as a "c" in the map.*

To import points from a linked file to the current job, see To import data to the job, page 24.

## To link files to the job

1. Tap ≡ and select **Job**. The current job is already selected.
2. Tap **Properties**.
3. Tap **Linked files**. The **Linked files** screen lists the files in the current project folder.
4. Tap the file(s) that you want to link to the current job or tap **All** to select all files.
5. To add files from another folder to the list, tap **Add**, navigate to the required folder and then select the file (s) to add.
6. If the **Advanced geodetic** check box is enabled in the **Cogo settings** screen, and you select a CSV or TXT file, you must specify the **Coordinate type** of the points in the file. Select **Grid points** or **Grid (local) points**.
7. If the points in the file are **Grid (local) points**, select the transformation to use to transform them to grid points:
   - To assign the transformation later, select **Not applied, this will be defined later**. Tap **Accept**.

     **TIP –** If you select this option and you later decide to assign an input transformation to this file, you must unlink and then relink the file.
   - To create a new display transformation, select **Create new transformation**. Tap **Next** and complete the required steps. See Transformations.

- To select an existing display transformation, select **Select transformation**. Select the display transformation from the list. Tap **Accept**.

8. Tap **Accept**.

   For more information on Grid (local) coordinates, see Local transformations.

# Active map layers

By default, points, lines, and arcs from the current job database appear in the map.

You can add other files to the map as layers, including RXL files, DXF files, and background image files. Features in layers can be made visible and selectable but they cannot be edited or deleted. See Supported map files.

## To add layers to the map

1. To open the **Active map** screen, you can:
   - Tap in the map toolbar.
   - In the **Job properties** screen, tap the **Linked files** button.

   The **Active map** screen lists the data files in the current project folder, including all .rxl, LandXML, image, and surface files.

   **TIP –** Layers with file names that contain invalid characters (such as a dollar sign or parentheses) are not shown.
2. To add files from another folder to the list, tap **Add**, navigate to the required folder and then select the file (s) to add.
3. In the **Active map** screen, tap the file(s) that you want to link to the current job or tap **All** to select all files. A single check mark indicates the file are visible in the map.
4. To make the features in the file(s) selectable, tap the file(s) again. A check mark inside a square indicates the features are selectable.

   If the icon does not change, the layer does not contain any features that can be selected.
5. If the file contains layers and you want to make only some layers visible or selectable, tap the arrow next to the file name and tap the layer(s) once to make them visible or twice to make them selectable. The icon next to the file name changes to indicate some layers are not visible or not selectable .
6. To explode polylines contained in DXF, STR, SHP, and LandXML files into individual line and arc segments, tap **Options** and select the **Explode polylines** check box.
7. Tap **Accept**.

## To make features in the map visible and selectable

To change the features that are visible and selectable at any time, tap in the map toolbar. Showing and hiding features can be useful to reduce visual clutter or to make it easier to select features that are close to

other features.

You can control which features are visible or selectable per file, or per layer if the file is a DXF, Shapefile or Surpac file.

| To... | Tap... | | File icon | Layer icon |
|---|---|---|---|---|
| Display all features in the file | the file name | once | ✓ | – |
| Make all features in the file selectable | | twice | ☑ | – |
| Disable all features in the file | | three times | | – |
| Expand the file to display all layers | + | | | |
| Minimize the file and hide all layers | – | | | |
| Display all features in the layer | the layer name | once | ✓ | ✓ |
| Make all features in the layer selectable | | twice | ☑ | ☑ or ✓ |
| Disable all features in the layer | | three times | | |

## To create nodes

To create points at the ends of lines and arcs and at all points along a polyline, or at the center of DXF circle and arc elements, select the **Create nodes** check box in the **Options** screen when selecting the layer to display in the map. The created points can then be selected for stakeout or Cogo calculations.

This option applies to DXF files, ESRI Shapefiles, and LandXML Parcels (polylines). Creating a point at the center of a DXF arc element does not apply to arc elements that are part of a polyline.

Surpac background files already have the node points available. Clearing the **Create nodes** check box does not hide these node points.

***NOTE –*** *Because Shapefiles do not support arcs, arcs are often represented as a series of short lines resulting in a large number of points. Performance may be impacted when Create nodes is selected.*

# Feature library

A **feature library** is a text file that contains the definitions of feature codes, attributes, linework, and control codes.

**Control codes** define the relationship between points so that the geometry of a line or polygon is drawn in the map.

An **attribute** is a characteristic or property of a feature in a database. All features have a geographic position as an attribute. Other attributes depend on the type of feature. For example, a road has a name or designation number, surface type, width, number of lanes, and so on. The value chosen to describe a particular feature is called the attribute value.

When you measure a point and select a feature code from the feature library in the **Code** field, if the feature code has attributes then the Trimble Access software prompts you to enter the attribute data.

***NOTE –*** *If you have enabled **Use descriptions**, you cannot select codes from feature libraries in **Description** fields.*

## Supported feature library files

You can create your own feature library using the Feature Definition Manager in the Trimble Business Center software and then transfer the file to the **System Files** folder on the controller. Alternatively, you can create a feature library using Trimble Access.

***NOTE –*** *Feature codes created using Trimble Access are used only to draw feature geometry. To create a feature library that contains attribute definitions you must use the Feature Definition Manager in Trimble Business Center.*

## To select the feature library

To select a code in a survey, the job must be using the feature library that contains the appropriate codes.

To select the library that you want to use, the library must be on the controller in the :

1. Tap ≡ and select **Job**. The current job is already selected.
2. Tap **Properties**.
3. Tap **Feature library**. The **Select feature library** screen shows the available feature library files in the **System Files** folder.
4. Tap the feature library file to select it.

## Trimble Business Center feature libraries

You can create your own feature library using the Feature Definition Manager in the Trimble Business Center software and then transfer the file to the **System Files** folder on the controller.

Feature code names that contain spaces are shown in Trimble Access with a small dot between the words, for example, Fire·Hydrant. These dots do not appear in the office software.

## Control codes

If you are using an old FXL file, then the control codes supported depend on the FXL file version.

- Smooth curve control codes need FXL file version 4 or later.
- Rectangle and circle control codes need FXL file version 5 or later.
- Horizontal and vertical offset control codes need FXL file version 6 or later.
- Block control codes need FXL file version 8 or later.

To upgrade older version files select **File** / **Save As** in the Feature Definition Manager and select the latest **Save As** format.

## Block codes

Blocks must be created or edited using the Feature Definition Manager in Trimble Business Center. If required, you can change the feature code and feature code description for a block using Trimble Access.

***NOTE –*** *Blocks are not actually constructed or displayed in the Trimble Access software. Points with feature codes that reference blocks are displayed with the appropriate block symbols when the file is imported to the Trimble Business Center software version 3.80 or later.*

Block control codes have a **Control code action** field that controls the behavior of the block:

| Control code action | Enter this control code to... |
|---|---|
| Rotation | Rotate the block by the specified value about the current point in a clockwise direction. |
| Scale X | Scale the block along the X axis. |
| Scale Y | Scale the block along the Y axis. |
| Scale Z | Scale a 3D block along the Z axis. |
| From 1 point | Specify the construction of a block using the current point as the insertion point. |
| From 2 points | Specify the construction of a block using the current and next point as insertion points. |
| From 3 points | Specify the construction of a block using the current and next two points as insertion points. |

## Symbology

The colors defined in the FXL file created using the Feature Definition Manager software may not be identical to the colors used by the Trimble Access software.

Colors can be defined in the Feature Definition Manager as **By layer** or **Custom**.

- When **By layer** has been defined, by default Trimble Access uses black.
- When **Custom** has been defined, by default Trimble Access uses the closest color match to the Trimble Access palette.

Where **By layer** or **Custom** has been defined, you can change the default Trimble Access color to a different color but if you do this you cannot change it again.

Trimble Access does not fill feature coded polygons.

Some symbols are not supported in feature libraries, for example ! and [ ]. If you use unsupported symbols when creating a library in the office software, the Trimble Access software converts them to the underscore symbol "_" when they are transferred. All line features that are coded as white are drawn in black.

## To create or edit a feature library in Trimble Access

1. Tap ≡ and select **Settings** / **Feature Libraries**.
2. To create a feature library:
   a. Tap **New**.
   b. Enter the name.
   c. Tap **Accept**.
3. To add feature codes to the library, select the feature library in the list. Tap **Edit**. Then:
   a. Tap **Add**.
   b. Enter the **Feature code**.

      The maximum length of this field is 20 characters. Trimble recommends keeping code names short and meaningful to allow multiple codes to be selected for a point. When selecting codes for a point, the maximum length of the **Code** field is 60 characters.

      Feature code names that contain spaces are shown in Trimble Access with a small dot between the words, for example, **Fire·Hydrant**. These dots do not appear in the office software.
   c. If required, enter a **Description** for the code.

      By default, if the code is a control code the value of the **Control code action** field appears in the **Description** field when viewing the **Code list**.
   d. Select the **Feature type**. If you select any feature type except **Point**, additional fields appear.
   e. If the **Feature type** is a:
      - **Line**, select the line style and color.
      - **Polygon**, select the line style and border color.
      - **Control code**, select the control code action.
   f. Tap **Accept**.
4. Tap **Store**.

## Feature geometry control codes

When it is operating with a feature library, the Trimble Access software can process the feature codes so that points with their **Feature type** set to the same **Line** or **Polygon** code will be joined by lines. Polygons are automatically closed. Trimble Access does not fill polygons.

Example – To survey the center line of a road, create a center line (**CL**) feature code as a **Line** feature type and assign the code **CL** to each measured point. If you have the **CAD linework** filter turned on, all points to which the code **CL** has been assigned are joined. See Show in map options.

However, you will need extra line joining control to start new line sequences, close figures, and join specific points. To achieve this extra control, define feature codes that use the **control code** feature type. Then select the control code action that will occur when the feature code is assigned to a point.

Example – To survey the center line of a road that has gaps, in addition to the center line (**CL**) feature code, create a start join (**Start**) feature code as a control code feature type and an end join (**End**) feature code as a control code feature type. To each measured point assign the code **CL**. To the point that defines the end of the center line sequence (that is, the start of the gap), select the **CL** feature code, insert a space and then select the **End** feature code. To the point that restarts the center line, select the **CL** feature code, insert a space and then select the **Start** feature code.

***NOTE –*** *When surveying a point that uses a control code you must assign a* ***line*** *code and then the* ***control code****. A* ***control code*** *always follows the* ***line*** *code it applies to and is separated from the* ***Line*** *code by a space character.*

The rest of this topic describes the types of control codes that you can select when creating feature codes.

## Control codes for join sequences

### Join to first (same code)

Enter this control code to join the point to the first point in the sequence that has the same code. For example, **<Line code> <Join to first (same code)>**. Whether the current point will also join to the next point that has the same code depends on the control code entered for the next point.

### Join to named point

Enter this control code to join the current point to the point named after this control code in the code field. The control code and name should be separated by a space. For example, **<Line code> <Join to named point> 123**. Whether the current point will also join to the next point that has the same code depends on the control code entered for the next point.

### Start join sequence

Enter this control code to start a new join sequence. The current point is set as the first point in the sequence.

### End join sequence

Enter this control code to instruct the system that the current point is the last point in the join sequence. This means that the next point that has the same line code will not join to it.

### Skip join

Operates in a similar fashion to the **Start join sequence** action, but it only stops the join action of the line code it is associated with. It does not make the current point the first point in a new join sequence. **Skip join** is

ignored for polygons.

## Control codes for arcs

### Start tangential arc

Enter the **Start tangential arc** control code to start an arc tangentially. The azimuth between the previous point with the same feature code, and the point that has the start arc control code, defines the entry tangent direction.

### End tangential arc

Enter the **End tangential arc** control code to end an arc tangentially. The azimuth between the point with the end arc control code, and the next point with the same feature code, defines the exit tangent direction.

### Start non-tangential arc

Enter the **Start non-tangential arc** control code to start an arc non-tangentially. You do not need a previous point with the same feature code to start an arc this way.

### End non-tangential arc

Enter the **End non-tangential arc** control code to end an arc non-tangentially. No next point with the same feature code is required to end an arc this way.

***NOTE –*** *If an arc cannot be computed, the segment is drawn as a dashed red line to indicate that something is wrong with the coding. Situations where this will occur are:*

- *An arc is defined by two points and no tangency information is defined for at least one of the two points.*
- *A two point arc is defined as being tangential at both the start and end but these tangents do not work.*
- *A best fit arc from three or more points cannot be determined, for example when the points are all on a straight line.*

## Control codes for curves

### Start smooth curve

Enter the **Start smooth curve** control code to start a smooth looking curve. Subsequent points are added to the smooth curve until you use the **End smooth curve** control code. If any point that makes up the curve has a null elevation then the entire curve is considered to be 2D, and will lie on the groundplane.

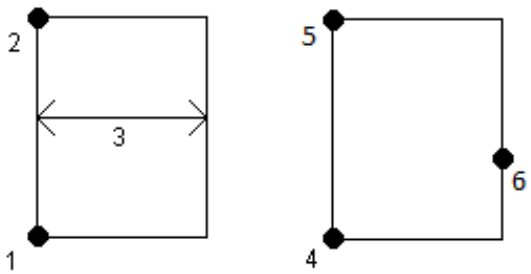
### End smooth curve

Enter the **End smooth curve** control code to end a smooth curve. The next point is not added to the curve.

### Start rectangle

Enter the **Start rectangle** control code to define a rectangle. Referring to the following diagrams, the rectangle can be defined by:

- Two points where the first point (1), defining one corner of the rectangle, uses the *Start rectangle* control code, the second point (2) defines the next corner of the rectangle and one of the two points includes a width value (3). For example, **<Line code> <Start rectangle> 8** for the first point and then **<Line code>** for the second point. When given a positive width value, the rectangle is drawn to the right of the line drawn from the first point to the second point. If the width value is negative, the rectangle is drawn to the left.
- Three points where the first point (4), defining one corner of the rectangle, uses the **Start rectangle** control code, the second point (5) defines the next corner of the rectangle and the third point (6) is used to define the width. For example, **<Line code> <Start rectangle>** for the first point, **<Line code>** for the second point and then **<Line code>** for the third point.



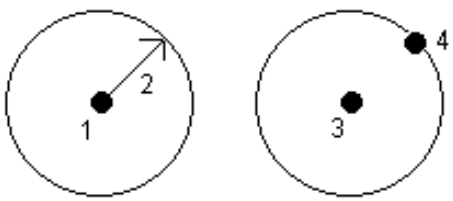

***NOTE –*** *Rectangles are drawn respecting the elevation of all points.*

## Control codes for circles

### Start circle (center)

Enter the **Start circle (center)** control code to define a circle. Referring to the following diagrams, the circle can be defined by:

- One point (1) at the center of the circle where that point uses the **Start circle (center)** control code followed by a radius value (2). For example, **<Line code> <Start circle (center)> 8**.
- One point (3) at the center of the circle where that point uses the **Start circle (center)** control code and a second point (4), which lies on the edge of the circle, and is used to define the radius of the circle. For example, **<Line code> <Start circle (center)>** for the first point and then **<Line code>** for the second point.



### Start circle (edge)

Enter the **Start circle (edge)** control code to define a circle. The circle is defined by three points that lie on the edge of the circle. The first point uses the line code and the **Start circle (edge)** control code, and the second and third points just use the line code.

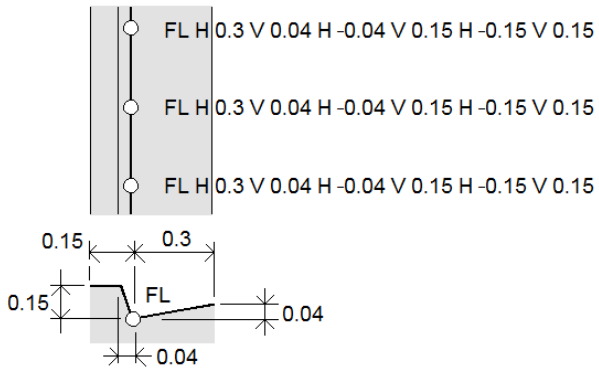
***NOTE –*** *Circles are drawn horizontal at the elevation of the first point with an elevation.*

### Horizontal offset and vertical offset for lines and arcs

Enter the horizontal offset and vertical offset control codes to offset feature coded lines and arcs by a horizontal or vertical value.

These codes are ideal when surveying a curb and gutter where points would be measured at the flow line (invert) of the gutter with a line code and horizontal and vertical offset control codes. For example, <**Line code**> <**Horizontal offset**> 0.3 <**Vertical offset**> 0.04.

Refer to the following real world example of a curb and gutter where FL is the line code for the flow line, H is the horizontal offset control code and V is the vertical offset control code:




***NOTE –***

- *To break an offset use H – as the code.*
- *A negative horizontal offset value creates an offset to the left of the line. A negative vertical offset value creates an offset below the line.*
- *You cannot offset line work created using the smooth curve control codes.*

## Cogo settings

To configure Cogo settings for the job:

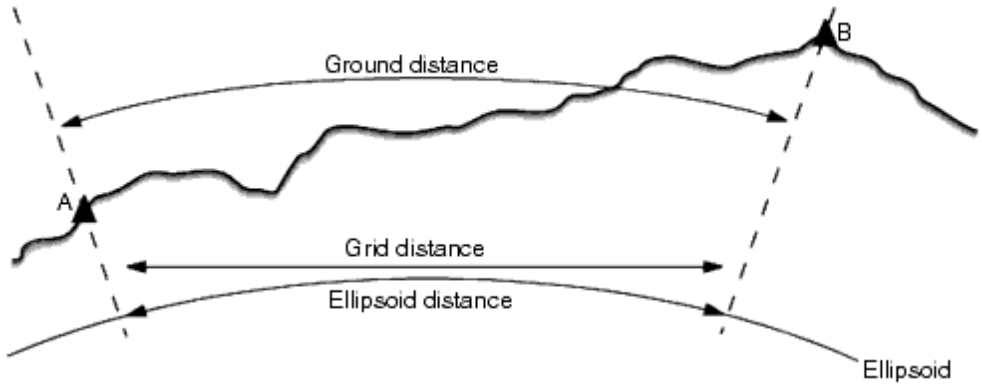
1. Tap ≡ and select **Job**. The current job is already selected.
2. Tap **Properties**.
3. Tap **Cogo settings.**
4. Change the fields as required.

## Distance display and calculation

The **Distances** field specifies how distances are displayed and calculated in the software. The **Distances** field appears in the **Cogo settings** screen and in some Key in and Cogo **Options** screens.

| When Distances are set to... | The length or area is computed... |
|---|---|
| Ground | At the mean ground elevation |
| Ellipsoid | On the ellipsoid surface |
| Grid | Directly off the grid coordinates |

The following diagram shows the options between points A and B.




***NOTE –*** *If the coordinate system for a job is defined as* ***Scale factor only****, ellipsoid distances cannot be displayed.*

## Ground distance

A ground distance is the horizontal distance calculated between the two points at the mean elevation parallel to the chosen ellipsoid.

If an ellipsoid has been defined in the job and the **Distances** field is set to **Ground**, the distance is calculated parallel to that. If no ellipsoid has been defined, the WGS-84 ellipsoid is used.

## Ellipsoid distance

If the **Distances** field is set to **Ellipsoid** then a correction is applied and all distances are calculated as if on the local ellipsoid, which usually approximates to sea level. If no ellipsoid has been specified, the WGS-84 ellipsoid is used.

## Grid distance

If the **Distances** field is set to **Grid**, the grid distance between two points is displayed. This is the simple trigonometrical distance between the two sets of two-dimensional coordinates. If the coordinate system for the job is defined as **Scale factor only**, and the **Distances** field is set to **Grid**, the software displays ground

distances multiplied by the scale factor.

To perform Cogo calculations in a **No projection / No datum** coordinate system, set the **Distances** field to **Grid**. The software then performs standard Cartesian computations. If the grid distances you enter are distances on the ground, the new computed grid coordinates will be ground coordinates.

***NOTE –*** *A grid distance between two measured GNSS points cannot be displayed unless you have specified a datum transformation and a projection, or performed a site calibration.*

## Curvature correction

In Trimble Access, all ellipsoid and ground distances are parallel to the ellipsoid.

## Sea level (ellipsoid) correction

Select the **Sea level (ellipsoid) correction** check box if the horizontal components of distances measured with a conventional total station should be corrected to their equivalent length on the ellipsoid.

In most cases, Trimble recommends selecting the **Sea level (ellipsoid) correction** check box to compute the correct geodetic grid coordinates from the total station observations. However, if the local ellipsoid was inflated to provide computed ground coordinates, but the point heights were not changed to be in terms of the inflated ellipsoid, do not select sea level correction; for example, when using jobs with Minnesota county coordinate systems.

The sea level correction is carried out using the average height (not elevation) of the line above the local ellipsoid. If both ends of the line have null heights, the default height specified for the job is used to compute this correction.

The formula used for the computation is:

**Ellipsoid horizontal distance = HzDist x Radius / (Radius + AvHt)**

| | |
|---|---|
| HzDist: | Horizontal component of measured distance |
| Radius: | Ellipsoid semi-major axis |
| AvHt: | Average height above local ellipsoid of the measured line |

***NOTE –***

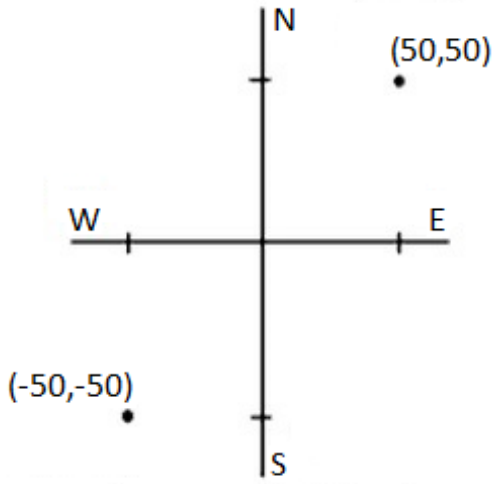
- *In jobs where the coordinate system is configured to provide ground coordinates, the **Sea level (ellipsoid) correction** is always enabled and cannot be edited. This is because the sea level correction is already applied in the computation of the ground coordinates.*
- *In a Scale only job, there is no local ellipsoid available because this is not a geodetic projection. In this case, the correction computation defaults to using the semi-major axis of the WGS-84 ellipsoid (6378137.0 m) as the radius value. The sea level correction in Scale only jobs also uses the point elevations because there are no ellipsoidal heights available.*
- *You cannot set a default height for Scale only jobs. This means that if the **Sea level (ellipsoid) correction** is enabled in a Scale only job, you must use 3D points, or null coordinates will be computed because it is not possible to compute the sea level correction.*

## Grid coordinate direction

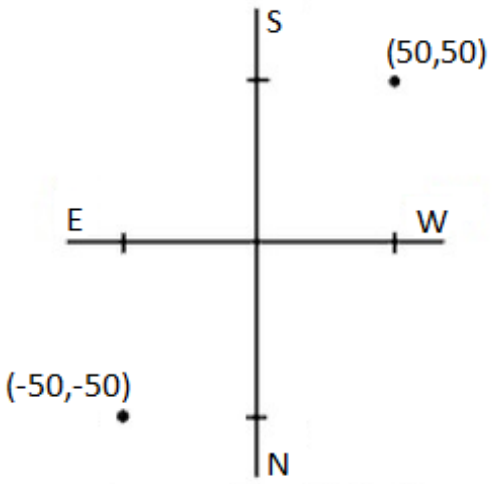
Use the **Grid coords** field to set the grid coordinates to increase in one of the following sets of directions:

- north and east
- south and west
- north and west
- south and east

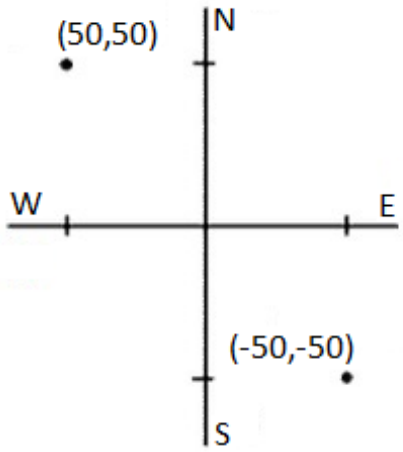
The following diagram shows the effect of each setting.



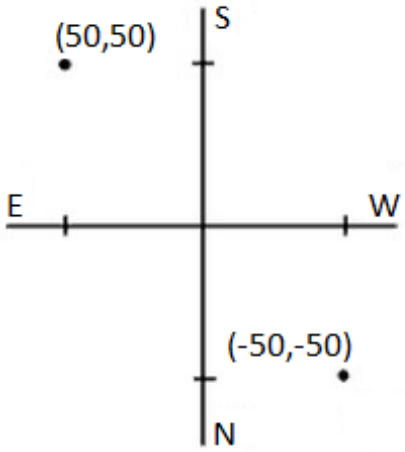

Increase North-East




Increase South-West




Increase North-West




Increase South-East

## Azimuth display

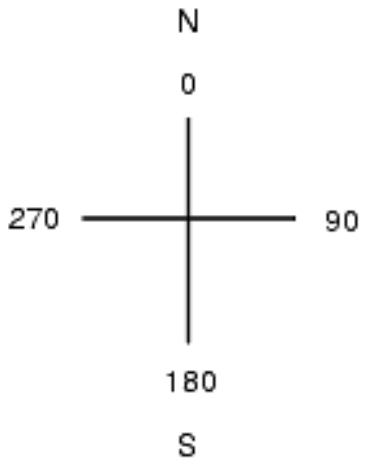
The azimuth displayed and used by the software depends on the coordinate system that you defined for the current job:

- If you defined both a datum transformation and a projection, or if you selected **Scale factor only** , the grid azimuth is displayed.
- If you defined no datum transformation and/or no projection, the best available azimuth is displayed. A

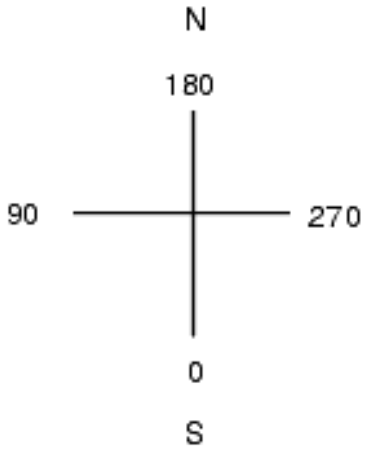
grid azimuth is the first choice, then a local ellipsoidal azimuth, then the WGS-84 ellipsoid azimuth.

- If you are using a laser rangefinder, the magnetic azimuth is displayed.

If a south azimuth display is required, set the **South azimuth** field to **Yes**. All azimuths still increase clockwise. The following diagram shows the effect of setting the **South azimuth** fields to No or Yes.




South azimuth = No




South azimuth = Yes

## Neighborhood adjustment

To apply a neighborhood adjustment to all conventional foresight observations made from a Station setup plus or Resection, and to all GPS observations made in a job that has a valid GPS site calibration, select the **Neighborhood adjustment** check box.

Neighborhood adjustment uses the residuals from **Station setup plus, Resection** or **GNSS site calibration** to calculate delta grid values to apply to subsequent observations made during the survey. Each observation is adjusted according to its distance from each of the backsight points (for a conventional survey) or calibration points (for a GNSS survey). The following formula is used to calculate the weight to give the residuals of each backsight or calibration point:

$p = 1/D^n$ where:

p is the weight of the backsight or calibration point

D is the distance to the backsight or calibration point

n is the weight exponent

A weighted average is then computed and the resulting delta values are applied to each new observation to get an adjusted grid position.

***NOTE –*** *A high value for the weight exponent results in low impact (weight) of distant backsight or calibration points.*

For **Neighborhood adjustment** to be applied, the station setup or calibration must have at least 3 known points with 2D grid residuals. That is, if you perform a:

- Station setup plus, you must have HA VA SD observations to at least 2 backsight points, each with known 2D coordinates.
- Resection, you must have HA VA SD observations to at least 3 backsight points, each with known 2D coordinates.
- Calibration, you must have GNSS observations to at least 3 control points, each with known 2D coordinates.

***NOTE –***

- *Neighborhood adjustment will use a **GNSS site calibration** only if it has been observed in the current job. This is because a GNSS calibration that is part of the coordinate system in an uploaded job does not include the GNSS calibration residuals.*
- *For **Station setup plus**, the known station coordinate is included in the neighborhood adjustment calculation. In the calculation, the station coordinate is given grid residuals of zero.*
- *Neighborhood adjustment is a 2D-only adjustment. Any vertical residuals from station setup or calibration are not used in the neighborhood adjustment calculations.*
- *Neighborhood adjustment using GNSS site calibration residuals is applied to all WGS-84 points in the job, not just GNSS observations.*

**WARNING –** Make sure that the backsight or calibration points are around the perimeter of the site. Do not survey outside the area enclosed by the backsight or calibration points (and for Station setup plus, the station point). The neighborhood adjustment is not valid beyond this perimeter.

## Magnetic declination

Set the magnetic declination for the local area if magnetic bearings are being used in the Trimble Access software. You can use magnetic bearings if you choose the **Cogo / Compute** point using the Brng-dist from a point method.

The magnetic declination defines the relationship between magnetic north and grid north for the job. Enter a negative value if magnetic north is west of grid north. Enter a positive value if magnetic north is east of grid north. For example, if the compass needle points 7° to the east of grid north, the declination is +7° or 7°E.

***NOTE –***

- *Use the published declination values if available.*
- *If grid north in the job has been rotated away from true north due to the coordinate system definition (possibly via a GNSS calibration) then this must be allowed for in the magnetic declination specified.*

## Advanced Geodetic

Select **Advanced Geodetic** to enable the following options:

- Station setup scale factor – see Station setup options
- Helmert transformation for resection – see To complete a resection
- Local transformations – see Transformations
- SnakeGrid projections – see Projection, page 39

## Averaging

The **Averaging** field defines how duplicate points are averaged. Select one of the following options:

- Weighted
- Unweighted

If **Weighted** is selected, points in an average are weighted as follows:

- GNSS positions use the horizontal and vertical precisions of the observations. Observations that do not have precisions, and keyed-in points, use 10 mm for horizontal and 20 mm for vertical.
- For conventional observations that include a measured slope distance, horizontal and vertical standard errors are computed based on the standard errors of the components of the observation.

  The standard error used for weighting the horizontal position is a combination of those used for the horizontal direction and horizontal distance weights from the resection calculation. For more information, see the *Trimble Access Software Resection Computations* PDF.

***NOTE –*** *The Trimble Access software computes an averaged coordinate by averaging the grid coordinates computed from the underlying coordinates or observations. Observations that do not allow a grid coordinate to be resolved (for example, angles only observations) are not included in the average coordinate.*

Averaging uses **Least squares** to average points/observations stored with the same name in the job.

- If the average includes anything other than ECEF or WGS-84 positions, the average is stored as a grid.
- GNSS observations and conventional observations that include a measured slope distance are resolved to grid and then averaged using Least squares. The intersections of angles only conventional observations are averaged using Least squares.
- Conventional angle-only observations are only added to the solution if there are no other positions or observations. Any Mean Turned Angle (MTA) observed to the point is ignored and the original observations are used to compute the average position.
- When the average includes only ECEF or WGS-84 positions, the averaged grid position is converted back to WGS-84 and stored as a WGS-84. When the average contains only grid positions and conventional observations, or a mixture of position types, then the averaged grid position is stored as a grid.

***NOTE –*** *An averaged position is not automatically updated if the positions used to compute the average are changed. For example, if the calibration is updated, if observations are transformed or deleted, or if new observations of the same name are added, recompute the averaged position.*

# Additional settings

To configure additional settings, such as adding description fields or configuring the point range for the job, or to add measured points to a CSV file:

1. Tap ≡ and select **Job**. The current job is already selected.
2. Tap **Properties**.
3. Tap **Additional settings.**
4. Change the fields as required.

## Use descriptions

To display two additional description fields in some software screens, enable the **Use descriptions** switch and then enter the **Description 1 label** and **Description 2 label**.

The description fields are similar to **Code** fields because they enable you to add additional information to data. They do not use feature code libraries, and they do not support attributes.

The description field data is available in Trimble DC files as Note records. If required, you can export the data stored in the description fields.

Once the additional descriptions fields are enabled, they are available in the following features of the Trimble Access software:

- Measure topo, Continuous topo or Measure codes
- Stakeout
- Point manager or Review job
- Key in point, line, and arc
- Compute point, Compute average, Transformations, or Traverse
- Station setup
- Wildcard search

Each of the **Description** fields remembers the descriptions that are entered. To view the stack of previously used descriptions, tap ▸ next to the **Description** field.

## Feature library – Use attributes of base code

Select the **Use attributes of base code** check box to provide attributes for the complete code, or from a portion of the code – the "base code". This setting is applied throughout the Trimble Access software, including Measure codes.

Typically, base codes are used when you use the '+' and '-' softkeys to "string" feature codes. For example, when you code a fence where all observations coded "Fence01" are joined together and all observations coded "Fence02" are joined together, and so on, and they all have the same attributes. In this example, you can create feature code libraries that contain all the "Fence**" codes, or contain just the base code "Fence".

If you do string codes, and the feature library includes only the base code, then select the **Use attributes of base code** check box.

If you do not string codes, or if you do string codes but you include the entire code in the feature library, then you are not using base codes and you should clear the **Use attributes of base code** check box.

In the Trimble Access software, you can use Measure codes to create a code button that contains a numeric or alpha-numeric code (the base code) and then append a numeric suffix using the + or - softkeys. For codes entered into any other code field in the Trimble Access software, you cannot use the + or - softkeys to append a suffix, so when you use base codes, the software can only attempt to determine the base code by stripping the numeric characters from the end of the codes.

For more information, see Attributes and base codes.

### Point name range for the job

To specify the minimum and maximum point name for the job, enable the **Apply point name range** switch and then enter the required point names.

***NOTE –*** *The point names must be numeric. Numbers that include decimal points or alphabetic characters are ignored. Negative and positive numbers are supported.*

### Add to CSV file

To add points measured using **Measure topo** or **Measure rounds** to a CSV file, enable the **Enable** switch and then enter the **CSV file name**. By default, the CSV file is stored in the current project folder.

**TIP –** You can use this option to create a file of control points.

## Media files

Configure media file settings at the job level so that when the image is captured the Trimble Access knows whether to link the file to the job or a point in the job. For more information on media files and how to use them, see Media files.

1. Tap ≡ and select **Job**. The current job is already selected.
2. Tap **Properties**.
3. Tap **Media files**.
4. In the **Link to** field, select how the images will be linked. Choose from:
   - **Job** – linked to the job
   - **Previous point** – linked to the latest point stored
   - **Next point** – linked to the next point to be stored
   - **Point name** – linked to the point entered in the **Point name** field
   - **None** – the image is saved but is not linked to the job or a point

***NOTE –*** *For all options, the media file is always saved to the* ***<project>\<job name> Files*** *folder. If there is no job open, the media file is saved to the current project folder.*

5. Select the **Show with new media file** option to show the media file screen immediately after capturing an image. This enables the **Link to** method to be changed and, if linking by point name, the point name. Changing this setting applies the setting to all jobs.
6. If the **Link to** option was set to **Previous point**,**Next point**, or **Point name**, you can select **Geotag images**. See To geotag an image.
7. Tap **Accept**.

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