User's Guide

Trimble Access for Spatial Imaging

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Contents

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Valid as of April 6th, 2006.

CHAPTER 1

Getting Started

The first time you install or update the Trimble Access software, you must download and install the Trimble Access Installation Manager onto your Trimble Rugged Tablet Computer.

System Requirements

To run Trimble Access, you need to have the system requirements listed below:

Software Configuration:

- Genuine Windows 7® Professional

Hardware Configuration*:

- A Trimble Rugged Tablet Computer with the following specifications:

    - Intel Atom 1.6 GHz processor,
    - 1 GB DRAM,
    - 32 GB Solid State Hard Drive,
    - Integrated WiFi b/g (Cisco certification pending),
    - Etc.

Note: (*) Please, refer to the Trimble Rugged Tablet Computer's data sheet for more information.

Installing Trimble Access Installation Manager

To Install Trimble Access Installation Manager:

1. Turn On your Trimble Rugged Tablet Computer to install the Windows operating system.
2. Once completed, turn On the WIFI radio(*).
3. Install the latest Windows updates.
4. On your Trimble Rugged Tablet Computer, enter www.trimble.com/taim into the Internet browser.
5. And then tap Downloads / Trimble Access Installation Manager.
6. Click Run and then follow the instructions in the installation wizard to download the Trimble Installation Manager onto your Trimble Rugged Tablet Computer.

Note: (*) For more information regarding to how to turn On the WIFI radio, please refer to the Trimble Rugged Tablet Computer documentation.

Installing and Updating Trimble Access

To Install and Update Trimble Access:

1. Tap the Start button on the taskbar and then All Programs / Trimble Access Installation Manager. Once running, the Trimble Access Installation Manager contacts the Trimble hosted server to check for any available updates.
2. Select the software that you want to install or update on your Trimble Rugged Tablet Computer:

    - If a component is already up-to-date with the latest version, it is not available to select.
    - If a component is compulsory, the text is maroon and you cannot de-select the item.

3. Tap Start. The Trimble Access Installation Manager downloads and installs the license file and the selected components.

Note:
- You need to have an Internet connection on your Trimble Rugged Tablet Computer.
- If you are not licensed to install a particular item, it does not appear in the list.

Licensing Trimble Access and Components

Every Trimble Access application must be licensed to be able installed and operated on your Trimble Rugged Tablet Computer. The license file is hosted on the Trimble hosted sever. You must download it through Trimble Access Installer Manager.

When you purchase an additional component, extend your existing license, the license file is then updated on the Trimble hosted server. You need to download the new license file.

CHAPTER 2

Using Trimble Access

Trimble Access is a software program which offers survey teams a new approach to surveying that expedites data collection, processing, analysis, and delivery through improved workflows, collaboration and control.

Starting Trimble Access

To Start Trimble Access:

1. Tap the Start button on the taskbar and then All Programs / Trimble / Trimble Access For Tablet PC / Trimble Access.
2. Or double-tap the Trimble Access icon on your desktop.

    - If Trimble Access has been started for the first time, the Trimble Access Home Page opens with a message* prompting you to choose the type of instrument to be connected to. All Instrument Tools (like On-site Video Calibration, Auto-Test, etc.) are dimmed.
    - If Trimble Access has not been started for the first time, it attempts a connection to the last type of instrument you have used.

Note: (*) You need close the message by tapping OK to be able to choose an instrument type.

Exiting Trimble Access

To Exit Trimble Access:

1. Tap the Close  button. A dialog opens.
2. Tap Yes. The Trimble Access program closes.
3. Tap No. The Trimble Access program remains open.

About Trimble Access

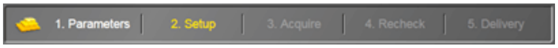
On the Home Page, tapping the Home Page  button will make the About dialog appeared. This dialog lists the version of Trimble Access you are using and the plug-ins that are inside. For each, you have the Type of License, the Date of Expiration and the Version.

Understanding Trimble Access's Concepts

Trimble Access is based on three types of Jobs. The workflow of each Job is a series of Steps and Sub-Steps and each workflow differs from another.

Having an Overview of a Job Workflow

You can have an overview of where you currently are in a Job workflow thanks to the Step Bar. The icon of the current Job is placed at the beginning of the Step Bar. The Accomplished Step is in white while the Current Step is in yellow. The Not Already Accomplished Step(s) is (or are) not available yet.



Note: There are no Sub-Steps in the Step Bar.

Going Backwards to a Step

To Go Backwards to a Step:

- In the Step Bar, tap an Accomplished Step (step in white before the Current Step (in yellow)).

Note: If the current step is not completed, going backwards to a step will invalidate it.

Going Forwards to a Step

To Go Forwards to a Step:

1. In the Step Bar, tap the Current Step.
2. Or tap an Accomplished Step if there is more than one before the Current Step.

Browsing Through a Step

In a given Sub-Step, the Back and Next buttons when enabled means that this Sub-Step requires an input or can be left as it without any input. When the Next button is dimmed; the user has to fill in this Sub-Step with parameters before the button becomes enabled. When the Back button is dimmed; it is because the user is e.g. at the first Sub-Step of a Step. Going back is forbidden.

When both the Back and Next buttons are dimmed; it is because the Sub-Step is in progress. When there are no buttons; the user has to make a choice in order to access to a Step (or Sub-Step).

The Back and Next buttons can become respectively Cancel and (Start or Done). Cancel means that the user can abort the current Step (or Sub-Step). Start launches the Sub-Step and Done validates it.

Going Backwards to a Sub-Step

To Go Backwards to a Sub-Step:

- Tap the Back button next to the Step Bar.

Going Forwards to a Sub-Step

To Go Forwards to a Sub-Step:

- Tap the Next button next to the Step Bar.

Going Back to the Trimble Access Home Page

Inside a job workflow, you can go back to the Trimble Access Home Page at any time by tapping the Home Page  button.

CHAPTER 3

Setting up a Network Connection

Before being able to work with an instrument, you need to setup a network connection which is a set of information that enables your Trimble Rugged Tablet Computer to connect to it.

You can connect to a Trimble GX instrument through an Ethernet cable using an USB/RJ45 adapter or through Wi-Fi. You can only connect to a Trimble CX instrument through an Ethernet cable using an USB/RJ45 adapter. In all cases, Trimble Access uses a TCP/IP protocol that needs to be configured.

Configuring the TCP/IP Settings for a Wireless Network Connection

To Configure the TPC/IP Settings for a Wireless Network Connection:

1. Tap the Wireless LAN button*. The Control Panel \ Network Connections window opens.
2. Tap the Wireless Network Connection icon. A Mouse Icon in transparency appears next to it.
3. Tap on the right button of the Mouse Icon. A pop-up menu drops down.
4. Tap Properties. The User Account Control dialog opens and prompts to Continue (or Cancel) the action.
5. Tap the Continue button. The Wireless Network Connection Properties dialog opens.
6. In the Networking tab, select Internet Protocol Version 4 (TCP/IPv4).
7. Tap the Properties button. The Internet Protocol Version 4 (TPC/IPv4) Properties dialog opens.
8. In the General tab, check the "Use the following IP Address" option.
9. Input 192.0.4.X** in the IP Address field.
10. Input 255.255.255.0 in the Subnet Mask field.
11. Tap OK. The Internet Protocol Version 4 (TPC/IPv4) Properties dialog closes.
12. Tap Close. The Wireless Network Connection Properties dialog closes.
13. Tap . The Control Panel \ Network Connections window closes.

Note:

- (*) First start Trimble Access.
- (**) X could be anything between 0 and 255 except 0, 1, 10 and 255.
- Use the Input Panel to enter the settings. Please, refer to the Trimble Rugged Tablet Computer documentation on the use of the Input Panel.

Configuring the TPC/IP Settings for a Local Area Connection

To Configure the TPC/IP Settings for a Local Area Connection:

1. Tap the Wireless LAN button*. The Control Panel \ Network Connections window opens.
2. Tap the Local Area Connection icon. A Mouse Icon in transparency appears next to it.
3. Tap the right button of the Mouser Icon. A pop-up menu drops down.
4. Tap Properties. The User Account Control dialog opens and prompts to Continue (or Cancel) the action.
5. Tap the Continue button. The Local Area Connection Properties dialog opens.
6. In the Networking tab, select Internet Protocol Version 4 (TCP/IPv4).
7. Tap the Properties button. The Internet Protocol Version 4 (TPC/IPv4) Properties dialog opens.
8. In the General tab, check the "Use the following IP Address" option.
9. Input an address** in the IP Address field.
10. Input 255.255.255.0 in the Subnet Mask field.
11. Tap OK. The Internet Protocol Version 4 (TPC/IPv4) Properties dialog closes.
12. Tap Close. The Local Area Connection Properties dialog closes.
13. Tap . The Control Panel \ Network Connections dialog closes.

Note:

- (*) First start Trimble Access.
- (**) If using a Trimble GX instrument, the address should be 192.0.4.X where X could be anything between 0 and 255 except 0, 1, 10 and 255.
- (**) If using a Trimble CX instrument, the address should be 192.168.100.X where X must be equal to 1.
- Use the Input Panel to enter the settings. Please, refer to the Trimble Rugged Tablet Computer documentation on the use of the Input Panel.

Setting up a Wi-Fi Connection to the Trimble GX instrument

Once you have a network connection, you can setup a connection to the Trimble GX instrument.

To Setup a Wi-Fi Connection to the Trimble GX instrument:

1. In the Network Connections window, tap the Wireless Network Connection icon to select it. The Connect To icon appears.
2. Tap the Connect To icon. The Connect to a Network dialog opens.
3. If required, tap the Refresh Network List icon.
4. Choose an access point connected to a Trimble GX instrument from the list.
5. Tap the Connect button. The "TRIMBLE_Serial_Number is an unsecured network" message appears as well as the Connect Anyway button.
6. Tap the Connect Anyway button. The "Connecting to TRIMBLE_Serial_Number" and "Successfully Connected to TRIMBLE_Serial_Number" messages appear.
7. Tap Close. The Connect to a Network dialog closes.
8. If required, close the Network Connections window.
9. If required, close the Network Connections and Network and Sharing Center windows.

Tip: You can first tap the Start button in your Windows® desktop, select Control Panel from Settings.

Checking the Windows Firewall

A Firewall is a security system when may set restriction on what information is communicated from your Trimble Rugged Tablet Computer to your instrument and vice versa. The Windows Firewall protection is by-default On.

To Check the Windows Firewall:

1. Tap the Start button in your Windows® desktop. A menu bar pops up.
2. Select Settings \ Control Panel from the menu bar. The Control Panel window appears.
3. In e.g. Windows' Classic View, double-tap the Security Center icon. The Windows Security Center window appears.
4. You may see Off in the Firewall line.

Turning Off the Windows Firewall

To be able to run Trimble Access, you need to turn off the Windows Firewall.

<u>To Turn Off the Windows Firewall:</u>

1. In the Windows Security Center window, tap the Windows Firewall icon in left panel. The Windows Firewall window appears.
2. Tap either Change Settings or Turn Windows Firewall On or Off. The User Account Control dialog appears and prompts to Continue (or Cancel) the action.
3. Tap the Continue button. The User Account Control dialog disappears while the Windows Firewall Settings dialog opens.
4. Check the Off (Not Recommended) option.
5. Tap OK. The Windows Firewall Settings dialog closes.
6. Tap . The Windows Firewall window closes.
7. Tap again . The Windows Security Center window closes.
8. Tap again . The Control Panel window closes.

CHAPTER 4

Connecting to an Instrument

You can connect to an instrument in two ways. First is an automatic connection when you start Trimble Access. Second is a manual connection when the connection has been lost.

Note: In the first case, if Trimble Access has been started for the first time, no (automatic) connection to an instrument will occur. If this is not the first time; Trimble Access attempts an automatic connection to the last type of instrument.

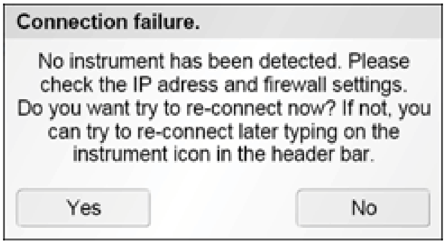
Connecting to a Trimble GX instrument

<u>To Connect to a Trimble GX instrument:</u>

1. In the Trimble Access Home Page, browse to the Settings  button using the scroll bar.
2. Tap the Settings button. The Settings window appears with the General tab open by-default.
3. Tap the Network tab. The Network window appears.
4. Tap on the Instrument pull-down arrow.
5. Choose GX as instrument type.
6. Tap Done. The Settings window closes.

Trimble Access executes two operations in batch mode. The first operation consists of running an automatic detection procedure to find the Trimble GX instrument connected to your Trimble Rugged Tablet Computer. Once detected, Trimble Access tries to establish a connection between the instrument and your Trimble Rugged Tablet Computer.

If the instrument's IP address is not correctly set-up, Trimble Access displays a warning message and prompts you to try to reconnect to the instrument or not. Tap No to close the warning message and update consequently the IP address.



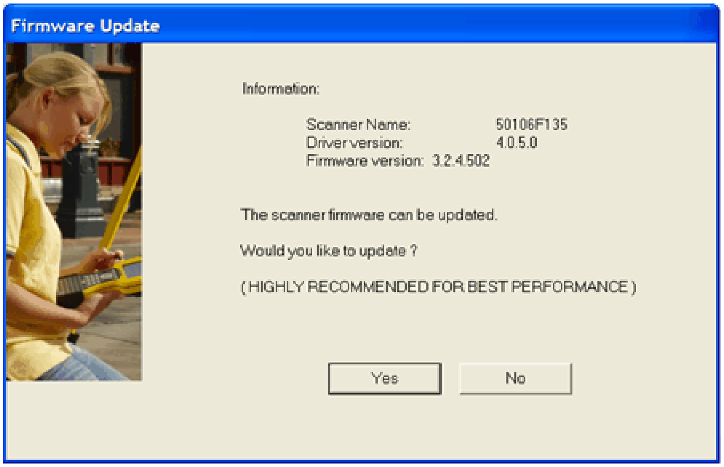
If an instrument is already connected to your Trimble Rugged Tablet Computer, Trimble Access displays the warning message below. Tap Ok to close the warning message.

The second procedure consists of checking the driver and firmware versions and their compatibility. On some rare occasions, the driver and firmware versions may not be fully compatible. Trimble Access will prompt you to update the firmware. Note that selecting No will not prevent you from working with Trimble Access, but may cause some functions (or features) to remain inactive.

Note: Follow the steps from 1 to 6 only if Trimble Access has been started for the first time.

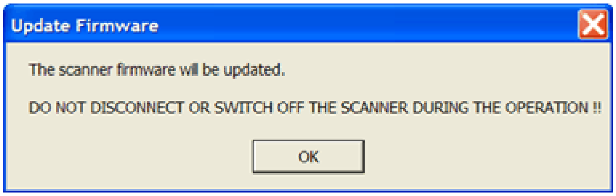
Updating the Trimble GX instrument's Firmware

The Firmware Update dialog opens. Trimble Access lists the Trimble GX instrument with its name and reference number as well as the firmware and driver versions and a conflicting version (if present).



To Update the Firmware:

1. Tap Yes. Trimble Access displays a warning message and prompts you to not disconnect or switch the Trimble GX instrument off while the set-up is in doing.



2. Tap OK. The warning message closes. The Trimble GX instrument's firmware updating is carried out in two stages. First concerns the firmware updating. Second is about the instrument rebooting.
3. Tap OK. The Firmware Update dialog closes.

Note:

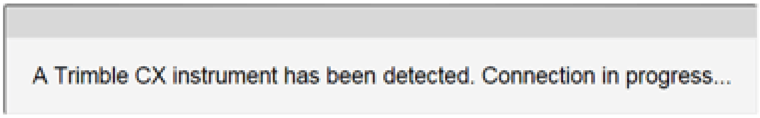
- Ensure also that the power supply box's cable does not prevent the Trimble GX instrument from rotating.
- The Trimble GX instrument rotates around its base 180° clockwise looking for its origin and then 360° anticlockwise if the origin is not found on the first turn. To prevent the Trimble GX instrument from rotating excessively, ensure that the specifically marked Trimble GX instrument leg is set at the left of the porthole.

Connecting to a Trimble CX instrument

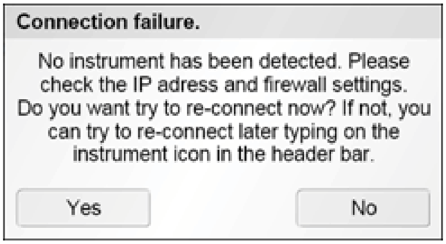
<u>To Connect to a Trimble CX instrument:</u>

1. In the Trimble Access Home Page, browse to the Settings  button using the scroll bar.
2. Tap the Settings button. The Settings window appears with General tab open by-default.
3. Tap the Network tab. The Network window appears.
4. Tap on the Instrument pull-down arrow.
5. Choose CX as instrument type.
6. Tap Done. The Settings window closes.

An automatic detection procedure to find the Trimble CX instrument connected to your Trimble Rugged Tablet Computer is running. Once detected, Trimble Access tries to establish a connection between the instrument and your Trimble Rugged Tablet Computer.



If the instrument's IP address is not correctly set-up, Trimble Access displays a warning message and prompts you to try to reconnect to the instrument or not. Tap No to close the warning message and update consequently the IP address.



If an instrument is already connected to your Trimble Rugged Tablet Computer, Trimble Access displays the warning message below. Tap Ok to close the warning message.

Note: Follow the steps from 1 to 6 only if Trimble Access has been started for the first time.

Checking the Connection Status

You can visually check if your Trimble Rugged Tablet Computer is connected (or not) to an instrument thanks to the Connection button located at the title bar of Trimble Access.

- The Connection button when taking the following color  means that no instrument is connected to your Trimble Rugged Tablet Computer or the connection has been lost. In this state, Trimble Access does not look for an instrument.
- The Connection button when flashing (from  to  and vice versa) means that Trimble Access is looking for an instrument.
- The Connection button when taking the following color  means that an instrument is connected to your Trimble Rugged Tablet Computer.

Requesting a Connection to an Instrument

At any time, when the connection to an instrument is lost or when you are simply not connected; you can request for a connection.

To Request a Connection to an Instrument:

1. Tap the Connection  button. The Connection Request dialog opens.
2. Tap Yes. Trimble Access will attempt a connection to your instrument.
3. Tap No. The connect request is aborted.

Note: If an instrument is already connected to your Trimble Rugged Tablet Computer, tapping the Connection button has no effect.

Checking the Wireless Signal Strength

You can visually check the Wireless signal strength thanks to the Wireless LAN button located at the title bar of Trimble Access. The signal strength is symbolized by five bars from Low to Strong.

Note: When connecting to the instrument through an Ethernet cable using a USB/RJ54 adapter, the Wireless LAN button may have two states: Connectivity On or Connectivity Off.

Checking the TPC/IP Settings

<u>To Check the TPC/IP Settings:</u>

1. Tap the Wireless LAN button*. The Control Panel \ Network Connections window opens.
2. Tap the Wireless Network Connection (or Local Area Connection) icon. A Mouse Icon in transparency appears next to it.
3. Tap on the right button of the Mouse Icon. A pop-up menu drops down.
4. Tap Properties. The User Account Control dialog opens and prompts to Continue (or Cancel) the action.
5. Tap the Continue button. The Wireless Network Connection Properties (or Local Area Connection Properties) dialog opens.
6. In the Networking tab, select Internet Protocol Version 4 (TCP/IPv4).
7. Tap the Properties button. The Internet Protocol Version 4 (TPC/IPv4) Properties dialog opens.
8. Verify that the "Use the following IP Address" option is checked as well as the address and the numbers respectively in the IP Address and Subnet Mask fields.
9. Tap OK. The Internet Protocol 4 (TPC/IPv4) Properties dialog closes.
10. Click Close. The Wireless Network Connection Properties (or Local Area Connection Properties) dialog closes.
11. Tap . The Control Panel \ Network Connections dialog closes.

Note:

- (*) First start Trimble Access.
- For a Trimble GX instrument, the IP Address and Subnet Mask should be respectively 192.0.4.X and 255.255.255.0. X could be anything between 0 and 255 except 0, 1, 10 and 255.
- For a Trimble CX instrument, the IP Address and Subnet Mask should be respectively 192.168.100.X and 255.255.255.0. X could be anything except to the Trimble CX instrument (serial) number.

The Laser Safety Standards

All Trimble GX instruments comply with the performance requirements of US FDA 21 CFR §1040.10 as a Class 2 laser product, and are therefore labeled in accordance with the requirements of this standard. They also comply with the performance requirements of IEC 60825-1 as a Class 3R laser product and are therefore labeled as follows in accordance with the requirements of this standard.

All Trimble CX instruments comply with the performance requirements of IEC 60825-1 as a Class 3R laser product and are therefore labeled in accordance with the requirements of this standard.

Choosing a Laser Safety Standard

The Laser Safety dialog opens once an instrument* has been detected and a connection (to the instrument) is in progress.

<u>To Choose a Laser Safety Standard:</u>

1. In the Laser Safety dialog, choose between US Standard 21 CFR §1041.10 and International Standard IEC 60825-1, Edition 1.2.
2. Tap the OK button. The Laser Safety dialog closes.

Note:

- (*) The Laser Safety dialog will not open if using a Trimble CX instrument.
- Be aware that the "Don't Show Me This Message Again" option is checked by default. If you decide to leave it checked; the chosen Standard cannot then be changed later as the Laser Safety dialog will not appear again.

Viewing the Laser Safety Class

If the International Standard IEC 60825-1 (Edition 1.2) has been chosen; the Laser Safety Class* under which you intend to operate will display in the Estimation and Safety Parameters panel when choosing the Conventional Resolution as Resolution Type.

Note: (*) For a Trimble GX instrument, it may be (2M or 3R). For a Trimble CX instrument, it will only be 3R.

CHAPTER 5

Leveling and Compensating an Instrument

Leveling an instrument is the action of adjusting its vertical position using to the three leveling screws of the tribrach*. Leveling can be done after the instrument has been detected and connected to your Trimble Rugged Tablet Computer or later when you need to do it. In the latter case, you need to select the related command.

Note: (*) Located below the instrument. Please, refer to the user manual that comes with your instrument for more information about how adjusting the tribrach leveling screws. We assume here that the instrument has been already setup.

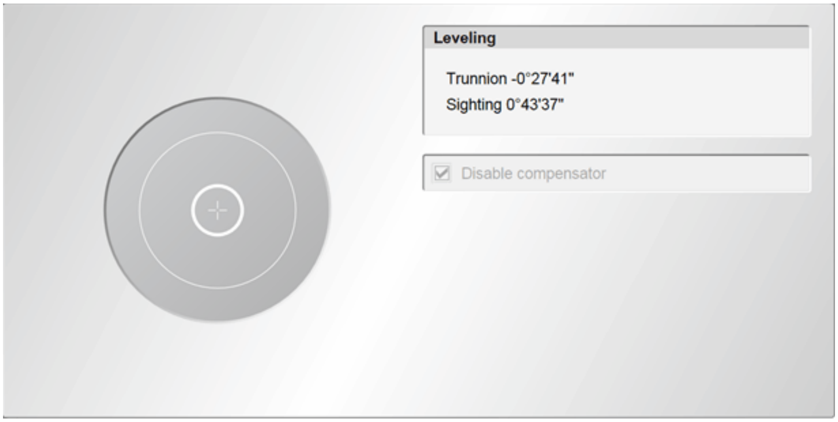
Leveling a Trimble GX instrument

The electronic bubble in the Leveling window contitues as a visual control to check if your instrument is leveled (or not). It may have three states: Out of Range, Yellow and Green.

In addition to the electronic bubble, the Leveling window displays the Trunnion and Sighting information. The horizontal rotation's axis of the instrument is called Trunnion while its sighting direction for acquiring cloud data is called Sighting and both are expressed in degrees, minutes and seconds. The Compensator (when activated) is a feature to level-compensate automatically for all 3D points.

Note: The Leveling, Trunnion and Sighting information are available once the Leveling window appears.

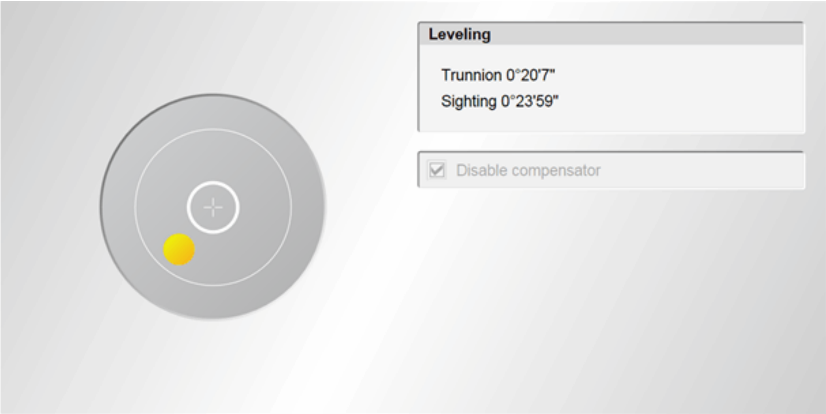
The Instrument is Out of Range



When the instrument is out of range, the electronic bubble is as shown above. The Compensator feature (when the instrument rotates) is not enabled because not guaranteed; the Disable Compensator option is not enabled. In this case, tap the Ok button to close the Error message and adjust the instrument's vertical position using the three leveling screws of the tribrach below the instrument until the electronic bubble level becomes first yellow and then green and centered.

Note: You can leave the instrument as it is (out of range) and directly tap Next.

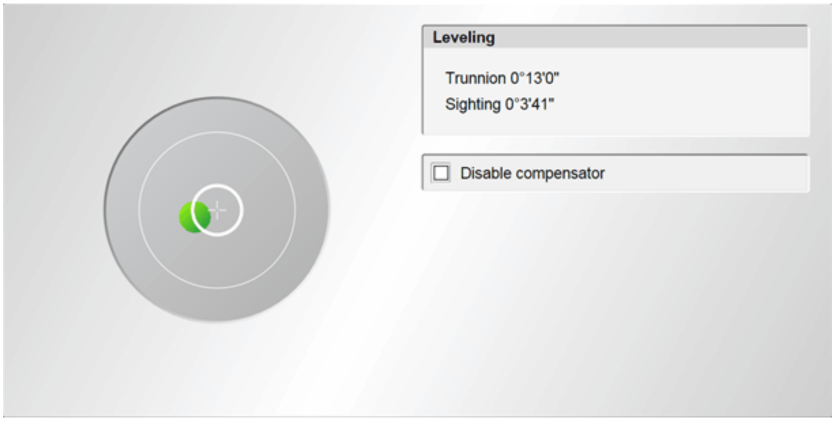
The Instrument is Misleveled



When the instrument is misleveled, the electronic bubble color is yellow. The Compensator feature (when the instrument rotates) is not enabled because not guaranteed; the Disable Compensator option is not enabled. In this case, adjust the instrument's vertical position using the three leveling screws of the tribrach below the instrument until the electronic bubble becomes first green and then centered.

Note: You can leave the instrument as it is (misleveled) and directly tap Next.

The Instrument is Leveled



When the instrument is leveled, the electronic bubble color is green and centered. The Compensator feature (when the instrument rotates) is enabled because guaranteed, the Disable Compensator option is enabled and unchecked by default.

Leveling a Trimble CX instrument

The electronic bubble in the Leveling window contitues as a visual control to check if your instrument is leveled (or not). It may only have two states: Yellow or Green.

In addition to the electronic bubble, the Leveling window displays the Trunnion and Sighting information. The horizontal rotation's axis of the instrument is called Trunnion while its sighting direction for acquiring cloud data is called Sighting and both are expressed in degrees, minutes and seconds. The Compensator (when activated) is a feature to level-compensate automatically for all 3D points.

Note: The Leveling, Trunnion and Sighting information remain unavailable until the Tilt measurement has been performed.

Measuring the Tilt

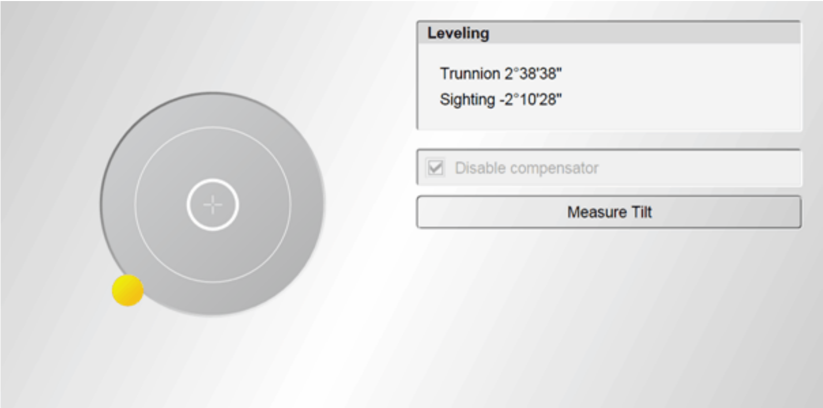
Before measuring the Tilt and when the measurement is in progress, the Disable Compensator option is by default checked and grayed-out. Both the Trunnion and Sighting information are unavailable.

<u>To Measure the Tilt:</u>

- Tap the Measure Tilt button. The Trimble CX instrument performs four measurements. It first turns 270° anticlockwise to make the first measurement, then 90° clockwise for the second, again 90° clockwise to the third and finally 90° clockwise to the last. Once completed, the Disable Compensator option becomes then enabled and un-checked. Both the Trunnion and Sighting information are displayed.

Note: The measurements (performed by the instrument) may take some time.

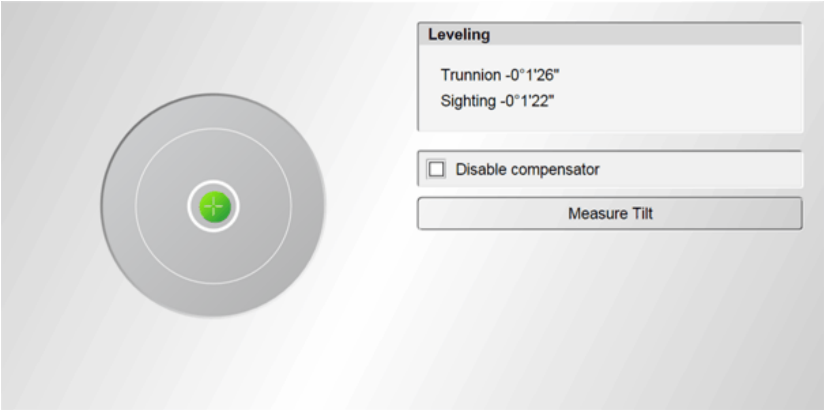
The Instrument is Misleved



When the instrument is misleveled, the electronic bubble color is yellow. The Compensator feature (when the instrument rotates) is not enabled because not guaranteed; the Disable Compensator option is not enabled. In this case, adjust the instrument's vertical position using the three leveling screws of the tribrach below the instrument and measure the Tilt again until the electronic bubble becomes first green and then centered.

Note: You can leave the instrument as it is (misleveled) and directly tap Next.

The Instrument is Leveled



When the instrument is leveled, the electronic bubble color is green and centered. The Compensator feature (when the instrument rotates) is enabled because guaranteed, the Disable Compensator option is enabled and unchecked by default.

Activating and Deactivating the Compensator

Activating the Compensator

You can decide to automatically level-compensate for all 3D points.

To Activate the Compensator:

1. Keep the Disable Compensator option unchecked.
2. Tap Next.

    - When using a Trimble GX instrument, the Atmospheric Correction window appears.
    - When using a Trimble CX instrument, the Trimble Access Home Page appears.

Deactivating the Compensator

You can decide to not automatically level-compensate for all 3D points.

To Deactivate the Compensator:

1. Check the Disable Compensator option.
2. Tap Next.

    - When using a Trimble GX instrument, the Atmospheric Correction window appears.
    - When using a Trimble CX instrument, the Trimble Access Home Page appears.

Correcting the Atmospheric Parameters

The Trimble GX instrument is based on the EDM (Electronic Distance Measurement) for collecting points. The distance measurement is function of the velocity of light in the atmosphere and the velocity of light depends on the refractive index of air, temperature, pressure and humidity. The Atmospheric Correction feature in Trimble Access enables to apply corrections to the distance measurement - expressed in PPM (Part Per Million) - according to these atmospheric parameters. The Trimble GX instrument has been calibrated so that no correction is applied at 20°C and 1013.25 mBar.

You can decide to apply (or not) a correction after auto-detecting and leveling the instrument connected to your Trimble Rugged Tablet Computer. You can apply several corrections to a project.

Inputting a PPM Value

To Input a PPM Value:

1. In the Atmospheric Correction window, tap in the PPM (Keyed In) field. An on-screen keypad appears.
2. Input a value in the PPM (Keyed In) field.
3. Tap Ok. The on-screen keypad disappears.
4. Tap Done. The Atmospheric Correction window closes.

Computing a PPM Value

To Compute a PPM Value:

1. In the Atmospheric Correction window, check the Set Atmospheric Temperature and Pressure option. The Pressure and Temperature fields appear below the option.
2. Tap in the Pressure field. An on-screen keypad appears.
3. Input a value in the Pressure field. The default unit of measurement is setup in millibars; you do not need to enter "mBar" after the value.
4. Tap the Tab button. The on-screen keypad jumps to the Temperature field for editing.
5. Input a value in the Temperature field. The default unit of measurement is the one set in Settings. If Celsius has been chosen; you do not need to enter "°C" after the value. If Fahrenheit has been chosen, you do not need to enter "°F" after the value.
6. Tap Ok. The on-screen keypad disappears.
7. Tap Done. The Atmospheric Correction window closes.

Keeping the Atmospheric Correction Deactivated

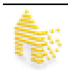
You can decide to not apply a correction to your project. In this case, tap the Done button in the Atmospheric Correction window without inputting a value in the PPM (Keyed In) field.

CHAPTER 6

Creating Jobs

To record data acquired by an instrument, you must create (or have) a job (open). There are several types of jobs in Trimble Access: General Scanning, Volumes and DTM. A job cannot come alone. It is always associated to a project inside which you can mix different types of jobs.

The table below lists the types of job you can have according to the instrument you are using.

	GX Instrument*	CX Instrument
 General Scanning	✓	✓
 Volumes	✓	
 DTM	✓	

Note: (*) The Trimble GX instrument needs to be a GX Advanced™. Otherwise, some of the applications like the DTM cannot be used.

A General Scanning Job

The purpose of the General Scanning job is to first control a Trimble instrument with the Trimble Rugged Tablet Computer and then acquire data (Point Cloud(s) or Point(s)**) and Images (if needed).

To Create a General Scanning Job:

1. In the Trimble Access Home Page, tap the General Scanning  button.
2. Do one of the following:

- If there is no project; the Create a New Project window opens. A new project is created with a default name "Project".
- If there is at least one (not loaded) project (with or without station(s) already setup); the Project Manager window appears and you have choice among Load "Last_Project_Name", Load an Existing Project and Create a New Project.
- If there is a project already loaded (but without station(s) inside); the New Station window appears.
- If there is a project already loaded (but with station(s) already setup or not); the Stationing window* appears.

Note:
- (*) The Stationing window name may change according to the Station Setup you used. It can be Stationing "Known_Point_Name", Stationing "Station_Point_Name" or Stationing "Station_Name".
- (**) Only with a Trimble GX instrument. If using a Trimble CX instrument, you can only acquire Point Cloud(s) and/or Image(s).

Editing Newly Created Project Name

To Edit the Newly Created Project Name:

1. If you wish to create a new project with the default name, tap Next.
2. Otherwise, tap inside the New Project Name field. An on-screen keyboard appears.
3. Input a new name in the New Project Name field.
4. Tap Ok to validate. The on-screen keyboard disappears.
5. Tap Next. The New Station window appears.

Loading Last Project

To Load the Last Project:

- Tap Load "Last_Project_Name". The Stationing window* appears.

Note:
- (*) Only if the last station of the loaded project has been setup. Otherwise, the New Station window appears in place.
- (*) The Stationing window name may change according to the Station Setup you used. It can be Stationing "Known_Point_Name", Stationing "Station_Point_Name" or Stationing "Station_Name".

Loading Existing Project

To Load an Existing Project:

1. Tap Load an Existing Project. The Projects window appears.
2. Select a project by tapping it.
3. Tap Done. The Projects window closes and the Stationing window* appears.

Tip: You can also select and double-tap a project to load it.

Note:
- (*) Only if the last station of the loaded project has been setup. Otherwise, the New Station window appears in place.
- (*) The Stationing window name may change according to the Station Setup you used. It can be Stationing "Known_Point_Name", Stationing "Station_Point_Name" or Stationing "Station_Name".

A Volume Job

The purpose of the Volume job is to calculate a volume between the acquired data (Point Cloud) and a Reference Plane. The Volume job is based on a grid method and the result is represented in the View 3D by a graph of vertical color lines.

To Create a Volume Job:

1. In the Trimble Access Home Page, tap the Volumes  button.
2. Do one of the following:

- If there is no project; the Create a New Project window opens. A new project is created with a default name "Project".
- If there is at least one (not loaded) project (with or without station(s) already setup); the Project Manager window appears and you have choice among Load "Last_Project_Name", Load an Existing Project and Create a New Project.
- If there is a project already loaded (but without station(s) inside); the New Station window appears.
- If there is a project already loaded (but with station(s) already setup or not); the Stationing window* appears.

Note:

- (*) The Stationing window name may change according to the Station Setup you used. It can be Stationing "Known_Point_Name", Stationing "Station_Point_Name" or Stationing "Station_Name".
- And if a Job Resolution has been already defined. Otherwise, the Define Job Resolution window appears.
- You can have access to the job even if the used instrument is not a GX Advanced™ (with the SureScan™ functionality). The current project is not aborted but created in the Project Tree.

Editing Newly Created Project Name

To Edit the Newly Created Project Name:

1. If you wish to create a new project with the default name, tap Next.
2. Otherwise, tap inside the New Project Name field. An on-screen keyboard appears.
3. Input a new name in the New Project Name field.
4. Tap Ok to validate. The on-screen keyboard disappears.
5. Tap Next. The Define Job Resolution window appears.

Loading Last Project

To Load the Last Project:

- Tap Load "Last_Project_Name". The Stationing window* appears.

Note:

- (*) Only if the last station of the loaded project has been setup. Otherwise, the New Station window appears in place.
- And if a Job Resolution has been already defined. Otherwise, the Define Job Resolution window appears.
- (*) The Stationing window name may change according to the Station Setup you used. It can be Stationing "Known_Point_Name", Stationing "Station_Point_Name" or Stationing "Station_Name".

Loading Existing Project

<u>To Load an Existing Project:</u>

1. Tap Load an Existing Project. The Projects window appears.
2. Select a project by tapping it.
3. Tap Done. The Projects window closes and the Stationing window* appears.

Tip: You can also select and double-tap a project to load it.

Note:

- (*) Only if the last station of the loaded project has been setup. Otherwise, the New Station window appears in place.
- And if a Job Resolution has been already defined. Otherwise, the Define Job Resolution window appears.
- (*) The Stationing window name may change according to the Station Setup you used. It can be Stationing "Known_Point_Name", Stationing "Station_Point_Name" or Stationing "Station_Name".

A DTM Job

The purpose of the DTM (stood for Digital Terrain Model) job is to create a triangulated mesh from the acquired data (Point Cloud).

To Create a DTM Job:

1. In the Trimble Access Home Page, tap the DTM  button.
2. Do one of the following:

- If there is no project; the Create a New Project window opens. A new project is created with a default name "Project".
- If there is at least one (not loaded) project (with or without station(s) already setup); the Project Manager window appears and you have choice among Load "Last_Project_Name", Load an Existing Project and Create a New Project.
- If there is a project already loaded (but without station(s) inside); the New Station window appears.
- If there is a project already loaded (but with station(s) already setup or not); the Stationing window* appears.

Note:

- (*) The Stationing window name may change according to the Station Setup you used. It can be Stationing "Known_Point_Name", Stationing "Station_Point_Name" or Stationing "Station_Name".
- And if a Job Resolution has been already defined. Otherwise, the Define Job Resolution window appears.
- You can have access to the job even if the used instrument is not a GX Advanced™ (with the SureScan™ functionality). The current project is not aborted but created in the Project Tree.

Editing Newly Created Project Name

To Edit the Newly Created Project Name:

1. If you wish to create a new project with the default name, tap Next.
2. Otherwise, tap inside the New Project Name field. An on-screen keyboard appears.
3. Input a new name in the New Project Name field.
4. Tap Ok to validate. The on-screen keyboard disappears.
5. Tap Next. The Define Job Resolution window appears.

Loading Last Project

To Load the Last Project:

- Tap Load "Last_Project_Name". The Stationing window* appears.

Note:
- (*) Only if the last station of the loaded project has been setup. Otherwise, the New Station window appears in place.
- And if a Job Resolution has been already defined. Otherwise, the Define Job Resolution window appears.
- (*) The Stationing window name may change according to the Station Setup you used. It can be Stationing "Known_Point_Name", Stationing "Station_Point_Name" or Stationing "Station_Name".

Loading Existing Project

To Load an Existing Project:

1. Tap Load an Existing Project. The Projects window appears.
2. Select a project by tapping it.
3. Tap Done. The Projects window closes and the Stationing window* appears.

Tip: You can also select and double-tap a project to load it.

Note:
- (*) Only if the last station of the loaded project has been setup. Otherwise, the New Station window appears in place.
- And if a Job Resolution has been already defined. Otherwise, the Define Job Resolution window appears.
- (*) The Stationing window name may change according to the Station Setup you used. It can be Stationing "Known_Point_Name", Stationing "Station_Point_Name" or Stationing "Station_Name".

A Job Resolution

In Volumes, a Job Resolution is first used as a SureScan™ parameter for acquiring data (Point Cloud) in a job and then as a grid resolution in computing a Delivery from the acquired data.

In DTM, a Job Resolution is only used as a SureScan™ parameter for acquiring data.

Defining a Job Resolution

To Define a Job Resolution:

1. Tap in the Job Resolution field. An on-screen keypad appears.
2. Input a value in the Job Resolution field.
3. Tap Ok. The on-screen keypad disappears.
4. Tap Next. The New Station window appears.

Modifying a Job Resolution

You can modify a Job Resolution after defining it in the New Station window or once a Point Cloud data has been acquired by tapping Parameters on the Step Bar.

CHAPTER 7

Creating New Stations

A Station is composed of all Scans obtained from a fixed position of an instrument. The way it will be created in Trimble Access varies with the instrument leveling.

Note: A Station is always associated with a unique instrument. When the user attempts to complete an existing Station with a different instrument in type (GX or CX) or in serial number (for the given type), he will be prompted to create a new Station (or not).

When the Instrument is Leveled

To Create a New Station:

1. Tap Station Setup. The Create Station Known Point window appears.
2. Or tap Resection. The Set Station Parameters window appears.
3. Or tap No Station Setup. The Set Station Parameters window appears.

When the Instrument is Misleveled

To Create a New Station:

1. Tap Level the Instrument. The Leveling window appears.
2. Or tap 3 Backsight Based. The Set Station Parameters window appears.
3. Or tap No Station Setup. The Set Station Parameters window appears.

Setting up a Station with Known Coordinates or Azimuth

The Station Setup method consists of leveling the instrument, setting it up Over a Known Point (also called Control Point) and orienting it using a known Backsight Point, an unknown Backsight Point or a Video-Based Azimuth.

Creating a Station Known Point

A Known Point is mainly a point on the ground for which the coordinates are known. Theses coordinates are three-dimension coordinates expressed in the Cartesian coordinate system*. They can be manually entered or can come from an imported file.

Note: (*) If Cartesian X, Y, Z has been chosen in the Settings \ Units.

To Create a Station Known Point:

1. Define a Known Point Name.
2. Input Know Point Coordinates.
3. And/or set the Station Parameters.
4. Tap Next. The Orientate Station With window appears.

Defining a Known Point Name

By default, a Known Point Name is a Number which starts at One and is incremented of One each time a new Known Point is added.

To Define a Known Point Name:

1. Keep the default name or tap in the Known Point Name field. An on-screen keyboard appears.
2. Enter a new name in the Known Point Name field.
3. Tap Ok. The on-screen keyboard closes by its own.

Inputting Known Point Coordinates

To Input Known Point Coordinates:

1. Tap in the X field. An on-screen numerical pad appears next to the X field.
2. Input a value in the X field.
3. Tap Ok. The on-screen keypad closes by its own.
4. Repeat the steps from 1 to 3 for the Y and Z fields.

Note: The unit of measurement for X, Y and Z is by default set to Meters; you can change it in the Settings / Units.

Tip:

- The newly created Known Point is put in a list. You may see that list by tapping Back (once the Create Known Point step has been completed).
- Instead tapping Ok, you can also use the Tab button. The on-screen keypad jumps to the next filed to edit.

Note: The created Known Point is put under a Topographic Station which name is Control Points. Its related Target (once measured) is created and put under the current Station.

Importing a List of Known Points

To Import a List of Known Points:

- Tap Import. The Import Project window opens.

Choosing a Destination Folder

A Destination Folder is a Local Folder in your Trimble Rugged Tablet Computer drive. You can choose between a pre-defined Local Folder and a user-defined Local Folder.

Pre-defined Folders

There are three Local Folder shortcuts in your Trimble Rugged Tablet Computer drive: Files Folder, Desktop and My Documents. The Files Folder is the default Local Folder. Its path is C:\Users\TablePC\AppData\Local\Trimble\Trimble Access.

Control Network Files

A control network surveyed by traditional surveying instruments contains Control Points with known coordinates. These points used for georeferencing registration items (spheres, targets and surveying point) are stored in an ASCII format file (with *.txt as extension) or in a coordinate format file (with *.CRD (or CR5) as extension).

A file with the CRD extension is a coordinate file with five data fields (Point number, Northing, Easting, Elevation and Description) in binary form. A file with the CR5 extension is also a coordinate file but owned by TDS. A file with the TXT extension is an ASCII text file. Each line of the text file can contain any combination of Point number, Northing, Easting, Elevation and Description. All point information should be on one line with the values separated by a comma, space or other delineators.

Importing Files

You can import as many control network files as required. A control network file will not be removed from your project once imported (into the project) even if the station has been deleted because its setup is not complete.

<u>To Import a File:</u>

1. Navigate to the drive/ folder where the control network file is located.
2. Tap on the file name to select it.
3. Tap Next. The Surveying Network Import Parameters window appears.

Setting Surveying Network Import Parameters

The import parameters (Coordinate System and Unit) are those used to represent the coordinates of Control Points in the imported file.

To Set Surveying Network Import Parameters:

1. Tap on the Coordinate System pull-down arrow.
2. Choose among "Cartesian X, Y, Z", "North, West, Elevation", "South, West, Elevation" and "North, West, Elevation".
3. Tap on the Unit pull-down arrow.
4. Choose a unit of measurement from the drop-down list.
5. Tap Next. The Select Known Point window appears.

All imported Known Points are listed in the Select Known Point window. They are gathered according to the file they belong to under a Topographic Station* whose name is the imported file's name.

Note: (*) You may see the Topographic Station with all Known Points under the Project Tree.

Selecting a Station Known Point

To Select a Station Known Point:

1. Tap List. The Select Station Known Point window appears.
2. Select a Known Point by tapping it.
3. And/or set the Station Parameters.
4. Tap Next. The Orientate Station With window appears.

Note: The Select Station Known Point window will be empty if there is no already existed Known Point.

Setting the Station Parameters

The Over Known Point method involves measuring the distance which separates a Known Point from the center of the instrument's mirror. This distance is called True Height.

To Set the Station Parameters:

- Input a value in the Instrument Height* field.

Tip: You can tap Next without inputting a value in the Instrument Height* field as you can edit its value later.

Note: (*) When using a Trimble GX instrument, the Instrument Height type (True Height, Bottom Notch Height or Top Notch Height) which appears in the Set Station Parameters window is the last used one. If the instrument is a CX, only the True Height is available.

Inputting the True Height

To Input the True Height:

1. If you only have a True Height value, first tap the pull-down arrow and change the height type to True Height.
2. Tap in the True Height field. An on-screen numerical pad appears.
3. Input a value in the True Height field.
4. Tap Ok. The on-screen numerical pad disappears.

Note: The unit of measurement for the True Height is by default set to Meters; you can change it in the Settings / Units.

Inputting the Bottom Notch Height

To Input the Bottom Notch Height:

1. If you only have a Bottom Notch Height value, first tap the pull-down arrow and change the height type to Bottom Notch Height.
2. Tap in the Bottom Notch Height field. An on-screen keypad appears.
3. Input the value in the Bottom Notch Height field.
4. Tap Ok. The on-screen keypad disappears. The Bottom Notch Height value will be automatically corrected (a vertical slope distance is applied to this value).

Note: The unit of measurement for the Bottom Notch Height is by default set to Meters; you can change it in the Settings \ Units.

Inputting the Top Notch Height

To Input the Top Notch Height:

1. If you only have a Top Notch Height value, first tap the pull-down arrow and change the height type to Top Notch Height.
2. Tap in the Top Notch Height field. An on-screen keypad appears.
3. Input the value in the Top Notch Height field.
4. Tap Ok. The on-screen keypad disappears. The Top Notch Height value will be automatically corrected (two slope distances (vertical and horizontal) are applied to this value).

Note: The unit of measurement for the Top Notch Height is by default set to Meters; you can change it in the Settings \ Units.

Orientating a Station With

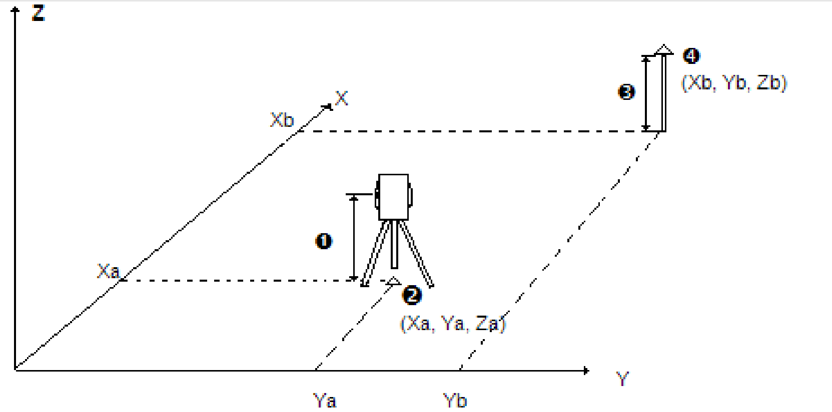
Orientating a station can be done by sighting a known Backsight Point, with an unknown Backsight Point and an Angle or by giving an Azimuth angle.

To Orientate a Station With:

1. Tap Known Backsight. The Create Backsight Known Point window appears.
2. Or tap Unknown Backsight. The Define Backsight Point Name window appears.
3. Or tap Video-Based Azimuth. The Set Station Arbitration Orientation window appears.

A Known Backsight Point

The figure below illustrates the principle of setting-up a station over a Known Point and orientating it with a known Backsight Point.



1 - Instrument Height 2 - Known Point	3 - Backsight Height 4 - Backsight Point

Creating a Backsight Known Point

A Backsight Point is mainly a point used to orientate a station for which the coordinates are known. These coordinates are three-dimension coordinates expressed in the Cartesian coordinate system*. They can be manually entered or can come from an imported file.

Note: (*) If Cartesian X, Y, Z has been chosen in the Settings / Units.

<u>To Create a Backsight Known Point:</u>

1. Define a Known Point Name.
2. Input Know Point Coordinates.
3. And/or set the Backsight Parameters.
4. Tap Next. The Measure Backsight Point window appears.

Defining a Known Point Name

By default, a Known Point Name is a Number which starts at One and is incremented of One each time a new Known Point is added.

To Define a Known Point Name:

1. Keep the default name or tap in the Known Point Name field. An on-screen keyboard appears.
2. Enter a new name in the Known Point Name field.
3. Tap Ok. The on-screen keyboard closes by its own.

Inputting Known Point Coordinates

To Input Known Point Coordinates:

1. Tap in the X field. An on-screen numerical pad appears next to the X field.
2. Input a value in the X field.
3. Tap Ok. The on-screen keypad closes by its own.
4. Repeat the steps from 1 to 3 for the Y and Z fields.

Note: The unit of measurement for X, Y and Z is by default set to Meters; you can change it in the Settings / Units.

Tip:

- The newly created Known Point is put in a list. You may see that list by tapping Back (once the Create Known Point step has been completed).
- Instead tapping Ok, you can also use the Tab button. The on-screen keypad jumps to the next filed to edit.

Note: The created Known Point is put under a Topographic Station which name is Control Points. Its related Target (once measured) is created and put under the current Station.

Note: The Backsight Azimuth value will be updated according to the input coordinates or to the selected Backsight Point.

Note: When the input coordinates are not valid, the following warning message is displayed: "This point cannot be set as Backsight because its coordinates are on the instrument up axis." You need to tap valid coordinates to access to the next sub-step. The instrument up axis is 0, 0 and 1.

Importing a List of Known Points

To Import a List of Known Points:

- Tap Import. The Import Project window opens.

Choosing a Destination Folder

A Destination Folder is a Local Folder in your Trimble Rugged Tablet Computer drive. You can choose between a pre-defined Local Folder and a user-defined Local Folder.

Pre-defined Folders

There are three Local Folder shortcuts in your Trimble Rugged Tablet Computer drive:  Files Folder,  Desktop and  My Documents. The Files Folder is the default Local Folder. Its path is C:\Users\TablePC\AppData\Local\Trimble\Trimble Access.

Control Network Files

A control network surveyed by traditional surveying instruments contains Control Points with known coordinates. These points used for georeferencing registration items (spheres, targets and surveying point) are stored in an ASCII format file (with *.txt as extension) or in a coordinate format file (with *.CRD (or CR5) as extension).

A file with the CRD extension is a coordinate file with five data fields (Point number, Northing, Easting, Elevation and Description) in binary form. A file with the CR5 extension is also a coordinate file but owned by TDS. A file with the TXT extension is an ASCII text file. Each line of the text file can contain any combination of Point number, Northing, Easting, Elevation and Description. All point information should be on one line with the values separated by a comma, space or other delineators.

Importing Files

You can import as many control network files as required. A control network file will not be removed from your project once imported (into the project) even if the station has been deleted because its setup is not complete.

To Import a File:

1. Navigate to the drive/ folder where the control network file is located.
2. Tap on the file name to select it.
3. Tap Next. The Surveying Network Import Parameters window appears.

Setting Surveying Network Import Parameters

The import parameters (Coordinate System and Unit) are those used to represent the coordinates of Control Points in the imported file.

To Set Surveying Network Import Parameters:

1. Tap on the Coordinate System pull-down arrow.
2. Choose among "Cartesian X, Y, Z", "North, West, Elevation", "South, West, Elevation" and "North, West, Elevation".
3. Tap on the Unit pull-down arrow.
4. Choose a unit of measurement from the drop-down list.
5. Tap Next. The Select Known Point window appears.

All imported Known Points are listed in the Select Known Point window. They are gathered according to the file they belong to under a Topographic Station* whose name is the imported file's name.

Note: (*) You may see the Topographic Station with all Known Points under the Project Tree.

Selecting a Backsight Known Point

To Select the Backsight Known Point:

1. Tap List. The Select Backsight Known Point window appears.
2. Select a Known Point by tapping it.
3. And/or set the Backsight Parameters.
4. Tap Next. The Measure Backsight Point window appears.

Note: The Select Backsight Known Point window will be empty if there are no already existed Known Points.

Setting the Backsight Parameters

To Set the True Backsight Height:

1. Tap in the True Backsight Height field. An on-screen keypad appears.
2. Input a value in the True Backsight Height field.
3. Tap Ok. The on-screen keypad disappears.

Note:
- The unit of measurement for the True Backsight Height is in Meters; you do not need to enter "m" after the value and can change it in Settings / Units.
- You can tap Next without inputting a value in the True Backsight Height field as you can edit it later.

Measuring the Backsight Point

You can swap from "HA, VA, SD" to "X,Y,Z" or "HA, ∆HD, ∆VD", "∆X, ∆ Y, ∆Z", "∆HA, ∆VA, ∆SD" by tapping "HA, VA, SD" before (or after) measuring the Backsight Point.

To Measure the Backsight Point:

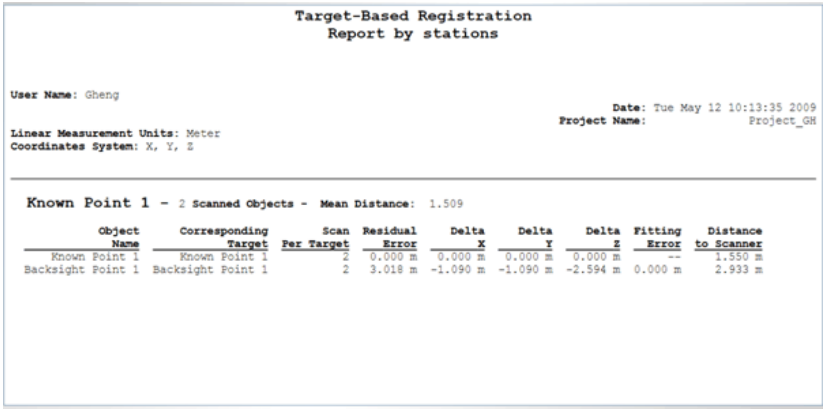
1. First move the instrument to sight the Backsight Point by using the sliders (Horizontal and Vertical).
2. Or tap a point on the Live Video.
3. If the instrument in use is a GX, choose among Fast Flat Target, Flat Target and Spherical Target.
4. If the instrument in use is a CX, choose between Spherical Target and Black and White Flat Target.
5. Tap and drag the Slider to increase the yellow frame size.
6. Tap Measure. At the end of the measurement, Trimble Access displays the backsight point coordinates as "HA, VA, SD".
7. Tap Next. The Target-Based Registration Report by Stations window appears.

Note: "HA, ∆HD, ∆VD", "∆X, ∆Y, ∆Z", "∆HA, ∆VA, ∆SD" give a previous of the errors between the current Backsight Point and the previous point (Known Point or Backsight Point) that you will get by tapping the Next button.

The Target-Based Registration Report by Stations

A Target-Based Registration Report by Stations is a RTF (Rich Text Format) format file. It has as default name: Report_Name-Of-The-Project\Year-Month-Date.

The Target-Based Registration Report looks as shown below when orientating the station with a Backsight Point.



Target-Based Registration
Report by stations

User Name: Gheng

Date: Tue May 12 10:13:35 2009
Project Name: Project_GH

Linear Measurement Units: Meter
Coordinates System: X, Y, Z

Known Point 1 - 2 **Scanned Objects** - **Mean Distance:** 1.509

Object Name	Corresponding Target	Scan Per Target	Residual Error	Delta X	Delta Y	Delta Z	Fitting Error	Distance to Scanner
Known Point 1	Known Point 1	2	0.000 m	0.000 m	0.000 m	0.000 m	--	1.550 m
Backsight Point 1	Backsight Point 1	2	3.018 m	-1.090 m	-1.090 m	-2.594 m	0.000 m	2.933 m

To Export the Target-Based Registration Report:

1. Tap Export. The Destination Folder window appears.
2. Or tap Done. The Stationing "Known_Point_Name" window appears.

Ending the Station Setup

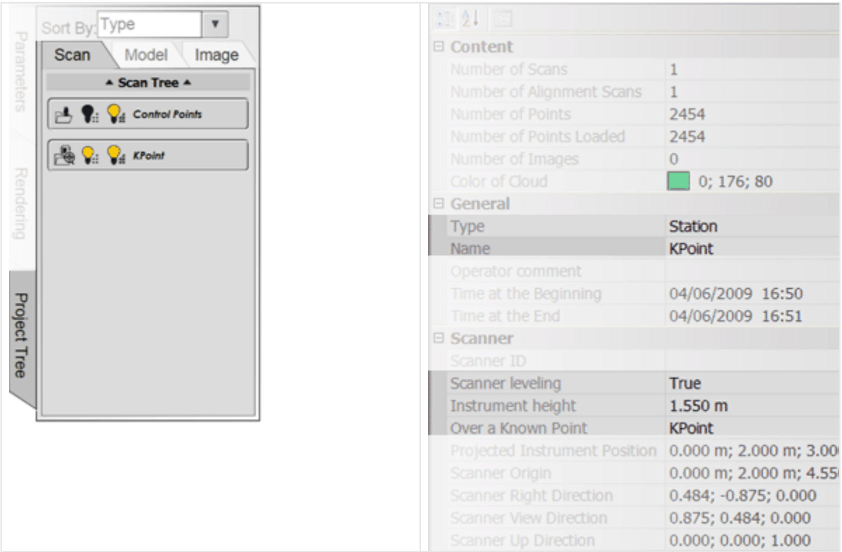
To End the Station Setup:

1. Choose an option among Add Foresight*, Add New Backsight*, Setup Report* Edit Station Setup* and New Station in the Stationing "Known_Point_Name" window.
2. Or tap Done*. The Acquire in "Known_Point_Name" window appears.

Note: The user will be in the same Station when choosing an option with (*).

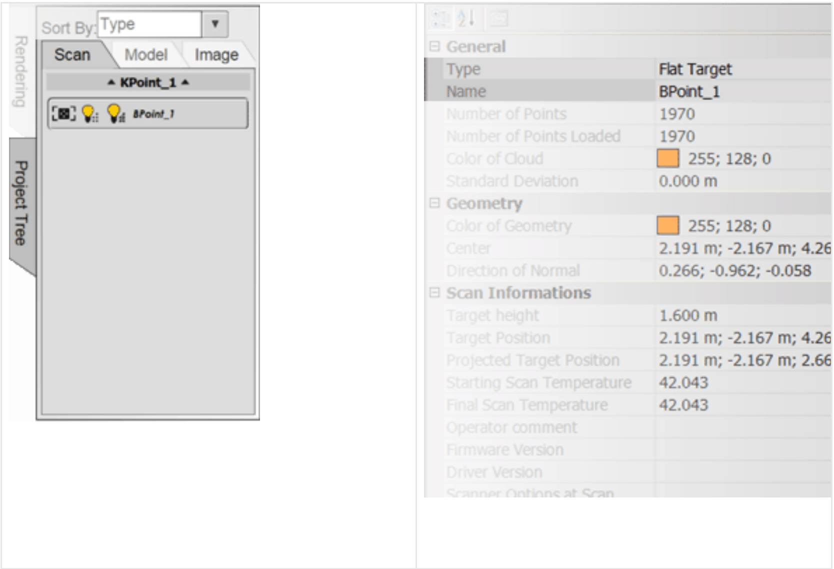
Stationing Review in the Project Tree

An Over_Known_Point_Station is created and rooted under the Scan Tree. This station has a Point Cloud and a Geometry inside; and both are displayed in the View 3D window. You may see the created Station by tapping View Trees (or View 3D). Note that the Leveling Information of that Station is marked as True and its name is the Known Point name.



For Trimble GX instrument Users:

If the Fast Flat Target / Flat Target (or the Spherical Target) feature has been chosen for measuring the Backsight Point; a Flat Target * (or a Spherical Target *) is created under the current Station.

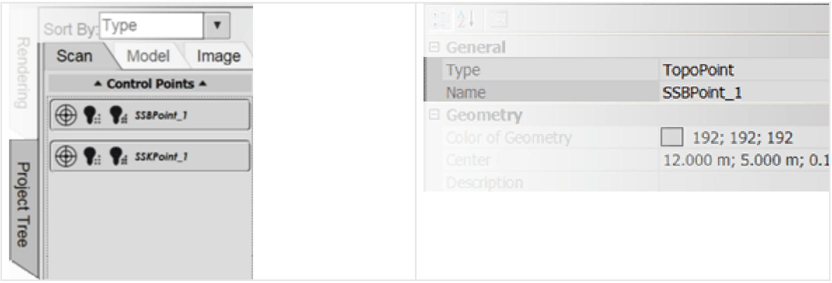


For Trimble CX instrument Users:

If the Black and White Flat Target (or the Spherical Target) has been chosen for measuring the Backsight Point; a Flat Target * (or a Spherical Target *) is created under the current Station.

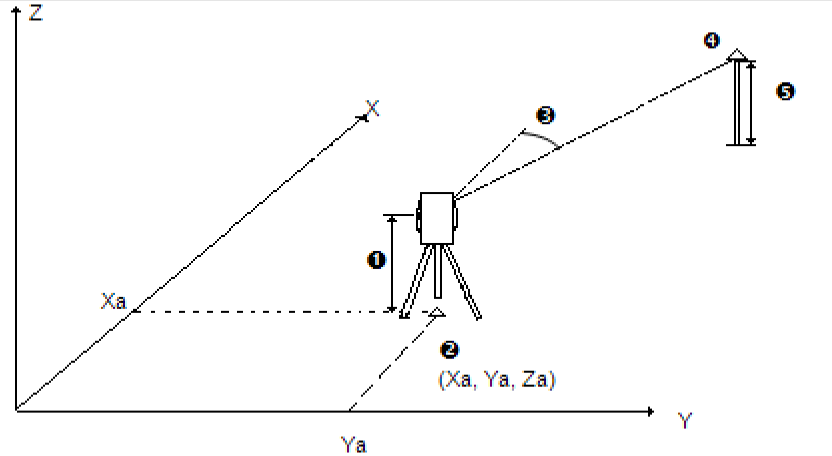
Note: (*) A target (once measured) is named TargetX where X is its order. Once created in the Trimble Access database, it takes the Backsight Point name.

A Topographic Station (if not already existing) with the two Control Points used for Setup (Known Point and Backsight Point) is created and rooted under that tree. Any of them may be displayed in the View 3D.



An Unknown Backsight Point

The figure below illustrates the principle of setting-up a station over a Known Point and orientating it with an unknown Backsight Point and an Azimuth Angle.



1 - Instrument Height 2 - Known Point	3 - Azimuth Angle 4 - Backsight Point 5 - Backsight Height

Defining the Backsight Point Name

A Backsight Point is mainly a point used to orientate a station.

<u>To Define a Backsight Point</u>

1. Define a Backsight Point Name.
2. Set the Backsight Parameters.
3. Tap Next. The Measure the Backsight Point window appears.

Defining a Known Point Name

By default, a Known Point Name is a Number which starts at One and is incremented of One each time a new Known Point is added.

To Define a Known Point Name:

1. Keep the default name or tap in the Known Point Name field. An on-screen keyboard appears.
2. Enter a new name in the Known Point Name field.
3. Tap Ok. The on-screen keyboard closes by its own.

Setting the Backsight Parameters

To Set the True Backsight Height:

1. Tap in the True Backsight Height field. An on-screen keypad appears.
2. Input a value in the True Backsight Height field.
3. Tap Ok. The on-screen keypad disappears.

Note:

- The unit of measurement for the True Backsight Height is in Meters; you do not need to enter "m" after the value and can change it in Settings / Units.
- You can tap Next without inputting a value in the True Backsight Height field as you can edit it later.

Inputting the Orientation Angle

To Input the Orientation Angle:

1. Tap in the Orientation Angle field. An on-screen keypad appears.
2. Input a value in the Orientation Angle field.
3. Tap Ok. The on-screen keypad disappears.

Note: The unit of measurement for the Orientation Angle is by default set to Degrees; you can change it in the Settings / Units.

Measuring the Backsight Point

You can swap from "HA, VA, SD" to "X, Y, Z" by tapping "HA, VA, SD" before (or after measuring) the Backsight Point.

To Measure the Backsight Point:

1. First move the instrument to sight the Backsight Point by using the sliders (Horizontal and Vertical).
2. Or tap a point on the Live Video.
3. If the instrument in use is a GX, choose among Fast Flat Target, Flat Target and Spherical Target.
4. If the instrument in use is a CX, choose between Spherical Target and Black and White Flat Target.
5. Tap and drag the Slider to increase the yellow frame size.
6. Tap Measure. At the end of the measurement, Trimble Access displays the backsight point coordinates as "HA, VA, SD".
7. Tap Next.

Ending the Station Setup

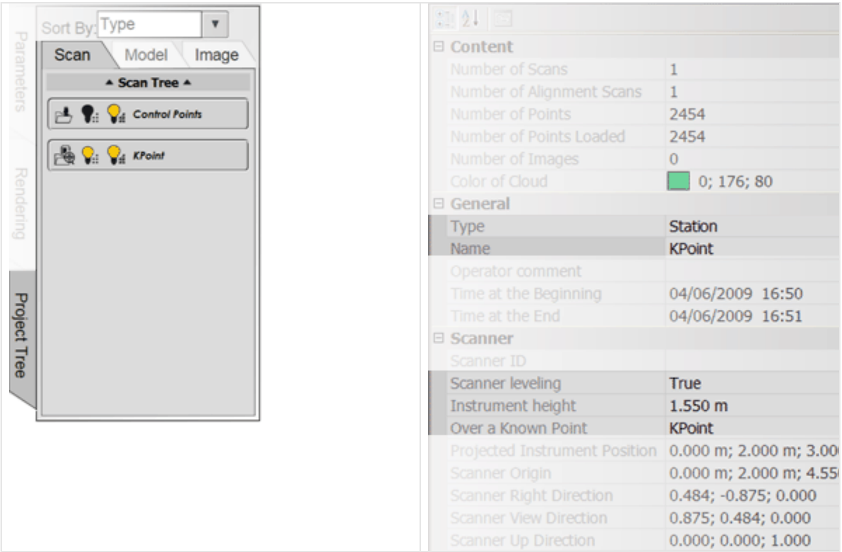
To End the Station Setup:

1. Choose an option among Add Foresight*, Add New Backsight*, Setup Report* Edit Station Setup* and New Station in the Stationing "Known_Point_Name" window.
2. Or tap Done*. The Acquire in "Known_Point_Name" window appears.

Note: The user will be in the same Station when choosing an option with (*).

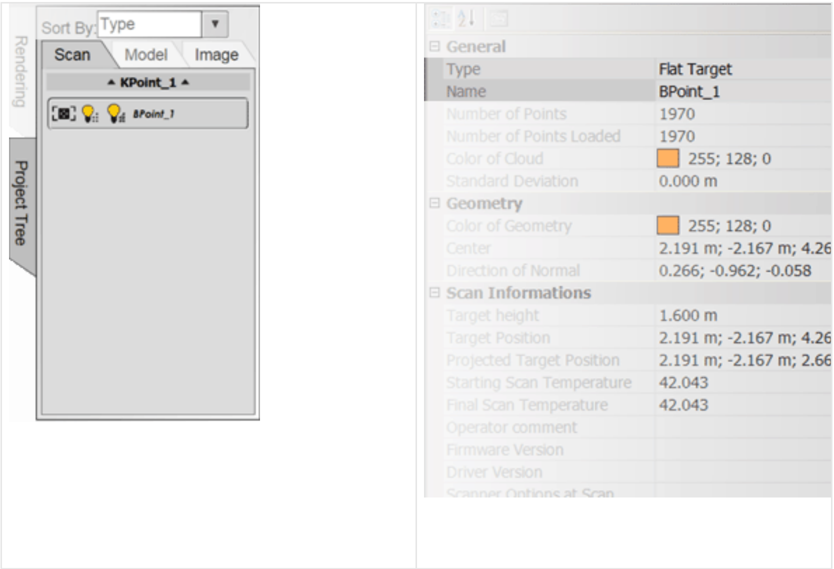
Stationing Review in the Project Tree

An Over_Known_Point_Station is created and rooted under the Scan Tree. This station has a Point Cloud and a Geometry inside; and both are displayed in the View 3D window. You may see the created Station by tapping View Trees (or View 3D). Note that the Leveling Information of that Station is marked as True and its name is the Known Point name.



<u>For Trimble GX instrument Users:</u>

If the Fast Flat Target / Flat Target (or the Spherical Target) feature has been chosen for measuring the Backsight Point; a Flat Target * (or a Spherical Target *) is created under the current Station.

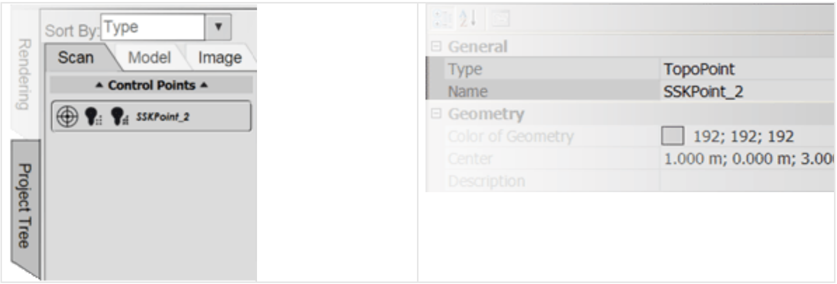


<u>For Trimble CX instrument Users:</u>

If the Black and White Flat Target (or the Spherical Target) has been chosen for measuring the Backsight Point; a Flat Target* (or a Spherical Target*) is created under the current Station.

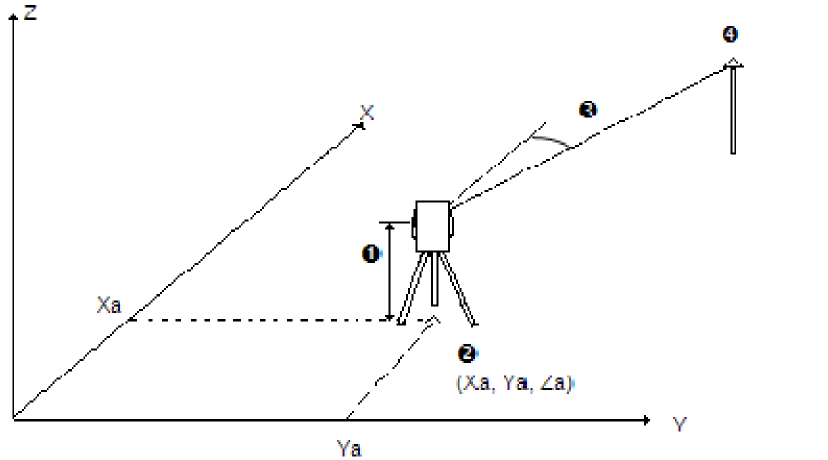
Note: (*) A target (once measured) is named TargetX where X is its order. Once created in the Trimble Access database, it takes the Backsight Point name.

A Topographic Station (if not already existing) with a Control Point used for Setup over a Known Point is created and rooted under that tree. It is not displayed in the View 3D.



A Video-Based Azimuth

The figure below illustrates the principle of setting-up a station over a Known Point and orientating it with a Video-Based Azimuth.



1 - Instrument Height	3 - Azimuth Angle
2 - Known Point	4 - Backsight Point

Inputting the Orientation Angle

<u>To Input the Orientation Angle:</u>

1. Tap in the Orientation Angle field. An on-screen keypad appears.
2. Input a value in the Orientation Angle field.
3. Tap Ok. The on-screen keypad disappears.

Note: The unit of measurement for the Orientation Angle is by default set to Degrees; you can change it in the Settings / Units.

Ending the Station Setup

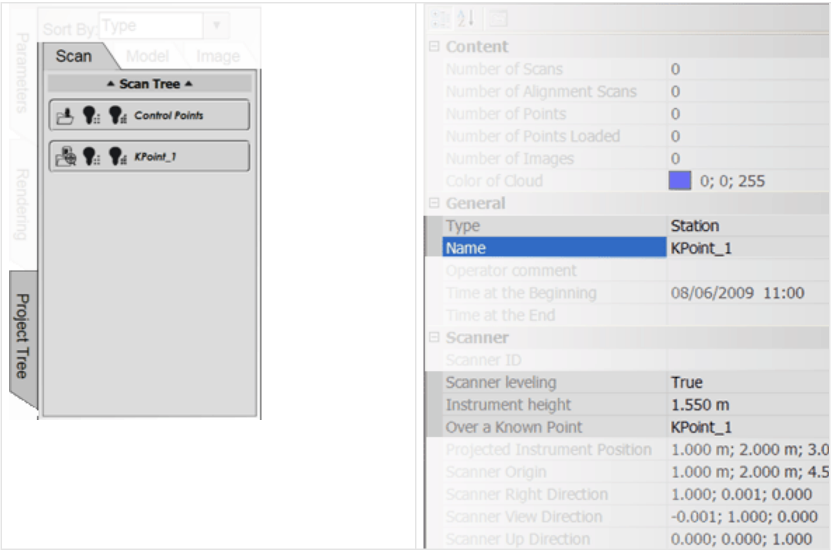
To End the Station Setup:

1. Choose an option among Add Foresight*, Add New Backsight*, Setup Report* Edit Station Setup* and New Station in the Stationing "Known_Point_Name" window.
2. Or tap Done*. The Acquire in "Known_Point_Name" window appears.

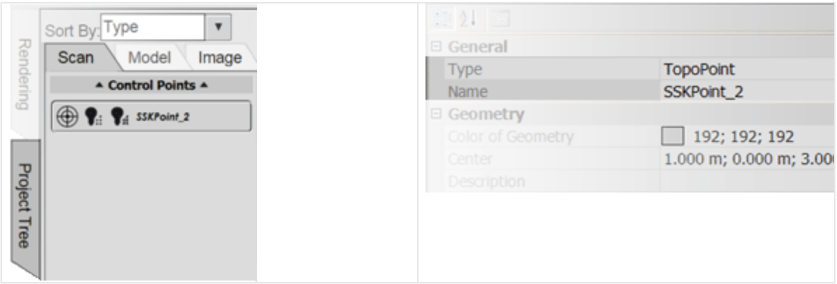
Note: The user will be in the same Station when choosing an option with (*).

Stationing Review in the Project Tree

An Over_Known_Point_Station is created and rooted under the Scan Tree. This station has no Point Cloud and no Geometry inside. You may see the created Station by tapping View Trees (or View 3D). Note that the Leveling Information of that Station is marked as True and its name is the Known Point name.



A Topographic Station (if not already existing) with a Control Point used for Setup over a Known Point is created and rooted under that tree. It is not displayed in the View 3D.



Setting up a Station Using Multiple Point Resection

The Resection Method consists of leveling the instrument, setting it up over a point for which the coordinates are unknown (called Station Point) and registering it using the Resection measurements to two Backsight Points.

A Station Point default name is a Number which starts at One and is incremented of One each time a new Station Point is added (under the current Project).

Creating the First Backsight Known Point

To Create the First Backsight Known Point:

1. Define a Known Point Name.
2. Input Know Point Coordinates.
3. And/or set the Backsight Parameters.
4. Tap Next. The Measure 1st Backsight Point window appears.

Defining a Known Point Name

By default, a Known Point Name is a Number which starts at One and is incremented of One each time a new Known Point is added.

To Define a Known Point Name:

1. Keep the default name or tap in the Known Point Name field. An on-screen keyboard appears.
2. Enter a new name in the Known Point Name field.
3. Tap Ok. The on-screen keyboard closes by its own.

Inputting Known Point Coordinates

To Input Known Point Coordinates:

1. Tap in the X field. An on-screen numerical pad appears next to the X field.
2. Input a value in the X field.
3. Tap Ok. The on-screen keypad closes by its own.
4. Repeat the steps from 1 to 3 for the Y and Z fields.

Note: The unit of measurement for X, Y and Z is by default set to Meters; you can change it in the Settings / Units.

Tip:

- The newly created Known Point is put in a list. You may see that list by tapping Back (once the Create Known Point step has been completed).
- Instead tapping Ok, you can also use the Tab button. The on-screen keypad jumps to the next filed to edit.

Note: The created Known Point is put under a Topographic Station which name is Control Points. Its related Target (once measured) is created and put under the current Station.

Importing a List of Known Points

To Import a List of Known Points:

- Tap Import. The Import Project window opens.

Choosing a Destination Folder

A Destination Folder is a Local Folder in your Trimble Rugged Tablet Computer drive. You can choose between a pre-defined Local Folder and a user-defined Local Folder.

Pre-defined Folders

There are three Local Folder shortcuts in your Trimble Rugged Tablet Computer drive: Files Folder, Desktop and My Documents. The Files Folder is the default Local Folder. Its path is C:\Users\TablePC\AppData\Local\Trimble\Trimble Access.

Control Network Files

A control network surveyed by traditional surveying instruments contains Control Points with known coordinates. These points used for georeferencing registration items (spheres, targets and surveying point) are stored in an ASCII format file (with *.txt as extension) or in a coordinate format file (with *.CRD (or CR5) as extension).

A file with the CRD extension is a coordinate file with five data fields (Point number, Northing, Easting, Elevation and Description) in binary form. A file with the CR5 extension is also a coordinate file but owned by TDS. A file with the TXT extension is an ASCII text file. Each line of the text file can contain any combination of Point number, Northing, Easting, Elevation and Description. All point information should be on one line with the values separated by a comma, space or other delineators.

Importing Files

You can import as many control network files as required. A control network file will not be removed from your project once imported (into the project) even if the station has been deleted because its setup is not complete.

To Import a File:

1. Navigate to the drive/ folder where the control network file is located.
2. Tap on the file name to select it.
3. Tap Next. The Surveying Network Import Parameters window appears.

Setting Surveying Network Import Parameters

The import parameters (Coordinate System and Unit) are those used to represent the coordinates of Control Points in the imported file.

To Set Surveying Network Import Parameters:

1. Tap on the Coordinate System pull-down arrow.
2. Choose among "Cartesian X, Y, Z", "North, West, Elevation", "South, West, Elevation" and "North, West, Elevation".
3. Tap on the Unit pull-down arrow.
4. Choose a unit of measurement from the drop-down list.
5. Tap Next. The Select Known Point window appears.

All imported Known Points are listed in the Select Known Point window. They are gathered according to the file they belong to under a Topographic Station* whose name is the imported file's name.

Note: (*) You may see the Topographic Station with all Known Points under the Project Tree.

Selecting the First Backsight Known Point

To Select the First Backsight Known Point:

1. Tap List. The Select 1st Backsight Known Point window appears.
2. Select a Known Point by tapping it.
3. And/or set the Backsight Parameters.
4. Tap Next. The Measure 1st Backsight Point window appears.

Note: The Select 1st Backsight Known Point window will be empty if there are no already existed Known Points.

Setting the First Backsight Parameters

To Set the True Backsight Height:

1. Tap in the True Backsight Height field. An on-screen keypad appears.
2. Input a value in the True Backsight Height field.
3. Tap Ok. The on-screen keypad disappears.

Note:

- The unit of measurement for the True Backsight Height is in Meters; you do not need to enter "m" after the value and can change it in Settings / Units.
- You can tap Next without inputting a value in the True Backsight Height field as you can edit it later.
-

Measuring the First Backsight Point

You can swap from "HA, VA, SD" to "X, Y, Z" by tapping "HA, VA, SD" before (or after measuring) the Backsight Point.

To Measure the Backsight Point:

1. First move the instrument to sight the Backsight Point by using the sliders (Horizontal and Vertical).
2. Or tap a point on the Live Video.
3. If the instrument in use is a GX, choose among Fast Flat Target, Flat Target and Spherical Target.
4. If the instrument in use is a CX, choose between Spherical Target and Black and White Flat Target.
5. Tap and drag the Slider to increase the yellow frame size.
6. Tap Measure. At the end of the measurement, Trimble Access displays the backsight point coordinates as "HA, VA, SD".
7. Tap Next. The Create 2nd Backsight Known Point Window appears.

Note: (*) If using a Trimble GX instrument. Otherwise, choose between Spherical Target and Black and White Flat Target when using a Trimble CX instrument.

Creating the Second Backsight Known Point

To Create the Second Backsight Known Point:

1. Define a Known Point Name.
2. Input Know Point Coordinates.
3. And/or set the Backsight Parameters.
4. Tap Next. The Measure 2nd Backsight Point window appears.

Defining a Known Point Name

By default, a Known Point Name is a Number which starts at One and is incremented of One each time a new Known Point is added.

To Define a Known Point Name:

1. Keep the default name or tap in the Known Point Name field. An on-screen keyboard appears.
2. Enter a new name in the Known Point Name field.
3. Tap Ok. The on-screen keyboard closes by its own.

Inputting Known Point Coordinates

To Input Known Point Coordinates:

1. Tap in the X field. An on-screen numerical pad appears next to the X field.
2. Input a value in the X field.
3. Tap Ok. The on-screen keypad closes by its own.
4. Repeat the steps from 1 to 3 for the Y and Z fields.

Note: The unit of measurement for X, Y and Z is by default set to Meters; you can change it in the Settings / Units.

Tip:
- The newly created Known Point is put in a list. You may see that list by tapping Back (once the Create Known Point step has been completed).
- Instead tapping Ok, you can also use the Tab button. The on-screen keypad jumps to the next filed to edit.

Note: The created Known Point is put under a Topographic Station which name is Control Points. Its related Target (once measured) is created and put under the current Station.

Importing a List of Known Points

To Import a List of Known Points:

- Tap Import. The Import Project window opens.

Selecting the Second Backsight Known Point

To Select the Second Backsight Known Point:

1. Tap List. The Select 2nd Backsight Known Point window appears.
2. Select a Known Point by tapping it.
3. And/or set the Backsight Parameters.
4. Tap Next. The Measure 2nd Backsight Point window appears.

Note: The Select 2nd Backsight Known Point window will be empty if there are no already existed Known Points.

Setting the Second Backsight Parameters

To Set the True Backsight Height:

1. Tap in the True Backsight Height field. An on-screen keypad appears.
2. Input a value in the True Backsight Height field.
3. Tap Ok. The on-screen keypad disappears.

Note:

- The unit of measurement for the True Backsight Height is in Meters; you do not need to enter "m" after the value and can change it in Settings / Units.
- You can tap Next without inputting a value in the True Backsight Height field as you can edit it later.
-

Measuring the Second Backsight Point

You can swap from "HA, VA, SD" to "X,Y,Z" or "HA, ∆HD, ∆VD", "∆X, ∆ Y, ∆Z", "∆HA, ∆VA, ∆SD" by tapping "HA, VA, SD" before (or after) measuring the Backsight Point.

To Measure the Backsight Point:

1. First move the instrument to sight the Backsight Point by using the sliders (Horizontal and Vertical).
2. Or tap a point on the Live Video.
3. If the instrument in use is a GX, choose among Fast Flat Target, Flat Target and Spherical Target.
4. If the instrument in use is a CX, choose between Spherical Target and Black and White Flat Target.
5. Tap and drag the Slider to increase the yellow frame size.
6. Tap Measure. At the end of the measurement, Trimble Access displays the backsight point coordinates as "HA, VA, SD".
7. Tap Next. The Target-Based Registration Report by Stations window appears.

Note: "HA, ∆HD, ∆VD", "∆X, ∆Y, ∆Z", "∆HA, ∆VA, ∆SD" give a previous of the errors between the current Backsight Point and the previous point (Known Point or Backsight Point) that you will get by tapping the Next button.

Note: (*) If using a Trimble GX instrument. Otherwise, choose between Spherical Target and Black and White Flat Target when using a Trimble CX instrument.

The Target-Based Registration Report by Stations

A Target-Based Registration Report by Stations is a RTF (Rich Text Format) format file. It has as default name: Report_Name-Of-The-Project\Year-Month-Date.

The Target-Based Registration Report looks as shown below when orientating the station with the Resection method.

Target-Based Registration
Report by stations

User Name: Gheng

Date: Tue May 12 10:30:55 2009
Project Name: Project_GH

Linear Measurement Units: Meter
Coordinates System: X, Y, Z

Station 1 - 3 **Scanned Objects - Mean Distance:** 1.876

Object Name	Corresponding Target	Scan Per Target	Residual Error	Delta X	Delta Y	Delta Z	Fitting Error	Distance to Scanner
Station 1 (Resected)	--	--	--	--	--	--	0.000 m	1.600 m
Backsight Point 6	Backsight Point 6	2	1.876 m	0.418 m	-1.671 m	0.745 m	0.002 m	2.745 m
Backsight Point 7	Backsight Point 7	2	1.876 m	-0.418 m	1.671 m	-0.745 m	0.002 m	3.149 m

<u>To Export the Target-Based Registration Report:</u>

1. Tap Export. The Destination Folder window appears.
2. Or tap Done. The Stationing "Station_Point_Name" window appears.

Ending the Station Setup Using Multiple Point Resection

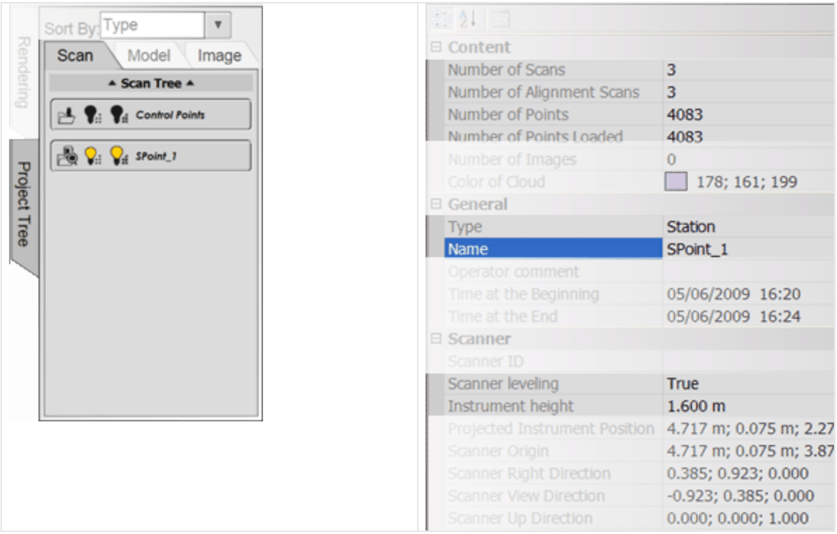
To End the Station Setup:

1. Choose an option among Add Foresight*, Add New Backsight*, Setup Report* Edit Station Setup* and New Station in the Stationing "Station_Point_Name" window.
2. Or tap Done*. The Acquire in "Station_Point_Name" window appears.

Note: The user will be in the same Station when choosing an option with (*).

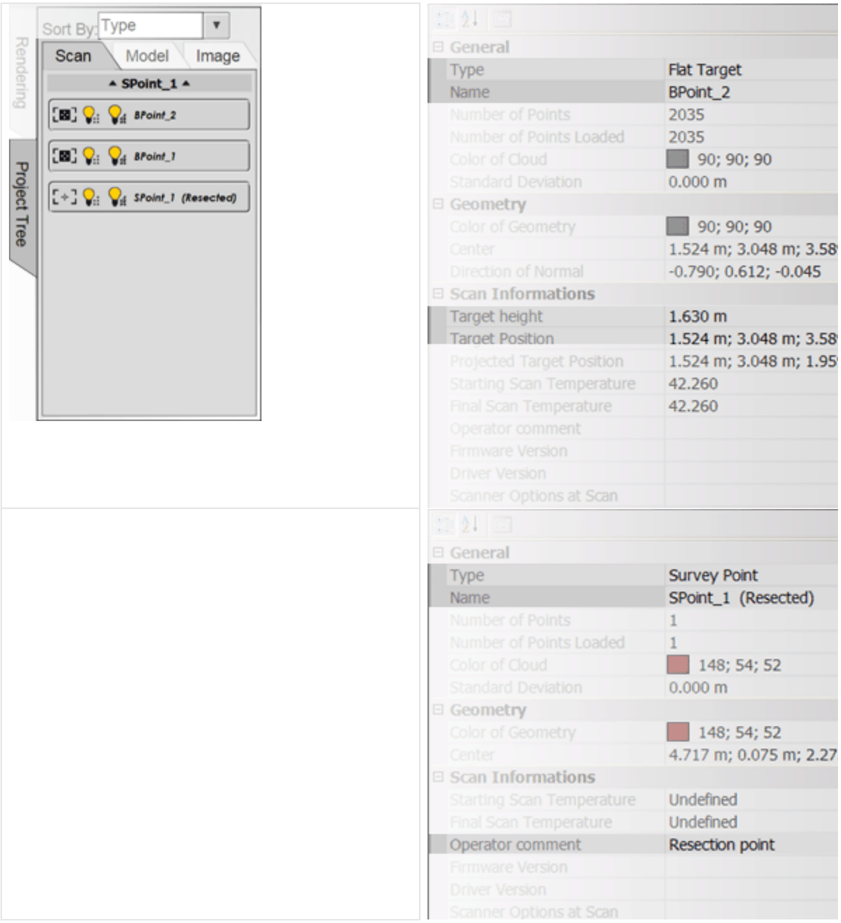
Stationing Review in the Project Tree

A Leveled Station is created and rooted under the Scan Tree. This station has a Point Cloud and a Geometry inside; and both are displayed in the View 3D. You may see the created Station by tapping View Trees (or View 3D). Note that the Leveling Information of that Station is marked as True and its name is the Station Point name.



<u>For Trimble GX instrument Users:</u>

If the Fast Flat Target / Flat Target (or Spherical Target) feature has been chosen for measuring the Backsight Points; two Flat Targets * (or Spherical Targets *) are created under the current Station as well as a Survey Point**.



Rendering
Project Tree
Sort By: Type
Scan
Model
Image
SPoint_1
BPoint_2
BPoint_1
SPoint_1 (Resected)
General
Type
Flat Target
Name
BPoint_2
Number of Points
2035
Number of Points Loaded
2035
Color of Cloud
90; 90; 90
Standard Deviation
0.000 m
Geometry
Color of Geometry
90; 90; 90
Center
1.524 m; 3.048 m; 3.58
Direction of Normal
-0.790; 0.612; -0.045
Scan Informations
Target height
1.630 m
Target Position
1.524 m; 3.048 m; 3.58
Projected Target Position
1.524 m; 3.048 m; 1.95
Starting Scan Temperature
42.260
Final Scan Temperature
42.260
Operator comment
Firmware Version
Driver Version
Scanner Options at Scan
General
Type
Survey Point
Name
SPoint_1 (Resected)
Number of Points
1
Number of Points Loaded
1
Color of Cloud
148; 54; 52
Standard Deviation
0.000 m
Geometry
Color of Geometry
148; 54; 52
Center
4.717 m; 0.075 m; 2.27
Scan Informations
Starting Scan Temperature
Undefined
Final Scan Temperature
Undefined
Operator comment
Resection point
Firmware Version
Driver Version
Scanner Options at Scan

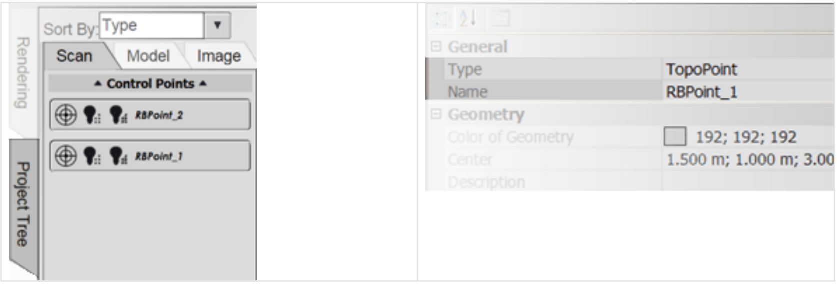
For Trimble CX instrument Users:

If the Black and White Flat Target (or the Spherical Target) feature has been chosen for measuring the Backsight Points; two Flat Targets * (or a Spherical Targets *) are created under the current Station as well as a Survey Point**.

Note:

- (*) A target (once measured) is named TargetX where X is its order. Once created in the Trimble Access database, it takes the Backsight Point name.
- (**) A Survey Point has the Station Point name.

A Topographic Station with the two Control Points used for Resection (Backsight Point 1 and Backsight Point 2) is created and rooted under that tree. Any of them is displayed in the View 3D.



Setting up a Station Based on Three Backsight Measurements

The 3 Backsight-Based method consists of not leveling the instrument, not setting it up over a Known Point but registering it using the measurements of three Backsight Points.

A Station default name is a Number which starts at One and is incremented of One each time a new Station is added (under the current Project).

Defining a New Station Name

To Define a New Station Name:

1. If you wish to create a new Station with the default name, leave it as is it.
2. Otherwise, tap inside the Station Name field. An on-screen keyboard appears.
3. Input a new name in the Station Name field.
4. Tap Ok to validate. The on-screen keyboard disappears.
5. Tap Next. The Create 1st Backsight Known Point window appears.

Note: An information box with the following message "'Station_Name' already existed. Please, choose another name" appears when the input name matches one that already exists. Tap Ok to close the information box and define another name.

Creating the First Backsight Known Point

To Create the First Backsight Known Point:

1. Define a Known Point Name.
2. Input Know Point Coordinates.
3. Tap Next. The Measure 1st Backsight Point window appears.

Defining a Known Point Name

By default, a Known Point Name is a Number which starts at One and is incremented of One each time a new Known Point is added.

<u>To Define a Known Point Name:</u>

1. Keep the default name or tap in the Known Point Name field. An on-screen keyboard appears.
2. Enter a new name in the Known Point Name field.
3. Tap Ok. The on-screen keyboard closes by its own.

Inputting Known Point Coordinates

<u>To Input Known Point Coordinates:</u>

1. Tap in the X field. An on-screen numerical pad appears next to the X field.
2. Input a value in the X field.
3. Tap Ok. The on-screen keypad closes by its own.
4. Repeat the steps from 1 to 3 for the Y and Z fields.

Note: The unit of measurement for X, Y and Z is by default set to Meters; you can change it in the Settings / Units.

Tip:

- The newly created Known Point is put in a list. You may see that list by tapping Back (once the Create Known Point step has been completed).
- Instead tapping Ok, you can also use the Tab button. The on-screen keypad jumps to the next filed to edit.

Note: The created Known Point is put under a Topographic Station which name is Control Points. Its related Target (once measured) is created and put under the current Station.

Importing a List of Known Points

<u>To Import a List of Known Points:</u>

- Tap Import. The Import Project window opens.

Choosing a Destination Folder

A Destination Folder is a Local Folder in your Trimble Rugged Tablet Computer drive. You can choose between a pre-defined Local Folder and a user-defined Local Folder.

Control Network Files

A control network surveyed by traditional surveying instruments contains Control Points with known coordinates. These points used for georeferencing registration items (spheres, targets and surveying point) are stored in an ASCII format file (with *.txt as extension) or in a coordinate format file (with *.CRD (or CR5) as extension).

A file with the CRD extension is a coordinate file with five data fields (Point number, Northing, Easting, Elevation and Description) in binary form. A file with the CR5 extension is also a coordinate file but owned by TDS. A file with the TXT extension is an ASCII text file. Each line of the text file can contain any combination of Point number, Northing, Easting, Elevation and Description. All point information should be on one line with the values separated by a comma, space or other delineators.

Pre-defined Folders

There are three Local Folder shortcuts in your Trimble Rugged Tablet Computer drive: Files Folder, Desktop and My Documents. The Files Folder is the default Local Folder. Its path is C:\Users\TablePC\AppData\Local\Trimble\Trimble Access.

Importing Files

You can import as many control network files as required. A control network file will not be removed from your project once imported (into the project) even if the station has been deleted because its setup is not complete.

To Import a File:

1. Navigate to the drive/ folder where the control network file is located.
2. Tap on the file name to select it.
3. Tap Next. The Surveying Network Import Parameters window appears.

Setting Surveying Network Import Parameters

The import parameters (Coordinate System and Unit) are those used to represent the coordinates of Control Points in the imported file.

To Set Surveying Network Import Parameters:

1. Tap on the Coordinate System pull-down arrow.
2. Choose among "Cartesian X, Y, Z", "North, West, Elevation", "South, West, Elevation" and "North, West, Elevation".
3. Tap on the Unit pull-down arrow.
4. Choose a unit of measurement from the drop-down list.
5. Tap Next. The Select Known Point window appears.

All imported Known Points are listed in the Select Known Point window. They are gathered according to the file they belong to under a Topographic Station* whose name is the imported file's name.

Note: (*) You may see the Topographic Station with all Known Points under the Project Tree.

Selecting the First Backsight Known Point

To Select the First Backsight Known Point:

1. Tap List. The Select 1st Backsight Known Point window appears.
2. Select a Known Point by tapping it.
3. Tap Next. The Measure 1st Backsight Point window appears.

Note: The Select 1st Backsight Known Point window will be empty if there is no already existed Known Point.

Measuring the First Backsight Point

You can swap from "HA, VA, SD" to "X, Y, Z" by tapping "HA, VA, SD" before (or after measuring) the Backsight Point.

To Measure the Backsight Point:

1. First move the instrument to sight the Backsight Point by using the sliders (Horizontal and Vertical).
2. Or tap a point on the Live Video.
3. If the instrument in use is a GX, choose among Fast Flat Target, Flat Target and Spherical Target.
4. If the instrument in use is a CX, choose between Spherical Target and Black and White Flat Target.
5. Tap and drag the Slider to increase the yellow frame size.
6. Tap Measure. At the end of the measurement, Trimble Access displays the backsight point coordinates as "HA, VA, SD".
7. Tap Next. The Create 2nd Backsight Known Point Window appears.

Note: (*) If using a Trimble GX instrument. Otherwise, choose between Spherical Target and Black and White Flat Target when using a Trimble CX instrument.

Creating the Second Backsight Known Point

To Create the Second Backsight Known Point:

1. Define a Known Point Name.
2. Input Know Point Coordinates.
3. Tap Next. The Measure 2nd Backsight Point window appears.

Defining a Known Point Name

By default, a Known Point Name is a Number which starts at One and is incremented of One each time a new Known Point is added.

To Define a Known Point Name:

1. Keep the default name or tap in the Known Point Name field. An on-screen keyboard appears.
2. Enter a new name in the Known Point Name field.
3. Tap Ok. The on-screen keyboard closes by its own.

Inputting Known Point Coordinates

To Input Known Point Coordinates:

1. Tap in the X field. An on-screen numerical pad appears next to the X field.
2. Input a value in the X field.
3. Tap Ok. The on-screen keypad closes by its own.
4. Repeat the steps from 1 to 3 for the Y and Z fields.

Note: The unit of measurement for X, Y and Z is by default set to Meters; you can change it in the Settings / Units.

Tip:

- The newly created Known Point is put in a list. You may see that list by tapping Back (once the Create Known Point step has been completed).
- Instead tapping Ok, you can also use the Tab button. The on-screen keypad jumps to the next filed to edit.

Note: The created Known Point is put under a Topographic Station which name is Control Points. Its related Target (once measured) is created and put under the current Station.

Importing a List of Known Points

To Import a List of Known Points:

- Tap Import. The Import Project window opens.

Selecting the Second Backsight Known Point

To Select the Second Backsight Known Point:

1. Tap List. The Select 2nd Backsight Known Point window appears.
2. Select a Known Point by tapping it.
3. Tap Next. The Measure 2nd Backsight Point window appears.

Note: The Select 2nd Backsight Known Point window will be empty if there is no already existed Known Point.

Measuring the Second Backsight Point

You can swap from "HA, VA, SD" to "X, Y, Z" by tapping "HA, VA, SD" before (or after measuring) the Backsight Point.

To Measure the Backsight Point:

1. First move the instrument to sight the Backsight Point by using the sliders (Horizontal and Vertical).
2. Or tap a point on the Live Video.
3. If the instrument in use is a GX, choose among Fast Flat Target, Flat Target and Spherical Target.
4. If the instrument in use is a CX, choose between Spherical Target and Black and White Flat Target.
5. Tap and drag the Slider to increase the yellow frame size.
6. Tap Measure. At the end of the measurement, Trimble Access displays the backsight point coordinates as "HA, VA, SD".
7. Tap Next. The Create 3rd Backsight Known Point window appears.

Creating the Third Backsight Known Point

To Create the Third Backsight Known Point:

1. Define a Known Point Name.
2. Input Know Point Coordinates.
3. Tap Next. The Measure 3rd Backsight Point window appears.

Defining a Known Point Name

By default, a Known Point Name is a Number which starts at One and is incremented of One each time a new Known Point is added.

To Define a Known Point Name:

1. Keep the default name or tap in the Known Point Name field. An on-screen keyboard appears.
2. Enter a new name in the Known Point Name field.
3. Tap Ok. The on-screen keyboard closes by its own.

Inputting Known Point Coordinates

To Input Known Point Coordinates:

1. Tap in the X field. An on-screen numerical pad appears next to the X field.
2. Input a value in the X field.
3. Tap Ok. The on-screen keypad closes by its own.
4. Repeat the steps from 1 to 3 for the Y and Z fields.

Note: The unit of measurement for X, Y and Z is by default set to Meters; you can change it in the Settings / Units.

Tip:

- The newly created Known Point is put in a list. You may see that list by tapping Back (once the Create Known Point step has been completed).
- Instead tapping Ok, you can also use the Tab button. The on-screen keypad jumps to the next filed to edit.

Note: The created Known Point is put under a Topographic Station which name is Control Points. Its related Target (once measured) is created and put under the current Station.

Importing a List of Known Points

To Import a List of Known Points:

- Tap Import. The Import Project window opens.

Selecting the Third Backsight Known Point

To Select the Third Backsight Known Point:

1. Tap List. The Select 3rd Backsight Known Point window appears.
2. Select a Known Point by tapping it.
3. Tap Next. The Measure 3rd Backsight Point window appears.

Note: The Select 3rd Backsight Known Point window will be empty if there is no already existed Known Point.

Measuring the Third Backsight Point

You can swap from "HA, VA, SD" to "X,Y,Z" or "HA, ∆HD, ∆VD", "∆X, ∆ Y, ∆Z", "∆HA, ∆VA, ∆SD" by tapping "HA, VA, SD" before (or after) measuring the Backsight Point.

To Measure the Backsight Point:

1. First move the instrument to sight the Backsight Point by using the sliders (Horizontal and Vertical).
2. Or tap a point on the Live Video.
3. If the instrument in use is a GX, choose among Fast Flat Target, Flat Target and Spherical Target.
4. If the instrument in use is a CX, choose between Spherical Target and Black and White Flat Target.
5. Tap and drag the Slider to increase the yellow frame size.
6. Tap Measure. At the end of the measurement, Trimble Access displays the backsight point coordinates as "HA, VA, SD".
7. Tap Next. The Target-Based Registration Report by Stations window appears.

Note: "HA, ∆HD, ∆VD", "∆X, ∆Y, ∆Z", "∆HA, ∆VA, ∆SD" give a previous of the errors between the current Backsight Point and the previous point (Known Point or Backsight Point) that you will get by tapping the Next button.

The Target-Based Registration Report by Stations

A Target-Based Registration Report by Stations is a RTF (Rich Text Format) format file. It has as default name: Report_Name-Of-The-Project\Year-Month-Date.

The Target-Based Registration Report looks as shown below when setting-up the station with the 3-Backsight-Based method.

Target-Based Registration
Report by stations

User Name: Gheng

Date: Mon May 11 16:51:43 2009
Project Name: Project_Test

Linear Measurement Units: Meter
Coordinates System: X, Y, Z

Station 1 - 3 **Scanned Objects - Mean Distance:** 3.716

Object Name	Corresponding Target	Scan Per Target	Residual Error	Delta X	Delta Y	Delta Z	Fitting Error	Distance to Scanner
Backsight Point 1	Backsight Point 1	2	4.546 m	2.105 m	2.845 m	2.853 m	0.000 m	2.798 m
Backsight Point 2	Backsight Point 2	2	1.388 m	1.380 m	-0.100 m	-0.117 m	0.000 m	2.878 m
Backsight Point 3	Backsight Point 3	2	5.213 m	-3.485 m	-2.745 m	-2.737 m	0.000 m	2.882 m

To Export the Target-Based Registration Report:

1. Tap Export. The Destination Folder window appears.
2. Or tap Done. The Stationing "Station_Name" window appears.

Ending the Station Setup

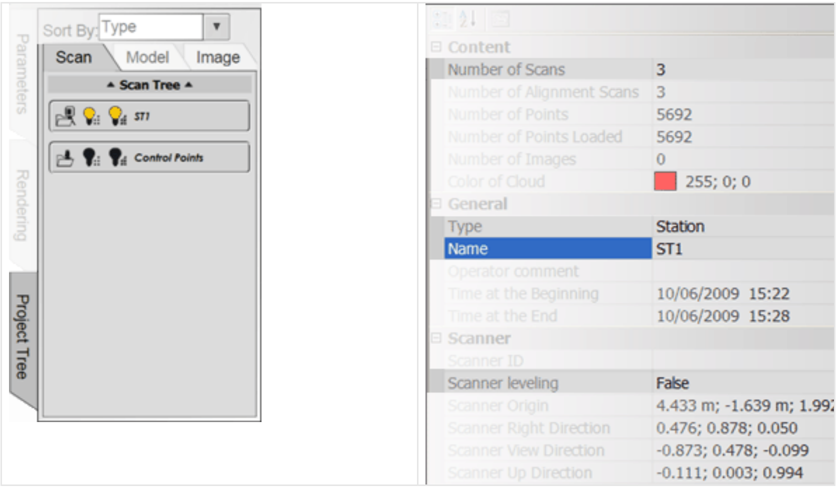
To End the Station Setup:

1. Choose an option among Add Foresight*, Add New Backsight*, Setup Report* Edit Station Setup* and New Station in the Stationing "Station_Name" window.
2. Or tap Done*. The Acquire in "Station_Name" window opens.

Note: The user will be in the same Station when choosing an option with (*).

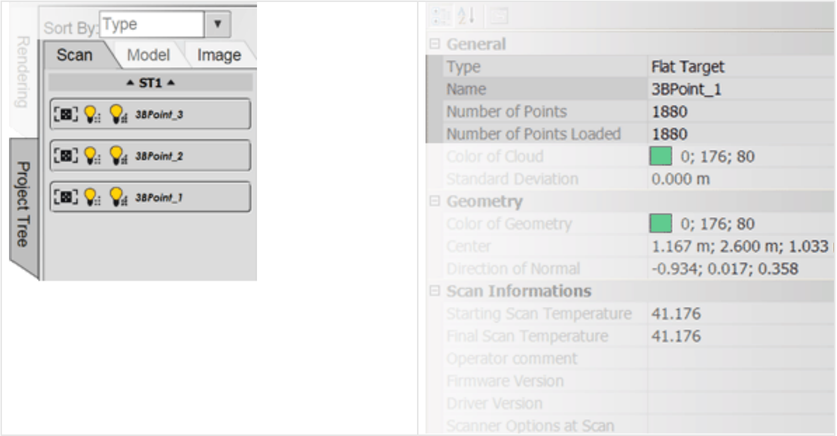
Stationing Review in the Project Tree

A Misleveled_Station is created and rooted under the Scan Tree. This station has a Point Cloud and a Geometry inside; and both are displayed in the View 3D window. You may see the created Station by tapping View Trees (or View 3D). Note that the Leveling Information of that Station is marked as False.



<u>For Trimble GX instrument Users:</u>

If the Fast Flat Target / Flat Target (or the Spherical Target) feature has been chosen for measuring the Backsight Points; three Flat Targets * (or Spherical Targets *) are created under the current Station.

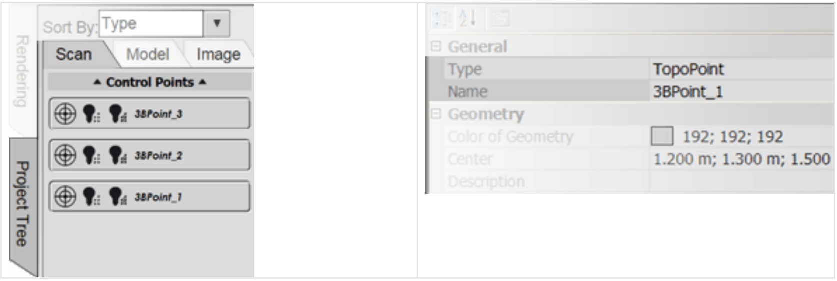


<u>For Trimble CX instrument Users:</u>

If the Black and White Flat Target (or the Spherical Target) feature has been chosen for measuring the Backsight Points; three Flat Targets * (or a Spherical Targets *) are created under the current Station.

Note: (*) A target (once measured) is named TargetX where X is its order. Once created in the Trimble Access database, it takes the Backsight Point name.

A Topographic Station with the three Control Points is created and rooted under that tree. Any of them is displayed in the View 3D.



Not Setting up a Station

A Station default name is a Number which starts at One and is incremented of One each time a new Station is added (under the current Project).

Note: If your Project already contains setup station(s); you will be prompted to cancel the new Station to create and start a new Project. If no, the Station will be created anyway and will not match with the already setup station(s). If yes, the creation procedure is aborted.

Defining a New Station Name

To Define a New Station Name:

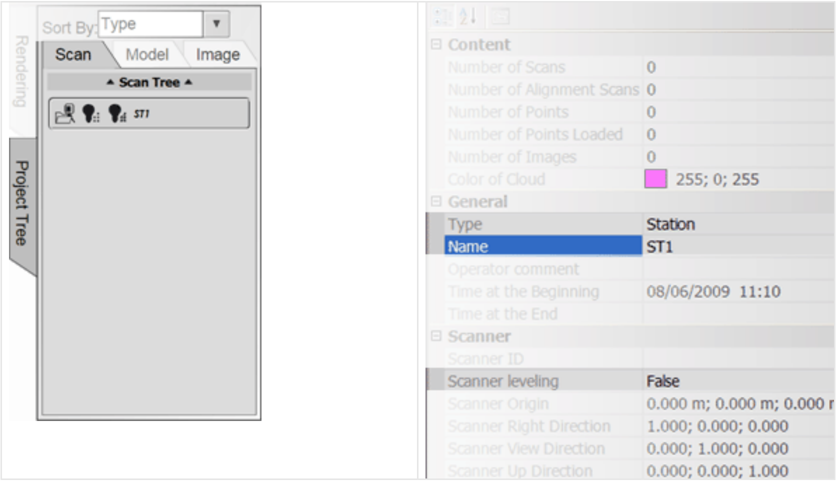
1. If you wish to create a new Station with the default name, leave it as is it.
2. Otherwise, tap inside the Station Name field. An on-screen keyboard appears.
3. Input a new name in the Station Name field.
4. Tap Ok to validate. The on-screen keyboard disappears.
5. Tap Next.

After tapping Next in the Set Station Parameters window, the Acquire in "Station_Name" (or Define Zone of Interest) window appears if you are in a General Scanning (or in a Volumes or DTM) job.

Note: An information box with the following message "'Station_Name' already existed. Please, choose another name" appears when the input name matches one that already exists. Tap Ok to close the information box and define another name.

Stationing Review in the Project Tree

A Misleveled_Station is created and rooted under the Scan Tree. This station has no Point Cloud and no Geometry inside. You may see it by tapping View Trees (or View 3D). Note that the Leveling Information of that Station is marked as False.



Adding Foresight Points

Adding a Foresight Point in a Station has no influence upon the Registration result.

To Add a Foresight Point:

1. In the Stationing window*, tap Add Foresight.
2. Define a Foresight Point Name,
3. Set the Foresight Point Parameters,
4. Tap Next. The Measure Foresight Point window appears.
5. Measure the Foresight Point and tap Next.

Note:

- (*) The Stationing window name may change according to the Station Setup you used. It can be Stationing "Known_Point_Name", Stationing "Station_Point_Name" or Stationing "Station_Name".
- When the user tries to complete an existing with a different instrument; a message appears and prompts the user to create a new station.

Adding New Backsight Points

To Add a New Backsight Point:

1. In the Stationing window*, tap Add New Backsight. The Create Backsight Known Point window appears.
2. Create a new Backsight Point by inputting known coordinates,
3. Or select an existing Backsight Point from a list,
4. Or import a list of Known Points,
5. Tap Next. The Measure New Backsight Point window appears.
6. Measure the Backsight Point and tap Next.

    - If the Station has been setup over a Known Point and orientated with:

        - A Known Backsight Point; the average between the two Backsight Points is taken into account,
        - An unknown Backsight Point and an Angle; the average between the two Backsight Points is taken into account. Adding a Backsight Point in this case is not recommended.
        - An Arbitrary Orientation; the added Backsight Point is taken into account and the Arbitrary Orientation ignored.

    - If the Station has been resected using the measurement of two Backsight Points; the average between all Backsight Points is taken into account,
    - If the Station has not been leveled; the average between all Backsight Points is considered.

Note:

- You can add as many Backsight Points as required. Once added; you can ignore some of them in the Registration using Ignore Backsight in the Edit Station Setup.
- (*) The Stationing window name may change according to the Station Setup you used. It can be Stationing "Known_Point_Name", Stationing "Station_Point_Name" or Stationing "Station_Name".
- When the user tries to complete an existing with a different instrument; a message appears and prompts the user to create a new station.

CHAPTER 8

Setting up a Target-Based Registration Report

A rapport is a Target-Based Registration Report with two parts: by Stations and by Targets. The Report by Stations is the one displayed once you have completed a Station Setup with a Known Backsight Point (or the Resection measurements of two Backsight Points or the measurements of three Backsight Points). The Report by Targets is exactly the same report by viewed from target observations.

Viewing a Report

To View a Report:

1. In the Stationing window*, tap Setup Report. The Target-Based Registration Report by Stations window appears.
2. Scroll the slider down to view the Report by Targets.
3. Tap Done. The Acquire in window** appears.

Note:

- (*) The Stationing window name may change according to the Station Setup you used. It can be Stationing "Known_Point_Name", Stationing "Station_Point_Name" or Stationing "Station_Name".
- (**) The Acquire in window name may change according to the Station Setup you used. It can be Acquire in "Known_Point_Name", Acquire in "Station_Point_Name" or Acquire in "Station_Name".

Exporting a Report

To Export a Report:

1. In the Target-Based Registration Report by Stations window, tap the Export button. The Destination Folder window appears.
2. Choose a Local Folder where to store the report.
3. Keep the default name: Report_Name-Of-The-Project_Year-Month-Date.
4. Or input a name for the report to save.
5. Tap Done. The Destination Folder window closes.

Note: Exporting the Target-Based Registration Report under the same name and the same folder will make appeared the "C:\Users\TabletPC\AppData\Local\Trimble\Trimble Access\Report_Name-Of-The-Project_Year-Month-Date already exists. Do you want to replace it?" message.

Choosing a Destination Folder

A Destination Folder is a Local Folder in your Trimble Rugged Tablet Computer drive. You can choose between a pre-defined Local Folder and a user-defined Local Folder.

Pre-defined Folders

There are three Local Folder shortcuts in your Trimble Rugged Tablet Computer drive: Files Folder, Desktop and My Documents. The Files Folder is the default Local Folder. Its path is C:\Users\TablePC\AppData\Local\Trimble\Trimble Access.

User-defined Folders

A User-Defined Folder:

1. Tap on the Go Up To Parent button.
2. Navigate though a drive/folder where you want to export the report.
3. Tap a folder to select it.

Defining the Destination File Name

To Define the Destination File Name:

1. Tap in the File Name field. An on-screen keyboard appears.
2. Enter a new name in the File Name field.
3. Tap Ok. The on-screen keyboard disappears.

Defining the Destination File Type

The Extension field is not dimmed even if you can only export the result into a unique format (RTF).

CHAPTER 9

Editing the Station Setup

To Edit the Station Setup:

1. In the Stationing window*, tap Edit Station Setup. The Select Station window appears.
2. Select a Station from the Select Station list.

   - If the Station has been setup over a Known Point and orientating with a known (or unknown) Backsight Point; the Change Height, Change Known Point and Edit Backsights buttons are enabled.
   - If the Station has been setup over a Known Point and orientating based on an Arbitrary Angle; only the Change Height and Change Known Point buttons are enabled.
   - If the Station has been setup using the Resection measurements of two Backsight Points; the Change Height and Edit Backsights buttons are enabled.
   - If the Station has been setup using the measurements of three Backsight Points; only the Edit Backsights button is enabled.
   - If the Station has not been setup; none of them is enabled.

Note: (*) The Stationing window name may change according to the Station Setup you used. It can be Stationing "Known_Point_Name", Stationing "Station_Point_Name" or Stationing "Station_Name".

Changing the Station Height

To Change the Station Height:

1. Tap the Change Height button. The Change Station "Known_Point_Name" (or "Station_Point_Name") Height window appears.
2. Do one of the following:

   - Change the Instrument Height * value.
   - Change the Instrument Height** type.

3. Tap Done.

Note:

- The Mean Error value will be updated according to the new Instrument Height* value.
- (*) True Height, Bottom Notch Height or Top Notch Height.

Changing the Station Known Point

You can change the selected Station's Known Point. The new Known Point can be either a Backsight Point or a Foresight Point that does not belong the Station. The selectable points cannot correspond to any Backsight Point of the station.

To Change the Station Known Point:

1. Tap the Change Known Point button. The Change Station "Known_Point_Name" Known Point window appears. The selected Station's Known Point is highlighted in yellow. All available Points* that you can associate to the selected Station are listed.
2. Choose another Point from the list by tapping it.
3. Tap Done. A warning message below appears.
4. Tap Ok. The warning message disappears. The selected Station will take the new Known Point name.

Note:

- There is no Undo when validating the transformation to the Station (by tapping Done).
- (*) Changing the Station (in the Select Station window) will update that list.

Editing the Station Backsight Points

You can edit the selected Station's Point which can be a Backsight Point, a Foresight Point or a Station Point.

To Edit the Station Backsight Points:

1. Tap the Edit Backsights button. The Edit Station Backsights* window appears.
2. Tap a Point from the list to select it.

   - In a Setup-With-Known Backsight-Point Station, the selected point can only be a Backsight Point. In that case, all the buttons (Change Height, Change Known Point and Ignore Backsight) are enabled.
   - In a Setup-With-Unknown Backsight-Point Station, the selected point can only be a Backsight Point. In that case, only the Change Height is enabled.
   - In a Resected Station, if the selected point is the Station Point; only the Change Height button is enabled. If the selected point is one of the two Backsight Points (used for the Resection measurements); all the buttons (Change Height, Change Known Point and Ignore Backsight) are enabled.
   - In a Three-Backsight-Point-Measurement Station, the selected point is one of the three Backsight Points. Only the Change Known Point and Ignore Backsight are enabled.

Note: (*) The Edit Station Backsights window name may change according to the Station Setup you used. It can be Edit Station "Known_Point_Name" Backsights, Edit Station "Station_Point_Name" Backsights or Edit Station "Station_Name" Backsights.

Changing a Point Height

To Change a Point Height:

1. Tap the Change Height button. The Change Backsight "Backsight_Name" Height window appears.
2. Tap in the True Backsight Height field. An on-screen keypad appears.
3. Input a value in the True Backsight Height field.
4. Tap Ok. The on-screen keypad disappears. The Deltas values will be updated according the input value.
5. Tap Done. The transformation will be first applied to the Point's Height and then to the selected Station. The Change Backsight "Backsight_Name" Height window closes.
6. Or tap Cancel. The transformation will not be applied to the Point's Height and to the selected Station. The Deltas values will remain unchanged and the Change Backsight "Backsight_Name" Height window closes.

Changing the Backsight Point

To Change the Backsight Point:

1. Tap the Change Known Point button. The Change Backsight "Backsight_Name" Known Point window appears. All available Points (Backsight, Foresight or Station) are listed.
2. Tap a Point to select it.
3. Tap Done. A warning message below appears.
4. Tap Ok. The warning message disappears. The selected Point will take the new Point name.

Note: You cannot change a Point which is a Station Point.

Ignoring the Backsight Point

To Ignore the Backsight Point:

1. Tap the Ignore Backsight button. The "Ignored" word between two brackets will be added to the selected Point.
2. Tap Done. The Edit Station* Backsights window closes.

Note: (*) The Edit Station Backsights window name may change according to the Station Setup you used. It can be Edit Station "Known_Point_Name" Backsights, Edit Station "Station_Point_Name" Backsights or Edit Station "Station_Name" Backsights.

Applying a Traverse

When applying a Traverse to stations, those that have been setup over a Known Point remains over that Known Point at the defined height but can rotate in order to adjust the errors. The other stations (those that have been not setup over a Known Point) are adjusted in translation and rotation to minimize errors.

To Apply a Traverse:

1. Tap the Traverse button.
2. Tap the Done button.

Note: No selection is required. The transformation will be applied to the project.

Applying a Global Adjustment

When applying a Global Adjustment to stations, all of them are adjusted in translation and rotation in order to minimize overall error. The over-known-point stations may move slightly).

To Apply a Global Adjustment:

1. Tap the Global Adjustment button.
2. Tap the Done button.

Note: No selection is required. The transformation will be applied to the project.

CHAPTER 10

Acquiring Data

When using a Trimble GX instrument; you can acquire one or (two) type(s) of data (Scan or Point) depending on the job workflow you are working with. While with a Trimble CX instrument, only one type of data (Scan) can be acquired.

In a General Scanning Job

In a General Scanning job, both a Scan and a Point* can be acquired. You can choose each of them in the Acquire in window**.

Note:

- (*) When using a Trimble CX instrument, only a Scan can be acquired.
- (**) The Acquire in window name may change according to the Station Setup you used. It can be Acquire in "Known_Point_Name", Acquire in "Station_Point_Name" or Acquire in "Station_Name".

In a Volume Job

In a Volume job workflow, only a Scan can be acquired. That's why the Acquire in window** is not present.

Note: (**) The Acquire in window name may change according to the Station Setup you used. It can be Acquire in "Known_Point_Name", Acquire in "Station_Point_Name" or Acquire in "Station_Name".

In a DTM Job

In a DTM job workflow, only a Scan can be acquired. That's why the Acquire in window** is not present.

Note: (**) The Acquire in window name may change according to the Station Setup you used. It can be Acquire in "Known_Point_Name", Acquire in "Station_Point_Name" or Acquire in "Station_Name".

Acquiring Scans

The table below lists the type(s) of Scan you can perform according to the instrument in use.

	GX Instrument	CX Instrument
Area Scan	✓	✓
Full Scan		✓

<u>To Acquire a Scan:</u>

1. In the Acquire in window**, tap New Area Scan. The Define Zone of Interest window appears.
2. Or tap New Full Scan. The Conventional Resolution window appears.
3. Or tap the Done button to cancel the step.

    - In the Station Setup With a Known (or an Unknown) Backsight method or using the Resection (or 3 Backsights Based) measurement, the Recheck window appears.
    - In the Video-Based Azimuth (or No Setup) method, a dialog appears and prompts you to create a new station (or not). Choosing Yes will open the New Station window while choosing No will bring you back to the Trimble Access Home Page.

Note:

- The Acquire in window** appears again once a Scan has been acquired.
- (**) The Acquire in window name may change according to the Station Setup you used. It can be Acquire in "Known_Point_Name", Acquire in "Station_Point_Name" or Acquire in "Station_Name".

Defining a Zone of Interest

A Zone of Interest is a Frame that the user has to define. The table below lists the type(s) of Support on which the user can define a Zone of Interest according to the instrument in use.

	GX Instrument	CX Instrument
Live Video	✓	✓
Panorama	✓	
360° Pre-Scan		✓
Existing 3D View	✓	✓

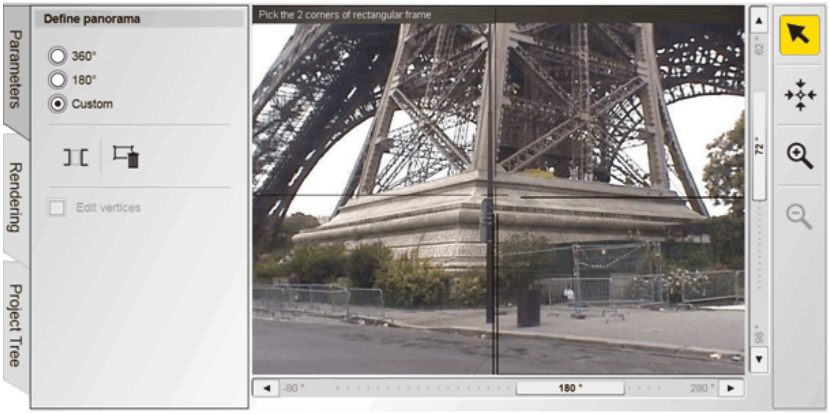
To Define a Zone of Interest:

- Tap In Live Video. The Define Frame window appears.
- Or tap In New Panorama. The Define Panorama window appears.
- Or tap In 360° Pre-Scan. The Acquisition window appears.
- Or tap In Existing 3D View. The Define Frame window appears.

Note: A Frame once drawn will be kept in memory even if the user decides to come back to the Define Zone Of Interest window.

In a New Panorama

A Panorama is a lonely (or a set of) image(s) taken by the camera embedded on your Trimble GX instrument. Such image(s) can be used for identification purposes during data editing or for framing. You can take three types of Panorama: a 360° Panorama, a 180° Panorama and a user-defined Panorama (called Custom). In the last case, the result will depend on the Zoom Factor you choose.



Note:

- In the 360° Panorama (or 180° Panorama) mode, the Selection button remains enabled; but you cannot use that picking mode to define a Rectangular Frame. Tapping a point on the Video View will have no effect.
- In the Custom mode, the Zoom On Point button (when selected) enables to center the Video View on a tapped point. In that case, the Invert Rectangular Frame Selection][button becomes enabled.

Taking a 360° Panorama

A 360° Panorama is a 360° (in horizontal) x 60° (in vertical)-field image.

<u>To Take a 360° Panorama:</u>

1. Tap the 360° option. The Zoom On Point  button becomes selected.
2. Tap Start. A progress bar* appears and an information box** opens at the end of the 360° Panorama.
3. Tap Ok. The information box closes.
4. Tap Next. The Define Frame window appears.

Note:
- (*) The progress bar shows the Panorama in progress.
- (**) The information box displays the following message "Panorama completed: X image(s) acquired" where X is the number of images.

Taking a 180° Panorama

A 180° Panorama is a 180° (in horizontal) x 60° (in vertical)-field image. 180° is the default option when the user accesses the New Panorama feature (with no Frame).

<u>To Take a 180° Panorama:</u>

1. Tap the 180° option. The Zoom On Point  button becomes selected.
2. Tap a point in the Video View. This point will be the horizontal center of the 180° Panorama.
3. Tap Start. A progress bar* appears and an information box** opens at the end of the 180° Panorama.
4. Tap Ok. The information box closes.
5. Tap Next. The Define Frame window appears.

Note:
- (*) The progress bar shows the Panorama in progress.
- (**) The information box displays the following message "Panorama completed: X image(s) acquired" where X is the number of images.

Taking a User-Defined Panorama

The Custom option enables to take a Panorama based on an area defined by the user. This option will be automatically set and the Edit Vertices option enabled if the user accesses the New Panorama feature with an existing Rectangular Frame.

To Take a User-Defined Panorama:

1. Tap the Custom option. The Selection and Invert Rectangular Frame Selection] [buttons become respectively selected and enabled. Note that the Start button swaps from enabled to disabled. It remains in this state until a frame is defined.
2. Tap two corners. These two corners define a rectangular frame (in yellow).
3. If required, tap the Invert Rectangular Frame Selection] [button.
4. Tap Start. A progress bar* appears and an information box** opens at the end of the Panorama.
5. Tap Ok. The information box closes.
6. Tap Next. The Define Frame window appears.

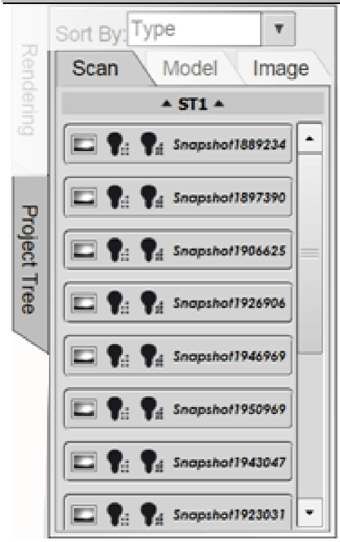
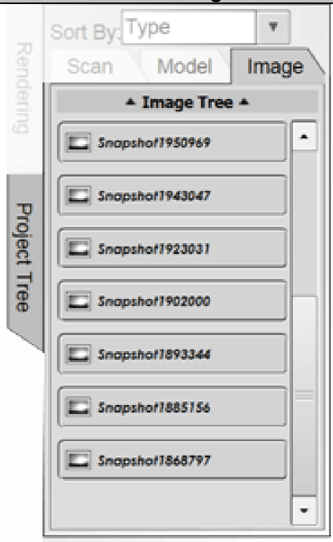
Tip:
- Swapping from Custom to 360° (or 180°) will not cancel the Rectangular Frame.
- Starting a new Rectangular Frame will delete the one that has been defined.

Note:
- (*) The progress bar shows the Panorama in progress.
- (**) The information box displays the following message "Panorama completed: X image(s) acquired" where X is the number of images.

The Panorama Results

The result is a lonely image or a set of overlapped images; this depends on the option (360°, 180° or Custom) or the frame size (only in Custom) the user chose or defined.

A Panorama once taken is a Matched Image* named Snapshot. It is put in two places under the Project Tree: under its corresponding Station in the Scan Tree and in a list in the Image Tree. Each image has as dimensions 768 pixels along its Width and 576 pixels along its Height whatever the Zoom Factor you selected.

The Scan Tree	The Image Tree
	

Note: (*) A Matched Image is an image linked to a station.

Viewing a Panorama

A Panorama once taken is displayed in the View 3D. If the Panorama is bigger than the View 3D's frame; you can pan it in any direction by dragging and dropping. You can also Zoom In, Zoom Out or Zoom All the Panorama.

Note: If the Custom option has been selected; you may see the Panorama with the rectangular frame (in yellow).

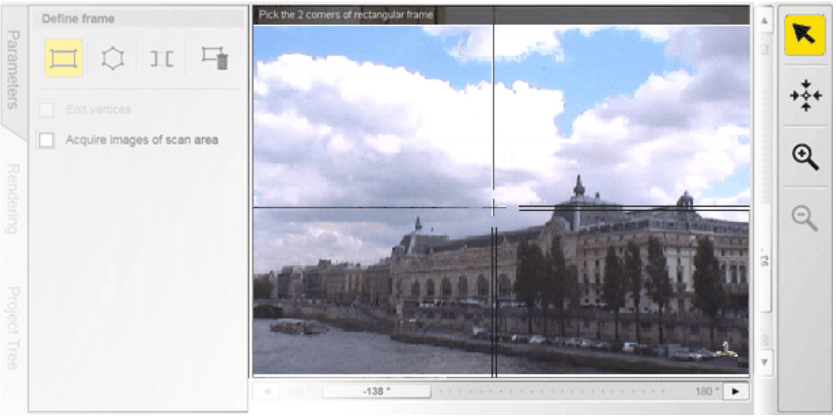
Adding a New Panorama

To Add a New Panorama:

1. Tap the Back button. The Define Panorama window appears again.
2. Perform as previously described to take a new Panorama. It will be rooted under both the Scan Tree and the Image Tree.
3. Or tap the Next button. The Define Frame window appears.

In the Video

You can use the embedded camera of your instrument to first display a video and then to frame on it.



With a Trimble GX instrument, the video is in Streaming mode. This means in real-time and the resolution is 768x572 pixels. With a Trimble CX instrument, the video is in Static mode. The video is only a static picture and the resolution is 576x720 pixels. The table below lists the type(s) of Tool you can have according to the instrument in use.

	GX Instrument	CX Instrument
Selection	✓	✓
Zoom In	✓	✓
Zoom Out	✓	✓
Center On Point	✓	✓
Refresh Static Video		✓

Selecting Items

The Selection button mainly in use in the Video View enables to select points for defining a frame. We call that a picking mode.

To Select an Item:

1. Tap the Selection button.
2. Tap a point.

Zooming In

The Optical Zoom of your instrument embedded camera is used for zooming. In a Trimble GX instrument, four Zoom Factors are available: 100%, 150%, 250% and 550%. In a Trimble CX instrument, two Zoom Factors are available: 100% and 340%. Optical zooming is the traditional method of physically manipulating the distance between two lenses to create a different camera view. The Video View appears with a Zoom Factor of 100% and the Zoom Out button is dimmed.

To Zoom In:

1. Tap the Zoom In button. The Zoom Factor will jump from 100% to 150% (or to 340%).
2. Tap again the Zoom In button. It will jump to 250% until you reach 550%.

Note:

- You cannot zoom in beyond 550%.
- The step 2 is not available for a Trimble CX instrument.

Zooming Out

After zooming in, the Zoom Out button becomes enabled.

To Zoom Out:

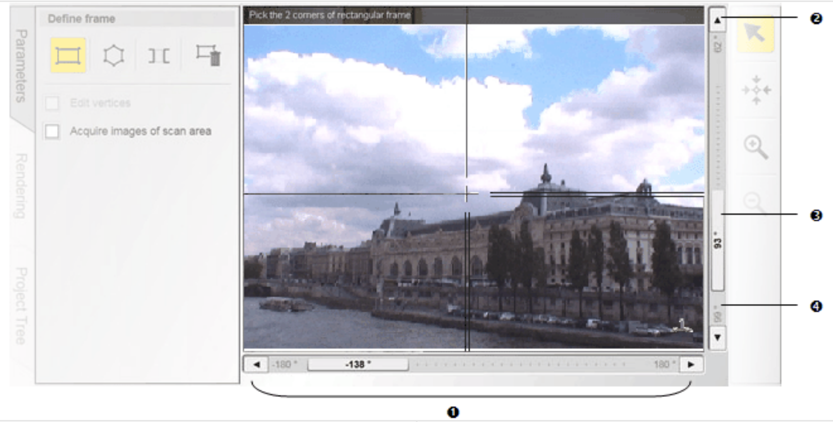
1. Tap the Zoom Out button. The Zoom Factor will decrease from e.g. 550% to 250%.
2. Tap again and again the Zoom Out button. The Zoom Factor will decrease until it reaches 100%.

Note:

- You cannot zoom out below 100%.
- For a Trimble CX instrument, the Zoom Factor will automatically decrease from 340% to 100% without intermediate step(s).

Changing the Video View

To change the Video View, you can move your instrument in Horizontal 360° around its axis and the embedded camera in Vertical (38° above the horizontal and 22° below the horizontal) for a Trimble GX instrument. If using a Trimble CX instrument, your instrument will move in Horizontal 360° around its axis and its embedded camera in Vertical (from 0° to 150°). Two scroll bars (Horizontal and Vertical) as illustrated below are available for theses purposes.



1 - Scroll bar 2 - Scroll arrow	3 - Scroll slider 4 - Scroll track

Note: When rotating your Trimble CX instrument around its axis (or its embedded camera), the Static Video may take a while before being refreshed. When the refresh is in progress, the "Move" text appears below the Refresh Static Video button. Once the refresh completed, the "Move" text is replaced by "Pict".

Scrolling the Horizontal Slider

The Horizontal Slider ranges from -180°* to 180°*. Scrolling it will change the camera's horizontal position (the value on the slider).

To Scroll the Horizontal Slider:

1. Slide the Horizontal Slider from Right to Left to move Left the instrument.
2. Or slide the Horizontal Slider from Left to Right to move Right the instrument.

Note: (*) As a Horizontal Angle (HA).

Scrolling the Vertical Slider

The Vertical Slider ranges from 103°* to 66°*. Scrolling it will change the camera's vertical position (the value on the slider).

To Scroll the Vertical Slider.

1. Slide the Vertical Slider from Up to Down to move Down the embedded camera.
2. Or slide the Vertical Slider from Down to Left to move Up the embedded camera.

Note: (*) As Vertical Angle (VA).

Tapping a Scroll Arrow

You can move the Video View in Horizontal (or Vertical) with an Increment which depends on the Zoom Factor. The [A] is available for a Trimble GX instrument while the table [B] is for a Trimble CX instrument.

[A]:

Zoom Factor	Horizontal Increment (in Degrees)	Vertical Increment (in Degrees)
100%	33	26
150%	22	16
250%	13	9
550%	6	4

[B]:

Zoom Factor	Horizontal Increment (in Degrees)	Vertical Increment (in Degrees)

100%	30	39
340%	9	11

To Tap a Scroll Arrow:

1. Tap the Right Arrow (or Left Arrow) on the horizontal scroll bar.
2. Or tap the Top Arrow (or Bottom Arrow) on the vertical scroll bar.

Tapping the Scroll Track

You can move the Video View in Horizontal (or Vertical) with no increment.

To Tap the Scroll Track:

- Tap anywhere on a scroll bar track.

Centering On Point

To Center on a Point:

1. Tap the Zoom On Point button.
2. Tap a point in the Video View window. The Video View moves to center to the tapped point.

Refreshing the Static Video On Demand

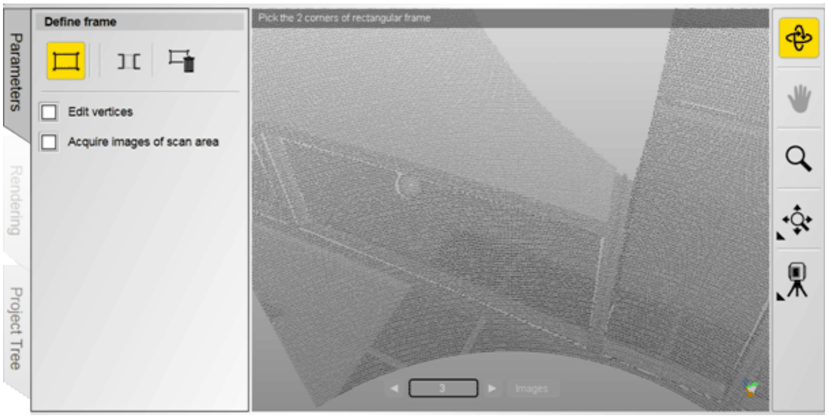
You can refresh the Static Video without having to rotate the Trimble CX instrument or its embedded camera.

To Refresh the Static Video On Demand:

- Tap the Refresh Static Video button.

In a 360° Pre-Scan

You can define a Zone of Interest on a 360° Pre-Scan which is a Full Scan but with a low square resolution (0.25° x 0.25° as Horizontal Angle and Vertical Angle) and limited in time (about 30 seconds). The Station-Based mode is the default navigation mode in a 360° Pre-Scan. The Examiner mode is dimmed.



Note: This step is only available for a Trimble CX instrument.

In an Existing 3D View

You can define a Zone of Interest on an already acquired data (Point Cloud or/and on Panorama(s)*).

Note: (*) Not available for a Trimble CX instrument.

Defining a Frame

A Frame is a scan area that the user has to define by tapping either in a New Panorama, in an Existing 3D View or in the Live Video. A Frame may have one (or two) shape(s) (Rectangular or Polygonal) depending on the instrument in use. If there is no Frame (as input of a New Panorama, an Existing 3D View or the Live Video); the Polygonal Frame is the default drawing mode. If there is a Rectangular Frame; the Rectangular Frame drawing mode is set in all (New Panorama, Existing 3D View and Live Video). If there a Polygonal Frame, the Polygonal Frame drawing mode is set except in all except in New Panorama.

	GX Instrument	CX Instrument
Rectangular Frame	✓	✓
Polygonal Frame	✓	
Invert Rectangular Frame Selection	✓	✓
Delete Frame	✓	✓

<u>To Define a Frame:</u>

1. Define a Polygonal Frame.
2. Or define a Rectangular Frame.
3. Or delete an existing Frame.
4. Or edit an existing Frame's vertices.
5. Tap Next.

    - If the Acquire Images of Scan Area option has been checked; the Panorama Resolution window opens.
    - If the Acquire Images of Scan Area option has been left unchecked; the Choose Resolution Type window appears.

Defining a Rectangular Frame

A Rectangular Frame is composed of only two points. Each corresponds to a corner and both are opposite.

To Define a Rectangular Frame:

1. Tap the Rectangular Frame button. The Invert Rectangular Frame Selection] [button becomes enabled.
2. Tap anywhere to draw the first corner of a Rectangular Frame.
3. Tap anywhere to draw the second and opposite corner. The Rectangular Frame is drawn.
4. If required, tap the Invert Rectangular Frame Selection] [button.

Defining a Polygonal Frame

A Polygonal Frame must be composed of at least three points.

To Define a Polygonal Frame:

1. Tap the Polygonal Frame button.
2. Tap anywhere to define the first vertex of a Polygonal Frame.
3. Tap anywhere to define the second. The two vertices are linked by a segment.
4. Continue to define other vertices. The Polygonal Frame is always closed in such a way that the start vertex is always linked to the last one.

Editing Vertices

If there is no Frame (as input of a New Panorama, an Existing 3D View or the Live Video); the Edit Vertices option is dimmed and remains in this state until a Frame is drawn. If there is a Frame, the Edit Vertices option is enabled so that you can edit it.

To Edit a Vertex:

1. Check the Edit Vertices option.

   - If a Polygonal Frame has been defined, a hollow square appears over each vertex.
   - If a Rectangular Frame has been defined, only two hollow squares appear: one over each tapped point.

2. Tap a vertex (with a hollow square) in the View 3D with the stylus pen.
3. Tap a point to move the vertex (with a hollow square) to that point. The Frame's shape changes consequently.

Tip: You can also tap and drag a vertex.

Deleting a Frame

You can delete the current Frame or an existing one.

To Delete a Frame:

1. Tap the Delete Frame  button.
2. Or if the current Frame is rectangular, start a new Rectangular Frame. This will delete the current one.
3. Or change the Frame definition mode for another.

Note: You cannot undo the operation.

Acquiring Images of Scan Area

This feature enables to automatically take video snapshots each time a Scan is started. These video snapshots are linked to a Scan and cover an area that corresponds to the framing area.

To Acquire Images of the Scan Area:

1. First define a Frame as previously described.
2. Check the Acquire Images of Scan Area option.
3. Tap Next. The Panorama Resolution window appears.

Note:

- You can check the Acquire Images of Scan Area option without framing. In this case, the Next button remains dimmed.
- When using a Trimble GX instrument, the acquired images are all named Snapshot and are put in two places under the Project Tree: under its corresponding Station in the Scan Tree and in a list in the Image Tree. In the case of a Trimble CX instrument, the acquired images are all named ImageX where X is its order. X starts from 1.

Setting Panorama Resolutions

With a Trimble GX instrument, an Image is always sized to 768X572 pixels whatever the Zoom Factor you select. As for the Video View, there are four different Zoom Factors: 100%, 150%, 250% and 550%. In the case of a Trimble CX instrument, an Image is sized to 576x720 pixels and there are two Zoom Factors: 100% and 340%.

Trimble Access gives an estimate for the number of Images that will be captured according to the Frame previously defined and to the Zoom Factor in use. For a given Frame, increasing the Zoom Factor will increase the number of images to capture.

To Set a Panorama Resolution:

1. Tap on the Image Size pull-down arrow.
2. Choose a Zoom Factor.
3. Tap Next. The Choose Resolution Type window appears.

Choosing a Resolution Type

A Resolution can be Conventional or SureScan™. When it is Conventional, it expresses the distance between two 3D coordinate points at a given distance. When it is SureScan™, it only expresses the distance between two 3D points regardless of the distance from the instrument to a scene. The table below lists the type(s) of Resolution according to the instrument in use.

	GX Instrument	CX Instrument
Conventional Resolution	✓	✓
SureScan™ Resolution	✓	

To Choose a Resolution Type:

1. Tap Conventional Resolution. The Choose Conventional Resolution window appears.
2. Or tap SureScan™ Resolution. The Choose SureScan™ Resolution window appears.

Note:

- The SureScan™ Resolution type is dimmed if the Trimble GX instrument is not an Advanced™.
- This step is not present in Volumes (or DTM) as the Resolution has been set in the Define Job Resolution step.

Setting a Conventional Resolution

A Conventional Resolution of a scan can be expressed in terms of spatial resolution (see Distance Parameters) or angular resolution (see Angle Parameters). The spatial resolution consists of defining the width and height resolutions in terms of distance at a fixed (or user-defined) distance. The angular resolution consists of defining the width and height resolutions in terms of angle. In both cases, the Convention Resolution is square by default (defining the HD (Horizontal Distance) will set the VD (Vertical Distance) at the same value); but you can choose to set each different.

To Set a Conventional Resolution:

1. Define Distance Parameters,
2. Or define Angle Parameters,
3. Or constrain the resolution to a time limit,
4. Or set Scan Options.
5. Tap Start.

Note: When using a Trimble CX instrument, the HA (or VA) value ranges from 0.001 degrees to 0.25 degrees (except for target scans). You cannot go beyond (or above) this range.

Defining Distance Parameters

To Define Distance Parameters:

1. Tap anywhere in the Distance Parameters panel.
2. Do one of the following:

   - Set a square resolution.

     a) Keep the Use Same Horizontal and Vertical Values padlock locked .
     b) Tap in the Horizontal Distance field. An on-screen keypad appears.
     c) Input a distance value in the Horizontal Distance field.
     d) Tap the Tab button*. The on-screen keypad jumps to the At Distance field for editing.
     e) Input a distance value in the At Distance field.
     f) Tap the Tab (or Ok) button. The on-screen keypad closes

   - Set an un-square resolution.

     a) Set the Use Same Horizontal and Vertical Values padlock unlocked by tapping it. The Vertical Distance field becomes enabled.
     b) Tap in the Horizontal Distance field. An on-screen keypad appears.
     c) Input a distance value in the Horizontal Distance field.
     d) Tap the Tab button*. The on-screen keypad jumps to the Vertical Distance field for editing.
     e) Input a distance value in the Vertical Distance field.
     f) Tap the Tab button*. The on-screen keypad jumps to the At Distance field for editing.
     g) Input a distance value in the At Distance field.
     h) Tap the Tab (or Ok) button. The on-screen keypad closes

Note: Once you have defined the Distance Parameters, Trimble Access will update the Angle Parameters with related parameters and will estimate the time required to collect data (If a Frame has been defined) as well as the number of points.

Tip: (*) You can also tap the Ok instead. In that case, you need to tap in the next field for editing.

Defining Angle Parameters

<u>To Define Angle Parameters:</u>

1. Tap anywhere in the Angle Parameters panel.
2. Do one of the following:

   - Set a square resolution.

     a) Keep the Use Same Horizontal and Vertical Values padlock locked .
     b) Tap in the Horizontal Angle field. An on-screen keypad appears.
     c) Input an angular value in the Horizontal Angle field.
     d) Tap the Tab (or Ok) button. The on-screen keypad closes

   - Set an un-square resolution.

     a) Set the Use Same Horizontal and Vertical Values padlock unlocked  by tapping it.
     b) Tap in the Horizontal Angle field. An on-screen keypad appears.
     c) Input an angular value in the Horizontal Angle field.
     d) Tap the Tab button*. The on-screen keypad jumps to the Vertical Angle field for editing.
     e) Input an angular value in the Vertical Angle field.
     f) Tap the Tab (or Ok) button. The on-screen keypad closes

Note: Once you have defined the Angle Parameters, Trimble Access will update the Distance Parameters with related parameters and will estimate the time required to collect data (If a Frame has been defined) as well as the number of points.

Tip: (*) You can also tap the Ok instead. In that case, you need to tap in the next field for editing.

Constraining the Resolution to a Time Limit

You can define a time required to collect data.

To Constrain the Resolution to a Time Limit:

1. Tap anywhere in the Estimation and Safety Parameters panel.
2. Tap in the Constrain Resolution to a Time Limit field. An on-screen keypad appears.
3. Input a value in the Constrain Resolution to a Time Limit field.
4. Tap OK. The on-screen keypad disappears on its own.

Note: Once you have defined duration, Trimble Access will update the parameters in the Distance Parameters and Angle Parameters panels and will estimate the number of points (If a Frame has been defined).

Setting a SureScan Resolution

The SureScan™ Resolution consists of defining a resolution regardless of the distance from your instrument to a scene.

To Set a SureScan™ Resolution:

1. Tap in the SureScan™ Distance field. An on-screen keypad appears.
2. Enter a new distance value in the SureScan™ Distance field.
3. Tap Ok. The on-screen keypad disappears.
4. Tap Start.

Note: The default unit of measurement is setup in Meters for the SureScan™ distance; you do not have to enter "m" after the value.

The scan parameters are not customizable. They are summarized below:

- Auto-Focus enabled,
- Grid: Best Quality,
- Point Coloring enabled,
- The limit scan distance: 200m,
- The Number of Shots: 4

Customizing the Scan Options

The Scan Options are typically Point Coloring, Focus, Grid Quality, Tilt and Scan Distance. Each will be detailed hereafter. The table below lists the type(s) of Scan Options according to the instrument in use.

	GX Instrument	CX Instrument
Point Coloring	✓	
Focus	✓	
Grid Quality	✓	
Tilt	✓	✓
Scan Distance	✓	
Remeasure Tilt Before Scan		✓
TZS File Format		✓
CMF File Format		✓

To Customize the Scan Options:

- Tap anywhere in the Scan Options panel to expand hidden scan options.

Point Coloring

The Point Coloring option allows RGB color information to be assigned to points in real-time during a scanning process. The result is a set of RGB colored points that can be viewed in the Trimble Access's View 3D.

Focus

There are two Focus modes: Autofocus and Fixed Focus At. The Autofocus mode is well suited for high detail capture requirements on objects (or scenes) at close range, up to 20 to 25 meters. Note that the Autofocus does not improve high detail capture at distances greater than 25 meters. If this focus mode suits your needs, we advise you to plan scan stations so that maximum distance from objects/scenes is less than 25 meters. For plain objects (walls, large non-detailed objects, etc.) at close range, this mode is unnecessary. In other cases, check the Fixed Focus At option and select focal distance relative to the object(s)/scene. In this configuration, the Trimble GX instrument will capture regular high accuracy data at all distances according to range specifications.

Grid Quality

Two options are available that effectively control the behavior of the Trimble GX instrument's mirror: Fast and Best Quality. The Fast option is for regular data quality. This option corresponds to standard (radial) grid and is sufficient for data acquisition for most industrial applications (data editing including geometric modeling). Keep the Enhanced Grid option unchecked to choose Fast. The Best Quality option is for special applications if data editing is likely to include meshing (c.f. texture mapping). This option corresponds to controlled rotation i.e. constant angular step. Using this option does not necessarily imply a need for Auto-Focus enabling. Check the Enhanced Grid option to choose Best Quality.

Tilt Feature

The Tilt component in your instrument is a dual-axis (Trunnion and Sighting axes) detector. Used in combination with the Compensator enables to level-compensate automatically all 3D points.

Level-compensation when using a Trimble GX instrument can be Dynamic or Static. In the Dynamic mode (when checking the Dynamic Tilt option), tilt measurements are continuous and measured values are applied to all points of a scan. This mode is well-suited when using the instrument under a stable environment. In the Static mode (when keeping the Dynamic Tilt option un-checked), only two measurements are done for a given scan, one when it starts and the other when it ends. All points of the scan are level-compensated with the value measured at the beginning. Both values (beginning and end) are compared together. A warning message appears if the difference is greater than 300 micro-radians. This mode is well-suited when using the instrument under high vibration environment.

The instrument needs to be leveled and the Compensator activated* to be able to use the Dynamic (or Static) mode. Otherwise, the Dynamic Tilt option is hidden.

Note: (*) The Disable Compensator option unchecked in the Leveling window.

Level-compensation when using a Trimble CX instrument is neither Dynamic nor Static but On-Demand (by remeasuring the Tilt).

Scan Distance

For objects (or scene) at distances less than the maximum standard range of the Trimble GX instrument, select the maximum distance at which the instrument is required to capture data. This will help to speed-up the scanning operation.

Greater distance setting is offered for situations where advanced users wish to attempt data capture at distances beyond maximum standard range. OverScan™ distance is indicated when the distance is greater than the maximum distance. The ability of the instrument to capture data at these distances and/or at any given level of density is not guaranteed by the manufacturer. Ad-hoc testing has shown that under favorable operating conditions, data capture at these distances may be achievable. Such attempts are at the operator's discretion and in the case of such attempts operator is advised to closely check status of real-time data capture in Trimble Access as scan is in progress.

Number of Shots

The Number of Shots refers to the number of times the laser is targeted on a single point for the purposes of collecting one point of data with increasing levels of distance accuracy in order to improve standard deviation.

Note that increasing the Number of Shots can improve accuracy up to a certain level, but to the detriment of speed of data capture. The number is setup by default to 4 and is limited to 25. The number of shots beyond 25 is unlikely to produce any discernable improvement in data quality.

Remeasure Tilt Before Scan

From the moment the Tilt had been measured and the beginning of a Scan, the Trimble CX instrument may move slightly e.g. due to vibrations. The user should then remeasure the Tilt to obtain new values.

Save Points in a TZS Format File

A TZS format file is a Trimble's LASERGen Manager format file.

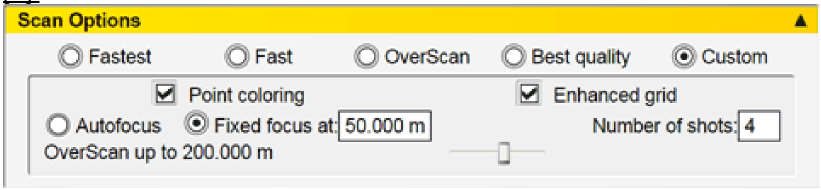
Save Points in a CMF Format File

A CMF format file is a file provided by a Trimble CPW 8000 (or Trimble CX) instrument.

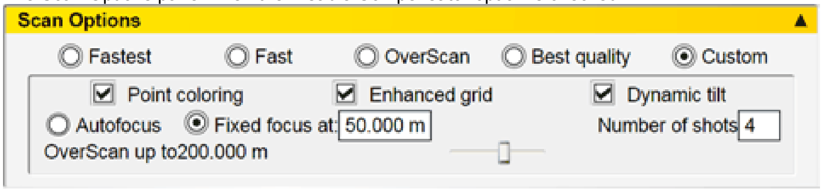
Defining the Scan Options

The Custom method must be used in specific cases and/or where you are an advanced user of the instrument. If your instrument is a GX; the Scan Options panel as shown in [A]. If it is a CX, the Scan Options panel is as shown in [B].

[A]:



The Scan Options panel when the Disable Compensator option is checked



The Scan Options panel when the Disable Compensator option is unchecked

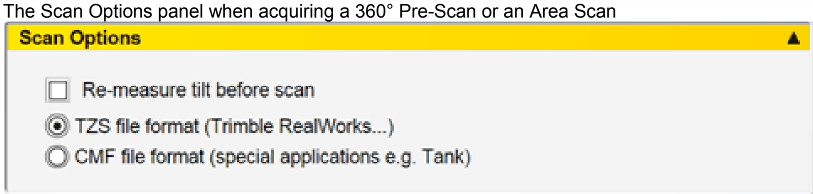
To Define the Scan Options:

1. Check the Custom option. All options become enabled.
2. Keep the Point Coloring option checked (if required).
3. Keep the Enhanced Grid option checked (if required).
4. If the Disable Compensator option has been checked when leveling the instrument, jump to step 7.
5. If the Disable Compensator option has been left unchecked when leveling the instrument, choose between Dynamic Tilt and Static Tilt (by checking (or keeping unchecked) the option).
6. Choose between Autofocus and Fixed Focus At as focus mode.
7. If Fixed Focus At has been checked, keep the default distance value or define a distance by entering a value.
8. Define the number of shots by inputting a value in the Number of Shots field.
9. Use the slider to define a scan distance:

   - If the distance is below 200.00 m, you are in the Limit Scan Distance,
   - If the distance is above 200.00 m, you are in the OverScan™.

[B]:

The Scan Options panel when acquiring a 360° Pre-Scan or an Area Scan



The Scan Options panel when acquiring a Full Scan

To Define the Scan Options:

1. If the Disable Compensator option has been checked after measuring the Tilt, the Remeasure Tilt Before Scan option is deactivated (dimmed).
2. If the Disable Compensator option has been left unchecked after measuring the Tilt, the Remeasure Tilt Before Scan option is activated (unchecked by default).
3. When acquiring a Full Scan, choose between TZS and CMF as file format.
4. If required, remeasure the Tilt before scanning by checking the option.

Note: The Scan Options panel (when not expanded) summarizes in which file format (TZS or CMF) acquired points will be saved as well as the Remeasure Tilt Before Scan option which is chosen or not.

Choosing a Scan Method

The Scan Options are spread between different Scan Methods. Choosing a Scan Method will choose the options that are related to.

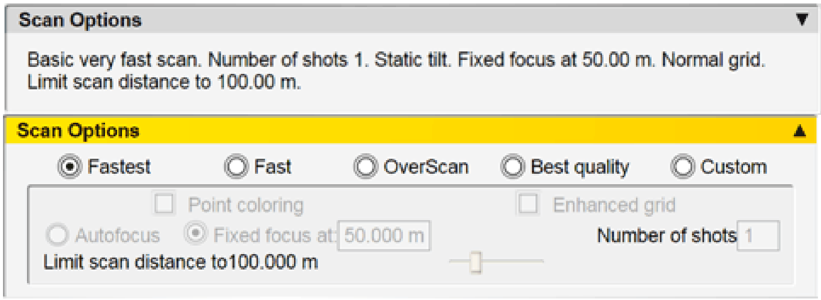
To Choose a Scan Method:

1. Tap anywhere in the Scan Options panel which expands showing hidden scan options.
2. Choose among Fastest, Fast, Best Quality and OverScan™.

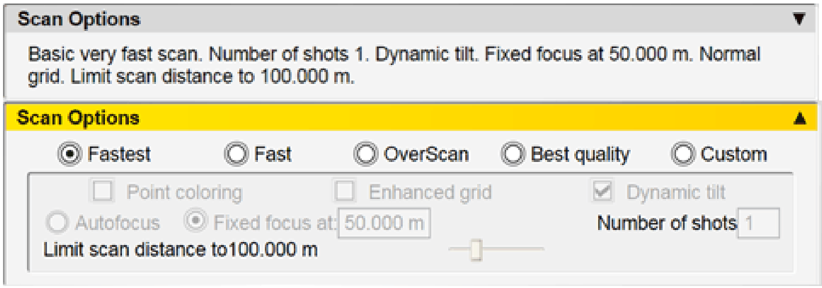
The Fastest Method

The Fastest method is for a basic and very fast scan under standard operating conditions. This method is limited to a range corresponding to half the regular range capability of the Trimble GX instrument (before OverScan™): 100.00 m. Point Coloring acquisition is not enabled and basic grid quality is in mono and 1 shot.

The level-compensation is in Static mode if the Disable Compensator option has been checked while leveling the instrument.



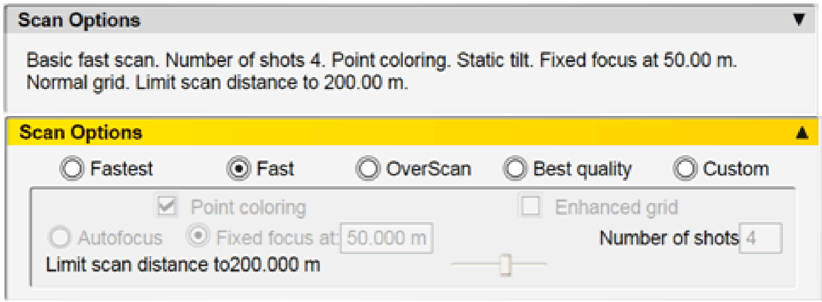
The level-compensation is in Dynamic mode if the Disable Compensator option has been left unchecked while leveling the instrument.



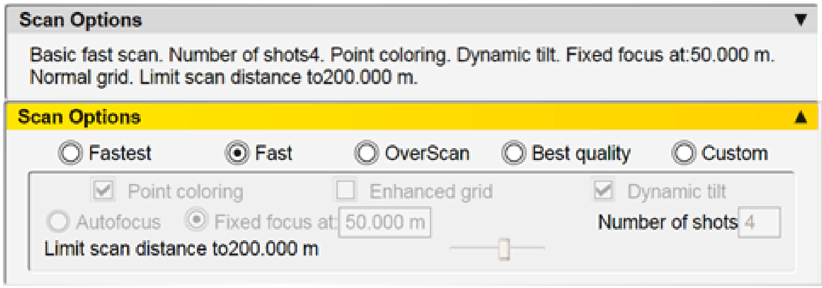
The Fast Method

The Fast method is for a basic fast scan over the full regular range of the Trimble GX instrument (before OverScan™): 200.00 m. In this method, Point Coloring acquisition is enabled, Autofocus is disabled and basic grid quality is in mono and 4 shots. This method is sufficient for non-complex objects and scenes and/or where very high accuracy is not a priority.

The level-compensation is in Static mode if the Disable Compensator option has been checked while leveling the instrument.



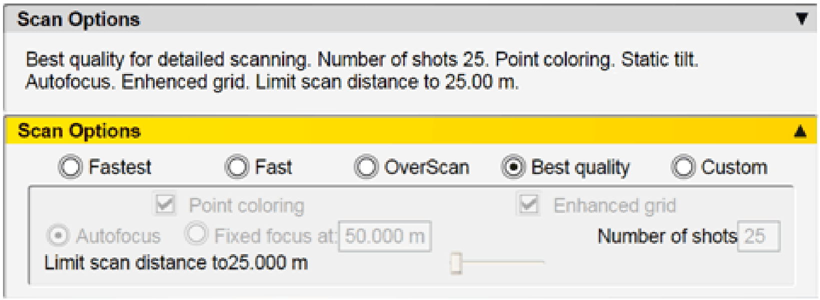
The level-compensation is in Dynamic mode if the Disable Compensator option has been left unchecked while leveling the instrument.



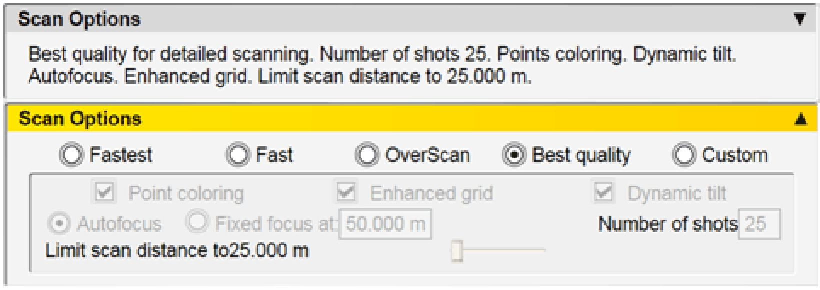
The Best Quality Method

The Best Quality method is for complex objects and scenes where edge/details are required and particularly for distances up to 20 to 25 meters. This method can be also used if you are in doubt about the level of accuracy required. In this method, scan is multi-shot, enhanced grid (angular constant-step); Autofocus and Point Coloring are enabled. This method is recommended if data editing is likely to include meshing. In this method we recommend scanning at no more than 25 shots - specify this during framing phase. Scanning time is approximately double that of the Fast scanning mode with same grid and averaging parameters.

The Disable Compensator option has been checked in the Leveling window. The level-compensation is in Static mode.



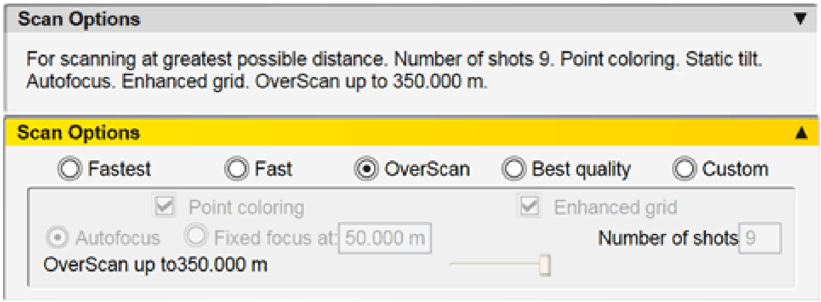
The Disable Compensator option has been left unchecked in the Leveling window. The level-compensation is in Dynamic mode.



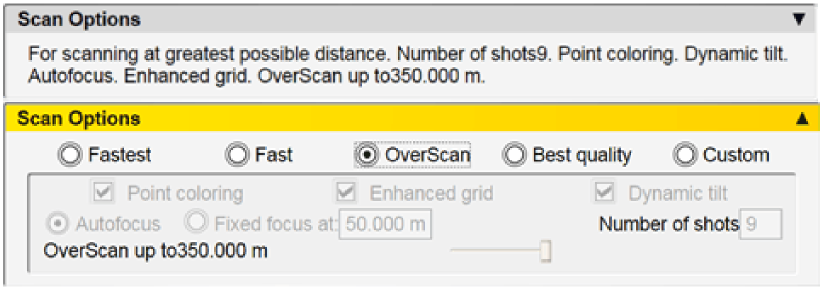
The OverScan Method

The OverScan™ method is used for scanning at greatest possible distance, corresponding to the OverScan™ distance of the Trimble GX instrument: 350.00 m. Point Coloring acquisition is enabled and basic grid quality is in mono and 9 shots.

The Disable Compensator option has been checked in the Leveling window. The level-compensation is in Static mode.



The Disable Compensator option has been unchecked in the Leveling window. The level-compensation is in Dynamic mode.



Acquiring Full Scans

You can add as many Full Scans as required under a given Station as the New Full Scan button in the Acquire in window remains enabled after acquiring one.

Note: You can cancel a Full Scan (TZS or CMF) in progress.

A TZS Full Scan

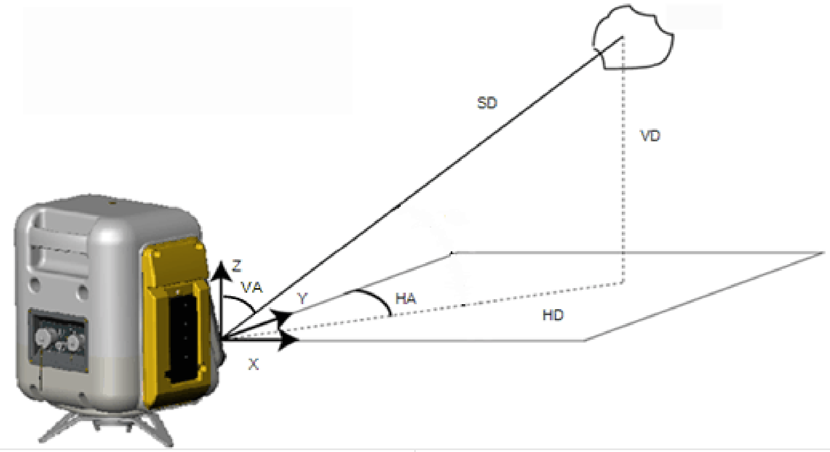
At the end of a TZS Full Scan, a message such as "Scan finished. Processing the data....You may disconnect the instrument" appears at the top left corner of the View 3D and points are displayed. Adding another TZS Full Scan under the same Station brings up a dialog which prompts you to replace the existing one. Choosing Yes overwrites the existing TZS format file. Choosing No adds the new TZS Full Scan under the Station. The new TZS Full Scan name is then incremented by one digit.

A CMF Full Scan

At the end of a CMF Full Scan, a message such as "Scan finished. Processing the data....You may disconnect the instrument" appears at the top left corner of the View 3D as well as a dialog. If adding another CMF Full Scan under the same Station, the new CMF Full Scan name is then incremented of one digit.

Acquiring Survey Points

For a given 3D point, a measurement composed of three components is performed. The first component is called SD (Slope Distance) - distance from the instrument to an object - with two derivatives HD (Horizontal Distance) and VD (Vertical Distance) (also called Elevation). The two other components are VA (Vertical Angle) and HA (Horizontal Angle) - respectively the Inclination and Azimuth of the instrument. The measurement principle is illustrated in the figure above.



SD: Distance from the instrument to an object HD: Horizontal Distance	VD: Elevation VA: Inclination HA: Azimuth

<u>To Acquire a Survey Point:</u>

- In the Acquire in** window, tap New Point. The Define Point Name window appears.

Note: (**) The Acquire in window name may change according to the Station Setup you used. It can be Acquire in "Known_Point_Name", Acquire in "Station_Point_Name" or Acquire in "Station_Name".

Defining a Survey Point Name

A Survey Point is always named "SurveyPointX" where X is its current order. For a given project, X starts from One and it is incremented from one to one each time a new Survey Point is added regardless of the station the Survey Point belongs to.

To Define a Survey Point Name:

1. Keep the default name: SurveyPoint1.
2. Or tap in the Point Name field. An on-screen keyboard appears.
3. Enter a new name in the Point Name field.
4. Tap Ok. The on-screen keyboard closes by its own.
5. Tap Next. The Discrete Point Measurement window appears.

Collecting a Survey Point

To Collect a Survey Point:

1. Move the instrument to an area where you want to collect a Survey Point (using the scroll-bars).
2. Tap a point in the Video View.
3. Tap Measure. At the end of the measurement, Trimble Access displays the Survey Point as a yellow point with a yellow label and its coordinates as "HA, VA, SD".
4. If required, tap another point in the Video View. The previously Survey Point will be cancelled.
5. Tap Next.

Tip: A collected Survey Point will not be created in the Trimble Access database as long as you do not tap the Next button.

Note:

- You can swap from "HA, VA, SD" to "X, Y, Z" by tapping "HA, VA, SD" before (or after measuring) a Survey Point.
- The unit of measurement for an angle (HA or VA) is set by default to Degrees. You can change it in Settings / Units.
- The unit of measurement for a distance (SD, X, Y and Z) is set by default to Meters. You can change it in Settings / Units.

Adding a New Survey Point

After tapping Next, the Acquire in window** appears again. This lets you to add a new Survey Point under the current station.

Note: (**) The Acquire in window name may change according to the Station Setup you used. It can be Acquire in "Known_Point_Name", Acquire in "Station_Point_Name" or Acquire in "Station_Name".

The Survey Point Results

Each Survey Point is created and placed under its current station in the Scan Tree. It has both the Point Cloud and the Geometry representations. By default, it is displayed in the View 3D.

Pausing on Data Acquisition

When acquiring data like a Scan or (a Panorama or Target), a Progress Bar in transparency appears on the top of the Video View (or View 3D). The data name* is at the left of the Progress Bar. If it is a Scan (in a General Scanning job), the Number of Points, a Rate between brackets and the Time Estimation (countdown to completion) are displayed at the right of the Progress Bar.

If it is a Scan (in a Volumes (or DTM) job), there are only the Number of Points and a Rate displayed at the right of the Progress Bar.

If it is a Panorama (only in a General Scanning job), no Number of Points, no Rate and no Time Estimation (counted in backward) information are displayed.

Note: There is no Pause if there is only one Panorama.

If it is a Full Scan (TZS or CMF) (only with a Trimble CX instrument), the Number of Points, a Rate and the Time Estimation (countdown to completion) are displayed at the right of the Progress Bar.

Note:

- (*) Trimble Access may first display the "Scan Starting..." message at the left of the Progress Bar before displaying the data name.
- If the Acquire Images of Scan Area option has been checked when defining a Zone of Interest; the "Acquiring Images..." message is displayed.

Interrupting

You can pause a data acquisition when it is in progress. There is a Pause button at the top right corner of the View 3D (or Video View).

<u>To Interrupt:</u>

- Tap the Pause button. The Pause button will take the name of Resume.

Note: The Pause button can take a short while to change to Resume. The "Scan Stopping..." message appears in place of the data name at the left of the Progress Bar during this period of time.

Resuming

<u>To Resume:</u>

- Tap the Resume button. The Resume button will take the name of Pause.

Stopping

You can stop a data acquisition like Targets.

<u>To Stop:</u>

- Tap the Stop button.

Cancelling

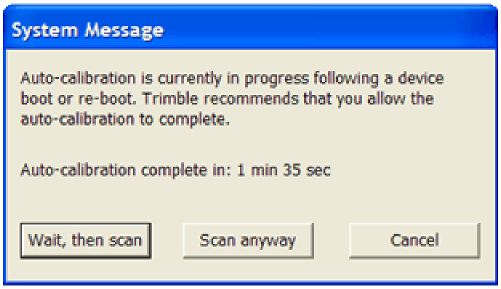
To Cancel:

- Tap the Cancel button. The "Scan Stopping..." message appears in place of the data name at the left of the Progress Bar during this period of time.

The Auto-Calibration in Progress

The Trimble GX instrument is equipped with an internal calibration system that is designed to compensate for various physical phenomena that are known factors with high precision mechanical/electronic instruments. This system carries out a check process every 5 minutes during scanning. The process lasts for around 20 to 30 seconds, during which time the scan is temporarily paused, and compensation is carried out if necessary. This allows data to be collected with higher overall levels of precision.

In order for the internal calibration system to reach maximum performance status, an initial period of 5 minutes after the instrument boot (or reboot) is required. During this time, the system is in auto-calibration mode. Trimble recommends that you do not scan during this period. If nevertheless you request a scan before the 5-minute post-boot (or reboot) period is complete, the following dialog appears:



- Tap Wait, then Scan. All buttons in the dialog become dimmed. Do not execute the scan until the Auto-Calibration is complete. After the 5-minute period, the scan starts by its own.
- Tap Scan Anyway. The scan starts but you will obtain a low accuracy in your result.
- Tap Cancel. The scan is aborted.

Note: Using the Trimble GX instrument before the Auto-Calibration is complete means that you may not reach the specified accuracy.

Refining Point Cloud Data

As the Data is mainly a Point Cloud; you can clean it by removing e.g. parasite points, by fencing an area or reduce it by filtering.

Note: This step is only present in a Volumes (or DTM) job.

To Refine Point Cloud Data:

1. Fence the Point Cloud data,
2. Or apply the Topographical Filter,
3. Tap the Next button. The Acquisition Menu window appears.

Note: The Acquisition Menu window is composed of New Scan as you can only acquire one type of data (Scan).

Fencing Data

A Fence has only one shape (polygonal) and is composed of segments and vertices. It is used as segmentation boundaries. Drawing a Fence is done by taping in the View 3D.

Fencing an Area

To Fence an Area:

1. Tap anywhere to define the first vertex of a Fence.
2. Tap anywhere to define the second vertex. The two vertices are linked by a segment.
3. Continue to define other vertices. The Fence is always closed in such a way that the start vertex is always linked to the last one.

Note:

- The New Fence button becomes enabled once a point has been tapped.
- The In and Out buttons become enabled once a Fence (with at least three vertices) has been defined.
- You can no longer rotate the data once a point has been tapped. You need to cancel it before you can rotate again.

Undoing a Fence

To start a new Fence, you need to cancel the current one by tapping the New Fence button.

To Undo a Fence:

- Tap New Fence .

Keeping the Inner Data

Selecting In keeps points inside the defined fence. Un-kept points are not deleted from the initial Point Cloud but just remain hidden in the View 3D. No points will be taken into account if the defined fence is empty.

To Keep the Inner Data:

- Tap In .

Keeping the Outer Data

Selecting Out keeps points outside the defined fence. No points will be taken into account if the defined fence is empty.

To Keep the Outer Data:

Tap Out .

Reloading the Initial Data

To Reload the Initial Data:

- Tap Reload .

Filtering Data

The idea behind the Topographical Filtering is to separate Valid Points from Invalid Points inside a Point Cloud. Because Invalid Points are more or less important according to where they are on the Point Cloud; you need to be able to work separately on them. This kind of situation occurs when the Point Cloud is a scene presentation with threes, bushes and the like. In such a case, Invalid Points are trees, bushes, etc. and Valid Points are the ground.

Topographically Filtering Points

The Topographical Filtering is based on a grid method and the resolution is square by default (the same in both of the Reference Plane directions). Points of the Point Cloud outside the square-grid tolerance will be not taken into account. And those nearby or faraway from the square-grid boundary can be gradually ignored using the Topographical Filtering slider which ranges from Min to Max with 10 Steps.

To Topographically Filter Points:

1. Tap the Topographical Filtering button. The Topographical Filtering window opens.
2. Tap and drag the Slider with the stylus pen from Right to Left. The result (from the square-grid projection and the distance selection) is a set of Invalid Points. These points will be un-kept and shown in red in the View 3D.
3. Tap and drag the Slider with the stylus pen from Left to Right. Invalid Points will become Valid Points.
4. Tap Done. The Refine Cloud window appears again. The filtering result is saved in the Trimble Access database.
5. Or tap Cancel. The Topographical Filtering procedure is aborted.

Note:
- You can drag the Slider to a position between two Steps or tap to the Left (or Right) of the Track.
- If a fence has been defined; the Topographical Filtering will be applied to the data In (or Out of) the fence.

Checking the Filtering Results

The Point Cloud data size is expressed in terms of the number of points in Cloud Size. Applying the Topographical Filtering to the Point Cloud data will update this number.

Note: Tapping Done will validate and save the result in the Trimble Access database; while tapping Cancel will leave the data as it is.

Reloading the Initial Data

To Reload the Initial Data:

- In the Refine Cloud window, tap Reload .

Checking the Refinement Results

The Point Cloud data size is expressed in terms of the number of points in Cloud Size. Fencing (or filtering) the Point Cloud data will update this number.

Note: Tapping Done will validate and save the result in the Trimble Access database.

CHAPTER 11

Extracting Targets

A target may have two shapes (spherical and flat). A spherical target is a White Spherical Target with a 76.2 mm diameter. A flat target is a square and Reflective Flat Target, 150 x 150 mm. There are two ways to extract a Reflective Flat Target but only one for a Spherical Target.

A flat target is also a square Black and White Flat Target,150 x 150 mm. The table below lists the types of target extraction available according to instrument.

	GX instrument	CX instrument
Spherical Target	✓	✓
Flat Target	✓	
Fast Flat Target	✓	
Black and White Flat Target		✓

The Spherical Target Feature

The Spherical Target feature enables to detect a sphere in one step. A single scan detects it and computes its centre. If you use a sphere other than a Trimble Spherical Target, you need to define its diameter. In addition to that, you can express the number of time a Spherical Target will be scanned. Both can be done by tapping the Target Measurement Settings button.

Note: The Target Measurement Settings can be reached by tapping .

When using a Trimble GX instrument, the parameters listed below are used for extracting a Spherical Target:

- Resolution (HD (Horizontal Distance) and VD (Vertical Distance)): 2 mm,
- Best Quality mode,
- Auto-Focus enabled,
- Point Coloring disabled,
- If using a Trimble Spherical Target, the limit scan distance is limited (from 0) to 200 m.
- If using another Spherical Target, the limit scan distance is limited (from 0) to 350 m.

When using a Trimble CX instrument, the parameters listed below are used for extracting a Spherical Target:

- Resolution (HD (Horizontal Distance) and VD (Vertical Distance)): 1.7 mm,
- If using a Trimble Spherical Target, the limit scan distance is the measured distance (from the instrument to the target).

The Flat Target Feature

The Flat Target feature enables to detect a Trimble Reflective Flat Target. The procedure differs from that of the Spherical Target detection. An initial fast scan in a limited area enables the detection of a Reflective Flat Target and a second high quality scan enables the calculation of its centre and normal.

The parameters listed below are used for extracting a Reflective Flat Target during an initial fast scan:

- Number of Shots: 1,
- Focus: 50 m,
- Distance Max: 200m.

The parameters listed below are used during the second high quality scan (of the same Reflective Flat Target):

- Number of Shots: 9,
- Focus: 50 m.

The Fast Flat Target Feature

The Fast Flat Target feature allows you to quickly detect a Trimble Reflective Flat Target. This procedure differs from the Flat Target because only one fast scan is required.

The Fast Flat Target scanning parameters are listed below:

- The limit scan distance is limited (from 0) to about 20m and 25m.
- The angle of incidence for scanning a Trimble Fast Flat Target: 0°

The Black and White Target Feature

The  Back and White Flat Target feature enables to quickly detect a Trimble Black and White Flat Target. That procedure is similar to the Fast Flat Target feature because only one fast scan is required.

- Resolution (HD (Horizontal Distance) and VD (Vertical Distance)): 3.5 mm,
- The limit scan distance is the measured distance (from the instrument to the target).

Extracting a Target

<u>To Extract a Target:</u>

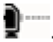
1. Move the instrument to sight a target (using the Horizontal and Vertical Scroll-bars).
2. Tap a target in the Video View (using the Zoom On Point).
3. When using a Trimble GX instrument, choose an extraction method (according to the type of target).
   - Tap Fast Flat Target.
   - Tap Flat Target.
   - Tap Spherical Target.
4. When using a Trimble CX instrument, choose an extraction method (according to the type of target).
   - Tap Black and White Flat Target.
   - Tap Spherical Target.
5. For a Spherical Target, define the settings (if required).
6. Auto-adapt roughly the yellow frame to the target by tapping .
7. Adapt in finesse the frame to the target using the slider for enlarging (or reducing) the frame.
8. Tap Measure.
   - If the target extraction succeeds, 3D points are acquired and fitted with a geometric entity corresponding to the target type. Trimble Access computes and displays its centre as "HA, VA, SD" and the Next button becomes enabled.
   - If the target extraction failed, only points are acquired, a dialog with the "Measurement Failed" message appears and the Next button remains disabled. You need to first close the dialog and adapt the frame if required and perform a new extraction.

Note:

- The Selection button is always dimmed when detecting a target.
- You can interrupt a target extraction in progress by tapping Stop on the top right corner of the Video View.
- You can swap from "HA, VA, SD" to "X, Y, Z" or to "HA, ∆HD, ∆VD", "∆X, ∆Y, ∆Z", "∆HA, ∆VA, ∆SD" (this depends on to the Station Setup method you used) by tapping "HA, VA, SD" before (or after) measuring the Backsight Point.

Auto-Framing a Target

To Auto-Frame a Target:

- Tap Auto-Frame . Trimble Access first measures the distance to the target*, size the yellow frame to fit the target according to the measured distance and to the Zoom Factor selected and apply a correction to parallax.

Note:

- (*) You may see a laser spot on the target. The distance to target is displayed at the top left corner of the Video View. This distance is an estimate.
- When using a Trimble GX instrument, only the "Frame size set for a target at: XX m" message appears.
- When using a Trimble CX instrument, the "Frame size set for a target at: XX m. Recommended frame width is twice the target width" message appears.

Manual-Framing a Target

The Framing Size slider ranges from Min to Max with 10 Steps. In Min Step, the yellow frame size is reduced to almost a point whatever the Zoom Factor selected. In Max Step, the yellow frame size depends on the Zoom Factor you selected. It fits to the Video View size at the current Zoom Factor and cannot exceed it.

To Manual-Frame a Target:

1. Tap the Slider.
2. Drag the Slider with the stylus pen from Left to Right (or from Right to Left) to increase (or decrease) the yellow frame size.

Or

3. Tap to the Left (or Right) of the Track to decrease (or increase) of one Step.

Note:
- You can drag the Slider to a position between two Steps.
- With a Trimble CX instrument, the Distance Estimation is updated when the user drags the Slider.

Defining Measurement Settings for a Spherical Target

To Define Measurement Settings for a Spherical Target:

1. Tap the Target Measurement Settings  button. The Target Measurement Settings window appears.
2. Do one of the following:

   - Define the Number of Iterations,
   - Define the Sphere Diameter.

3. Tap Done. The Target Measurement Settings window closes.

Defining the Number of Iterations

The Number of Iterations expresses the number of time an instrument scan a Spherical Target.

To Define the Number of Iterations:

1. Tap in the Number of Iteration field. An on-screen numerical pad appears.
2. Input a value in the Number of Iterations field.
3. Tap Ok. The on-screen numerical pad disappears.

Defining the Sphere Diameter

A sphere is a Spherical Target used as a marker (or reference point) for scene registration or georeferencing. If you use a Trimble Spherical Target, it should have a 76.2 mm diameter long. If you use a different spherical, this step lets to define its diameter.

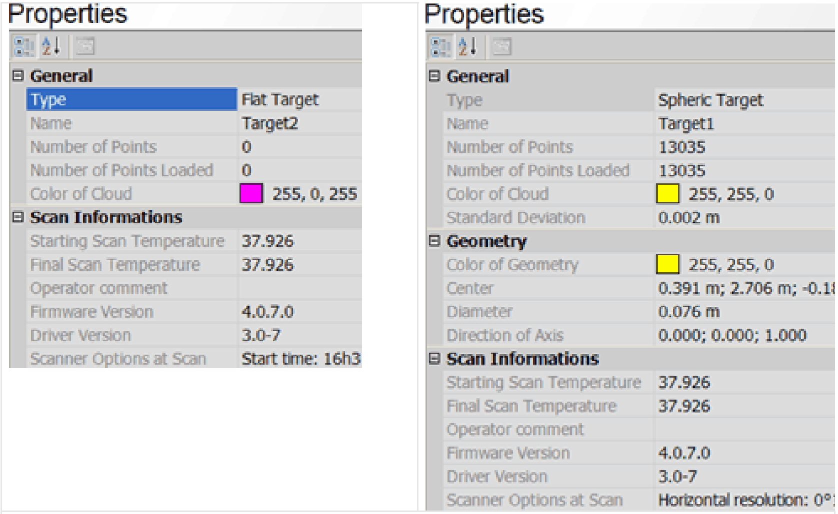
To Define the Sphere Diameter:

1. Tap in the Sphere Diameter field. An on-screen numerical pad appears.
2. Input a value in the Sphere Diameter field.
3. Tap Ok. The on-screen numerical pad disappears.

The Target Extraction Results

You can associate as many measurements as required to a target (whatever its type). For each measurement, a target named TargetX (where X is its order) is created and put under its related Station in the Scan Tree. Only the last measurement is taken into account and the extracted target takes the Backsight Point name. The others keep the Target X name.

If the extraction failed, a target is also created and put under its related Station in the Scan Tree. Only points are acquired. The extracted target is then named TargetX (where X is its order). The Next button remains disabled.



A target for which the extraction failed has no geometry properties.

The Spherical Targets

A Spherical Target (once extracted and fitted) is created and put under its parent Station in the Scan Tree. It has both the Point Cloud and the Geometry representations. The Geometry representation is shown as follows  (with accessory its True Height value) in the View 3D.

The Reflective Flat Targets

A Reflective Flat Target (once extracted and fitted) is created and put under its parent Station in the Scan Tree. It has both the Point Cloud and the Geometry representations. The Geometry representation is shown as follows (with accessory its True Height value) in the View 3D.

The Black and White Targets

A Black and White Flat Target (once extracted and fitted) is created and put under its parent Station in the Scan Tree. It has both the Point Cloud and the Geometry representations. The Geometry representation is shown as follows (with accessory its True Height value) in the View 3D.

CHAPTER 12

Rechecking Targets

The Recheck process is an option. It comes after you have completed the measurement of a (or a set of) target(s). It consists of remeasuring each target and compares the initial measurement with the remeasurement. You can also explicitly ask for the Recheck process by tapping Recheck on the Step Bar, whenever necessary and as often as required.

The number of targets to Recheck depends the Station Setup method you used. Each target when not already rechecked has the "Not Yet Rechecked" text beside and each will be remeasured twice.

You can cancel this step by tapping Done. A dialog opens and prompts you to create a new Station (or not). Choosing Yes will open the New Station window while tapping No will bring you to the Trimble Access Home Page in a General Scanning job (or to the Delivery Main Menu window in a Volume* (or DTM*) job).

Note: (*) The Volume (or DTM) job is not present in Trimble Access when using a Trimble CX instrument.

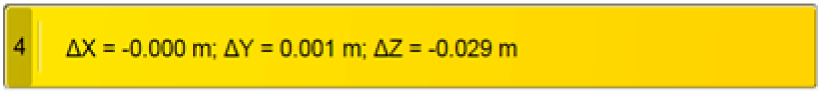
Remeasuring Targets

No selection is required. The Recheck process will be applied to all targets in the Recheck window, from the first to the last.

To Remeasure Targets:

1. Tap the Start button. The first target is remeasured. A Progress Bar with a Stop button appears.
2. When the first measurement fails, an Error message appears.
3. Tap the Ok button. The Error message disappears.

4. When the first and second measurements both succeed, the gap between the initial measurement and the Recheck measurements (for the current target) expressed as ΔX, ΔY, ΔZ in the current unit of measurement is displayed. The next target is remeasured and so on.



5. Tap Done. The Recheck window closes.

Note: Once the Recheck process completed, the Start button becomes dimmed.

Interrupting the Recheck Process

You can stop the Recheck process in progress by tapping the Stop button on the Progress Bar. This will not stop the Recheck process for the current target but for the whole targets in the Recheck window.

Resuming the Recheck Process

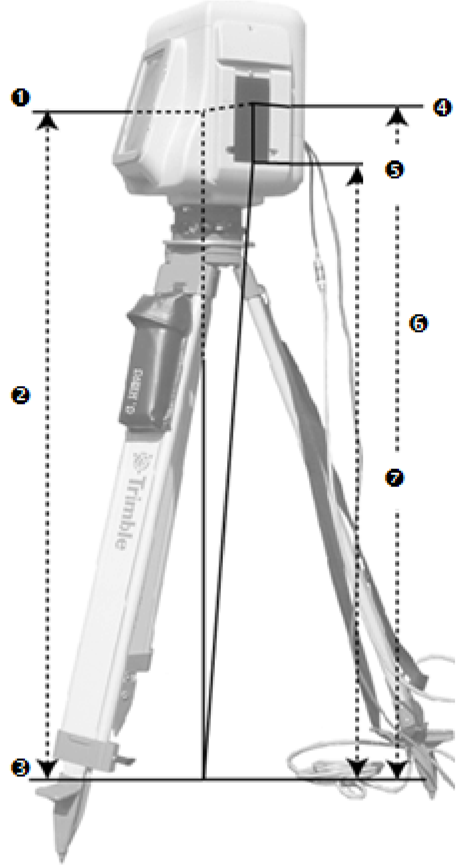
You can resume the Recheck process by tapping the Star button again. This will launch the process from beginning.

CHAPTER 13

Measuring an Instrument Height

In Trimble Access, the distance which separates a Known Point from the center of an instrument's mirror is called True Instrument Height.

Measuring the Trimble GX instrument Height



1 - Centre of the mirror 2 - Height from the instrument point to the center of the mirror 3 - Known instrument point 4 - Horizontal mark	5 - Bottom mark 6 - Height from the instrument point to the horizontal mark 7 - Height from the instrument point to the bottom mark

As the center of the mirror cannot be reached for measurements, different types of marks are set on the Trimble GX instrument's side for this purpose.

Two horizontal marks are set at the same height as the center of the instrument mirror. These two marks are on each side of the instrument; they are used for measuring the instrument height. In Trimble Access, this height is called Top Notch Height.

The bottom mark is a thin vertical mark aligned with the instrument vertical axis, with a triangle inscribed just above. The bottom mark is only on the right side of the instrument. It is used for measuring the instrument height. In Trimble Access, this height is called Bottom Notch Height.

Measuring the Top Notch Height

To Measure the Top Notch Height:

- Measure the distance from the Known Point to the Horizontal Mark.

Note: Two operators are required for this measurement procedure.

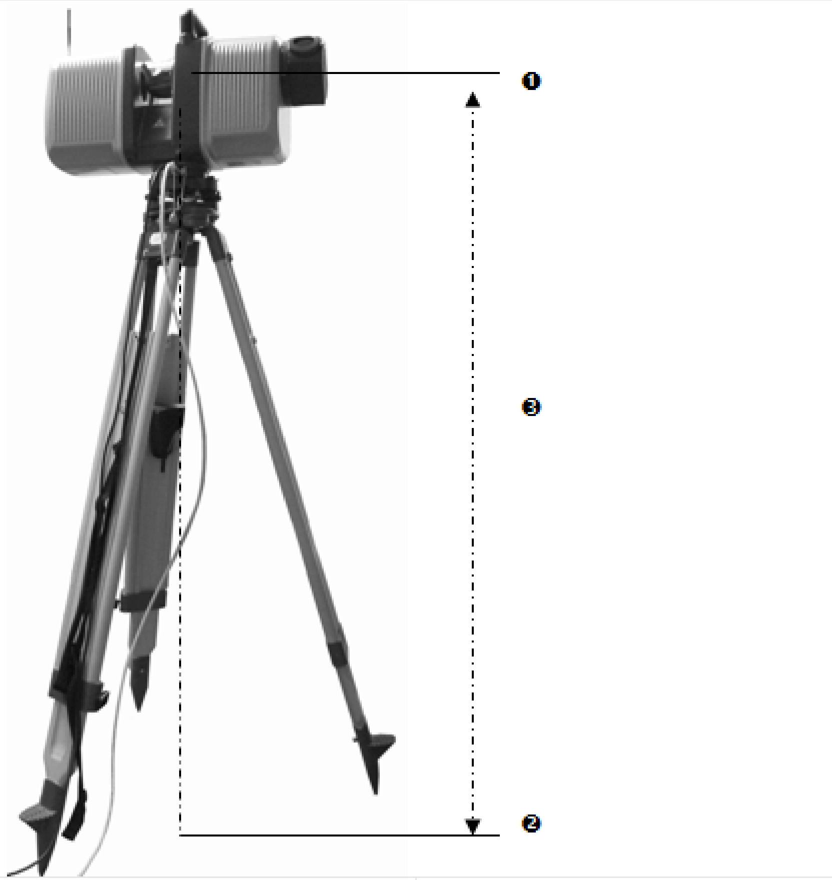
Measuring the Bottom Notch Height

To Measure the Bottom Notch Height:

- Measure the distance from the Known Point to the Bottom Mark.

Note: Two operators are required for this measurement procedure.

Measuring the Trimble CX instrument Height



1 - Centre of the mirror 2 - Known instrument point	3 - Height from the instrument point to the side mark

As the center of the mirror cannot be reached for measurements, two marks (one on the Front and one on the Rear side of the Trimble CX instrument) are set for this purpose.

CHAPTER 14

The Deliveries

In Trimble Access, a Delivery is a term used to qualify the kind of output the user can have from the acquired data (Point Cloud). A Delivery can be either a Volume or a Mesh. The Delivery Main Menu window remains inaccessible if no point has been acquired within the Project.

Tip: You can also tap Delivery in the Step Bar.

Note: In the Delivery Main Menu window, tapping Done will bring you back to the Trimble Access Home Page.

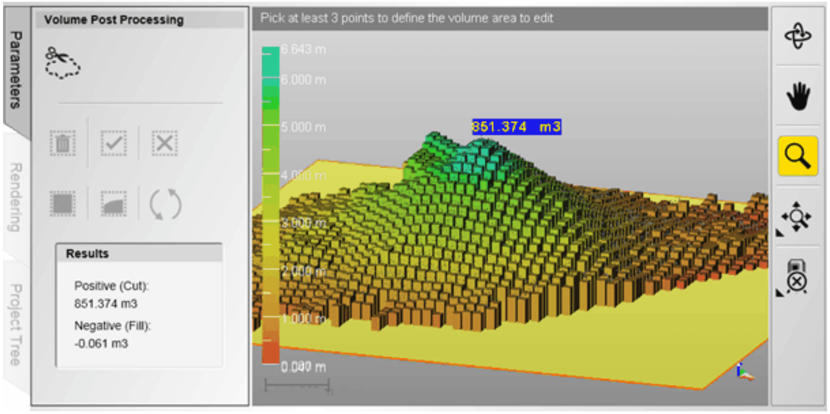
The table below lists the type(s) of Delivery you can have according to the instrument in use.

	GX Instrument>	CX Instrument
 Volume Delivery	✓	
 Mesh Delivery	✓	

A Volume Delivery

The Volume calculation is done between the Point Cloud data and a Reference Plane* which is by-default set to the ground point of the first Station. Two Volumes are computed if the Reference Plane cuts the data into two parts: one from each side of the Reference Plane, Positive (Cut) for the above part and Negative (Fill) for the negative part and the sum of both is the Volume calculation result. One Volume is calculated if the Reference Plane does not cut the data.

A Volume is represented by a graph of vertical color lines (Cells). You can estimate the height of each Cell compared to the Reference Plane thanks to a Graduated Color Scale on the left of the View 3D.



Tip: (*) You can change the Reference Plane within the first step of the Volume workflow, named Parameters.

Post Processing a Volume

The Volume computed previously may have irregularities like holes (or peaks). You can then edit the Volume in order to keep (or remove) the part you want, to fill holes or to smooth it.

To Post Process a Volume:

1. First fence the Volume part to modify.
2. And then apply the Fill (or Smooth Cells) filter.
3. Tap Done. The Delivery Main Menu appears again.

Fencing an Area

To Fence an Area:

1. Tap anywhere to define the first vertex of a Fence.
2. Tap anywhere to define the second vertex. The two vertices are linked by a segment.
3. Continue to define other vertices. The Fence is always closed in such a way that the start vertex is always linked to the last one.

Note:

- The New Fence button becomes enabled once a point has been tapped.
- The In and Out buttons become enabled once a Fence (with at least three vertices) has been defined.
- You can no longer rotate the data once a point has been tapped. You need to cancel it before you can rotate again.
- The Smooth Cells and Fill buttons become enabled too.

Undoing a Fence

To start a new Fence, you need to cancel the current one by tapping the New Fence button.

To Undo a Fence:

- Tap New Fence .

Keeping the Inner Cells

Selecting In keeps the Cells inside the defined fence. Un-kept Cells are not deleted from the initial Volume but just remain hidden in the View 3D. No Cells will be taken into account if the defined fence is empty.

<u>To Keep the Inner Cells:</u>

- Tap In .

Keeping the Outer Cells

Selecting Out keeps the Cells outside the defined fence. No Cells will be taken into account if the defined fence is empty.

<u>To Keep the Outer Cells:</u>

- Tap Out .

Filtering a Volume

Two filters are available. The Smooth Cells filter will remove peaks from the Volume. The Fill filter will complete holes in the Volume.

<u>To Filter a Volume:</u>

1. Fence an area on a Volume as previously described.
2. Do one of the following:
    - Tap Smooth Cells .
    - Tap Fill .

The Volume Post Processing Results

The Delivery data size is expressed in terms of Volume(s) in the Volume Post Processing window. Fencing (or filtering) the Delivery data will update both the Positive (Cut) and Negative (Fill) values.

Note:
- Tapping Done will validate and save the result in the Trimble Access database; while tapping Cancel will leave the Delivery data as it is.
- Fencing (or filtering) will not be done on the Point Cloud data but on the Delivery data.

Reloading the Initial Volume

A way to reload the initial Volume is to first tap Cancel in the Volume Post Processing window and then tap Post Processing again in the Delivery Main Menu window.

Refining the Point Cloud Data

To Refine the Point Cloud Data:

1. Tap the Refine Cloud  button. The Refine Cloud window appears.
2. Refine the point cloud data as previously described.
3. Tap Done.

Note: The Delivery previously computed will be recalculated according to the refinement you done on the Point Cloud Data.

Exporting a Volume

Exporting a Volume consists in saving the result in a RFT Text format file. A file has as default name: Volume_Project-Name_Date-of-Creation.

The Rich Text Format (often abbreviated RTF) is a document file format developed by Microsoft in 1987 for cross-platform document interchange.

To Export a Volume:

1. In the Delivery Main Menu window, tap Report. The Volume Calculation Report window appears.
2. In the Volume Calculation Report window, tap the Export button. The Destination Folder window appears.
3. Do one of the following:

   - Choose a Destination Folder.
   - Define Destination File Parameters (File Name and Extension).

4. Tap Done. The Delivery Main Menu window appears again.

Choosing a Destination Folder

A Destination Folder is a Local Folder in your Trimble Rugged Tablet Computer drive. You can choose between a pre-defined Local Folder and a user-defined Local Folder.

Pre-defined Folders

There are three Local Folder shortcuts in your Trimble Rugged Tablet Computer drive: Files Folder, Desktop and My Documents. The Files Folder is the default Local Folder. Its path is C:\Users\TablePC\AppData\Local\Trimble\Trimble Access.

User-defined Folders

A User-Defined Folder:

1. Tap on the Go Up To Parent button.
2. Navigate though a drive/folder where you want to export the report.
3. Tap a folder to select it.

Defining the Destination File Name

To Define the Destination File Name:

1. Tap in the File Name field. An on-screen keyboard appears.
2. Enter a new name in the File Name field.
3. Tap Ok. The on-screen keyboard disappears.

Defining the Destination File Type

The Extension field is not dimmed even if you can only export the result into a unique format (RTF).

Editing Parameters in Volume(s)

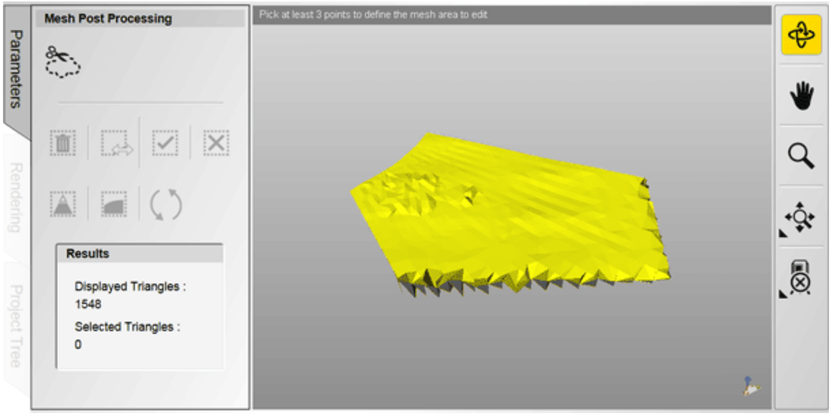
After computing a Volume from the acquired data (Point Cloud), the Resolution remains modifiable as well as the Reference Plane (Normal and Altitude).

To Edit Parameters in Volume(s):

- In the Step Bar, tap Parameters. The Volume Parameters / Reference Plane window appears.

A Mesh Delivery

The Mesh computation is based on a 2D triangulation method which applies a projection to 3D points onto a 2D surface (Reference Plane).



Tip: (*) You can change the Reference Plane in Parameters.

Post Processing a Mesh

Select-by-fencing is to define an area on a Mesh depending on your requirements as with a Point Cloud segmentation. By default, Triangles inside the fence will be selected. You can reverse the selection or keep the part that you need for further operation.

To Post Process a Mesh:

1. Do one of the following:

    - Fence the Mesh,
    - Apply the Smooth filter,
    - Apply the Remove Peaks filter.

2. Tap Done. The Delivery Main Menu appears again.

Fencing an Area

To Fence an Area:

1. Tap anywhere to define the first vertex of a Fence.
2. Tap anywhere to define the second vertex. The two vertices are linked by a segment.
3. Continue to define other vertices. The Fence is always closed in such a way that the start vertex is always linked to the last one.

Note:

- The New Fence button becomes enabled once a point has been tapped.
- The In and Out buttons become enabled once a Fence (with at least three vertices) has been defined.
- You can no longer rotate the data once a point has been tapped. You need to cancel it before you can rotate again.
- The Smooth and Remove Peak buttons become enabled too.
- Triangles (inside the defined fence) become "Selected Triangles" and are highlighted in red. The number of "Selected Triangles" is shown in text in the Mesh Post Processing window.

Undoing a Fence

To start a new Fence, you need to cancel the current one by tapping the New Fence button.

To Undo a Fence:

- Tap New Fence .

Keeping the Inner Triangles

Selecting In keeps the Triangles inside the defined fence. Un-kept Triangles are not deleted from the initial Mesh but just remain hidden in the View 3D. No Triangles will be taken into account if the defined fence is empty.

To Keep the Inner Triangles:

- Tap In .

Note:

- "Selected Triangles" become "Displayed Triangles" and their color swaps from red to the initial color. The number of "Selected Triangles" is equal to zero.
- Reload becomes enabled.

Keeping the Outer Triangles

Selecting Out keeps the Triangles outside the defined fence. No Triangles will be taken into account if the defined fence is empty.

To Keep the Outer Triangles:

- Tap Out .

Note:

- "Selected Triangles" become "Displayed Triangles" and their color swaps from red to the initial color. The number of "Selected Triangles" is equal to zero.
- Reload becomes enabled.

Reversing a Selection

<u>To Reverse a Selection:</u>

- Tap the Reverse Selection  button to invert the selection.
  - If no Fence has been defined, the whole Mesh becomes selected.
  - If a Fence has been, the unselected part of the Mesh becomes selected.

Filtering a Mesh

Two filters are available. The Smooth filter will apply a median filtering to the vertices of the selected triangles. The Remove Peaks filter will remove certain noisy peaks in the Mesh.

<u>To Filter a Mesh:</u>

1. Fence an area on a Mesh as previously described*.
2. Do one of the following:
   - Tap Smooth .
   - Tap Remove Peak .

Note: (*) If a Fence has been defined, the filter will be applied to the fenced Triangles.

The Mesh Post Processing Results

The Delivery data size is expressed in terms of number of Triangles in the Mesh Post Processing window. Fencing the Delivery data will update this number.

Note:
- Tapping Done will validate and save the result in the Trimble Access database; while tapping Cancel will leave the Delivery data as it is.
- Fencing (or filtering) will not be done on the Point Cloud data but on the Delivery data.

Reloading the Initial Mesh

To Reload the Initial Mesh:

- Tap Reload .

Note: An another way to reload the initial Mesh is to first tap Cancel in the Mesh Post Processing window and then tap Post Processing again in the Delivery Main Menu window.

Refining the Point Cloud Data

To Refine the Point Cloud Data:

1. Tap the Refine Cloud button. The Refine Cloud window appears.
2. Refine the point cloud data as previously described.
3. Tap Done.

Note: The Delivery previously computed will be recalculated according to the refinement you done on the Point Cloud Data.

Exporting a Mesh

Exporting a Mesh consists in saving it in a file with one of the five formats: DWG, DXF, DGN, XML and KMZ. A file has as default name: Mesh_Project-Name_Date-of-Creation.

DWG (for DraWinG) is a binary file format used by AutoDesk's AutoCAD software. It can contain 2D or 3D objects. DXF (for Drawing eXchange Format) is an ASCII file format of an AutoCAD® drawing file. Exporting to the DWG (or DXF) format means to export a Mesh Delivery from Trimble Access to the AutoCAD application. AutoCAD includes the notion of layers which can be used as a tool for organizing and gathering information about a drawing. These layers can be considered as an electronic version of traditional layers. The selection hierarchy is preserved during the export; each group or lone object has its own layer.

A KML (Keyhole Marked Language) file is a XML-based-language file from Google Earth (originally called Earth Viewer and created by Keyhole Inc.). Google Earth is a virtual globe program which maps the earth by superimposing images obtained from satellite imagery and aerial photography, etc. A KML file contains geo-referenced information (about points, lines and text) to display in Google Earth. A KMZ file is simply a zip compressed KML file with images. KMZ is the default Google Earth format. In Trimble Access, a Mesh (textured with images or not) and a geometry (plane, cylinder, sphere, etc.) can be exported to Google Earth.

Several companies, including Autodesk, teamed up to create a method for exchanging project information across different software packages and LandXML is the result. LandXML is a generic, text-based file format used to save project data. It's similar to a DXF™ file, which is a generic file format for vector-based drawing information.

DGN for DesiGN is a file format of Bentley MicroStation® which includes the notion of layers which can be used as a tool for organizing and gathering information about a drawing. These layers can be considered as an electronic version of traditional layers. In addition to the layers, this format includes the notion of working units which are the real-world units that you work with in drawing or creating your models in a DGN file. The working units are a set as Master Units (the largest units in common use in a design, such as meters) and fractional Sub Units (the smallest convenient unit to use, such as centimeters or millimeters). The Sub Units cannot be larger than Master Units.

To Export a Mesh:

1. In the Delivery Main Menu window, tap Report. The Destination Folder window appears.
2. Do one of the following:

   - Choose a Destination Folder.
   - Define Destination File Parameters (File Name and Extension).

3. Tap Done. The Export Parameters window appears except for LandXML which opens the Delivery Main Menu again.

Choosing a Destination Folder

A Destination Folder is a Local Folder in your Trimble Rugged Tablet Computer drive. You can choose between a pre-defined Local Folder and a user-defined Local Folder.

Pre-defined Folders

There are three Local Folder shortcuts in your Trimble Rugged Tablet Computer drive: Files Folder, Desktop and My Documents. The Files Folder is the default Local Folder. Its path is C:\Users\TablePC\AppData\Local\Trimble\Trimble Access.

User-defined Folders

A User-Defined Folder:

1. Tap on the Go Up To Parent button.
2. Navigate though a drive/folder where you want to export the report.
3. Tap a folder to select it.

Defining the Destination File Name

To Define the Destination File Name:

1. Tap in the File Name field. An on-screen keyboard appears.
2. Enter a new name in the File Name field.
3. Tap Ok. The on-screen keyboard disappears.

Defining the Destination File Type

To Define the Destination File Type:

1. In the Destination Folder window, tap on the Extension pull-down arrow.
2. Choose among Solids AUTOCAD files (*.dwg), Solids AUTOCAD files (*.dxf), MicroStation Files (*.dgn), LandXml (*Xml) and Google Earth (KMZ) Files (*.kmz) from the drop-down list.

Export Parameters

A Mesh can be exported to the following formats: Solids AutoCAD (*.dwg), Solids AutoCAD (*.dxf), Google Earth (*.KMZ), LandXML (*.xml) and MicroStation (*.dgn). The export parameters for each format will be described in the topics hereafter.

Note: There are no parameters for the LandXML format.

For the DWG Solids Format

AutoCAD's native file format, DWG, and to a lesser extent, its interchange file format, DXF, have become de facto standards for CAD data interoperability. From 1982 to 2007, Autodesk created versions of AutoCAD which wrote no less than 18 major variants of the DXF and DWG file formats. Here below are the numerous versions of AutoCAD.

Product	Version
AutoCAD® 2007	v.u.21.1.01
AutoCAD® 2006	v.u.20.1.01
AutoCAD® 2005	v.u 19.1.01
AutoCAD® 2004	v.u 18.1.01
AutoCAD® 2002	v.u 16.1.01
AutoCAD® 2000	v.u 15.0.02
AutoCAD® Release 14	v.u 14.1.04
AutoCAD® Release 13	v.u 13.1.01

A Mesh will be exported to AutoCAD® 2007 (v.u.21.1.01) as a Polyface Mesh in the Home frame and with the current Unit System (used in Trimble Access). The number of faces is limited to 32767.

For the DGN Format

The relationship between the Unit System used in Trimble Access and the working units (Master Units (MU), Sub Units (SU) and Positional Units (PU)) in the DGN format (when exporting to that format) is given in the table below. A set of Meshes (or a lonely Mesh) will be exported as a unique layer. The Export Frame is the Home Frame.

From Trimble Access Format	To Bentley MicroStation® Format
Kilometers	MU: Kilometers SU: Meters PU: 80
Meters	MU: Meters SU: Decimeters PU: 80
Decimeters	MU: Decimeters SU: Centimeters PU: 80
Centimeters Millimeters	MU: Centimeters SU: Millimeters PU: 80
Miles	MU: Miles SU: Yards PU: 2024
Yards	MU: Yards SU: International Feet / U.S. Survey Feet PU: 2024
International Feet U.S. Survey Feet	MU: International Feet / U.S. Survey Feet SU: Inches PU: 2024
Inches Inch Parts	MU: Inches SU: Inch Parts PU: 2024

For the KMZ File Format

In a basic Geodetic System, a location (or a point) on the Earth has as coordinates its longitude and latitude, both expressed in angles. Latitude is measured from the equator and a longitude from a meridian (the Greenwich meridian is used as reference). There are around a hundred Geodetic Systems in use around the world differing from country to country. A unified Geodetic System (called WGS84, dating from 1984) is in use in Google Earth.

In the WGS84 coordinate system, the distance of one degree in longitude changes according to the latitude. This drawback disappears in the Universal Transverse Mercator (UTM) system which is a grid-based method of specifying locations on the surface of the Earth. The surface of the Earth is divided between 80° S latitude and 84° N latitude into 60 zones, each 6° of longitude in width and centered over a meridian of longitude. Zones are numbered from 1 to 60.

We assume that a Mesh once computed is geo-referenced in the UTM coordinate system. Exporting to the Google Earth format means converting a Mesh coordinates expressed in the UTM coordinates to the WGS84 coordinates (latitude, longitude and height).

Setting DWG (or DXF) Export Parameters

To Set DWG (or DXF) Export Parameters:

1. Tap on the Version pull-down arrow.
2. Choose a version of AutoCAD to export to.
3. Tap on the Unit pull-down arrow.
4. Choose a Unit from the drop-down list.
5. Tap Done. The Delivery Main Menu window appears again.

Setting DGN Export Parameters

To Set DGN Export Parameters:

1. Tap on the Master Unit pull-down arrow.
2. Choose a unit of measurement from the drop-down list.
3. Tap on the Sub Unit pull-down arrow.
4. Choose a unit of measurement from the drop-down list.
5. Tap Done. The Delivery Main Menu window appears again.

Setting KMZ Export Parameters

To Set KMZ Export Parameters:

1. Tap on the UTM Latitude Hemisphere pull-down arrow.
2. Choose between North and South.
3. Tap in the UTM Zone Number field. An on-screen keypad appears.
4. Input a number* in the UTM Zone Number field.
5. Tap OK. The on-screen keypad disappears.
6. If required, input comments in the Description field.
7. Tap Done. The Delivery Main Menu window appears again.

Note: The default UTM Latitude Hemisphere and UTM Zone Number are respectively set to North and 31.

Editing Parameters in Mesh(es)

After computing a Mesh from the acquired data (Point Cloud), the Resolution remains modifiable as well as the Reference Plane (only Normal).

To Edit Parameters in Mesh(s):

- In the Step Bar, tap Parameters. The Mesh Parameters / Reference Plane window appears.

Modifying a Volume Job Resolution

Modifying a Job Resolution in Volumes will update the Delivery data (both the Positive (Cut) and Negative (Fill) values).

From the Job Resolution is deduced the scanning resolution of your data set. Hence, changing a Job Resolution while the job is in progress will only affect subsequent scans. Already acquired points won't be affected by the resolution change.

If the Job Resolution is too small (small value) many integration cells will be required to compute the Volume, which may slow down the Trimble Rugged Tablet Computer's performances. In this case, it is possible to change the resolution for a bigger one (larger value e.g. move from 0.2m to 0.5m). There is no risk of changing the resolution for a larger one, as this will only enlarge the integration cells for the Volume evaluation.

On the other hand, if you change the Job Resolution for a smaller one (were using 0.2m and select now 0.1m) you may end up with holes in already acquired data (you will still be able to fill these holes in the post processing).

Note: Changing the Job Resolution during a job will discard any post processing previously realized on the Volume.

To Modify a Job Resolution:

1. Tap in the Job Resolution field. An on-screen keypad appears.
2. Input a value in the Resolution field.
3. Tap OK. The on-screen keypad disappears

Note: If the new Job Resolution is smaller than the previous one, a dialog appears and prompts you to keep it or not. If yes, you then may have to fill holes during the Post Processing step.

Modifying a Mesh Job Resolution

Modifying a Job Resolution in DTM will not update the Delivery data (the number of computed triangles).

<u>To Modify a Job Resolution:</u>

1. Tap in the Job Resolution field. An on-screen keypad appears.
2. Input a value in the Resolution field.
3. Tap OK. The on-screen keypad disappears

Note: If the new Job Resolution is smaller than the previous one, a dialog appears and prompts you to keep it or not. If yes, you then may have to fill holes during the Post Processing step.

Modifying a Reference Plane

A Reference Plane is a plane on which points from the acquired data will be projected. This Reference Plane combined with the Job Resolution (defined in a Volume (or DTM) job) will be used for a computing a Volume (or Mesh).

Modifying the Reference Plane parameters will update the Delivery data (both the Positive (Cut) and Negative (Fill) values in Volumes and the number of computed triangles in DTM).

Setting a Direction

A Reference Plane's direction is given by its Normal. By default, the Normal direction is parallel to the Z axis of the active coordinate frame (0, 0, 1 as X, Y, Z coordinates).

To Set a Direction:

1. Tap in the X field. An on-screen keypad appears.
2. Input a value in the X field.
3. Tap Ok. The on-screen keypad disappears.
4. Repeat the steps from 1 to 3 for Y and Z.

Tip: You can also tap the Tab button to jump from a field to edit to another.

Setting a Position

A Reference Plane's position is given by one point. If the instrument is not setup; this position corresponds to its center. If the instrument is setup over a known point; the default Reference Plane's position will be set at the first station ground point.

To Set a Position:

1. Tap in the Altitude field*. An on-screen keypad appears.
2. Input a value in the Altitude field*.
3. Tap Ok. The on-screen keypad disappears.

Note: (*) The Altitude field is not available in a DTM job.

Measuring a Reference Plane

There are two methods for defining a Reference Plane. First is to measure an altitude. Second is to measure an arbitrary plane. You need to have a station in your project to be able to use one of these two methods. Otherwise, a warning message appears.

To Measure a Reference Plane:

- Tap the Define Reference Plane  button. The Choose Plane Definition Method window appears.

Measuring an Altitude

In this method, we assume that the Reference Plane is Horizontal. Its Normal has a direction perpendicular to the measured plane. The displayed Normal is the current one (0, 0 and 1 by default). It will be updated after the plane measurement.

To Measure an Altitude:

1. Tap Measure Altitude. The Measure Altitude (Horizontal Plane) window appears.
2. Move the instrument to an area where you want to measure an altitude (using the scroll-bars).
3. Or tap a point on the Video View (using the Center On Point).
4. Tap Measure. At the end of the measurement, Trimble Access displays the tapped point's altitude* in the current unit of measurement and as a yellow hollow square with a plane passing though it in the Video View.
5. Tap Done. The Measure Altitude window disappears.

Note: (*) The measured altitude value is not editable (dimmed).

Measuring an Arbitrary Plane

In this method, the Reference Plane is defined by three measured points. Its Normal has as direction parallel to the Z axis of the active coordinate frame (0, 0, 1 as X, Y, Z coordinates).

To Measure an Arbitrary Plane:

1. Tap Measure Arbitrary Plane. The Measure Arbitrary Plane window appears.
2. Move the instrument to an area where you want to measure Point 1.
3. Or tap a point on the Video View (using the Center On Point).
4. Tap Measure. At the end of the measurement, Trimble Access jumps to Point 2.
5. Repeat the steps from 2 to 4 for Point 2 and Point 3.
6. Tap Done. The Measure Arbitrary Plane window disappears.

Note: When three points are reached, they are linked two-by-two by a yellow segment and form in that way a triangle. The Reference Plane is then generated and its Normal is be automatically calculated and displayed.

CHAPTER 15

Projects

In Trimble Access, a project file is a Trimble proprietary format file with RWP as extension. Creating a new project will create such a file. In conjunction with the project file, you will find an image directory RWI where images, point files (RWC) and video files (RWV) will be stored. A project can be managed in the Manage window, explored as a Project Tree structure in the View Trees and visualize as a project data in the View 3D.

When using a Trimble CX instrument, a CMF (or TZS) format file (one per Full Scan)* is created and put under the RWI folder. Each file will be named as follows: "Station_Name-fullscanX" where X is its order. Note that X starts from "Blank", "Zero", "One" and so on. A Scan file (with RWC extension) is associated to a TZS format file.

Note: (*) Only if the Full Scan option has been chosen in the Acquire In window.

Performing Basic Operations on Projects

To Perform Basic Operations on Projects:

1. In the Trimble Access Home Page, tap the Projects button. The Projects window appears with the Manage, New Project and Import Project buttons inside.
2. Do one of the following:
   - Manage a project,
   - Create a new project,
   - Import a project file.

Note: There is no Done button in the Projects window. The only way to leave that window is to tap the Home Page button

Managing Projects

Manage contains basics commands for managing a project such as New Project, Open Project, Close Project, Import Project Into, etc.

To Manage a Project:

1. In the Projects window, tap the Manage button. The Manage window appears.
2. If there is no project (or one but not loaded), only New Project is available.
3. If there is an open project; its name is displayed on the title bar and New Project, Open Project, Close Project, Duplicate Project, Delete Project and Import Project are available.

Selecting a Project

A project (open or not) when selected is highlighted in yellow in the Projects panel and its name and properties are displayed in the Properties panel.

To Select a Project:

- Tap a project from the Projects panel.

Note: Selecting a project (open or not) and tapping Done without choosing a command will open a dialog which prompts you to load the selected project or not.

Tip: You may see "None" in the Properties panel when there is no project selected.

Creating a New Project

To Create a New Project:

- Tap New Project . The Create a New Project dialog opens. A new project is created and has as default name "Project".

Opening a Project

You can open one project at once in Trimble Access.

To Open a Project:

1. Select a not already open project from the Projects panel by tapping it.
   The Open Project button becomes enabled. The selected project's properties are displayed in the Properties panel.
2. Tap Open Project.
3. Tap Done.

Tip: An open project has its name displayed in the title bar.

Note: The selected project remains selected once open.

Closing a Project

You can close one project at once in Trimble Access. Any selection is required but the project needs to be open.

To Close a Project:

1. Tap Close Project.
2. Tap Done.

Deleting a Project

You can delete one project at once in Trimble Access. The deleted project (project file (RWP), image directory (RWI) with images, point files (RWC) and video files* (RWV)) will be removed from the Files folder: C:\Users\TabletPC\AppData\Local\Trimble\Trimble Access.

<u>To Delete a Project:</u>

1. Select a project (open or not) from the Projects panel. The Delete Project  button becomes enabled. The selected project properties are displayed in the Properties panel
2. Tap Delete Project. The "Confirm Project Deletion" dialog appears and prompts you to abort the operation or not.
3. Tap Yes. The "Confirm Project Deletion" dialog closes and the selected project is removed from the Projects panel.
4. If required, select another project for the deletion purpose.
5. Tap Done.

Duplicating a Project

You can duplicate one project at once in Trimble Access.

<u>To Duplicate a Project:</u>

1. Select a project from the Projects panel. The Duplicate Project  button becomes enabled and the selected project properties are displayed in the Properties panel.
2. Tap Duplicate Project. The Copy Selected Project window appears.

    - To duplicate with the default name "ProjectX" where X is its order, tap on Next.
    - To duplicate with a different name, tap inside the New Project Name field. An on-screen keyboard appears. Input a new name in the New Project Name field. Tap Ok to validate. The on-screen keyboard disappears.

3. Tap Next.
4. Tap Done.

Importing a Project

You can import three types of files (JobXML files, Surveying Network ASCII files and ASCII files).

A Surveying Network ASCII file (*.CR5, *.CRD, *.txt) as extensions) is a data file obtained by traditional data collectors such as Total Stations, Field Stations, etc. Each such file will be opened (or imported) alone as a Topographic Station with points converted to Topopoints (or as a station like other scanning stations in the selected project with points converted to 3D points).

A file with the CRD extension is a coordinate file with five data fields (Point number, Northing, Easting, Elevation and Description) in binary form. A file with the CR5 extension is also a coordinate file but owned by TDS. A file with the TXT extension is an ASCII text file. Each line of the text file can contain any combination of Point number, Northing, Easting, Elevation and Description. All point information should be on one line with the values separated by a comma, space or other delineators.

An ASCII file may have ASC, NEU or XYZ as file extension. There are in general two sections in such a file: the first section is called a header section in which specific information about the nature of the file is stored; the second section is a list of 3D points. Each line contains a point represented by its X, Y, and Z coordinates plus, optionally, other attributes such as intensity or color.

A JobXML file (with *.jxl extension) is a text file exported from Trimble Survey Controller™, Survey Manager™ or Survey Pro™ software in an XML based format. Some dependency files may be related to the JobXML file (such as Scan files with TSF extension (*.tsf stands for Trimble Scanning File) and JPEG images (*.jpg extension)).

To Import a Project:

1. Tap Import Project . The Import Project window opens.
2. Tap the Extension pull-down arrow.
3. Select an Extension from the drop-down list. It must be related to the file to import.
4. Navigate to the drive/ folder where the file is located in the Location field.
5. Tap the file name to select it.
1. Tap Next. The Manage window appears.
2. Tap Done.

Note: You need to have a project open. Otherwise, the Import Project button is dimmed.

Saving a Project

There is no Save (or Save As) command as in the other application softwares for saving a project. Creating a new project will automatically save it in the Trimble format file.

Creating a New Project

You can create a new project in two ways: when performing a measurement (General Scanning, Volumes or DTM) or when selecting New Project.

A new project is always named "ProjectX" where X is its current order. When there is no project in Trimble Access, X is not equal to zero but is blank. It will be incremented from One to One each time you add a new project. If there are existing projects in Trimble Access, X will be the last project's order plus One. Creating a new project will automatically open it in Trimble Access.

<u>To Create a New Project:</u>

1. In the Projects window, tap the New Project  button. The Create a New Project dialog opens. A new project is created and has as default name "ProjectX" where X is its current order.
2. Tap in the New Project Name field. An on-screen keypad appears.
3. Input a name in the New Project Name field.
4. Tap Ok. The on-screen keypad disappears.
5. Tap Done.

Importing as a Project

You can import three types of files (JobXML files, Surveying Network ASCII files and ASCII files).

A Surveying Network ASCII file (*.CR5, *.CRD, *.txt) as extensions) is a data file obtained by traditional data collectors such as Total Stations, Field Stations, etc. Each such file will be opened (or imported) alone as a Topographic Station with points converted to Topopoints (or as a station like other scanning stations in the selected project with points converted to 3D points).

A file with the CRD extension is a coordinate file with five data fields (Point number, Northing, Easting, Elevation and Description) in binary form. A file with the CR5 extension is also a coordinate file but owned by TDS. A file with the TXT extension is an ASCII text file. Each line of the text file can contain any combination of Point number, Northing, Easting, Elevation and Description. All point information should be on one line with the values separated by a comma, space or other delineators.

An ASCII file may have ASC, NEU or XYZ as file extension. There are in general two sections in such a file: the first section is called a header section in which specific information about the nature of the file is stored; the second section is a list of 3D points. Each line contains a point represented by its X, Y, and Z coordinates plus, optionally, other attributes such as intensity or color.

A JobXML file (with *.jxl extension) is a text file exported from Trimble Survey Controller™, Survey Manager™ or Survey Pro™ software in an XML based format. Some dependency files may be related to the JobXML file (such as Scan files with TSF extension (*.tsf stands for Trimble Scanning File) and JPEG images (*.jpg extension)).

<u>To Import as a Project:</u>

1. In the Projects window, tap the Import  button. The Import Project window opens.
2. Tap the Extension pull-down arrow.
3. Select an Extension from the drop-down list. It must be related to the file to import.
4. Navigate to the drive/ folder where the file is located in the Location field.
5. Tap the file name to select it.
1. Tap Next. The Import Parameters window appears except for the JobXML format (for which parameters are not required) which brings you to the Trimble Access Home Page.

Note:
- You do not need to have a project open. But if there is one open, the selected file will be imported into it.
- If there is no project open, a new project will be created.
- Tapping Back will not bring to the Projects window but to the Trimble Access Home Page.

Setting Surveying Network Import Parameters

The import parameters (Coordinate System and Unit) are those used to represent the coordinates of Control Points in the imported file.

To Set Surveying Network Import Parameters:

1. Tap on the Coordinate System pull-down arrow.
2. Choose among "Cartesian X, Y, Z", "North, West, Elevation", "South, West, Elevation" and "North, West, Elevation".
3. Tap on the Unit pull-down arrow.
4. Choose a unit of measurement from the drop-down list.
5. Tap Next. The Trimble Access Home Page appears.

All imported Known Points are put under a Topographic Station* whose name is the imported file's name.

Note: (*) You may see the Topographic Station with all Known Points under the Project Tree.

Setting ASCII Import Parameters

To Set ASCII Import Parameters:

1. Tap on the Coordinate System pull-down arrow.
2. Choose among "Cartesian X, Y, Z", "North, West, Elevation", "South, West, Elevation" and "North, West, Elevation".
3. Tap on the Unit pull-down arrow.
4. Choose a unit of measurement from the drop-down list.
5. Tap Next. The Trimble Access Home Page appears.

One station is created for each ASCII format file in the Scan Tree. A default Sub-Project gathering all the ASCII format files is created in the Model Tree.

Import Parameters

A file of the following formats: JobXML (*.xml), ASCII (*.neu, *.asc, *.xyz) and Surveying Network (*.cr5, *.crd, *.txt) can be imported into Trimble Access. The import parameters for each format will be clarified in the topics hereafter.

Note: There are no parameters for the JobXML format.

For the Surveying Network Format

The relationship between the Unit System in the Surveying Network format and the Unit System in Trimble Access is given in the table below.

From Surveying Network Format	To Trimble Access Format
Kilometers Meters	Meters
Decimeters Centimeters Millimeters	Millimeters
Miles Yards International Feet Inches Inch Parts	International Feet
U.S. Survey Feet	U.S. Survey Feet

The relationship between the Coordinate System in the Surveying Network format and the Coordinate System in Trimble Access is given in the table below.

From Surveying Network Format	To Trimble Access Format
Cartesian X,Y,Z	Cartesian X,Y,Z
North, East, Elevation South, West, Elevation North, West, Elevation	North, East, Elevation

For the ASCII Format

The Unit System is limited to Millimeters. The relationship between the Coordinate System in the Surveying Network format and the Coordinate System in Trimble Access is given in the table below.

From Surveying Network Format	To Trimble Access Format
Cartesian X,Y,Z	Cartesian X,Y,Z
North, East, Elevation South, West, Elevation North, West, Elevation	North, East, Elevation

Viewing a Project as Data Tree

In Trimble Access, a project contains original scanned data and images, and all objects created from the scanned data. In order to make such data visible to users, we organize them into a Project Tree.

To View a Project as Data Tree:

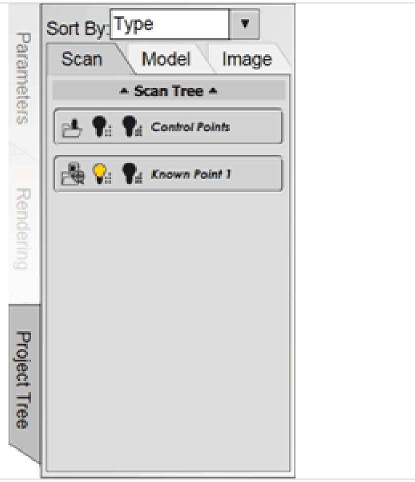
1. In the Trimble Access Home Page, browse to the View Trees  button using the scroll bar (if required).
2. Tap the View Trees button.
3. Do one of the following:
   - View a tree,
   - Short objects in a tree,
   - Display object properties,
   - Short object properties.
4. Tap Done.

Note: If there is no project in Trimble Access (or if there are projects and none of them are open); the View Trees button remains grayed-out.

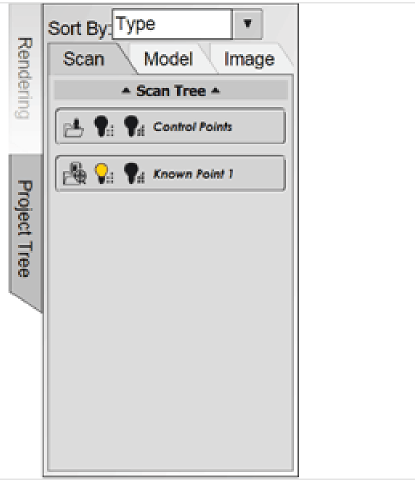
The Project Tree

A Project Tree is composed of three trees called Scan, Model and Image. Under the Project Tree, you can find two types of node called Group Node and Object Node. An Object Node is always a leaf node, while a Group Node could be either an internal or a leaf node.

Note: When you are out of the View Trees mode; you can have access to the Project Tree at anytime by tapping the Project Tree tab.



When acquiring data



When viewing a project in the View 3D

The Scan Sub-Tree

The Scan Tree is the first tree of the Project Tree. It is used for organizing scanning results called Stations, Scans or Images. It may have as many levels as a project requires. Scans and Images are always the leaves of the tree, while Stations are internal nodes. It is important to note that the content of a Station (Scans or Images) cannot be moved to other stations, nor can their position be changed inside a Station. This is to preserve the scanning order.

The Model Sub-Tree

The Model Tree is the second tree of the Project Tree. It is used for organizing models of a scene and may have as many levels as a project requires.

Each Object Node of this tree may be a Point Cloud, a Geometry or both. We call them the two representations of this object. By default, only one representation is displayed:

- A Point Cloud is displayed by its cloud representation,
- A Geometry is displayed by its geometric representation,
- By default, an object with both representations is displayed by its geometric representation. The user must explicitly ask to display its cloud representation.

Sub-Projects

Due to the capabilities of Trimble Rugged Tablet Computer to handle a large amount of points, we introduce the concept of Sub-Project which is linked to the notion of partial loading of a Project.

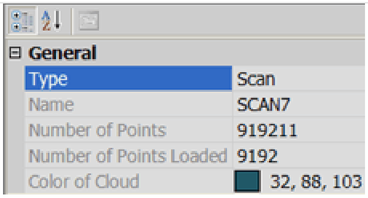
There is a default Sub-Project per Project. A Sub-Project has a representation in the Model Tree because it corresponds to a hierarchy group with clouds and objects inside. Only one single Sub-Project can be active at any given time.

A Project Cloud

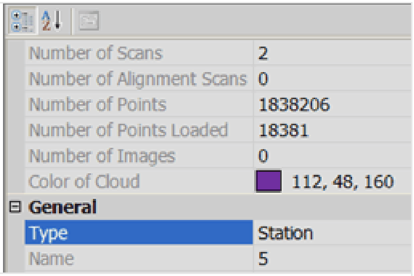
A Project Cloud is a cloud node created by default for each Sub-Project and is attached to the Model Tree. The aim of the Project Cloud is to allow the user to quickly find all points (or all unused points) of the current Sub-Project.

Understanding the Loading State

There are always two numbers associated to an object with Point Cloud properties: Number of Points and Number of Loaded Points. You may see them when displaying the object's Properties.

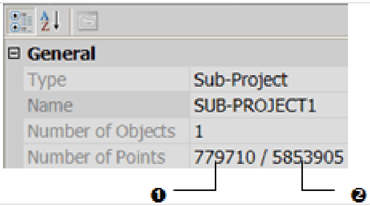


Number of Points and Number of Loaded Points in a Scan



Number of points and Number of Loaded Points in a Station

The total of loaded points is called Loading State which cannot exceed five millions. You can find this Loading State when displaying the (current) Sub-Project's Properties.



1 - Loading State

2 - Total of points in the current Sub-Project

Loading Scan Points

When starting a new Scan, Trimble Access checks the amount of points in the (current) Sub-Project. If the number of points does not exceed five millions, the new Scan will be entirely loaded (100%). If this number exceeds five millions, the new Scan will be also entirely loaded (100%) but for those that have been already acquired Trimble Access will decimate the Sub-Project by removing points from the Loading State as follows.

- Scan(s) for which a decimation has been performed is (are) left intact,
- Scan(s) for which points are completely loaded (not already yet decimated), a decimation will be then applied. The Number of Loaded Points (per Scan) is reduced from 100% to 1% (if less than 100 00 points) or to less than 1% (if more than 100 00 points).

The Loading State then changes. If it remains below five million points; the next new Scan(s) will be loaded at 100% until this number of five million is reached again.

Loading TZS Full Scan Points

The Number of Loaded Points per TZS Full Scan is limited to one million points (if more than one million points are acquired) or to fifty percent (if less than one million).

Loading CMF Full Scan Points

There are no points loaded. The Scan associated to the CMF Full Scan is empty.

The Image Sub-Tree

The Image Tree is the last tree of the Project Tree. It is used to organize (or browse) images taken by your instrument's on-board video camera.

Viewing a Tree

At any given time, only one of the three trees (Scan, Model and Image) can be displayed.

To View a Tree:

- Tap e.g. the Scan tab.

Going Down in a Parent Node

As a rule, a Group Node in a tree has a directory representation.

To Go Down in a Parent Node:

- In a tree, tap a Group Node. Its name appears between two arrows as illustrated hereafter 

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Going Up to a Parent Node

To Go Up to a Parent Node:

1. In a given tree, tap once the Go Up to Parent 

button to go up to the parent level.
2. Tap again the Go Up to Parent button until the tree name appears.

Sorting-out Objects

"Type" is the default shorting out mode. Objects are arranged in each tree (Scan, Model or Image) as they come. But you can short them by alphabetical order (Name), from Group Nodes to Object Nodes (Type), by descending order (Size) or to not short them (None).

To Sort-out Objects:

1. First display a tree by tapping its related tab.
2. Tap the Sort By pull-down arrow.
3. Choose among None, Name, Type and Size.

Renaming Objects

To Rename an Object:

1. In a tree, select an object for which you want to change its name.
2. Make a long tap over the object's name. An on-screen keypad appears.
3. Input a name in the Change Name field.
4. Tap Ok. The on-screen keypad disappears.

Object Properties

The Properties panel lists the information related to a selected object. It is divided into two columns. The left one lists the titles of each property and the right one shows property values.

All properties shown in gray are not modifiable. Properties are classified by category such as General, Content, Geometry, etc. You can shrink each category of properties by hiding its content. To do this, tap the Shrink button.

Displaying Properties

To Display Object Properties:

1. First display a tree by tapping its related tab.
2. Tap an object from a tree. Its properties are displayed in the Properties panel.

Shorting Properties

Properties can be sorted-out by Category (Content, General, Scanner, etc.), by Alphabetical Order (from A to Z) or by Pages *.

To Short Properties:

1. First display an object's properties.
2. Choose a shorting-out type.

Note: (*) The Pages button is currently dimmed.

Viewing a Project as 3D Data

To View a Project in 3D Data:

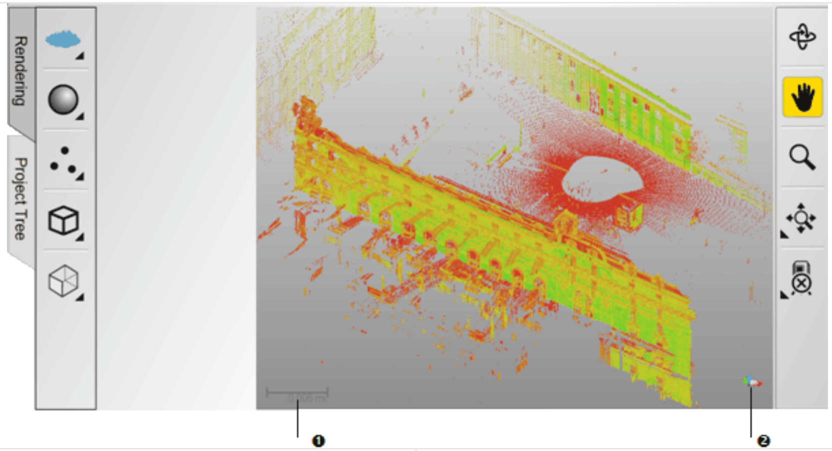
1. In the Trimble Access Home Page, browse to the View 3D  button using the scroll bar (if required).
2. Tap the View 3D button.

Note:

- If there is no project in Trimble Access; the View 3D button remains grayed-out.
- You can still access to the Project Tree when viewing a Project as 3D data.

About the View 3D

The View 3D is a window which is mainly used for displaying (or hiding) the 3D representation of an object selected from the Project Tree. An orthogonal Reference Frame and a Scale* are displayed respectively at the bottom right and bottom left corners of the View 3D. By default, the View 3D looks as shown below with the navigation buttons gathered in the right panel and the Project Tree and the Rendering options in the left panel.



1 - Scale* 2 - Reference Frame

Note: (*) Only in the Isometric projection mode.

There are two types of buttons in use in Trimble Access: Normal-tapped-buttons and Long-tapped-buttons**. For the first type, tapping on a button will call its related feature/command/option. For the second type, long-tapping on a button will expand in line the hidden tools.

Note:

- (**) Each of these buttons has a Small Triangle at the lower right (or left) corner.
- You can also single tap on a long-tapped-button to swap from a feature/command/option to another.

Viewing Objects

An object (Point Cloud, Geometry or Image) is automatically displayed in the View 3D at the end of a data acquisition process. If the object is a Group Node; it may have three states: Totally Displayed, Partially Displayed or Not Displayed. If the object is an Object Node; it has only two states: Totally Displayed or Not Displayed. Each state varies according to the type the object belongs to: Point Cloud or Geometry.

A Group Node is a Parent item. When it is Totally Displayed; all its Child items are displayed. When it is Partially Displayed; some of its Child items are displayed. When it is Not Displayed; none of its Child items are displayed.

Displaying an Object

<u>To Display an Object:</u>

1. Tap the Project Tree tab (if required).
2. Tap an object from its tree to select it.
3. Toggle the Off icon to On.

Note: It is important to note that if the selected object has both the Point Cloud and the Geometry representations, you need to toggle On the icon that is related to type you want to display.

Hiding an Object

To Hide an Object:

1. Tap the Project Tree tab (if required).
2. Tap an object from its tree to select it.
3. Toggle the On icon to Off .

Hiding all Objects

The Hide All functionality is intended to hide all objects from the View 3D whatever the objects could be (Point Clouds or Geometries).

To Hide all Objects:

1. Long-tap the View All button. A list (of hidden tools) expands inline.
2. Tap the Hide All button.

Rotating an Object

To Rotate an Object:

1. Tap the Rotation button.
2. Tap anywhere (or on an object displayed) in the View 3D with the stylus pen. The (or) appears beneath the stylus pen in the Examiner mode (or Station-Based mode).
3. In the Examiner mode, drag the object with the stylus pen in a direction to rotate the object in that direction and around the center of the View 3D.
4. In the Station-Based mode, drag the object with the stylus pen in a direction to rotate the object in that direction and around the viewpoint of the current station.

Panning an Object

To Pan an Object:

1. Tap the Pan button.
2. Tap anywhere (or on an object displayed) in the View 3D with the stylus pen. The appears beneath the stylus pen
3. Drag with the stylus pen in a direction to pan in that direction.

Note: The Pan button is dimmed in the Station-Based mode.

Zooming In or Out

To Zoom In or Out:

1. Tap the Zoom button.
2. Tap anywhere (or on an object displayed) in the View 3D with the stylus pen. A cross appears beneath the stylus pen.
3. Drag the cross from Down to Up to Zoom In.
4. Or drag the cross from Up to Down to Zoom Out.

Note: Dragging the cross from Right to Left (or vice versa) has no effect.

Viewing all

View All allows you to fit the whole displayed scene into the View 3D (except in the Station-Based mode, where the field of view is limited).

To View all:

1. If required, long-tap the View All button. A list (of hidden tools) expands inline.
2. Then, tap the View All button.

Zooming on Selection

Zoom on Selection allows you to fit the selected objects into the View 3D.

To Zoom on Selection:

1. If required, long-tap the View All button. A list (of hidden tools) expands inline.
2. Tap the Zoom on Selection button from the list.
3. Tap two points in the View 3D window.

Changing the Rotation Center

To Change the Rotation Center:

1. If required, long-tap the View All button. A list (of hidden tools) expands inline.
2. Tap the Change Rotation Center button.
3. Tap a point on displayed object(s) in the View 3D to assign it as a center of rotation.

Note: No center will be assigned if the point you tapped is not over the displayed object(s).

The Station-Based Mode

In the Station-Based mode, a scene is viewed from the viewpoint of one of the stations, i.e., the instrument location for this station, and you can jump from one station to another (if there is more than one). The Station-Based mode is the default mode; it is automatically set at the end of a data acquisition process.

Note:

- You cannot be in the Isometric projection mode when navigating in the Station-Based mode.
- Navigating through a scene in such mode is restricted to Rotate and Zoom In (or Out). The Pan button is dimmed.

Enabling the Station-Based Mode

<u>To Enable the Station-Based Mode:</u>

1. Long-tap the Station-Based (On) button (if required).
2. Then, tap the Station-Based (On) button.

Note: Display objects in the View 3D, if not present.

Browsing Stations

The scene is viewed from the first station viewpoint (the first in the Project Tree) with overlapped images in background.

<u>To Browse Stations:</u>

1. Tap the Next Station button to go to the next station.
2. Tap the Previous Station button to go to the previous station.

Note:

- If there is only one station, tapping the Next Station (or Previous Station) button has no effect as they are dimmed.
- The current station has its name displayed Station_1.

Hiding (or Displaying) Overlapped Images

To Hide (or Display) the Overlapped Images:

1. Tap the Overlapped Images button. The overlapped images in background are hidden.
2. Tap again the Overlapped Images button. The overlapped images in background are displayed.

Note: If the displayed station has no images, the Overlapped Images button is dimmed and displays the "No Image" text.

Disabling the Station-Station Mode

To Disable the Station-Based Mode:

1. Long-tap the Station-Based (On) button. A list (of hidden tools) expands inline.
2. Tap the Station-Based (Off) button.

Note: Disabling the Station-Based mode will disable the Overlapped Images, Previous Station and Next Station buttons as well as the current station name button.

The Examiner Mode

Disabling the Station-Based swaps the navigation from that mode to the Examiner one. In such mode, you turn the camera around an object. These operations are actually obtained by moving the scene with a stylus pen. Navigation is free inside the View 3D window.

Note: In the Examiner mode, you can be in either the Isometric projection mode or the Perspective projection mode.

The Rendering Options

A Rendering option defines how an object is displayed. For example, a geometric object can be displayed in Wireframe (or Surface). We introduce the different options available for the two representations of an object: Point Cloud and Geometry. A Rendering will be applied to all objects of the same type displayed in the View 3D; this means that you cannot specify different renderings for different displayed objects of the same type. For example, you cannot display a geometry object A in Wireframe, and a geometry object B in Surface.

Point Cloud

There are eight Renderings that you can apply to a Point Cloud. All are listed here below:

Station Color enables to render displayed points with the color of the stations they belong to.

True Color enables to display each point with its true color (RGB).

White Color enables to render all displayed points with white color.

Scan Color enables to render displayed points with the color of the scans they belong to.

Gray Scale enables to render displayed points using the gray scale defined by their intensity.

Color Code enables to render displayed points using the color encoded intensity.

Distance Color enables to color each point according to some distance computed from a reference object.

Single Color enables to associate one single color to the point cloud (not necessarily the yellow color). In this way many point clouds can be displayed at a time with various colors.

Geometry

There are four Renderings that you can apply to a displayed geometry. All are listed here below:

Wireframe enables to render a geometry in wireframe.
Hidden Lines enables to render a geometry in wireframe with hidden lines removed.
Surface is to render a geometry as a smooth shaded surface.
Textured is to render a geometry as a texture mapped surface if such a mapping exists.

Point Sizes

"Point Sizes" is not exactly a rendering option but it enables to change the point size (in Pixels) when displaying a Point Cloud. Five sizes are available and all are listed here below:

1 Pixel
2 Pixels
3 Pixels
4 Pixels
5 Pixels

Note: The default size is 1 Pixel.

Displaying the Rendering Options

To Display the Rendering Options:

- Tap the Rendering tab. The Point Cloud Renderings, Geometry Renderings, Point Sizes and Projection Modes buttons appear in the left panel.

Applying a Rendering

All available Renderings* are not shown; you need to expand inline a list to be able to view them.

To Apply a Rendering:

1. First display an object in the View 3D.
2. Tap the Renderings* button to swap from a rendering to another.
3. Or long-tap the Renderings* button. A list (of hidden options) expands inline.
4. Then, tap the Rendering you want to select from the list.

Note: (*) Choose the Rendering type (Point Cloud or Geometry) according to the displayed object.

Changing a Point Cloud's Point Size

All available Point Sizes are not shown; you need to expand inline a list to be able to view them.

To Change a Point Cloud's Point Size:

1. First display an object in the View 3D window.
2. Tap the Point Sizes button to swap from a Point Size to another.
3. Or long-tap the Point Sizes button. A list (of hidden options) expands inline.
4. Then, tap the Point Size you want to select from the list.

The Projection Modes

There are two projection modes in Trimble Access. In the Isometric  projection mode, the distance from the viewing camera origin to displayed objects has no impact on how large an object appears. In the Perspective  projection mode, the most unmistakable characteristic is foreshortening - the further an object from the viewing camera, the smaller it appears in the final screen image.

Note:

- The Isometric projection mode is the default mode.
- In that projection mode, a scale is displayed at the lower left corner of the View 3D.

Setting a Projection Mode

To Set a Projection Mode:

1. Tap the Projection Mode button to swap from Isometric to Perspective and vice versa.
2. Or long-tap the Projection Mode button. A list (of hidden options) expands inline.
3. Then, tap the Projection Mode you want to select from the list.

The Standard Views

Trimble Access provides six pre-programmed standard viewing positions. These views are defined as below. X, Y, Z represent respectively the three axes of the active coordinate frame.

Top: Looking parallel to - Z-axis, + Y-axis bottom to top, + X-axis left to right

Bottom: Looking parallel to + Z-axis, + Y-axis top to bottom, + X-axis left to right

Front: Looking parallel to + Y-axis, + Z-axis bottom to top, + X-axis left to right

Back: Looking parallel to - Y-axis, + Z-axis bottom to top, + X-axis right to left

Left: Looking parallel to + X-axis, + Z-axis bottom to top, + Y-axis right to left

Right: Looking parallel to - X-axis, + Z-axis bottom to top, + Y-axis left to right

Note: The standard viewing positions are not available in the Station-Based mode.

Aligning to a Standard View

To Align to a Standard View:

1. Tap the Standard Views button to jump from a standard view to another.
2. Or long-tap the Standard Views button. A list (of hidden options) expands inline.
3. Then, tap the Standard Views you want to select from the list.

Note: No selection is required to apply a standard view.

CHAPTER 16

The Instrument Tools

There are three instrument tools: On Site Video Calibration, Auto-Test and Leveling. All of them are in the Trimble Access Home Page. The table below lists the type(s) of instrument tool you can have according to the instrument in use. All of them (or only the Leveling) are (or is) enabled only if a Trimble GX instrument (or a Trimble CX instrument) is connected to your Trimble Rugged Tablet Computer. Otherwise, they (or it) remain(s) dimmed.

		GX Instrument	CX Instrument
	On-Site Calibration	✓	
	Auto-Test	✓	
	Leveling	✓	✓

The On-Site Video Calibration Tool

An image issued from the camera inside a Trimble GX instrument is used either to frame a scan or to project color information on 3D points. This is only possible because the video is calibrated; this means that there is a correlation between a 2D pixel and a 3D point issued from the instrument.

The video calibration is usually done when the instrument is manufactured. But the instrument can be exposed to chocks or vibrations. This can lead to camera (or laser beam) movements; usually both are slightly moved. The On-Site Calibration tool allows you to re-calibrate the video according to the laser without having to re-send the instrument to manufacturer.

Prerequisites

Hardware Requirement:

- A Trimble GX instrument,
- One flat target assembly (flat target, stud and tribrach adaptor),
- Two tripods,
- Two tribrachs.

To Setup the Instrument and Target:

1. Make two marks - A and B - on a flat and stable ground. The distance from A to B should be between 20m and 30m.
2. Setup a tripod over the position A.
3. Check that the tripod head is horizontal.
4. Place a tribrach with an optical (or laser plummet) on the tripod head.
5. Level the tribrach and centre it above A.
6. Place the GX instrument on the tribrach.
7. Lock the instrument into the tribrach.
8. Repeat the steps from 2 to 5 to setup a tripod/tribrach over the position B.
9. Place a flat target assembly on the tribrach at B.
10. Connect the instrument to a power supply.
11. Power and warm-up the instrument on site for 20 minutes before starting the calibration procedure.

Note: There is no constraint on the angular position of the target. It should be horizontally aligned with the instrument.

Starting the Tool

The On Site Video Calibration tool aims essentially to modify the extrinsic parameters of the camera. It will not change the intrinsic parameters. The principle is to compute the gap between two pixels: one is the center of a target in a picture, second is the projection on the picture of the 3D position of a scanned target. This gap in pixel will be converted into angles and sent to the instrument's driver in order to compute the new extrinsic parameters.

To Start the Tool:

1. In the Trimble Access home page, browse to the On Site Video Calibration  button using the scroll bar.
2. Tap the On Site Video Calibration button. The Video Calibration window appears. A new project is created with a default name "ProjectX" where X is its current order.

Calibrating the Video

To Calibrate the Video:

1. Move the GX instrument to sight a target (using the Horizontal and Vertical Scroll-bars).
2. Tap a Flat and Reflective Target on the Video View (using the Zoom On Point).
3. Adapt in finesse the frame to the Flat and Reflective Target using the slider for enlarging (or reducing) the frame.
4. Tap Measure.

   - The Flat and Reflective Target is scanned and its center is extracted.
   - A snapshot of the Flat and Reflective Target is taken with a zoom factor of 550% and centered on the target.
   - The Flat and Reflective Target is re-scanned and its center is extracted again.
   - New correction values (HA and VA) are computed and displayed.

5. Click Done. The new correction values are stored and applied.
6. Click Cancel. The On Site Video Calibration window closes. The current values are kept. No adjustment is made.

Note: You cannot calibrate a camera if its current correction (in horizontal and vertical) is greater than 500 micro-radians.

Video Calibration Errors

If the 3D target extraction fails on the first stage, the On-Site Video Calibration tool stops the procedure and an error message appears and prompts you to orientate correctly the Flat and Reflective Target, to clean it, to check if there is no another reflective object in the field of view or to enlarge the framing frame because it may be too small.

If the 2D target extraction in the snapshot fails, the On Site Video Calibration tool stops the procedure and an error message appears and prompts you to orientate correctly the Flat and Reflective Target or to clean it or to move it to another place (in order to improve the contrast with the background).

Each time the On-Site Video Calibration fails, a message appears and prompts you to restart the procedure from the beginning, to cancel the procedure or to close the tool.

The Auto-Test Tool

Trimble Access features an Auto-Test function which diagnoses various components (CPU board, auxiliary board, video zoom, etc.) of your Trimble GX instrument.

Auto-Testing the Trimble GX instrument

To Auto-Test the Trimble GX instrument:

1. In the Trimble Access home page, browse to the Auto-Test  button using the scroll bar.
2. Tap the Auto-Test button. The Running Auto-Test window with a progress bar in percent appears. At the end of the test, Trimble Access lists each tested component with result ("Passed" or "Failed") except for the Tilt and VC detections which are respectively Tilt/No Tilt and VC/No VC. "Passed" means that the tested component functions correctly while "Failed" means that it is out of order.

I/O driver	PASSED
Acquisition driver	PASSED
CPU driver	PASSED
Video driver	PASSED
Comm driver	PASSED
Streaming resident	PASSED
I/O board	PASSED
CPU board	PASSED
Acquisition board	PASSED
Power lines	PASSED
Scanner	PASSED
Head temperature	PASSED
Body temperature	PASSED
APD temperature	PASSED
Platform motorization	PASSED
Camera motorization	PASSED
Camera zoom	PASSED
Tilt detected	PASSED
VC detected	PASSED

3. Tap Done. The Running Auto-Test window closes.

Note: You need to have your instrument connected to the Trimble Rugged Tablet Computer to be able to perform an Auto-Test.

Saving the Auto-Test Result as a Report

You can save the Auto-Test result as a report which is a file of ASCII format (with .txt as extension). Inside the report, all you need to keep is the final result ("Failed" or "Passed") located in the line Auto-Test Main Result. If this result is "Passed", the instrument functions correctly. If this result is "Failed", please contact your supplier's support personnel and, if necessary, send the report.

To Save the Auto-Test Result as a Report:

1. Tap Export. The Save As dialog opens.
2. Specify a location where the result will be saved in the Save In field.
3. Keep the default name* in the File Name field.
4. Or enter a new name. The format extension .TXT will be added.
5. Tap Save. The Save As dialog closes. The report opens of its own.

Note:

- You need to tap Done to close the Running Auto-Test window.
- (*) A report default name is always: Auto-Test_Year_Month_Date.txt.

The Leveling Tool

Leveling can be done after the instrument has been detected and connected to your Trimble Rugged Tablet Computer or later when you need to do it. In the latter case, you need to select the related command.

Opening the Leveling Tool

Leveling an instrument by tapping the Leveling command is similar to leveling it after it has been detected and connected to your Trimble Rugged Tablet Computer.

To Open the Leveling Tool:

1. In the Trimble Access Home Page, browse to the Leveling  button using the scroll bar.
2. Tap the Leveling button. The Leveling window appears.

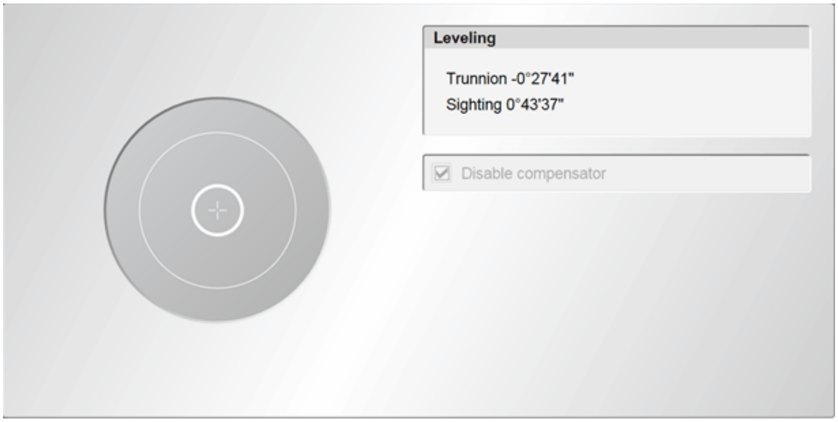
Leveling a Trimble GX instrument

The electronic bubble in the Leveling window contitues as a visual control to check if your instrument is leveled (or not). It may have three states: Out of Range, Yellow and Green.

In addition to the electronic bubble, the Leveling window displays the Trunnion and Sighting information. The horizontal rotation's axis of the instrument is called Trunnion while its sighting direction for acquiring cloud data is called Sighting and both are expressed in degrees, minutes and seconds. The Compensator (when activated) is a feature to level-compensate automatically for all 3D points.

Note: The Leveling, Trunnion and Sighting information are available once the Leveling window appears.

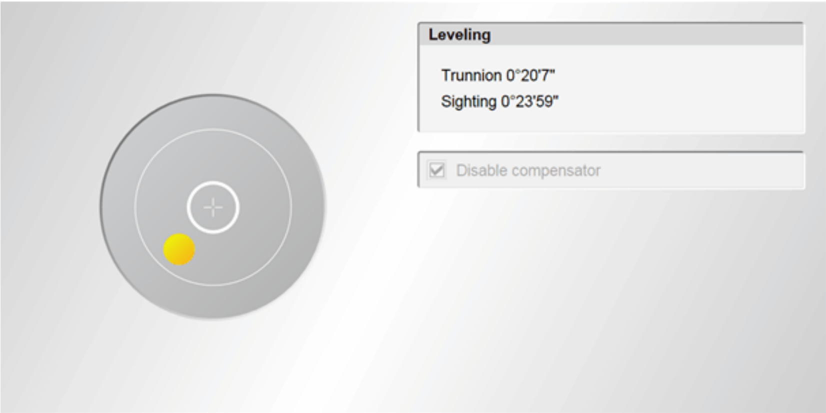
The Instrument is Out of Range



When the instrument is out of range, the electronic bubble is as shown above. The Compensator feature (when the instrument rotates) is not enabled because not guaranteed; the Disable Compensator option is not enabled. In this case, tap the Ok button to close the Error message and adjust the instrument's vertical position using the three leveling screws of the tribrach below the instrument until the electronic bubble level becomes first yellow and then green and centered.

Note: You can leave the instrument as it is (out of range) and directly tap Next.

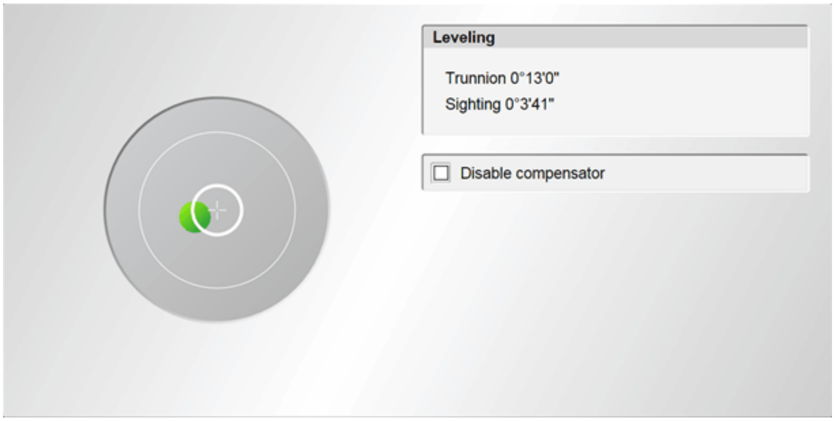
The Instrument is Misleveled



When the instrument is misleveled, the electronic bubble color is yellow. The Compensator feature (when the instrument rotates) is not enabled because not guaranteed; the Disable Compensator option is not enabled. In this case, adjust the instrument's vertical position using the three leveling screws of the tribrach below the instrument until the electronic bubble becomes first green and then centered.

Note: You can leave the instrument as it is (misleveled) and directly tap Next.

The Instrument is Leveled



When the instrument is leveled, the electronic bubble color is green and centered. The Compensator feature (when the instrument rotates) is enabled because guaranteed, the Disable Compensator option is enabled and unchecked by default.

Leveling a Trimble CX instrument

The electronic bubble in the Leveling window contitues as a visual control to check if your instrument is leveled (or not). It may only have two states: Yellow or Green.

In addition to the electronic bubble, the Leveling window displays the Trunnion and Sighting information. The horizontal rotation's axis of the instrument is called Trunnion while its sighting direction for acquiring cloud data is called Sighting and both are expressed in degrees, minutes and seconds. The Compensator (when activated) is a feature to level-compensate automatically for all 3D points.

Note: The Leveling, Trunnion and Sighting information remain unavailable until the Tilt measurement has been performed.

Measuring the Tilt

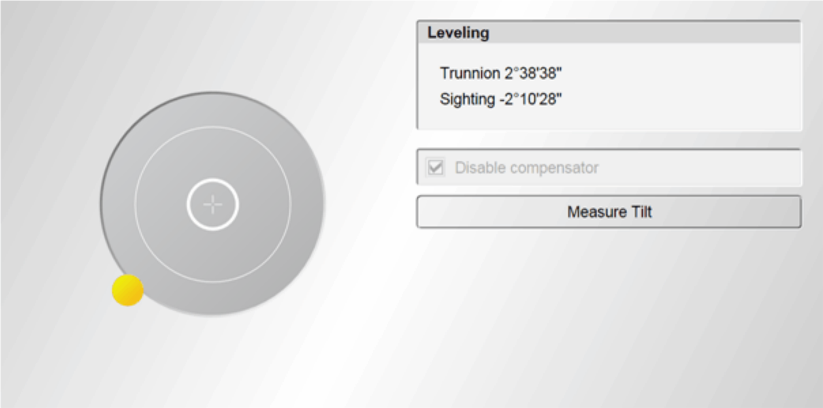
Before measuring the Tilt and when the measurement is in progress, the Disable Compensator option is by default checked and grayed-out. Both the Trunnion and Sighting information are unavailable.

<u>To Measure the Tilt:</u>

- Tap the Measure Tilt button. The Trimble CX instrument performs four measurements. It first turns 270° anticlockwise to make the first measurement, then 90° clockwise for the second, again 90° clockwise to the third and finally 90° clockwise to the last. Once completed, the Disable Compensator option becomes then enabled and un-checked. Both the Trunnion and Sighting information are displayed.

Note: The measurements (performed by the instrument) may take some time.

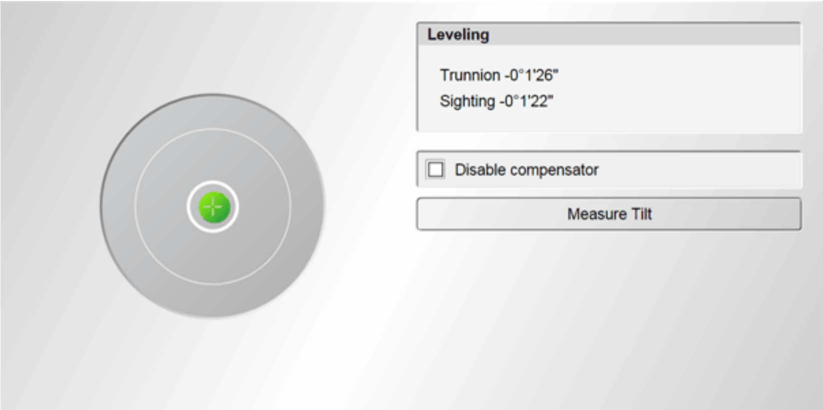
The Instrument is Misleved



When the instrument is misleveled, the electronic bubble color is yellow. The Compensator feature (when the instrument rotates) is not enabled because not guaranteed; the Disable Compensator option is not enabled. In this case, adjust the instrument's vertical position using the three leveling screws of the tribrach below the instrument and measure the Tilt again until the electronic bubble becomes first green and then centered.

Note: You can leave the instrument as it is (misleveled) and directly tap Next.

The Instrument is Leveled



When the instrument is leveled, the electronic bubble color is green and centered. The Compensator feature (when the instrument rotates) is enabled because guaranteed, the Disable Compensator option is enabled and unchecked by default.

Activating and Deactivating the Compensator

Activating the Compensator

You can decide to automatically level-compensate for all 3D points.

To Activate the Compensator:

1. Keep the Disable Compensator option unchecked.
2. Tap Next.

    - When using a Trimble GX instrument, the Atmospheric Correction window appears.
    - When using a Trimble CX instrument, the Trimble Access Home Page appears.

Deactivating the Compensator

You can decide to not automatically level-compensate for all 3D points.

To Deactivate the Compensator:

1. Check the Disable Compensator option.
2. Tap Next.

    - When using a Trimble GX instrument, the Atmospheric Correction window appears.
    - When using a Trimble CX instrument, the Trimble Access Home Page appears.

Correcting the Atmospheric Parameters

The Trimble GX instrument is based on the EDM (Electronic Distance Measurement) for collecting points. The distance measurement is function of the velocity of light in the atmosphere and the velocity of light depends on the refractive index of air, temperature, pressure and humidity. The Atmospheric Correction feature in Trimble Access enables to apply corrections to the distance measurement - expressed in PPM (Part Per Million) - according to these atmospheric parameters. The Trimble GX instrument has been calibrated so that no correction is applied at 20°C and 1013.25 mBar.

You can decide to apply (or not) a correction after auto-detecting and leveling the instrument connected to your Trimble Rugged Tablet Computer. You can apply several corrections to a project.

Inputting a PPM Value

To Input a PPM Value:

1. In the Atmospheric Correction window, tap in the PPM (Keyed In) field. An on-screen keypad appears.
2. Input a value in the PPM (Keyed In) field.
3. Tap Ok. The on-screen keypad disappears.
4. Tap Done. The Atmospheric Correction window closes.

Computing a PPM Value

To Compute a PPM Value:

1. In the Atmospheric Correction window, check the Set Atmospheric Temperature and Pressure option. The Pressure and Temperature fields appear below the option.
2. Tap in the Pressure field. An on-screen keypad appears.
3. Input a value in the Pressure field. The default unit of measurement is setup in millibars; you do not need to enter "mBar" after the value.
4. Tap the Tab button. The on-screen keypad jumps to the Temperature field for editing.
5. Input a value in the Temperature field. The default unit of measurement is the one set in Settings. If Celsius has been chosen; you do not need to enter "°C" after the value. If Fahrenheit has been chosen, you do not need to enter "°F" after the value.
6. Tap Ok. The on-screen keypad disappears.
7. Tap Done. The Atmospheric Correction window closes.

Keeping the Atmospheric Correction Deactivated

You can decide to not apply a correction to your project. In this case, tap the Done button in the Atmospheric Correction window without inputting a value in the PPM (Keyed In) field.

CHAPTER 17

The Files Folder

The Files folder is a folder where all project files* (RWP), image directories* (RWI) with images, point files* (RWC) and video files* (RWV) are stored. The path to the Files folder (C:\Users\TabletPC\AppData\Local\Trimble\Trimble Access) cannot be modified.

The Files folder is locked during an open session of Trimble Access. This prevents the user from neither removing nor renaming the Files folder. If Trimble Access crashes, the Files folder remains locked until the user re-launches and closes Trimble Access.

Note:

- All file names in the Files folder are editable.
- (*) Created within Trimble Access.

Opening the Files Folder

You can open the Files folder to view, copy or move files to another location (folder, external drive, etc).

<u>To Open the Files Folder:</u>

1. In the Trimble Access Home Page, browse to the Files  button using the scroll bar (if required).
2. Tap the Files button. The Files folder is open with all projects created within Trimble Access inside.

Note: The Files folder is also available in the Destination File window (when exporting a report out of Trimble Access) or in the Import Project window (when importing a file into Trimble Access).

Copying Files into the Files Folder

You can copy a Trimble project file (with RWP as extension), as well as it related image directory (RWI) with images, point files (RWC) and video files (RWV) into the Files Folder. In this case, this project file appears in the Projects panel in the Manage window.

CHAPTER 18

Settings

The Settings allow the user to customize the Coordinate System, Temporary Folder, Unit System, Network, etc. in use in Trimble Access. These Settings are grouped under several tabs: General, Units and Network. The Settings will be memorized and used for the current session and all future sessions of Trimble Access.

Defining a Setting

<u>To Define a Setting:</u>

1. In the Trimble Access Home Page, browse to the Settings  button using the scroll bar.
2. Tap the Settings button. The Settings window appears with the General tab open by-default.
3. Do one of the following:

    - Define a General setting,
    - Define a Units setting,
    - Define a Network setting.

4. Tap Done. The Settings window closes.

General Settings

General Settings allow you to define a Coordinate System to use, to assign a Temporary Folder where temporary data files will be stored, restore the default folder or clean the current folder.

Changing the Coordinate System

To Change the Coordinate System:

1. Tap the General tab (if required). The General window appears.
2. In the Graphical User Interface panel, tap the Coordinate System pull-down arrow.
3. Choose among "Cartesian X, Y, Z", "North, East, Elevation", "South, West, Elevation" and "North, West, Elevation" from the drop-down list.

Changing the Temporary Folder

In Trimble Access, a Temporary Folder is a folder where temporary data files (like snapshots, point data, etc.) will be stored. The path to the Temporary Folder is C:\Users\TabletPC\AppData\Local\Temp.

To Change the Temporary Folder:

1. Tap the General tab (if required). The General window appears.
2. Tap the button. The Browse For Folder dialog opens with the default folder highlighted.
3. Navigate to a new drive/folder where data files will be saved.
4. Or tap Make New Folder to create a new folder.
5. Tap OK. The Browse For Folder dialog closes.

Restoring the Default Folder

To Restore the Default Folder:

1. Tap the General tab (if required). The General window appears.
2. Tap Restore Default. The default folder name and path appear in the Temporary Folder field.

Cleaning the Current Folder

To Clean the Current Folder:

1. Tap the General tab (if required). The General window appears.
2. Tap the Clean Folder button.

Units Settings

In the Display Properties Panel:

- Decimal Places: This option allows you to specify the number of digits after the decimal separator. In Trimble Access, the decimal separator is a Point.
- Display Value With Unit Tag: This option allows you to display digital values with unit tag(s).

In the Unit System Panel:

This option allows you to select a unit of measurement for Length, Angle, Temperature and Pressure.

Defining the Decimal Places

To Define the Decimal Places:

1. Tap the Units tab. The Units window appears.
2. Tap in the Decimal Places field. An on-screen keypad appears.
3. Input a new value in the Decimal Places field.
4. Tap Ok. The on-screen keypad disappears.

Displaying a Value With Unit Tag

To Display a Value With Unit Tag:

- Check the Display Value With Unit Tag option.

Defining a Unit of Measurement

<u>To Define a Unit of Measurement:</u>

1. Tap the Units tab. The Units window appears.
2. Tap e.g. on the Length pull-down arrow.
3. Choose a unit of measurement from the drop-down list.

Network Settings

Network Settings allow the user to select an Instrument to be connected among those managed by Trimble Access.

Choosing an Instrument to be Connected to

To Choose an Instrument to be Connected to:

1. Tap the Network tab. The Network window appears.
2. Tap on the Instrument pull-down arrow.
3. Choose an instrument from the list.

Note:

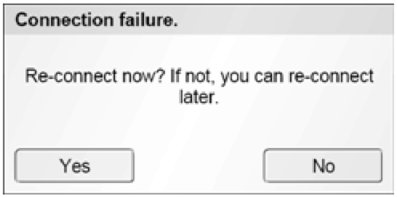
- When starting Trimble Access for the first time, "None" is by default in the Instrument field.
- Once an Instrument type has been validated (by tapping Done), Trimble Access will attempt a connection to this type (of instrument) at the beginning of each session, except when the user explicitly change to a new type.

List of Messages

Hereafter are listed all messages the user may encounter regardless of the instrument in use.

Connection to the Instrument Lost

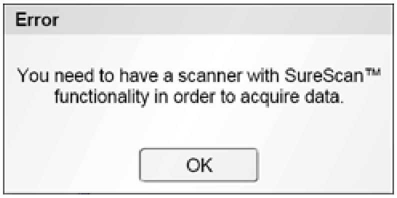
The Connection Feature dialog below appears when the connection to an instrument is lost.



1. Tap Yes to reconnect your Trimble Rugged Tablet Computer to the instrument.
2. Tap No to go you back to the Trimble Access Home Page.

The SureScan Feature Missing

The Error message below appears when the instrument in use is a Trimble GX instrument for which the SureScan™ feature is missing.

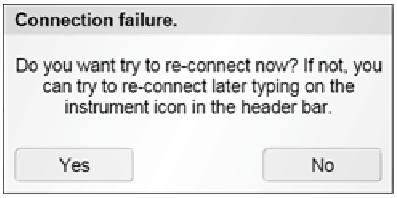


1. Tap Ok. The Error message closes. A new dialog appears with the "Do you want to create a new station" text.
2. Tap No. The Error message appears again.
3. Tap Yes. The New Station window appears.

Note: The current station is not aborted but created in the Project Tree.

Connection Failed When Creating Job(s)

The Connection Failure dialog below appears when trying to create a job (General Scanning, Volumes* or DTM*) without being connected to an instrument.



1. Tap No. The Connection Failure dialog closes and the re-connection attempt is aborted.
2. Tap Yes. The Connection Failure dialog closes and the "A search of an instrument is in Progress" message appears.

Note: (*) Not available when using a Trimble CX instrument.

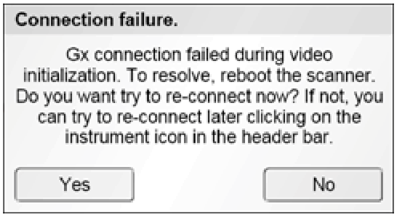
Connection Failed While Creating Station(s)

The Warming message below appears when trying to create a station without being connected to an instrument.

- Tap OK. The Warming message closes.

Connection Failed During Video Initialization

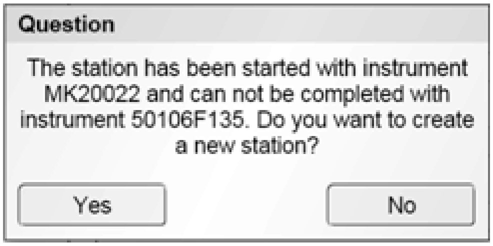
The Connection Failure dialog below appears if trying to connect to a Trimble GX instrument while the video is initializing.



- Tap No. The Connection Failure dialog closes and the re-connection attempt is aborted.
- Tap Yes. The Connection Failure dialog closes and the "A search of an instrument is in Progress" message appears.

When Completing an Existing Station With a Different Instrument

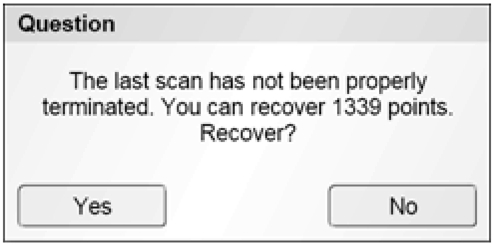
The Question dialog below appears when the user attempts to complete an existing station with a different instrument.



- Tap Yes to create a new station.
- Tap No to abort creating a new station.

Last Scan not Properly Terminated

The Question dialog below appears when the last scan has not been properly terminated.



- Tap Yes to recover points of the last scan.
- Tap No to remove points of the last scan.

Glossary of Terms

Black and White Flat Target

A Trimble black and white flat target with a 150 mm long per side.

Backsight Point

A point used to calculate the Azimuth between an instrument point (also called Known Point) on the ground and itself. This Azimuth determines the orientation of the instrument when setting it up.

Delivery

A term used to qualify the kind of output the user can have from the acquired data (Point Cloud). It can be either a Volume, a Mesh or the Point Cloud itself.

Flat Target

A Trimble reflective flat target with a 150 mm long per side.

Foresight Point

A point to measure from the current station establishment in order to extend a Traverse.

Frame

A scan area that the user has to define by tapping either on a Panorama, or on the Video View or on 3D data.

Job

A generic term for a Trimble Access's application like Volume, DTM, etc.

Loading State

A Loading State is the sum of loaded points in a given Project.

Panorama

A set of images taken by the instrument's embedded camera.

Point Cloud

A set of points.

Spherical Target

A Trimble white sphere with a 76.2 mm diameter long.

Survey Point

A point with 3D coordinates measured using the instrument laser beam.

Traverse

A method in the field of surveying to establish control networks. Traverse networks involved placing the survey stations along a line or path of travel, and then using the previously surveyed points as a base for observing the next point.

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