TOPCON

Topcon Tools™

Quick Reference Guide

SURVEY INSTRUMENTS

Topcon Tools
Quick Reference Guide

Part Number 7010-0616
Rev F

Terms and Conditions

Thank you for buying this Topcon product. This manual has been prepared to assist you with the care and operation of the product and its use is subject to these Terms and Conditions and those more fully set forth in the Operator's/User's Manual.

Usage and Safety

This product is designed for use by professionals. Always use safety precautions when operating this or any Topcon product.

Copyrights and Trademarks

Disclaimer of Warranty and License Agreement

Please see the Operator's/User's Manual for detailed information on warranties and the license agreement which may apply to the Product.

EXCEPT FOR SUCH WARRANTIES AND LICENSES PROVIDED WITH THE PRODUCT, THIS MANUAL AND THE PRODUCT ARE PROVIDED "AS-IS". TOPCON AND ITS DISTRIBUTORS SHALL NOT BE LIABLE FOR TECHNICAL OR EDITORIAL ERRORS OR OMISSIONS CONTAINED HEREIN; NOR FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES RESULTING FROM THE FURNISHING, PERFORMANCE OR USE OF THIS MATERIAL OR THE PRODUCT.

Use of any computer programs or software supplied by Topcon or downloaded from the Topcon website in connection with the Product implies acceptance of the Terms and Conditions here and in the Operator's/User's Manual.

Contents

Chapter 1
Introduction 1
Installing Topcon Tools 2
Starting Topcon Tools 2

Chapter 2
Working w/ Jobs 5
Creating a New Job 5
Job Configuration 6
Saving a Configuration 7
Importing Files on the Computer 8
Importing Files From a TPS Receiver 9
Importing Files From a Controller 11
Importing Files From a Total Station 14
Viewing Data 18

Chapter 3
Editing Data 21
Editing Points in the Points Tab 21

Editing Point Name, Status, Coordinates 21
Editing Codes Used for Points 22
Changing Display Coordinates 23
Selecting the Geoid Model 24
Selecting Antenna Type in the GPS Occupations Tab 25
Selecting Instrument Type in the TS Obs Tab 27
Editing the Reference Line for Tape Dimensions 28
Editing Linework 29
Adding/Appending/Inserting Points to Linework 29
Adding a Line to Linework 33
Map View 34
Viewing Properties for Points & Vectors 35
Processing Vectors 35
Map View Options 36
Occupation View 37
Viewing and Editing Occupations 39
Occupation View Options 40
Editing Codes 41
Adding and Editing Codes 41
Adding and Editing Attributes 42
Editing Codes Used in Points 42

Chapter 4
Process & Adjust 45
Editing and Processing Repeated Observations ..45
Processing Vectors in the GPS Obs Tab 49
Adjusting Vectors 51
Step 1: Fix Control Points 51
Step 2: Import Control Coordinates 53
Adjusting the Network 56
Creating Adjustment Reports 58
Report Configuration 60

Chapter 5
Export and Exit 63
Exporting to a File 63
Modifying and Saving Data During Export 64
Closing a Job 66
Revisiting a Job 66

Appendix A
Hot Keys 67

Notes:

Introduction

This quick reference guide is designed to provide the quickest way to get started using Topcon Tools™.

The following chapters are organized into sections according to typical sequential actions when using Topcon Tools:

- Creating a Job and Importing Data
- Viewing, Editing, and Processing Data
- Editing Repeated Observations, Adjusting the Network, and Creating Reports
- Exporting Files, Closing a Job, and Reloading a Job

More detailed information about the functionality of Topcon Tools can be found in the *Topcon Tools Reference Manual*.

Installing Topcon Tools

If earlier versions of Topcon Tools or Topcon Link are already installed, the InstallShield® Wizard will first uninstall these earlier versions before installing the latest version.

1. Navigate to the Topcon Tools executable file or insert the CD ROM software.

- If downloading the software from the TPS website, save the downloaded compressed file to an accessible location and extract the Topcon Tools executable file. Double-click this file.
- If downloading the software from a TPS CD, insert the CD software into the computer's CD-ROM drive. The InstallShield Wizard starts up.

When the installation completes, create a shortcut on the desktop from which to quickly start Topcon Tools.

Starting Topcon Tools

Depending on your software module, you will need either a hardware lock or an access code to start Topcon Tools.

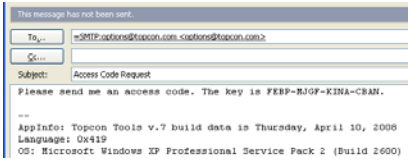
- If you have purchased a hardware lock (USB dongle) do the following to access it:

  – download the drivers from the site http://www.safenet-inc.com/support/tech/sentinel.asp and install them on the computer. This allows the computer to access the hardware lock.

  – insert the hardware lock into the computer's USB port and start Topcon Tools.

- To acquire access codes, do the following:

  – start Topcon Tools, press the **Request** link in the ***Licenses*** dialog box. The following e-mail will be automatically created:



  – after receiving the access code, press the **Add Code** button on the ***Licenses*** dialog box and type in (or paste) the code into the *Access Code* entry box on the **Enter Access Code** screen.

After clicking OK on this box, Topcon Tools will check the entered value. If this value is correct, the '*Access codes and dongles*' tab displays this code and all modules activated by this access code.

Working w/ Jobs

This chapter describes creating, editing and saving a job configuration, and importing files into a job.

Creating a New Job

When starting Topcon Tools for the first time, click **New Job** on the ***Startup*** dialog box or click **Job ▸ New Job**. On the ***Create a new job*** dialog box (Figure 2-1), do the following to create a new job:

1. Enter the job name (for example,Westland).
2. Select the location in which to store job files.
3. Edit *Created by* and *Comment* fields as needed.

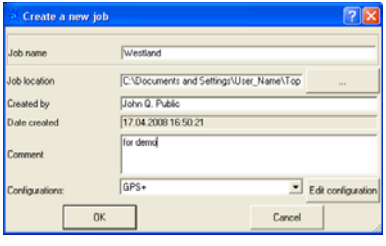


Figure 2-1. Create A New Job

Job Configuration

The ***Job configuration*** dialog box defines the parameters for viewing and processing data.

1. Click **Edit configuration** on the ***Create a new job*** dialog box.
2. Click **Coordinate Systems** (Figure 2-2), select the projection grid (USA->SPC83-> Maryland) and select the needed geoid (g2003u08.bin) for the given area.

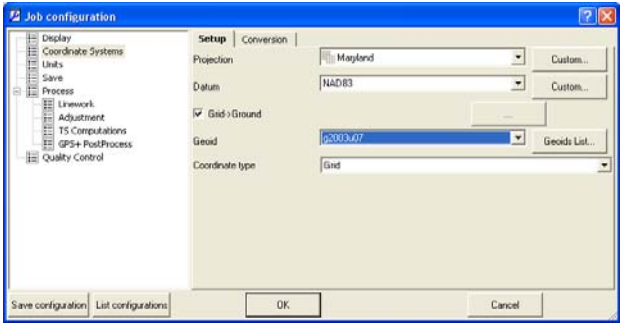


Figure 2-2. Job Configuration – Coordinate Systems

3. Click **Units** in the left panel and select the applicable *Linear Unit* (Figure 2-3).

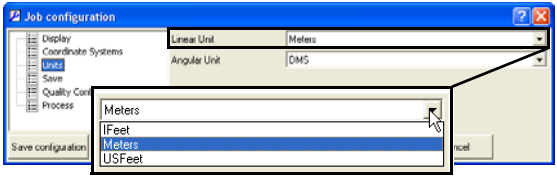


Figure 2-3. Select Linear Unit

Saving a Configuration

Save the configuration to use with another job.

1. Click **Save configuration** on the ***Job Configuration*** dialog box.
2. On the ***Enter configuration name*** dialog box, type the configuration's name and click **OK** (Figure 2-4).

Figure 2-4. Enter Configuration Name

Job files are stored in the location specified on the ***Create a new job*** dialog box. Topcon Tools creates and stores three files:

- <JobName>**.ttp**
- <JobName>**.job_options.jff**
- <JobName>**.settings.jff**

3. Click **OK** on the ***Job Configuration*** and ***Create a new job*** dialog boxes. The Map and Tabular views display in the Topcon Tools main window.

Importing Files on the Computer

NOTE: If importing a job where the coordinate system configuration differs from the current job, select the configuration to override.

To import data files located on the computer:

1. Click the **Import from files** button on the toolbar.
2. Select the format name of the files.

3. Navigate to where the files are stored and select the desired files.

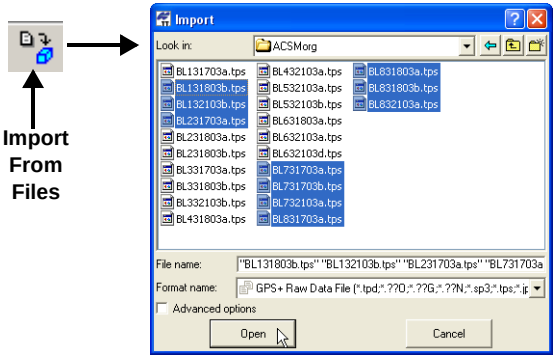


Figure 2-5. Import from File

4. Set desired *Advanced options* for the file type.
5. Click **Open**.

Importing Files From a TPS Receiver

To import raw data files to the job from a TPS receiver, take the following steps:

1. Connect the computer and the receiver.
2. Start Topcon Tools and open a job, then click **Job ▸ Import from Device**.

Click **Topcon Receivers** in the ***Import from Device*** dialog box (Figure 2-6). Topcon Tools will search for Topcon receivers connected to the computer (COM or USB port). When finished, all receivers connected to the computer will display.

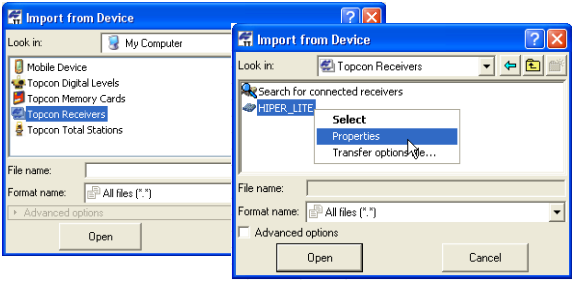


Figure 2-6. Import from Receiver

To view information about a receiver, right-click the receiver and click **Properties**.

3. To view the collected raw files stored in a receiver, click the desired receiver.
4. To import the file(s) from the receiver to the current job, highlight the file(s), set the corresponding file format in the *Format name* field and click **Open** (Figure 2-7 on page 11).

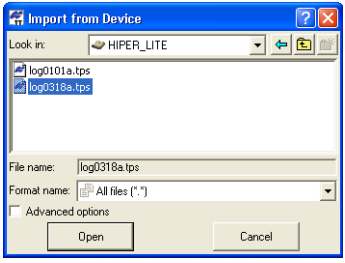


Figure 2-7. Select the Raw Data File to Import

The new point(s) at which GPS data was collected will display in the *Points* tab, *Map* view and *CAD* view after a successful import of the raw data file into the current Topcon Tools job. The *.tps file(s) will be saved in the folder defined in the *Folder For Backup* field during job configuration.

Importing Files From a Controller

To import raw data files to the job from a controller, Microsoft ActiveSync must be installed on the computer.

1. Connect the computer and controller according to the manufacturer's instructions.

2. Start Topcon Tools and open a job, then click **Job ▸ Import from Device**.
3. Once Microsoft ActiveSync establishes a connection with the controller, double-click **Mobile Device** in the ***Import from Device*** dialog box (Figure 2-8).

   To view information about a controller, right-click the controller and click **Properties**.

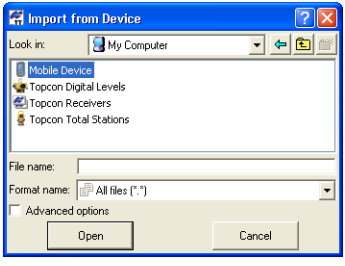


Figure 2-8. Connected Device(s

TopSURV job files supports two formats:

- TopSURV *. tsj. This job is created in TopSURV ver 7.0 and later:

  – In TopSURV ver 7.0 or later, the *.*tsj* file is saved on the controller so that this file format can be opened by Topcon Link/Topcon Tools/

TopSURV PC. Topcon Link/Topcon Tools are used only for transferring the **.tsj* file from the controller to the computer without format changes. Moreover, the user can use a removable memory card to transfer the **.tsj* file from the controller to the computer.

- TopSURV *.tsv job. This job is created in TopSURV ver 6.11.03 and earlier:

  – In TopSURV ver 6.11.03 or earlier, the **.tsv* file is saved on the controller. But Topcon Link/Topcon Tools/TopSURV PC version cannot open this file format. Topcon Link/ Topcon Tools have to convert mobile device-based formats to computer-based formats. Topcon Link/Topcon Tools performs the conversion during the import process from the **.tsv* file to the **.tlsv* file. This format (*.tlsv) is then opened by Topcon Link/Topcon Tools/ TopSURV PC.

4. To view the collected files stored in a controller, click the desired folder where **.tsv*/**.tsj* job files are stored.
5. To import the file(s) from the controller to the current job and convert them to *.tlsv/*.tsj job

files, set the corresponding file format in the *Format name* field and click **Open** (Figure 2-9).

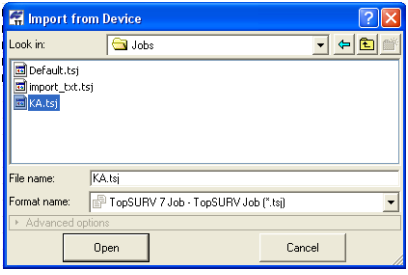


Figure 2-9. Select the TSV File to Convert and Import

The new point(s) and observations contained in the TopSURV file will display in the appropriate tabs, *Map* view and *CAD* view after a successful import of the file into the current Topcon Tools job. The file will be saved in the folder defined in the *Folder For Backup* field during job configuration.

Importing Files From a Total Station

When importing files from a robotic total station, the file transfer will be initiated from the total station after connecting to the computer. Refer to the total station's

documentation for connecting the computer and device.

1. Connect the computer and total station according to the manufacturer's instructions.
2. Double-click **Topcon Total Stations** in the ***Import from Device*** dialog box.
3. To add a device, right-click **Add New Station** and click **Create Station** (Figure 2-10 on page 15).

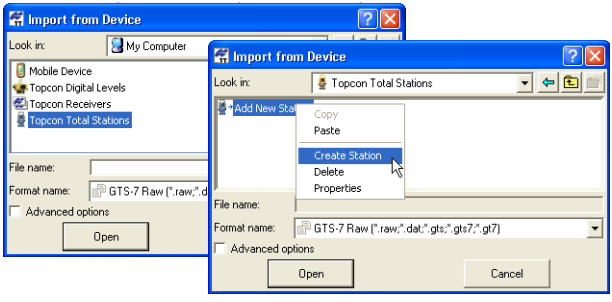


Figure 2-10. Creating a New Station

4. On *General* tab of the ***Create Station*** dialog box, enter *Name*, *Notes*, the *Port* the device connects to, and the *Model*. Click **OK** (Figure 2-11 on page 16).

5. On the ***Station properties*** dialog box (*Advanced* tab), enter the *Baud Rate*, *Parity*, *Data Bits*, *Stop Bits*, and/or *Protocol* used for communication (Figure 2-11). Click **OK**.

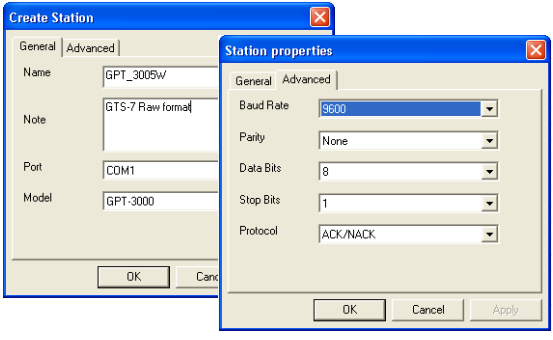


Figure 2-11. Total Station Properties

6. Double-click the total station icon.
7. Enter the file name as “file.txt” and select the file type.
8. Follow the on-screen steps to prepare the Total Station (Figure 2-12 on page 17).

Figure 2-12. Import From Total Station

9. Select the desired file in the Total Station to download to the computer (Figure 2-13).

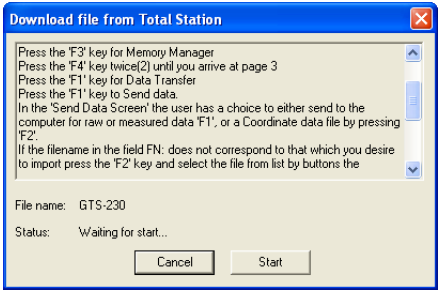


Figure 2-13. Total Station Instructions – Preparing for Import

The new point(s) contained in the total station(s) will display in the *Points* and *TS Obs* tabs, in *Map* view and in *CAD* view after a successful import of the file into the current Topcon Tools job. A “file.txt” file will be saved in the folder defined in the *Folder For Backup* field during job configuration.

Viewing Data

Once the job has data, the various views provide an interface for editing and processing the data.

- Use the Tabular view for viewing points information, viewing vector or occupation information, viewing data with the same names, and sorting lines in alphabetical order by time or by increasing or decreasing values.
- Use the Map view for displaying a common network configuration, estimating the mutual position of points and vectors, and finding the necessary vector or point.
- Use the Occupation View for displaying occupations.
- Use the CAD view to display the linework view and DTMs with the associated points and lines. A

special CAD view for images is also available (right-click an image and click CAD view).

- Use the 3D View for displaying linework, surfaces and roads as three dimensional images. Surfaces and roads are displayed with the color of the surface layer. Lines are displayed with the applied color(s).
- Use the Codes for viewing a list of all codes and their attributes used in the job. This view is also used to add codes to the job.
- Use the Layers for viewing a list of all layers, and associated parameters, used in the job. This view is also used to add layers to the job.

Topcon Tools uses symbols and colors to designate different information. The Legend windows in the Map and Occupation views describe these designations (Figure 2-14 on page 20).

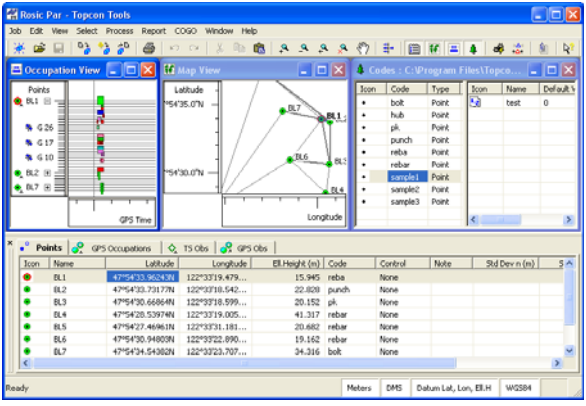


Figure 2-14. Topcon Tools Views – Example

To display any of these views, click the **View** menu, then click one of the view options, or click the applicable toolbar button (Figure 2-15).

Figure 2-15. Toolbar View Buttons

Editing Data

This chapter describes editing data in preparation for PostProcessing and Adjustment.

Editing Points in the Points Tab

The Points tab includes point name, coordinates, and other relevant point information.

Editing Point Name, Status, Coordinates

Figure 3-1 on page 22 displays example dialog boxes for the procedure below.

1. Right-click the point to edit and click **Properties** on the pop-up menu.
2. On the *General* tab, edit the point name and click **Apply**.
3. On the *Coordinates* tab, edit the point coordinates as needed and click **OK**.

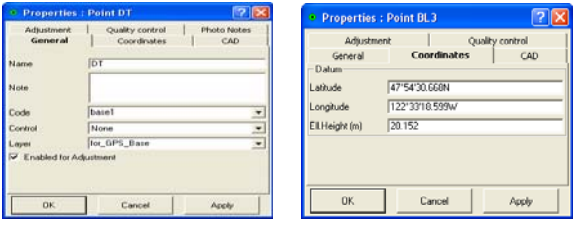


Figure 3-1. Edit Point Properties

The new name and coordinates are applied to the selected point(s). Point coordinates remain fixed during processing and network adjustment.

Editing Codes Used for Points

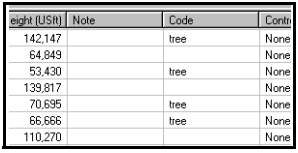
To edit the point code of a single point:

1. Double-click the code cell.
2. Select or type the new code.
3. Press the **Enter** key.

To edit the codes for multiple points (applying the same code to all selected points) (Figure 3-2 on page 23):

1. Press **Shift** and select several rows for the new code data.

2. Enter the new code to any row.
3. Press **Enter** (Figure 3-2).



eight (US ft)	Note	Code	Contr
142.147		tree	None
64.849			None
53.430		tree	None
139.817			None
70.695		tree	None
66.666		tree	None
110.270			None

Figure 3-2. Multiple Codes Edited

Changing Display Coordinates

The coordinate columns can be changed to display the desired coordinate type (Figure 3-3).

Note: the displayed height is an ellipsoidal height until a geoid model is defined.

1. Click **Job ▸ Job Configuration**.

2. Click **Coordinate Systems** in the left panel and select the *Coordinate* type. Click **OK**.

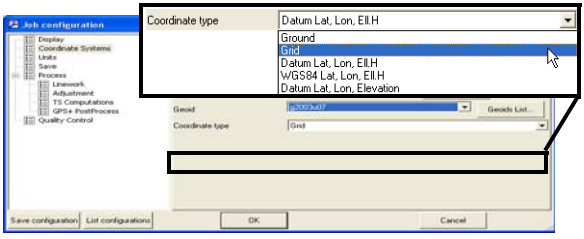


Figure 3-3. Select Coordinate Type

Selecting the Geoid Model

When defining a geoid model for a job, all point heights change from ellipsoidal heights to orthometric heights (Figure 3-4).

To select a geoid model:

1. Click **Job ▸ Job Configuration**. The ***Job configuration*** dialog box displays.
2. Click **Coordinate Systems** in the left panel, then click the **Geoids List** button.
3. Click **Add** in the ***Geoids List*** dialog box.

4. Select a geoid file and click **Open** (Figure 3-4).

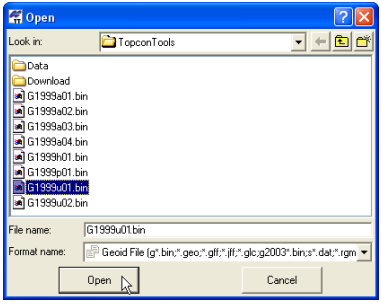


Figure 3-4. Add Geoid Model

The geoid model is added to the geoid list.

5. Close the ***Geoids List*** dialog box.
6. Select the desired geoid model from the ***Geoid*** drop-down list, then click **OK** (Figure 3-5).

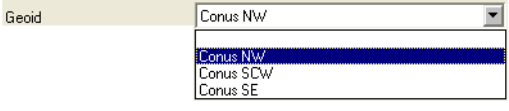


Figure 3-5. Select Geoid Model

Selecting Antenna Type in the GPS Occupations Tab

The GPS Occupations tab includes point names and antenna information, as well as occupation times, methods, file location, and receiver ID.

When selecting the antenna type for multiple occupations, press the **Ctrl** key while clicking the desired occupations. Any changes made will be applied to all highlighted occupations.

1. Right-click anywhere within the line.
2. On the pop-up menu, click **Properties**.
3. Click the *Antenna* tab, select the antenna type from the drop-down entry box in the *Antenna Type* field (Figure 3-6 on page 26), and click **OK**.

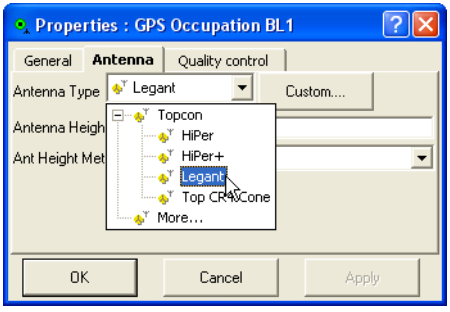


Figure 3-6. Select Antenna Type

TIP

Sort occupations by receiver type, then define the antenna type for each group of receivers.

Selecting Instrument Type in the TS Obs Tab

The TS Obs tab includes from and to point names, instrument and reflector heights, measured values, adjustment residuals, and other relevant point information for total station observations (Figure 3-7).

When selecting the instrument type for multiple TS observations, press the **Ctrl** key while clicking the desired observations. Any changes made will be applied to all highlighted observations.

1. Right-click anywhere within the line on the left panel.
2. On the pop-up menu, click **Properties**.
3. From the drop-down entry box on the *Instrument Type* tab, select the instrument type, and click **OK**.

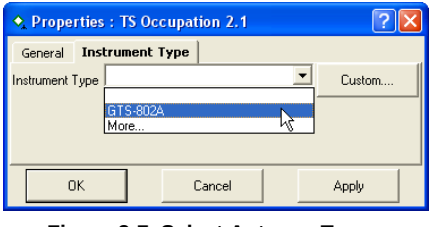


Figure 3-7. Select Antenna Type

Editing the Reference Line for Tape Dimensions

The Tape Dimensions tab contains two panels: the left panel displays start and end points and the right panel displays all point measurements.

1. Right-click a tape dimension in the left panel of the *Tape Dimensions* tab and click **Properties** on the pop-up menu.
2. Edit the *Start Point* and *End Point* parameters as needed (Figure 3-8).

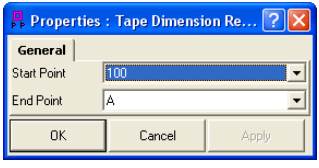


Figure 3-8. General Properties

3. When finished, click **OK** to apply the changes and close the dialog box.

Editing Linework

Use the CAD view or the Linework tab to edit linework.

Adding/Appending/Inserting Points to Linework

To add a new point to linework (Figure 3-9):

1. Click **Add ▸ Point**.
2. Hold down the ALT key and click on the desired point in the CAD view.
3. Enter point name, coordinates in the coordinate system set for the current job, code, string, control codes, note and set a control for the point. Click **OK**.
4. Click **Add ▸ Point** to deactivate the function.

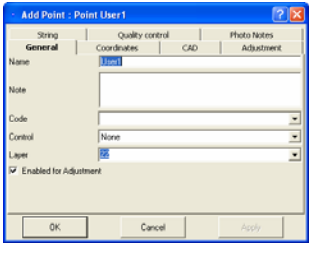


Figure 3-9. Add Point Dialog Box

To append a new point to the linework (Figure 3-10):

1. Click **Add ▸ Append Points to Line** to append a point to a line.
2. In the CAD view, click on a point to append to the line.

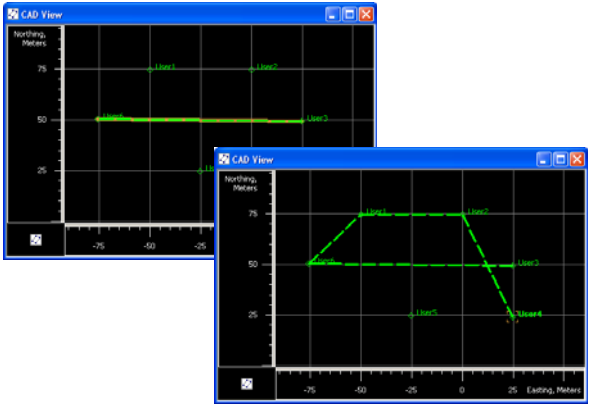


Figure 3-10. Append Points to Line

3. Click another point to create a segment. Repeat until all points have been appended.

4. To create a closed figure, append the finish point to the last segment and the start point of the first segment to the line (Figure 3-11).
5. Click **Add ▸ Append Points to Line** to deactivate this function.

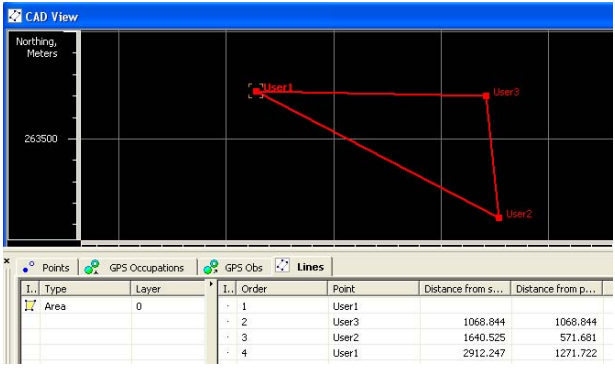


Figure 3-11. Creating a Closed Figure

To insert a point to a line:

1. Click **Add ▸ Insert Points to Line**. Select a segment in the CAD view.
2. In the CAD view, click at the desired place to insert a point: a new point will be created, the selected line will be deleted, and three points

(the start and the end point of the selected line and the new point) will be appended to the line (Figure 3-12).

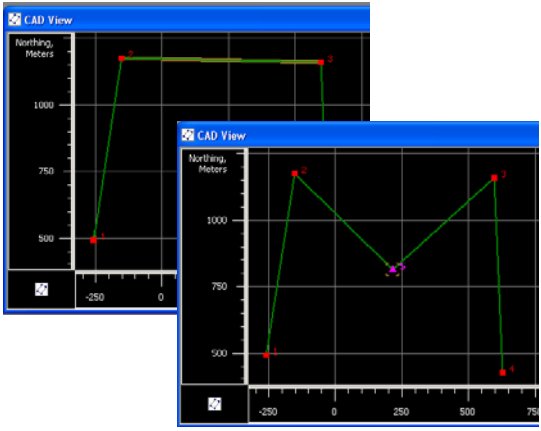
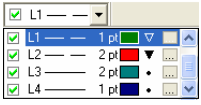


Figure 3-12. Inserting a New Point to the Selected Line

3. Right-click the new point and edit the point's name and coordinates (as needed).
4. Click **Add ▸ Insert Points to Line** to deactivate this function.

Adding a Line to Linework

Before creating a new line, the user has to select the desired layer. To set a layer for a new line, select any layer from the list of existing layers in the Toolbar (Layer combo box). The plotting styles of the new line will be assigned by the active layer 

:

To plot a line, do the following:

1. Click **Add ▸ Line** (or click the **Add Line** button on the Toolbar).
2. Select the desired segment type for the line from the drop-down list of the *Segment type* field.
3. Click the 'append point' cursor on the first point, then click on the second point. The line will be created between these two points (Figure 3-13 on page 34).

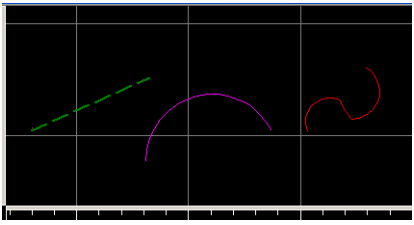


Figure 3-13. Plot a Line

Map View

Click on the **Map View** button on the toolbar or click **View ▸ Map View** to display the network scheme for a job (Figure 3-14).

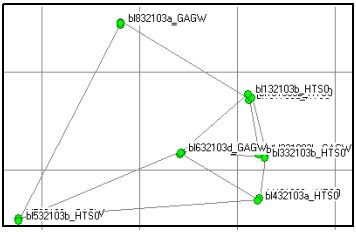


Figure 3-14. Map View – Network Scheme

Viewing Properties for Points & Vectors

Double-click (or right-click and click **Properties**) a point or vector on the Map View (Figure 3-15).

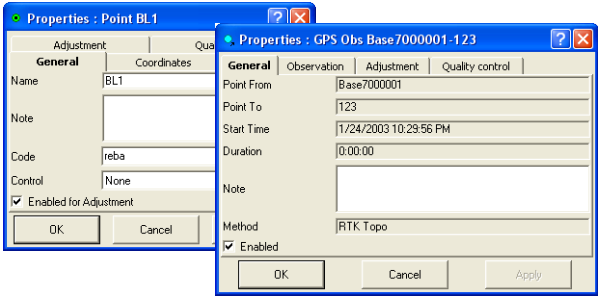


Figure 3-15. Point/Observation Properties

Processing Vectors

To process a vector, do the following:

1. Right-click the vector, then click **GPS+PostProcessing** on the menu.
2. Press **Ctrl** and click the desired vectors, then right-click and click **GPS+PostProcessing** on the pop-up menu to process several vectors.
3. Click the **GPS+PostProcessing** icon on the toolbar, to process all vectors.

To view vector postprocessing results, click the *Observation* tab on the ***Properties*** dialog box.

Map View Options

Click **Options** on the pop-up menu to show grid and point names, codes and heights, then right-click anywhere on the scheme (Figure 3-16 on page 37).

1. Click and enable the desired fields to display them on the scheme (Figure 3-16 on page 37).
2. Click and enable **Legend** to display the Map View's ***Legend*** dialog box.

To activate *Zoom* and *Pan* modes, right-click anywhere on the scheme and click either **Zoom** or **Pan**.

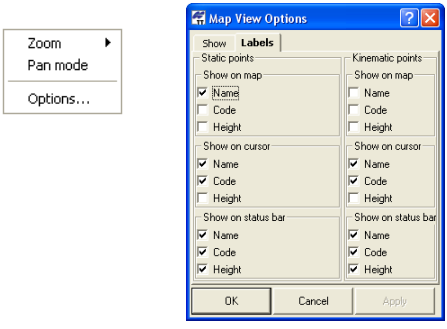


Figure 3-16. Pop-up Menu and Map View Options

Occupation View

To display parameters for the Occupation View, do the following:

1. Click the **Occupation View** button on the toolbar or **View ▸ Occupation View** to display the occupation graphic representation for a job (Figure 3-17 on page 38).
2. Click the **+/-** button next to a point or receiver to display individual satellite epochs, and disable or enable the data being used in satellite observations

using the right-click menu. The colors of the satellites simply indicate different satellites.

- select an entire satellite's epoch
- drag a box to select any part of an epoch(s)
- drag a box select some interval for all satellites

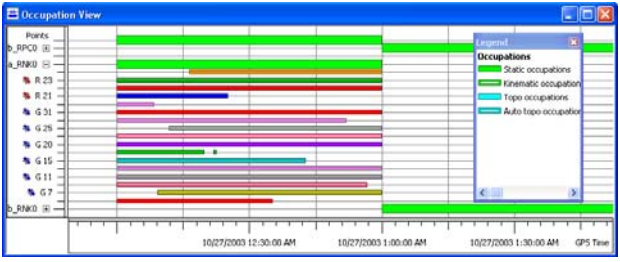


Figure 3-17. Occupation View – Occupation Graph and Legend

3. To select individual epochs for disabling/enabling, zoom in on a selected satellite vehicle occupation.
4. Either drag a square around an epoch or click a satellite's epoch to select the desired epoch(s) and time interval(s).
5. Once selected, right-click within the view and click **Disable** (or **Enable**) on the pop-up menu. Disabled epochs display with slanting lines.

Viewing and Editing Occupations

The ***Properties*** dialog box for occupations varies depending on the type of occupation selected.

Double-click (or right-click and click **Properties** on the pop-up men) an occupation in the Occupation View to display the ***Properties*** dialog box. Edit occupation information as needed (Figure 3-19).

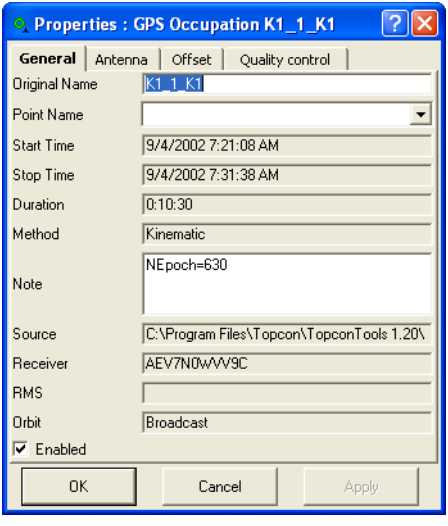


Figure 3-18. GPS Occupations Properties

Occupation View Options

To show the grid and legend, right-click anywhere on the scheme and click **Options** on the pop-up menu. The ***Occupation View Options*** dialog box displays (Figure 3-19). To select different options, do the following:

1. On the *Show* tab, click and enable the desired fields to display them on the scheme (Show grid or Show legend).
2. On the *Occupation View* tab, enable Show Occupations by receivers or by points.

   To activate *Zoom* and *Pan* modes, right-click anywhere on the graph and click either **Zoom** or **Pan** (Figure 3-19).

   To enable or disable an epoch, right-click an epoch and click the desired option on the pop-up menu.

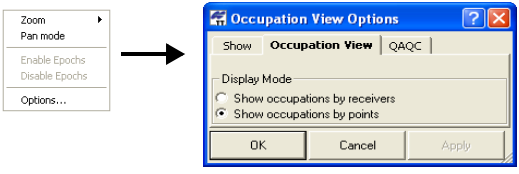


Figure 3-19. Pop-up Menu and Occupation View Options

Editing Codes

Click **View ▸ Codes** or click the **Codes List** button on the toolbar to view or hide the Codes View list (Figure 3-20).

The Codes view lists all codes used in the job and their attributes.

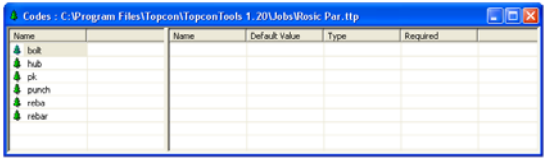


Figure 3-20. Codes View

Adding and Editing Codes

1. To add a code, right-click within the left panel of the codes view and click **New Code**.
2. On the *General* tab, edit the code's name and type.
3. On the *Outline* tab, select the style, line width, and color details to define the outline of the code.
4. On the *Vertex* tab, select the symbol and its color to represent the vertex of the code.

5. On the *Area* tab, select the color with which to define the area of the code. Select *Fill Area* to fill in the area.
6. Click **Apply** to save data without closing; click **OK** to set data and close the dialog box.

Adding and Editing Attributes

1. Right-click the code and click **New Attribute**, then select the attribute type on the pop-up menu.
2. Select or enter the desired attribute parameters.
   - For Integer, Real Number and Text attributes, enter a name and default value.
   - For Menu attributes, enter a name and default value. To add a default value, type the value and click **Add**.
3. Click **Apply** to save data without closing; click **OK** to set data and close the dialog box.

Editing Codes Used in Points

1. Right-click the desired point and click **Properties** on the pop-up menu.

Notes:

2. On the *CAD* tab, right-click in the left panel and select **Code**. Select the code from the drop-down list and click outside the cell (Figure 3-21).

   Note: typing a new code in the text entry box will add the code, the job file, and the point. Use the Codes view to apply attributes.

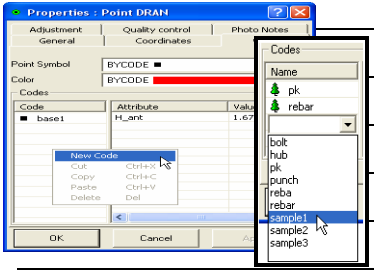


Figure 3-21. Add Code to Point

3. To delete a code and its attributes from the point, right-click a code in the left panel and click **Delete**.

   Note: deleting a code from the *CAD* tab deletes the code from the point, not the job.

4. Click **OK** to savethe settings.

Process & Adjust

This chapter describes editing GPS occupations (or TS occupations) in preparation for processing and adjusting.

Editing and Processing Repeated Observations

To import data into the Job, do the following:

1. On the ***Tabular*** view, click the *GPS Occupations* tab.

   In this example (Figure 4-1 on page 46), points b|1,b|3...b|6,b|8 have several files for each measured point.

2. To process vectors and perform a network adjustment, press **Shift** and click a group of points (for example, each b|1 point).

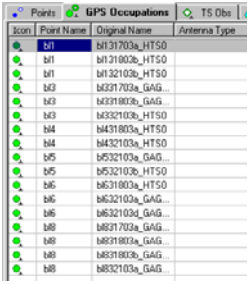


Figure 4-1. GPS Occupation Tab

3. Click one of the selected points in the *Point Name* column. Enter in a new name and press **Enter** to assign the new point name to the selected points.

   Renaming the points assigns files measured on the point to the corresponding point.

   Note: Only the point's name and number are changed; original occupation names, occupation number, and vectors remain unchanged.

   Figure 4-2 on page 47 displays the multiple unprocessed vectors on the scheme as a thick gray line.

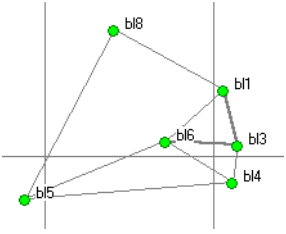


Figure 4-2. Network Scheme with Unprocessed Vector

4. Select unwanted points, then right-click and click **Delete** on the pop-up menu (Figure 4-3).

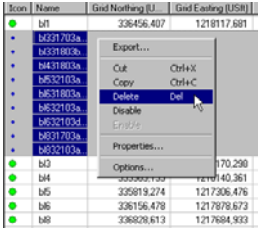


Figure 4-3. Delete Points

5. Edit the *Antenna Height* and *Antenna Height Method* columns as needed (Figure 4-4 on page 48). For multiple points, press **Shift** and click the desired points; click a point, type the new

height or select a new height method, and press **Enter**.

Icon	Point Name	Original Name	Antenna Type	Antenna Height ...	Ant Height M
	bl1	bl131703a_HTS0	Legant	4.700	Vertical
	bl1	bl131803b_HTS0	Legant	4.700	Vertical
	bl1	bl132103b_HTS0	Legant	4.700	Vertical
	bl3	bl331703a_GAG...	Legant	4.700	Vertical
	bl3	bl331803b_GAG...	Legant	4.700	Vertical
	bl3	bl332103b_HTS0	Legant	4.700	Vertical
	bl4	bl431803a_HTS0	Legant	4.700	Vertical
	bl4	bl432103a_HTS0	Legant	4.700	Vertical
	bl5	bl532103a_GAG...	Legant	4.700	Vertical
	bl5	bl532103b_HTS0	Legant	4.700	Vertical
	bl6	bl631803a_HTS0	Legant	4.700	Vertical
	bl6	bl632103a_GAG...	Legant	4.700	Vertical
	bl6	bl632103d_GAG...	Legant	4.700	Vertical
	bl8	bl831703a_GAG...	Legant	4.700	Vertical
	bl8	bl831803a_GAG...	Legant	4.700	Vertical
	bl8	bl831803b_GAG...	Legant	4.700	Vertical
	bl8	bl832103a_GAG...	Legant	4.700	Vertical

Figure 4-4. Edit Antenna Height and Height Method

6. Click the **GPS+ PostProcessing** button to process vectors. Processed vectors with a Fixed solution type display on the scheme as a green line (Figure 4-5).

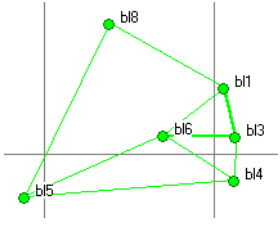


Figure 4-5. Network Scheme with Processed Vector

Horizontal and vertical precisions, and vectors increments and solution type, display in the Tabular view on the GPS Obs tab (Figure 4-6).

Horizontal Precis...	Vertical Precisio...	dn (USft)	de (USft)	du (USft)	Method	Solutior
0,018	0,051	-290,093	49,271	-3,375	PP	Fixed
0,011	0,035	3,712	-289,494	2,968	PP	Fixed
0,019	0,045	-240,173	-19,762	2,252	PP	Fixed
0,009	0,011	-100,679	-838,628	-21,222	PP	Fixed
0,023	0,042	-290,074	49,232	-3,316	PP	Fixed
0,028	0,043	243,859	-269,792	0,760	PP	Fixed
0,005	0,008	-286,402	-240,236	-0,366	PP	Fixed
0,027	0,073	3,693	-289,512	2,838	PP	Fixed
0,008	0,017	344,624	568,814	21,976	PP	Fixed
0,019	0,050	384,793	-453,350	-22,843	PP	Fixed
0,007	0,012	1015,836	355,683	-0,601	PP	Fixed

Figure 4-6. Processed Vectors – GPS Obs Tab

Processing Vectors in the GPS Obs Tab

The GPS Obs tab includes point from and point to names, observation time, components of computed vector solution, and other information about solution, adjustment residuals and relevant information.

- To process a vector, right-click anywhere within the vector line in the table and click **GPS+ PostProcessing** on the pop-up menu (Figure 4-7 on page 50).

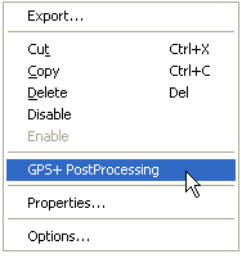


Figure 4-7. Processing Vectors

- To process several vectors, press **Ctrl**, click the desired vectors, then right-click and click **GPS+PostProcessing** on the pop-up menu.
- To process all vectors, click the **GPS+ PostProcessing** icon on the toolbar.

When the vector processing completes, the Horizontal Precision, Vertical Precision, dn, de, du and Solution Type columns display applicable information.

Horizontal Precis...	Vertical Precisio...	dn (USft)	de (USft)	du (USft)	Method	Solution Type
0,023	0,042	-290,072	49,232	-3,316	PP	Fixed
0,018	0,051	-290,090	49,271	-3,375	PP	Fixed
0,019	0,045	-240,175	-19,762	2,253	PP	Fixed
0,009	0,011	-100,677	-838,628	-21,222	PP	Fixed
0,011	0,035	3,710	-289,494	2,968	PP	Fixed
0,028	0,043	243,861	-269,791	0,760	PP	Fixed
0,005	0,008	-286,399	-240,236	-0,366	PP	Fixed
0,027	0,073	3,695	-289,512	2,837	PP	Fixed
0,008	0,017	344,627	568,814	21,376	PP	Fixed
0,019	0,050	384,796	-453,349	-22,844	PP	Fixed
0,007	0,013	1015,839	355,683	-0,600	PP	Fixed

Figure 4-8. Processed Vectors

Adjusting Vectors

This section describes adjusting GPS vectors and viewing the results.

Step 1: Fix Control Points

The main function of the adjustment process is to adjust measured vectors using fixed control point coordinates and heights (for 3D types). To fix control points, do the following:

1. To fix one or more point coordinates, open the ***Properties*** dialog box for the selected point.
2. In the drop-down list of the *Control* field, select **Both** to fix vertical and horizontal coordinates, then click **Apply**.

The legend of point, bl6 in the Tabular view dialog box (see Figure 4-12 on page 55) and on the scheme changes.

3. To edit coordinates, click the *Coordinates* tab, edit the coordinates of point bl6, then click **OK**.

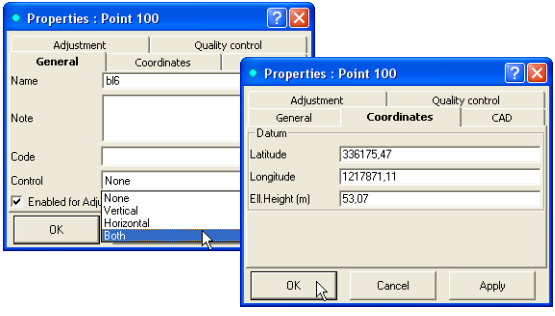


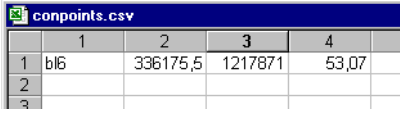
Figure 4-9. Point Properties – General and Coordinates

TIP

Click Edit ▸ Undo to return to the point's initial coordinates. Click Edit ▸ Redo to revert to edited coordinates.

Step 2: Import Control Coordinates

Figure 4-10 displays a sample coordinate file with Name, NEZ coordinates, and Code for point bl6.


conpoints.csv

	1	2	3	4
1	bl6	336175,5	1217871	53,07
2				
3				

Figure 4-10. Sample Coordinate File

To import control coordinates, do the following:

1. Click the **Import from file** button on the Toolbar. The ***Import*** dialog box displays.
2. On the ***Import*** dialog box, select the control points file and the format name; for example, "*conpoints.csv*" and "*Name,N,E,Z,Code*", respectively (Figure 4-11 on page 54).
3. Click and enable **Advanced options** and **Control** check boxes.
4. Disable the *Orthometric Height* parameter if the file contains ellipsoidal heights.
5. Select the type of linear units.

NOTICE *NOTICE*

To import files to the job correctly, know all settings; settings are not stored in the file.

6. Click **Open** when done.

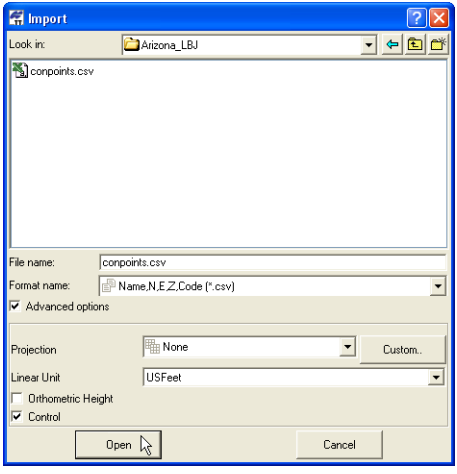
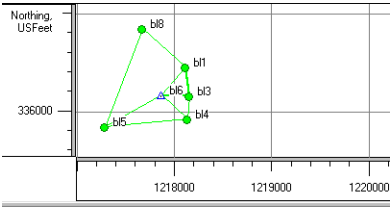


Figure 4-11. Sample Coordinate File

Point bl6 is marked in the Tabular view and on the scheme as a fixed coordinates point (Figure 4-12).



Points | GPS Occupations | TS Obs | GPS Obs

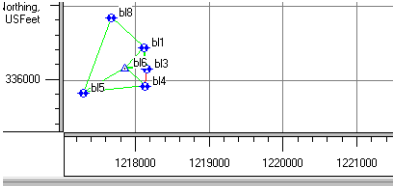
Icon	Name	Grid Northing (U...	Grid Easting (USft)	Elevation (USft)
●	bl1	336456,409	1218117,681	53,432
●	bl3	336165,294	1218160,432	50,121
●	bl4	335925,650	1218135,364	52,307
●	bl5	335843,702	1217294,744	31,084
△	bl6	336175,470	1217871,110	53,070
●	bl8	336851,230	1217673,078	30,598

Figure 4-12. Point Marked as a Fixed Coordinate

Adjusting the Network

To adjust the network, click the **Adjust Network** button on the Toolbar.

The legends of the points display in the *Tabular view* dialog box and on the scheme change accordingly; the auto-rejected vector is marked with red (Figure 4-13).



Points | GPS Occupations | TS Obs | GPS Obs

Icon	Name	Grid Northing (U...	Grid Easting (USft)	Elevation (USft)
	bl1	336456.410	1218117.682	53.430
	bl3	336165.294	1218160.432	50.121
	bl4	335925.592	1218135.370	52.295
	bl5	335843.700	1217294.743	31.092
	bl6	336175.470	1217871.110	53.070
	bl8	336851.249	1217673.087	30.524

Figure 4-13. Adjusted Network

- Auto-rejected vectors (blunders) are detected using a confidence level and a posteriori standard errors of unit weight. A vector with the biggest error is rejected, and free adjustment repeated until all vectors with errors are rejected. Rejected vectors are not used in the final adjustment.

- A Posteriori standard deviations of unit weight are calculated separately for plane coordinates and for heights.

  Standard deviations of the adjusted network points display in the Points tab of the Tabular view (Figure 4-14).

Std Dev n (USft)	Std Dev e (USft)	Std Dev u (USft)
0,004	0,004	0,010
0,008	0,006	0,027
0,011	0,007	0,021
0,006	0,006	0,018
0,009	0,007	0,023

Figure 4-14. Standard Deviations

- Vector residuals of the adjusted network vectors display in the GPS Obs tab in the Tabular view (Figure 4-15).

Res n (USft)	Res e (USft)	Res u (USft)
0,010	0,014	-0,064
0,011	-0,001	0,021
0,043	-0,067	0,080
0,006	-0,000	-0,002
0,028	-0,025	-0,005
-0,058	0,007	-0,012
0,001	0,001	-0,003
-0,008	-0,019	-0,109
-0,002	-0,001	0,008
-0,019	-0,008	0,071
0,005	0,002	-0,004

Figure 4-15. Vector Residuals

To choose the confidence level for adjustment, click **Process ▸ Process Properties** and select the new confidence level value (Figure 4-16 on page 58). Click **OK** to readjust the network.

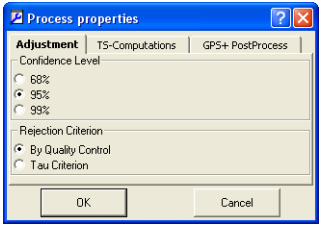
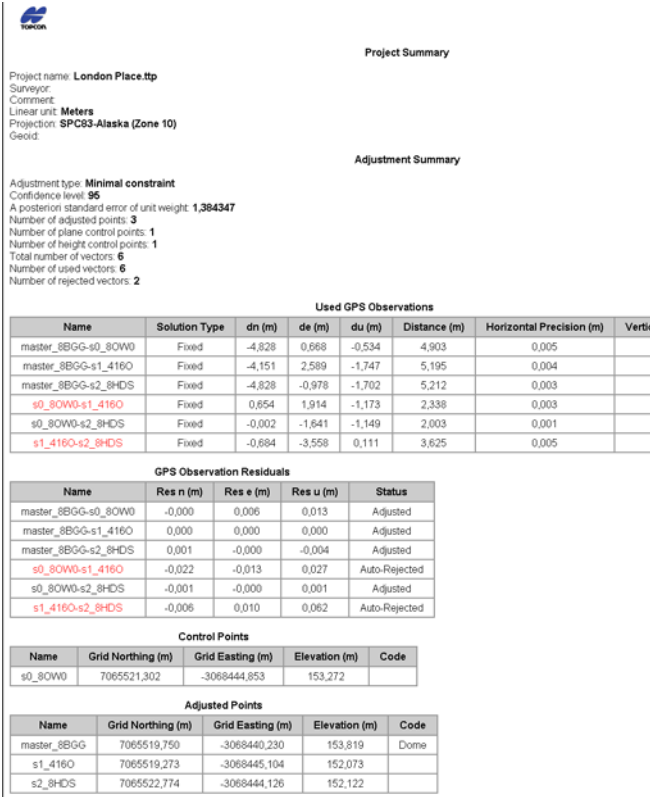


Figure 4-16. Select Confidence Level for Adjustment

Creating Adjustment Reports

To create an adjustment report, click **Report ▸ Adjustment**. The Topcon Tools ***report viewer*** dialog box displays and the default Adjustment Report (Figure 4-17 on page 59) list the following information:

- job information, including project summary and adjustment summary
- used GPS observations
- GPS observation residuals
- control points
- adjusted points



Project Summary

Project name: **London Place.ttp**
Surveyor:
Comment:
Linear unit: **Meters**
Projection: **SPC83-Alaska (Zone 10)**
Geoid:

Adjustment Summary

Adjustment type: **Minimal constraint**
Confidence level: **95**
A posteriori standard error of unit weight: **1,384347**
Number of adjusted points: **3**
Number of plane control points: **1**
Number of height control points: **1**
Total number of vectors: **6**
Number of used vectors: **6**
Number of rejected vectors: **2**

Used GPS Observations

Name	Solution Type	dn (m)	de (m)	du (m)	Distance (m)	Horizontal Precision (m)	Verti
master_8BGG-s0_8OW0	Fixed	-4,828	0,668	-0,534	4,903	0,005	
master_8BGG-s1_416O	Fixed	-4,151	2,589	-1,747	5,195	0,004	
master_8BGG-s2_8HDS	Fixed	-4,828	-0,978	-1,702	5,212	0,003	
s0_8OW0-s1_416O	Fixed	0,654	1,914	-1,173	2,338	0,003	
s0_8OW0-s2_8HDS	Fixed	-0,002	-1,641	-1,149	2,003	0,001	
s1_416O-s2_8HDS	Fixed	-0,684	-3,558	0,111	3,625	0,005	

GPS Observation Residuals

Name	Res n (m)	Res e (m)	Res u (m)	Status
master_8BGG-s0_8OW0	-0,000	0,006	0,013	Adjusted
master_8BGG-s1_416O	0,000	0,000	0,000	Adjusted
master_8BGG-s2_8HDS	0,001	-0,000	-0,004	Adjusted
s0_8OW0-s1_416O	-0,022	-0,013	0,027	Auto-Rejected
s0_8OW0-s2_8HDS	-0,001	-0,000	0,001	Adjusted
s1_416O-s2_8HDS	-0,006	0,010	0,062	Auto-Rejected

Control Points

Name	Grid Northing (m)	Grid Easting (m)	Elevation (m)	Code
s0_8OW0	7065521,302	-3068444,853	153,272	

Adjusted Points

Name	Grid Northing (m)	Grid Easting (m)	Elevation (m)	Code
master_8BGG	7065519,750	-3068440,230	153,819	Dome
s1_416O	7065519,273	-3068445,104	152,073	
s2_8HDS	7065522,774	-3068444,126	152,122	

Figure 4-17. Report Viewer – Adjustment Report

To save the report as a file, click the **Save As** button. Enter the location and name information, then press **Save**.

To copy the report to Microsoft® Word or Outlook Express, click the **Select All** then press the **Copy** button. Open the desired application and **paste** in the information.

To print the report, click the **Print** button.

Report Configuration

To configure a report, click **Report ▸ Report Configuration**. The ***Report Configuration*** dialog box edits and creates reports (Figure 4-18 on page 61).

- To create a new report, click **New report**.
- To delete a report, click **Delete report**.
- To copy a report, click **Copy report as** and type the new report name.
- To define the report, select it and click **Execute**.
- To edit/include a template in the report, select an item from the *Available report templates* panel and use the **move to right >>** button to include it in the report. Use the buttons at the right of the *Included*

report items panel (Move Up, Move Down, Remove) to configure the report columns.

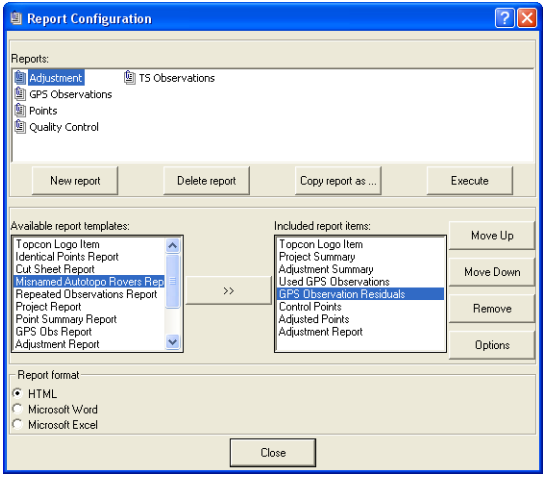


Figure 4-18. Report Configuration

To include or exclude informational columns to the item, select the item and click *Options*. The ***Options*** dialog box varies, depending on the selected item (Figure 4-19 on page 62).

- To include a column in the report, select an item from the *Selected columns* panel (left window), then click the **move to right >>** button.

- To exclude a column from the report, select from the right window, and click the **move to left** << button to delete from the report.

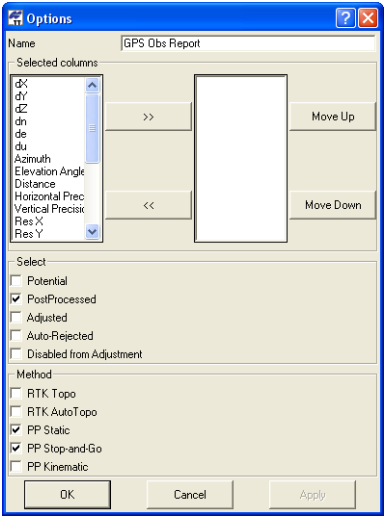


Figure 4-19. Informational Options Columns

Export and Exit

This chapter describes exporting data to a file, closing a job, and revisiting a job.

Exporting to a File

1. Click the **Export to file** button on the Toolbar.
2. Enter a file name and select the format name (for example, *allnetwork2, Name,N,E,Z,Code*) (Figure 5-1).

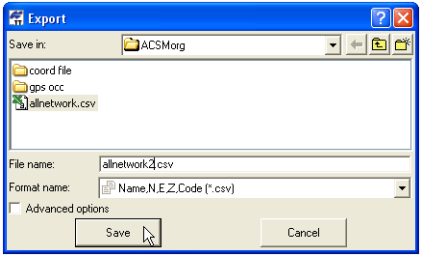


Figure 5-1. Export

3. Click **Save**.

The data is stored in the file without any modifications (Figure 5-2).

	1	2	3	4
1	bl1	336456,4	1218118	53,43
2	bl3	336165,3	1218160	50,121
3	bl4	335925,6	1218135	52,295
4	bl6	336175,5	1217871	53,07
5	bl7	335843,7	1217295	31,092
6	bl8	336851,2	1217673	30,524
7				

Figure 5-2. Stored Data

NOTICE *NOTICE*

If exporting ground coordinates, set the display option to "ground" and then export to a file that stores NEZ coordinates.

Modifying and Saving Data During Export

Figure 5-3 on page 65 on page shows the settings described in the procedure below.

1. CLick and enable **Advanced options** on the ***Export*** dialog box.
2. Select the projection to transform the coordinates to (e.g., *UTMNorth, zone_10*).
3. Select the linear unit, for example, *IFeet* and geoid model.
4. Click and enable **Orthometric Height** to transform ellipsoidal heights to orthometric.

5. Click **Save**. When saved, data will be modified according to the selections and stored in the file.

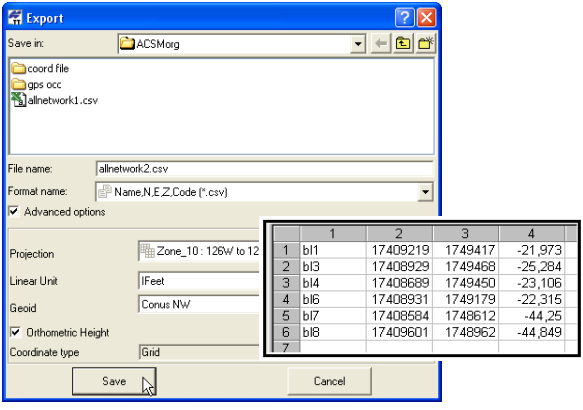


Figure 5-3. Advanced Options and Stored Data

NOTICE *NOTICE*

To import files to the job correctly, know all settings; settings are not stored in the file.

Closing a Job

To close the current job click, **Job ▸ Close Job**.
If changes were made, click **Yes** at the confirmation.

Revisiting a Job

The ***Startup*** dialog box opens automatically after starting Topcon Tools. From this dialog box, create a new job or open a previously created job.

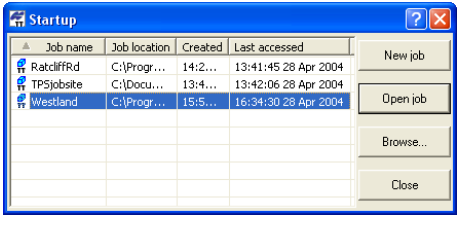


Figure 5-4. Startup Dialog Box

- To create a new job, click the **New Job** button.
- To open a job, click the **Open Job** button.
- To search for created jobs, either click a **column's title** to sort in descending or ascending order, or click **Browse** and navigate to the job.

Once you have selected the desired job, click **Open job**. The job displays in the main window.

Hot Keys

Table A-1 lists all known keyboard shortcuts and common hot keys for Topcon Tools.

Table A-1. Topcon Tools Hot Keys

Press This...	To Perform this...	Press This...	To Perform this...
Ctrl+C	Copy	Ctrl+V	Paste
Ctr+Z	Undo	Ctrl+Y	Redo
Ctrl+X	Cut	Ctrl+P	Print
Ctrl+N	New File (Job)	Ctrl+O	Open File (Job)
Ctrl+S	Save File (Job)	Ctrl+A	Select All (in active window)
Ctrl+E	Enable	Ctrl+D	Disable
Ctrl+Enter	Properties	Ctrl+T	Tabular View
Ctrl+M	Map View	Alt+Backspace	Undo
Ctrl+Insert	Copy	Shift+Insert	Paste
Shift+Del	Cut	F1	Help

Table A-1. Topcon Tools Hot Keys (Continued)

Press This...	To Perform this...	Press This...	To Perform this...
F2	Edit current cell (in table)	F2+Ctrl	Job Configuration
F3	Import	F3+Ctrl	Import From Device
F4	Export	F4+Ctrl	Export To Device
F7	GPS+ PostProcessing	F8	Adjustment
Shift+F8	Localization	F9	Report Configuration
Ctrl+Shift+N	Select none (deselect current selection)	Ctrl+Shift+I	Insert selection
Ctrl+Shift+P	Select point	Ctrl+Shift+T	Select TS Occupation
Ctrl+Shift+G	Select GPS Occupation	Ctrl+Shift+M	Select TS Obs
Ctrl+Shift+O	Select GPS Obs		

TOPCON
Topcon Positioning Systems, Inc.
7400 National Drive, Livermore, CA 94550
Phone: 800•443•4567
www.topconpositioning.com

Topcon Tools Quick Reference Guide
P/N: 7010-0616 Rev. F Printed in U.S.A. 05/08