Trimble Survey Controller™

Getting Started Guide

www.trimble.com

Trimble™

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Getting Started Guide

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Introduction

CHAPTER 1

Welcome to the *Trimble Survey Controller Getting Started Guide*.

This manual introduces the Trimble® ACU controller and describes how to:

- Start conventional surveys
- Start GPS surveys
- Transfer data to an office computer

The Trimble Survey Controller™ software configures and controls receivers and instruments used in GPS and conventional surveys.

Trimble Survey Controller is also available on the TSCe™ controller. The information in this document also applies to the TSCe.

Details that apply only to the TSCe are indicated by this TSCe icon.

Note – *If you are not familiar with GPS, visit Trimble's website (www.trimble.com) for an interactive look at Trimble and GPS.*

Related information

Sources of related information include the following:

- Help – the software has built-in, context-sensitive help that lets you quickly find the information you need. The Help is also available on the CD.
- Release notes – the release notes describe new features of the product, information not included in the manuals, and any changes to the manuals.

Technical assistance

If you have a problem and cannot find the information you need in the product documentation, contact your local distributor.

Your comments

Your feedback about the supporting documentation helps us to improve it with each revision. To forward your comments, send an e-mail to ReaderFeedback@trimble.com

The ACU Controller

CHAPTER 2

In this chapter:

- Attaching the ACU
- ACU function keys
- Power supply
- Screen
- Clock
- Storage card
- Rebooting
- Caring for the unit

The Trimble Survey Controller software is designed to run on the ACU controller. This chapter describes the controller and how to use it. Figure 2.1 shows the front of the ACU.

Figure 2.1 The ACU controller – front view

Attaching the ACU Controller

Warning – Switch off the ACU when attaching it to the holder or when changing the batteries in the holder with the ACU attached. Otherwise, the on/off status of the ACU and the holder may no longer be synchronized.

To attach the ACU:

1. Hold the controller with both hands.
2. Fit the groove on the back of the controller over the lower lip on the front of the holder.
3. Press down gently until the back of the controller is flat against the holder.
4. Gently releasing the downward pressure on the controller, guide the controller until the teeth on the front of the holder click into the notches on the top of the controller.

Figure 2.2 shows how to attach the ACU controller to the holder.

Figure 2.2 Attaching the ACU

ACU Function Keys

Table 2.1 describes Trimble Survey Controller functions that are associated with the ACU keys.

Table 2.1 ACU function keys

On this instrument or receiver ...	tap ...	to ...
Conventional or GPS		access the main Trimble Survey Controller menu
Conventional (with the Autolock® option)		access the *Trimble functions* screen
		switch Autolock on and start a search
		switch Autolock on or off
		take a measurement

Table 2.1 ACU function keys (continued)

On this instrument or receiver ...	tap ...	to ...
Conventional (with servos)		turn the instrument horizontally to the current point name or stakeout location
		turn the instrument vertically to the current point name or stakeout location
		turn the instrument horizontally and vertically to the current point name or stakeout location
		change face
		take a measurement
Conventional (3600)		activate the first softkey (F1)
		activate the second softkey (F2)
		activate the third softkey (F3)
		activate the fourth softkey (F4)
		take a measurement

Table 2.1 ACU function keys (continued)

On this instrument or receiver ...	tap ...	to ...
GPS		access the *Position* dialog
		access the *Satellites* dialog
		activate the first softkey (F1)
		activate the second softkey (F2)
		activate the third softkey (F3)
		activate the fourth softkey (F4)
		activate the **Enter** button

Power Supply

Under normal operation, the ACU draws power from the device it is attached to or from one of the following external batteries:

- 12V NiMH
- 7.4 Lithium-ion

The ACU has an internal, rechargeable 4.8 volt 600 mAh NimH battery. If power is lost during operation the ACU automatically switches over to this battery, which provides approximately one hours running time when fully charged.

The ACU holder has dual 7.4V 1.8Ah lithium-ion batteries. When fully charged, these provide approximately 12 hours running time to the ACU through the 7-pin backplane.

The TSCe is supplied with a rechargeable 4.8 volt 3800 mAh NiMH battery, which provides over 30 hours of running time when fully charged.

Charging the batteries

The internal battery of the ACU is automatically charged when the controller is attached to a Trimble 5600 instrument or the ACU holder, and connected to an external power supply.

To charge the internal battery:

- Connect the AC adaptor from the ACU 4-pin Hirose port to the mains power supply.

The ACU detects the following low power levels from the external batteries:

- 10 volts (12V NiMH battery)
- 6 volts (Lithium-ion battery)

The ACU alerts you when power level is critically low. If this happens, turn the equipment off and change the external battery. Otherwise, the ACU will switch over to its internal battery.

The TSCe incorporates a quick circuit that recharges its internal NiMH battery to 90% capacity in approximately one hour. To charge the battery, use one of the following methods:

– Connect the AC adaptor to a mains power supply, with the Multiport adaptor (part number RGR-MULTIADPT) plugged into the 26-pin port (COM 2) on the TSCe.

– Connect the O-shell to O-shell lemo (PN 31288-02) to Port 1 on the receiver (running on mains power).

– Connect the O-shell lemo from the OSMII to the O-shell lemo on the TSCe.

The control unit monitors the battery while it is charging. To turn off the display, press the ⏻ key.

Before using the TSCe on battery power alone, charge the battery for a minimum of two hours.

Battery replacement

Warning – Do not attempt to change the battery or you may seriously damage the ACU. Contact your local distributor.

Contact your local distributor for a replacement battery.

Screen

The ACU reflective LCD screen can be viewed easily in direct sunlight or in overcast conditions. It also incorporates a passive touch interface for navigation. Tap elements on the display screen with a stylus or your finger.

Recalibrating the touch screen

If the touch screen does not respond properly when you tap it, recalibrate it as follows:

1. Tap Start and select *Settings* / *Control Panel* / *Stylus*. The *Stylus Properties* dialog appears.
2. In the *Calibration* tab, tap Recalibrate.
3. Follow the prompts.

Disabling/enabling the touch screen

To clean the ACU touch screen during a survey, press Ctrl+α (the alpha key) then 1 four times (to access "S") to disable it. This locks the screen and keypad, except for the Esc key.

To disable the TSCe touch screen, press Ctrl+S.

To enable the touch screen and keypad again, press Esc.

Backlights (Screen or Keyboard)

To modify the touch screen or keyboard backlight settings using the controller keyboard:

1. Disable the Auto on option.
2. Press ▲ and . This key combination switches the backlight on or off.

To enable the keyboard backlight:

1. Tap Start and select *Settings* / *Control Panel* / *Keyboard*.

   The *Keyboard properties* dialog appears.
2. In the *Backlight* tab, select the *Enable keyboard backlight* check box.

When it is enabled, the keyboard backlight uses the current settings of the touch screen backlight.

Clock

To change time and date settings on the ACU:

1. Tap Start and select *Settings / Control Panel / Date/Time*.

   The *Date/Time Properties* dialog appears.

2. Change the date and time as required. Press ↵ to accept the new settings or Esc to cancel.

Note – *When you connect the ACU to a GPS receiver or to your PC using Microsoft ActiveSync, the date and time are automatically updated.*

Storage Card

The ACU has a built-in storage card for your data and programs. This appears in the Windows CE files system as the *\Disk* folder.

Note – *The system maintains several special files on the card, such as nk.bin and ranger.reg, which contain information crucial to the correct operation of the ACU. Directly modifying these files may result in the ACU failing to operate correctly.*

Safeguarding data

Back up your work regularly using Microsoft ActiveSync or the Trimble Data Transfer utility. For more information, see Chapter 5, Data Transfer.

Rebooting

If the ACU fails to respond to keystrokes, then perform one of the following resets, which shut down the hardware and restart the Trimble Survey Controller software.

Soft reset (warm boot)

This method retains all data.

To perform a soft reset:

- Hold down ⮝ and Ctrl, while you press and release .

The ACU resets to the default Microsoft Windows desktop view.

To warm boot the TSCe, hold down ⮝ and Ctrl, while you press and release ⏻.

Hard reset (cold boot)

Note – *If you need to perform a hard reset of the Windows CE operating system on the ACU controller, you* ***must*** *first connect external power to the controller. Otherwise, when you perform the hard reset, the ACU will shut down until external power is connected.*

This method retains any data on the built-in storage card (the \Disk folder). However, a hard reset clears the contents of the RAM memory, including any desktop shortcuts that you have created.

To perform a hard reset:

1. Hold down ⏻.

   After approximately 5 seconds, a countdown timer appears, indicating that the controller will reset.

2. Continue to hold ⏻ for a further 5 seconds, then release.

The controller briefly displays the boot screen and then resets to the default Microsoft Windows desktop view.

Caring for the unit

Trimble recommends the following temperature ranges to maintain your controller during everyday use, and to prevent potential physical damage or data loss. Do not leave the controller in direct sunlight for extended periods of time.

	Operating	Storage
	–20 °C to +50 °C	–30 °C to +70 °C
	–4 °F to +122 °F	–22 °F to +158 °F
	TSCe with Windows CE.NET operating system version 4.07 or later	
	–25 °C to +60 °C	–30 °C to +60 °C
	–13 °F to +140 °F	–22 °F to +140 °F

Shock

The TSCe is designed to withstand a MIL-STD-810E drop. However, impact or pressure on the display screen may cause it to crack. Protect the display from impact, pressure, or abrasive substances.

Environment

The ACU is designed to withstand driving rain and dust.

The TSCe is designed to be immersible in up to one meter of water, for up to one hour.

Cleaning the case

Clean the controller with a soft cloth dampened with clean water or with water containing a mild detergent. If the keyboard has dirt or grime on it, use compressed air or a vacuum cleaner, or gently rinse it with clean water.

Care of the touch screen

Clean the touch screen with a soft cloth dampened with clean water or glass cleaner. Do not apply any cleaner directly to the screen. Apply the cleaner to the soft cloth and then gently wipe the screen.

Note – *Do not use abrasive cleaners.*

Applying a screen protector

Use a screen protector to help keep the touch screen clean and protected. Clean the screen thoroughly and leave it slightly wet. Peel the backing from the screen protector and then apply the protector to the screen. Use a soft cloth to squeeze the excess water and air from under the screen protector.

Conventional Survey

CHAPTER 3

In this chapter:

- Preparing for the survey
- Creating a new job
- Starting a survey
- Trimble 3600 and 5600 configuration
- GDM CU programs
- Elta programs
- GDM CU and Elta measurement modes

This chapter describes how to carry out a conventional survey with Trimble Survey Controller when the ACU is attached to a Trimble 3600 or 5600 instrument. For more information, refer to the Help.

Preparing for the Survey

To do this:

1. Set up the instrument.
2. Ensure that the ACU is turned off, and then attach it to the instrument. For more information, see page 8.
3. Press ⏻ on the ACU to switch on the instrument.
4. Start Trimble Survey Controller. The software automatically connects to the instrument and the *Electronic level* dialog appears.

   Note – *If you have a Trimble 3600 instrument with a laser plummet, the laser plummet automatically turns on when this dialog appears.*
5. Position and level the instrument and tap Accept. If you are using a Trimble 5600 instrument, the compensator is automatically initialized now.
6. When prompted by the *Corrections* dialog, enter appropriate atmospheric values and tap Accept.

7. The *Survey Controller Basic* dialog appears. It displays the current instrument readings.

   Note – *You cannot store measurements in this mode.*

8. Tap Esc to exit Survey Controller Basic mode. The main Trimble Survey Controller menu appears, and you can then begin a survey.

If you are running a robotic survey, see the following section. Otherwise go directly to Creating a New Job, page 21.

Using the ACU to prepare for a robotic survey

Note – *If the radio settings on the 5600 instrument are already set to match the ACU, and the instrument is level, omit Step 1 through Step 5.*
Press the trigger button on the back of the 5600 to turn on the instrument for a robotic connection.

To survey using a 5600 robotic instrument:

1. From the main menu, select *Instrument* / *Radio settings*. Set the radio channel, station address, and remote address. Tap Accept.
2. From the main menu, select *Survey* / *Start Robotic* to prepare the 5600 for robotic connection.
3. Configure the search window. Do one of the following in the dialog that appears:
   - Tap *Autocentered* for Trimble Survey Controller to perform a search centered around the instrument's current horizontal and vertical angle.
   - Tap *Define now* and then follow the instructions on the screen to define the *Top left* and *Bottom right* extents of the search window.
4. Tap OK to suspend the 5600 and the ACU ready for robotic operation.
5. Remove the ACU from the 5600.
6. Ensure that the ACU is turned off, and then attach it to the ACU holder. For more information, see page 8.
7. Connect the ACU to Port A on the remote radio using the ACU holder or a 0.4 m, 4 pin Hirose cable.

8. Turn on the active target or connect it to Port B on the remote radio.

   Once the ACU is attached to the holder, Trimble Survey Controller connects to the remote radio and then to the 5600. The 5600 is reinitialized to compensate for the earlier removal of the controller.

You can now create a job, see page 21, and start the survey, see page 22.

Creating a New Job

Note – *All information about a survey is stored in a Survey Controller job file. (This is not the same as a GDM job file.)*

To create a new Trimble Survey Controller job:

1. From the main menu, select *File* / *New job*. The *New job* dialog appears.
2. Enter a name in the Job name field.
3. Tap the **Coord. sys** button and define one of the following coordinate systems:
   - Scale factor only
   - Select from library
   - Key in parameters
   - No projection / no datum

   Note – *For simple conventional surveys, select a scale factor only coordinate system and set the scale to an appropriate value. Use a scale factor of 1.0000 if you do not want to apply a scale.*

   The current coordinate system is displayed on the **Coord. sys** button.
4. Define the units by tapping the **Units** button. The current distance units are displayed on the **Units** button.

From the *New job* dialog, you can also select the following:

- a linked file. This can be a comma delimited (CSV), text (TXT), or an existing Survey Controller job (JOB) file that contains survey information.
- a background map file. This can be displayed in the map.

- a feature library. This defines codes and associated attributes that are used for coding features.
- the Page down softkey ( ). Tap this softkey to enter additional job details.

Starting a Survey

To start a survey, select *Survey* from the main menu, and then select one of the following:

- *Station setup* – to orientate the survey on a point with known coordinates. Measure a single backsight point.
- *Station setup plus* – to orientate the survey on a point with known coordinates. Measure to one or more backsight points.
- *Resection* – to orientate the survey on a point with unknown coordinates. The resection will calculate the coordinates for the instrument point and then orientate the survey.

Once the station setup or resection is completed, select one of the following:

- *Survey* / *Measure topo* – to perform survey measurements.
- *Survey* / *Stakeout* – to stake points, lines, arcs, roads or DTMs.
- *Map* – to graphically review the survey data or to perform survey operations.
- *Favorites* / *Review* – to view the data stored in the Survey Controller job.

For more information, see GDM CU Programs, page 24, or Elta Programs, page 29.

Trimble 3600 and 5600 Configuration

To view and modify the instrument configuration, select *Instrument* from the Trimble Survey Controller main menu. The instrument menu appears with all available options for the current instrument, as shown below:

	Instrument	
Item	**3600**	**5600**
Electronic level	✓	✓
Direct Reflex (DR instrument only)	✓	✓
Instrument controls (Servo only)	x	✓
Tracklight	✓	✓
Autolock (Autolock only)	x	✓
Instrument settings	✓	✓
Radio settings (Robotic only)	x	✓
Adjust instrument	✓	✓
Survey Controller basic	✓	✓

Modifying instrument configuration

To quickly access and modify the instrument configuration:

1. Select the Trimble functions key ( ) on the ACU, or the instrument icon on the status bar (for example,). The *Trimble functions* screen appears.
2. Select the required icon to change the instrument configuration.

Changing the target for DR measurements

For 3600 and 5600 instruments with Direct Reflex (DR), tap the target icon on the status bar and select one of the following:

- DR target – to change the target height and prism constant and enable the DR EDM mode on the instrument.
- Normal target – to change to a normal target height and prism constant and disable the DR EDM mode.

GDM CU Programs

Trimble Survey Controller offers similar functionality to the GDM Control Unit.

To access GDM CU programs, use the Trimble functions key as you would the PRG key on the GDM CU.

Table 3.1 shows where to find specific GDM CU programs within Trimble Survey Controller.

Table 3.1 GDM CU programs in Trimble Survey Controller

	Trimble Survey Controller		
GDM CU program	**Select ...**	**to ...**	**Shortcut (Trimble + number)**
20 - Station setup	*Survey* / *Station setup*	perform a known station setup.	20
	Survey / *Station setup plus*	perform a known station plus setup.	
	Survey / *Resection*	perform a free station setup or an eccentric station setup.	
21 - Z/IZ	*Survey* / *Station elevation*	calculate an instrument elevation	21
22 - Angle measurement	*Survey* / *Measure rounds*	measure one or more Face 1 (CI) and Face 2 (CII) measurements.	22
	Survey / *Measure topo*	measure individual Face 1 and/or Face 2 measurements.	30
23 - Set Out	*Survey* / *Stakeout* / *Points*	set out points with known coordinates. Points can be defined via *Keyin* / *Points* or obtained from a linked CSV, TXT or Survey Controller JOB file.	23

Table 3.1 GDM CU programs in Trimble Survey Controller (continued)

	Trimble Survey Controller		
GDM CU program	**Select ...**	**to ...**	**Shortcut ( + number)**
24 - Refline	*Survey* / *Station and offset*	measure or set out relative to a line, arc, or road. The line, arc, or road can be defined via *Keyin* / *Line*, *Arc*, *Road*, or imported to the Survey Controller job. *Refline* / *Unknown line* is not supported.	24
25 - Area Calculation	*COGO* / *Compute area*	calculate an area.	25
26 - Distob	*COGO* / *Compute inverse*	calculate an inverse between two points.	26
27 - Moving Coordinates Forward	Trimble Survey Controller stores raw data and automatically calculates point coordinates. There is no specific program required in Trimble Survey Controller to move coordinates forward. Instead select *Station setup plus* or *Measure rounds*.		27
28 - Obstructed Point	*Survey* / *Measure topo* and set the method to Dual-prism offset.		28
29 - Roadline	*Survey* / *Stakeout* / *Roads*	measure or set out relative to a road. Roads can be defined using horizontal alignments, vertical alignments, and templates defining cross sections.	29

Table 3.1 GDM CU programs in Trimble Survey Controller (continued)

	Trimble Survey Controller		
GDM CU program	**Select ...**	**to ...**	**Shortcut (+ number)**
30 - Measure Coordinates	Trimble Survey Controller stores raw data and automatically calculates point coordinates. There is no specific program required in Trimble Survey Controller to measure coordinates. Instead, use *Measure topo*. Points can be exported to a CSV or TXT file, via *Files* / *Import/Export* / *Send ASCII data*, for use as a control file. To access the control file from another job, select the CSV, TXT or JOB file as a linked file via *Files* / *Properties of current job*.		30
32 - Angle measurement plus	*Survey* / *Measure rounds*	measure one or more Face 1 (CI) and Face 2 (CII) measurements.	32
	Survey / *Measure rounds* / *Options*	configure the number of rounds to be measured; select automatic measurements (to Remote Targets only); set the observation order; measure distances on Face 2(CII); define a time interval between rounds (automatic measurements only).	
33 - Robotic Lite	Not supported		
39 - Roadline 3D	*Survey* / *Stakeout* / *Roads*	measure or set out relative to a road. Roads can be defined using horizontal alignments, vertical alignments, and templates defining cross sections.	39

Table 3.1 GDM CU programs in Trimble Survey Controller (continued)

	Trimble Survey Controller		
GDM CU program	**Select ...**	**to ...**	**Shortcut ( + number)**
43 - Enter coordinates	*Keyin* / *Points*	enter the coordinates for a point.	43
45 - Pcode	*Configuration* / *Feature and attribute libraries*	create a feature library with codes. To create a full feature and attribute library, or a feature and attribute library with both codes and attributes, use Feature and Attribute Editor or Autodraft Configuration File Editor. You can then transfer the feature and attribute library to the ACU.	45
60 - Athletics	Not Supported		
61 - COGO	*COGO* / *Compute point*	perform similar coordinate calculations.	61
65 - Direct Reflex	*COGO* / *Compute point*	perform a From a baseline (Corner + distance), Brng-Line intersect (Corner + angle), or Four point intersection (Two lines intersection) measurement.	65
	Survey / *Measure topo*	perform a Circular Object (Eccentric object) measurement.	
	Survey / *Surface scan*	perform a surface scan.	

Table 3.1 GDM CU programs in Trimble Survey Controller (continued)

	Trimble Survey Controller		
GDM CU program	**Select ...**	**to ...**	**Shortcut (+ number)**
66 - Monitoring	*Survey* / *Measure rounds*	configure the number of rounds to be measured, automatically store points (to Remote Targets only), and define a time interval between rounds.	66
	Survey / *Measure rounds* / *Options*		
Menu 2 (View/Edit)	*Files* / *Review current job*	review and edit the data stored in the job.	
	Favorites / *Review*		
F 6 (Change target height)	the target icon on the status bar	quickly change the target details for new observations.	
F 33 (Change prism constant)			
Edit target height or Prism constant	*Favorites* / *Review current job*	Edit Target 1 or Target 2 to change the target height or prism constant. Changes then apply to all observations that use that target. Tap the Insert softkey to edit the height or prism constant values for individual observations. For more information, refer to the Help.	
GDM Job Files export	Trimble Data Transfer (connected to Trimble Survey Controller)	transfer the GDM Job file. For more information about transferring data, see Chapter 5, Data Transfer.	

Elta Programs

The Trimble Survey Controller software offers similar functionality to the Elta software (a former Zeiss product line). Table 3.2 shows where to find specific Elta programs within Trimble Survey Controller.

Table 3.2 Elta programs in Trimble Survey Controller

Elta program	Trimble Survey Controller
Project Management	
New Project	*Files* / *New job*
Delete Project	*Files* / *Open job*, then highlight a job and tap Delete.
Copy Project	*Files* / *Open job*, then highlight a job and tap Copy.
Rename Project	*Files* / *Windows Explorer*, then highlight a job file and select *File* / *Rename.*
Project Information	*Files* / *Properties of current job*.
Adjustment	*Instrument* / *Adjust* to perform a collimation and compensator adjustment.
Measure (and Detail Points)	*Survey* / *Measure topo* to measure individual Face 1 and/or Face 2 measurements.
Indirect Survey (Eccentricity)	*Survey* / *Measure topo*, then select the Single dist offset method to measure eccentric offsets.
Indirect Survey (Intersection)	*Survey* / *Measure topo*, then select the H Angle offset method to measure an Angle/Dist intersection. *COGO* / *Compute point*, then select the Four point intersection method to perform a General intersection.
Hidden Point	*Survey* / *Measure topo*, then select the Dual-prism offset method.
Object Height	*Survey* / *Measure topo*, then select the Remote object elevation method.
Stationing	
Free Stationing	*Survey* / *Resection* to perform a free station setup.
Stationing on Known Point	*Survey* / *Station setup* to perform a known station setup.

Table 3.2 Elta programs in Trimble Survey Controller (continued)

Elta program	Trimble Survey Controller
Eccentric Stationing	*Survey* / *Resection* to perform an eccentric station setup.
Heightstationing	*Survey* / *Station elevation* to determine the elevation of the instrument point. Make observations to points that have known elevations.
Coordinates	
Detail Points (Verification Points)	Trimble Survey Controller checks all points using the duplicate point tolerances specified in the survey style.
Setting Out	*Survey* / *Stakeout* / *Points* to setout points with known coordinates. Points can be defined via *Keyin* / *Points* or from an existing CSV, TXT or Survey Controller JOB file.
Traverse	*COGO* / *Traverse* to adjust a traverse. Any station setup point can be used as a traverse point.
Intersect Lines	*COGO* / *Compute point* and use an appropriate method.
Intersect Arcs	
Transformation	Not Supported.
Roadline Lite	*Survey* / *Stakeout* / *Roads* to measure or set out relative to a road. Roads can be defined using horizontal alignments, vertical alignments and templates defining cross sections.
Special	
Multiple Rounds	*Survey* / *Measure Rounds* to measure a defined number of Face 1 and Face 2 measurements.
Point to Line	*Survey* / *Station and Offset* to measure or set out relative to a line, arc or road. The line, arc, or road can be defined via *Keyin* / *Line*, *Arc*, *Road* or imported to the Survey Controller job.
3D Plane	Not supported.
Vertical plane	*Cogo* / *Compute point* to calculate the coordinates of points using a vertical plane and angles only observations.
Area Computation	*COGO* / *Compute Area* to calculate between points.

Table 3.2 Elta programs in Trimble Survey Controller (continued)

Elta program	Trimble Survey Controller
Connecting Distances	*COGO* / *Inverse* to calculate an angle and distance between two points.
Editor	*Files* / *Review current job* to review and edit the data stored in the job.
Input coordinates	*Key in* / *Points*.
Search	*Files* / *Review current job*, then tap Search.
Data Transfer	*Files* / *Import/Export*.
Configuration	
Instrument	View/edit the instrument settings from the *Instrument* menu. *Files* / *Properties of current job* to change the job coordinate system and units. *Configuration* / *Controller* / *Language* to change the language.
Programs	*Configuration* / *Survey styles* to view/edit various survey options.
Codelists	*Configuration* / *Feature and Attribute libraries* to create a feature library with codes. To create a full feature and attribute library, or a feature and attribute library with both codes and attributes, use the Feature and Attribute Editor in the office software. You can then transfer the feature and attribute library to the ACU.

Table 3.2 Elta programs in Trimble Survey Controller (continued)

Elta program	Trimble Survey Controller
Additional functions	
Input of Parameters	Tap the target icon on the status bar to change the target height and prism constant. To edit the target height and prism constant, tap *Files* / *Review current job*. For more information, refer to the Help. Select *Options* from the *Station Setup*, *Resection, Measure topo, or Measure rounds* dialog to edit the temperature, pressure, and ppm.
Recording mode (R-M, R-C, R-MC)	Trimble Survey Controller stores raw data and automatically calculates point coordinates. There is no specific program required in Trimble Survey Controller to measure coordinates. To export points to a CSV or TXT file (to use as a control file), select *Files* / *Import/Export* / *Send ASCII data.* To link a control file to the current job, select *Files* / *Properties of current job,* then the required CSV, TXT, or JOB file.
Export M5 files	Use Data Transfer (connected to Trimble Survey Controller) to transfer the M5 file to your PC. For more information, see Chapter 5, Data Transfer.

GDM CU and Elta Measurement Modes

GDM CU and Elta measurement modes are supported in the Trimble Survey Controller software. Select the Trimble functions key or the instrument icon from the status bar to change measurement modes as follows:

Measurement mode	Function	Status bar indicator
STD (Standard / normal)	Measures and averages angles as one standard distance is measured.	S
FSTD (Fast standard / rapid)	Measures and averages angles as one fast standard distance is measured.	F
TRK (Tracking)	Continually measures angles and distances.	T

GDM CU D-bar

To access this mode in Trimble Survey Controller, select the *Averaged Observations measurement* method from the *Station setup*, *Resection*, *Measure topo*, or *Measure rounds* menu.

Then select one of the following:

- To measure a defined number of observations, select *Options* / *Averaged observations*. Standard deviations are updated and displayed during measurement.
- To continually measure until the standard deviations are acceptable, select *Options* and enter a high number in the *Averaged Observations* field.

  Tap Accept when the standard deviations are acceptable.

Matched Face 1 and Face 2 measurements

To observe points using face 1 (direct) and face 2 (reverse) measurements, select the Survey Menu option ***Measure rounds***. This option computes the mean turned angles to the observed points and displays the computed observation residuals.

Note – *The* ***Station setup plus*** *and* ***Resection*** *options provide similar support for observations on two faces.*

When you observe points on two faces in the Survey Menu option ***Measure topo***, Trimble Survey Controller does not match up the observations on each face. However, the average position calculation, which is included in duplicate point handling, does give an improved position for points that are observed on both faces. Trimble Survey Controller calculates an average grid position from all the positions available for the point. The averaged grid position is stored in the database.

Note – *To get the most accurate face 2 positions, make sure that you observe to the backsight point for face 2 before you observe other points on face 2. When the face 2 backsight has not been observed, the face 1 backsight is used to coordinate the positions for face 2 observations.*

When using a servo instrument:

- To automatically change face and retain the point name after completing the F1 measurement, select *Survey* / *Options.* Then select the *Auto matched pair (F1/F2)* check box.
- To perform an F2 measurement the same as the F1 measurement, press the trigger button on the back of the instrument. Press and hold the button to change the instrument back to F1.
- If distances are not required on F2, clear the *Measure distance on face 2* check box.

When using an instrument with Autolock and Remote Targets:

- Select *Auto matched pair (F1/F2)* to automatically change face, retain the point name, and start the F2 measurement.

  When the F2 measurement is completed, the instrument changes back to F1.

GPS Survey

CHAPTER 4

In this chapter:

- Setting up a GPS Total Station 5700 receiver (base)
- Setting up a GPS Total Station 5800 receiver (rover)

This chapter describes how to carry out a GPS survey with Trimble Survey Controller when the ACU is used with a Trimble GPS Total Station® 5700 or 5800 receiver. For more information, refer to the Help.

Setting Up a GPS Total Station 5700 Receiver (Base)

To set up a base receiver for a real-time survey using a GPS Total Station 5700 receiver:

1. Mount the Zephyr™ (or Zephyr Geodetic™) antenna on the tripod.
2. Connect the antenna to the GPS receiver port labeled “GPS”. Use the yellow GPS antenna cable (PN 41300-10).
3. Connect the external radio to the GPS receiver port 3 using the supplied radio cable, then connect a radio antenna to the external radio.
4. Connect an external power source to the 5700 through GPS receiver port 2.
5. Connect the ACU controller to the GPS receiver port 1 using an O-shell Lemo-to-Hirose cable.
6. Turn on the controller.

Starting a base survey

Before beginning a base survey:

1. Open a job. For more information, see Creating a New Job, page 21.
2. Select a survey style. From the main menu, select *Survey* and then select a survey style from the list. For information on creating or editing a survey style, refer to the Help.

To start the survey:

1. From the *Survey* menu, select *Start base receiver*. The first time that you use this survey style, the Style wizard prompts you to specify the equipment you are using.

   The *Start base* screen appears.

2. Enter the base station name, and one of the following:
   - a grid coordinate (projection and datum transformation parameters must be defined)
   - the current autonomous position derived by the GPS receiver (the Here softkey)
   - a WGS-84 coordinate

   For more information about entering base station coordinates, refer to the Help.

Warning – Within a job, only use an autonomous position (the Here softkey) to start the first base receiver.

   The *Observation class* field shows the observation class of the base point.

3. Enter values in the *Code* (optional) and *Antenna height* fields.

4. Set the *Measured to* field.

Tip – If you are using CMR or CMR+™ broadcast formats, tap Scan to view the index numbers of other base stations operating on the frequency you are using, and the reliability of each. Check that your radio is working and that there are no other base stations operating on your frequency. Choose a different station index number from those displayed.

5. Tap Start.

   The base receiver's external radio starts to broadcast RTK corrections. The following message appears:

   Base started
   Disconnect controller from receiver

6. Disconnect the controller from the base receiver but ***do not*** turn off the receiver.

   You can now set up the rover receiver.

Note – *For a real-time survey, check that the radio is working before leaving the equipment. The data light should be flashing.*

If you are logging data in the ACU, leave the controller connected to the base receiver and set up the rover using another controller.

Note – *To end an RTK survey, or after logging data in the base receiver, select Survey / End survey. For more information, refer to the Help.*

Setting Up a GPS Total Station 5800 Receiver (Rover)

To set up a rover receiver for a real-time survey using a GPS Total Station 5800 receiver:

1. Mount the 5800 receiver on a range pole. The 5800 supplies its own power from an internal battery.
2. Attach the whip radio antenna to the 5800 receiver.
3. Attach the Trimble lithium-ion batteries to the ACU holder.
4. Attach the ACU holder to the range pole.

5. Attach the ACU to the holder. For more information, see page 8.
6. Turn on the receiver.
7. Turn on the ACU and start Trimble Survey Controller.
8. Connect to the 5800 receiver using Bluetooth wireless communications:
   a. From the main menu, select *Configuration* / *Controller* / *Bluetooth.*
   b. Tap **Config.** and select the *Enable Bluetooth* check box. Tap OK .
   c. Select *Scan* to locate the 5800 receiver.
   d. When the scan is complete, select the 5800 receiver from the list and tap Accept.

Starting a rover survey

Note – Start the base receiver before you start a rover survey.

To start a survey:

1. Make sure that the required job is open. The name of the current job appears in the title bar of the main menu.
2. From the main menu, select *Survey*, then select a survey style from the list.
3. To start the rover receiver for a real-time survey, select *Start survey.*

   A *Survey* menu appears with items specific to the chosen survey style, including *Start base receiver* and *Start survey.* The first time that you use this survey style, the Style wizard prompts you to specify the equipment you are using.
4. If necessary, initialize the survey.

   For an RTK survey, initialize before starting centimeter-level surveying. If you are using the OTF option, the survey automatically starts to initialize using the OTF initialization method.

Once the survey is initialized, you can perform a site calibration, stakeout, or measure points.

Data Transfer

CHAPTER 5

5

In this chapter:

- Using the Data Transfer utility

This chapter describes how to use the Trimble Data Transfer utility to transfer data between the ACU and an office computer.

Install the Data Transfer utility from the Trimble Survey Controller CD to ensure that you have the latest version. Refer to the Trimble Survey Controller or Data Transfer Help for information on:

- connecting to a Trimble controller
- transferring files
- using Microsoft ActiveSync

Using the Data Transfer Utility

To transfer files using the Data Transfer utility:

1. Put Trimble Survey Controller into File Transfer mode:
   a. Turn on the controller and run the Trimble Survey Controller software.
   b. From the *Files* menu, select *Import/Export* / *Trimble PC Communications.*

      The following message appears:
      Waiting for PC Connection

      When you connect to the device in Data Transfer, the following message appears:
      Connected to PC

c. Connect the ACU to the office computer.

Note – *If Microsoft ActiveSync is installed on the office computer, clear the Allow serial cable or infrared connection to this COM port check box in the ActiveSync Connection Settings dialog. For more information, refer to the ActiveSync Help.*

2. Connect to the controller using the Trimble Data Transfer software. To do this:

   a. Run Data Transfer. (Select Start, then *Programs / Trimble Data Transfer / Data Transfer*.)

   b. In the *Devices* list, select the appropriate Trimble Survey Controller device.

   The Data Transfer software connects to the ACU.

3. Select the files to transfer. For example, to receive a file:

   a. Select the *Receive* tab and click **Add**.

      The *Open* dialog appears.

   b. Select the file type and files to transfer. Click **Open**.

   c. Click **Transfer All**.

      The files are transferred.

For more information on transferring files using Data Transfer with Microsoft ActiveSync, refer to the Help.

File types

Use the Data Transfer utility to transfer data from the Trimble Survey Controller in a number of different file formats.

To select the file format to transfer:

1. Click the **Add** button.
2. In the *Open* dialog that appears, use the *Files of type* field and the *File format* field to select file formats.

Options in the *Files of type* field that apply to Trimble Survey Controller are:

- Survey Controller Files

  This is the primary option for transferring Trimble Survey Controller DC files. Select the appropriate format DC file from the *File format* field. The valid DC file versions that can be transferred automatically appear.

- M5 Files

  Use this option to transfer terrestrial observation data collected on the controller and convert it into a Zeiss M5 format file. The M5 file mainly contains observation data but it also includes coordinates for observed points.

- GDM Job Files

  Use this option to transfer terrestrial observation data collected on the controller and convert it into a GDM (Geodimeter) job file. As it transfers data, the software processes point attributes that have the names of the GDM user-defined labels (90–99). These attributes are output to the GDM job file. For more information, refer to the Trimble Survey Controller Help.

- GPS Data Files

  Use this option to transfer any GPS data files that are available on the controller.

- Comma Delimited Coordinate Files

  Use this option to transfer any comma delimited coordinate files (.csv) that were created on the controller using the appropriate *Send ASCII data* option.

- Log Files

  Use this option to transfer the Trimble Survey Controller log file. Trimble Survey Controller creates and maintains this log file to record details of its operation.

- DC Files

  Use this option to transfer any DC files available on the controller. You can create DC files directly on the controller with the *Send ASCII data* option.

Menu Structure

APPENDIX

A

Table A.1 shows the Trimble Survey Controller main menu structure.

Table A.1 Main menu structure

Name and Icon	Menu and Sub-menu
Files 	New job Open job Review current job Map of current job Properties of current job Copy between jobs Import/Export Trimble PC communications Send ASCII data Receive ASCII data
Key in 	Points Lines Arcs Boundary Roads Templates Notes

Table A.1 Main menu structure (continued)

Name and Icon	Menu and Sub-menu	
Survey	**GPS**	**Conventional**

 Items depend on the type of survey you are doing	Start base receiver
	Start survey
	Measure points
	Continuous topo
	Station and offset
	  Measure
	  Stakeout
	Stakeout
	  Points
	  Lines
	  Arcs
	  DTMs
	  Roads
	Site calibration
	Initialization
	Swap base receiver
	End survey
		Station setup
		Station setup plus
		Resection
		Station elevation
		Measure topo
		Measure rounds
		Continuous topo
		Surface scan
		Station and offset
		  Measure
		  Stakeout
		Stakeout
		  Points
		  Lines
		  Arcs
		  DTMs
		  Roads
		Start Robotic
		End survey

Table A.1 Main menu structure (continued)

Name and Icon	Menu and Sub-menu	
Configuration 	Controller Time/date Language Sound events Bluetooth Feature and attribute libraries	
	GPS	**Conventional**
Items depend on the survey style you select	Survey Styles Rover options Rover radio Base options Base radio Laser rangefinder Topo point FastStatic point Observed control point Rapid point Continuous points Stakeout Site calibration PP initialization times Duplicate point tolerances Directory Options	Survey Styles Instrument Laser rangefinder Topo point Stakeout Duplicate point tolerances Traverse options

Table A.1 Main menu structure (continued)

Name and Icon	Menu and Sub-menu	
Cogo 	Compute inverse Compute point Compute area Compute azimuth Compute distance Subdivide a line Subdivide an arc Traverse	
Instrument  Items depend on the type of instrument the Trimble controller is connected to	**GPS**	**Conventional**
	Satellites Receiver files Import from receiver Export to receiver Position Receiver status Receiver settings Navigate to point	Electronic level Direct Reflex Instrument controls Tracklight Autolock Instrument settings Radio settings Adjust Survey Controller Basic Trimble functions