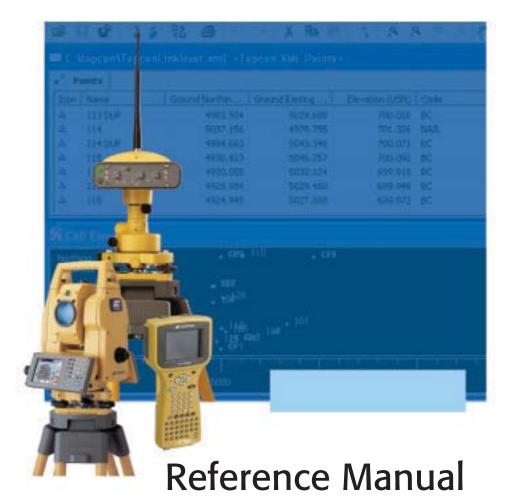


# **Topcon Link**

Data Import/Export Software





## Topcon Link Reference Manual

Part Number 7010-0522 Rev M

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# Preface

Thank you for purchasing this Topcon product. The materials available in this Manual (the "Manual") have been prepared by Topcon Positioning Systems, Inc. ("TPS") for owners of Topcon products, and are designed to assist owners with the use of the receiver and its use is subject to these terms and conditions (the "Terms and Conditions").



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## **Manual Conventions**

This manual uses the following conventions:

1 111	This manual uses the following conventions.					
Exa	ample	Description				
Co	e ► Exit nnection	Click the <b>File</b> menu and click <b>Exit</b> . Indicates the name of a dialog box or screen.				
	equency	Indicates a field on a dialog box or screen, or a tab within a dialog box or screen.				
En	ter	Press or click the button or key labeled <b>Enter</b> .				
	NOTE	Further information to note about the configuration, maintenance, or setup of a system.				
		Supplementary information that can help you configure, maintain, or set up a system.				
	NOTICE	Supplementary information that can have an affect on system operation, system performance, measurements, or personal safety.				
	CAUTION	Notification that an action has the potential to adversely affect system operation, system performance, data integrity, or personal health.				
WARNING		Notification that an action <i>will</i> result in system damage, loss of data, loss of warranty, or personal injury.				
	DANGER	Under no circumstances should this action be performed.				

# Introduction

Welcome to Topcon Link, a full-featured data import/export and conversion utility for Topcon instruments. Topcon Link contains features and functions to perform the following activities:

- Import data files from all Topcon and Sokkia instruments.
- Convert all Topcon and Sokkia data files and many industrystandard data files to corresponding file formats.
- Open and display data in easy to use tables and screens.
- Provide basic editing tools for some data types.
- Export coordinate files to a Topcon and Sokkia total station, and export any data file to a Topcon and Sokkia controller.

Topcon Link supports all proprietary Topcon and Sokkia file formats as well as a number of industry formats. Any format can be converted to desired Topcon and Sokkia format for export to Topcon and Sokkia instruments. Many files can be converted between third party and proprietary formats.

## **Installing Topcon Link**

Topcon Link software comes either on a CD (as a standalone application with TopSURV software), and also available as free download from the TPS website to install on a computer. The InstallAware® Wizard will save the earlier versions of Topcon Link already installed, and will install the latest version in the folder the user selects.



The CD version of Topcon Link contains all projections, datums and geoids. The version downloaded from the Topcon web site comes without the projections, datums and geoids. They will be downloaded from the Internet and installed on our computer during the installation process. Make sure that your computer has Internet access during installation.

Table 1-1 lists the recommended system requirements needed to install this software on a computer.

Table 1-1. Topcon Link System Requirements for Installation

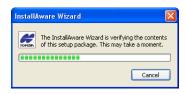
• Microsoft® Windows XP/Vista/7(32 bit and 64 bit) operating system	• 512 MB of RAM (1000MB recommended)
Processor compatible with Intel®     Pentium® 1000 MHz or faster	• 100 MB of available hard-disk space

Before connecting the receiver's USB port to the computer's USB port, the TPS USB driver must be installed on the computer. The driver is available on the TPS website:

(http://www.topconsupport.com/documents/view/1743).

- 1. Navigate to the Topcon Link executable file or insert the software CD-ROM.
  - If downloading the software from the TPS website, save the downloaded compressed file to an accessible location and extract the Topcon Link executable file.
  - If downloading the software from a TPS software CD, insert the CD into the computer's CD-ROM drive.

2. The InstallAware Wizard starts up:



- 3. Click Next to start the installation process.
- 4. Check the '*I accept the terms of the license agreement*' box, to continue the installation (Figure 1-1). Type *User Name* and *Company Name* information, then click **Next** (Figure 1-1)

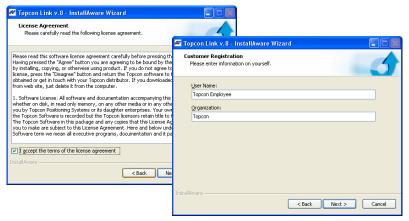


Figure 1-1. Review License Agreement and Enter User Information

- 5. Select a needed setup type. Depending on the user's selection, either all program features or only highlighted features will be installed. If the user selects *Typical* type and presses **Next**, the installation software will do the following:
  - automatically select all available datums and projections (except the following *Table Projections*:
    - rdtrans 2004 and rdtrans for Netherlands
    - LB72 for Belgium
    - KKJ for Finland
    - USTNO2 for United Kingdom)

• display the next installation dialog (Figure 1-2)

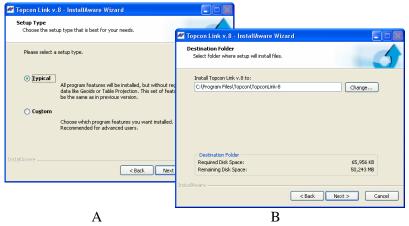


Figure 1-2. Typical Setup Type

If the user selects the *Custom* type and press **Next**, the *Custom Setup* dialog displays (Figure 1-3).

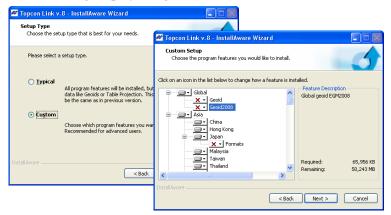


Figure 1-3. Custom Setup Type



The typical installation does not allow one to install a geoid on the computer. As against of the typical installation, the custom installation allows one to install the highlighted geoid for the corresponding projection(s)/datum(s) of the given region.

The user can highlight only those features (projection or projection and geoid), which needed for the given job area. Such regional selection allows one to economize the computer's disk size.

This dialog box contains the list of projections:

Feature Description 🔲 🔻 Europe with regional geoids IGN69, IGN78, RAF98 🗧 💷 France 🗐 🔻 Geoid or Feature Description Projections: GERMANY-Berlin Soldner, GERMANY, GERMANY-Gauss Krueger Germany • without regional geoids any BKG Geoid Form or Feature Description Table Projections Protection: RDTRANS 2004 · with table projection 💷 🛛 rdtrnas 2 - rdtrans

The *Feature Description* displays the list projection(s)/ formats/ geoid(s) which consist the highlighted item. To see what the feature contains, select the desired feature:

Germany	Feature Description Projections: GERMANY-Berlin Soldner, GERMANY, GERMANY-Gauss Krueger Germany BKG Geoid Format	
	B Denmark Geoid	Feature Description     Original bin geoid *.01

If the selected projection contains a list of projection(s) and a geoid file format, Topcon Link will be installed with the selected projection(s) and format for adding the corresponding geoid to the Topcon Link (but not a geoid file). In the given case:

 the Setup tab of the Coordinate System item of the Configuration dialog box will display the installed geoid file format in the list of geoid:

🖉 Topcon Link v. 8 - InstallAware Wizard		
Custom Setup Choose the program features you would like to install.	5	
Click on an icon in the list below to change how a feature is in	Feature Description	
i Norway	Properties: NSC1988.Akse Norway Geol Format Coordinate Systems. Coordinate Systems. Coordinate Systems. Concluse Systems. Concluse Systems. To Computations	Setup     Conversion       Geoid List       I., Name       Path       II. Name       Den       Look in       II. Beeld       File name:       File name:       Formit name:       II. Norverpair Gloud ()*.bm)       Open

- the installed projection(s) will be displayed in the list of



If the selected projection contains a list of projection(s) and the geoid, Topcon Link will be installed with the selected projection(s), format for adding the corresponding geoid and the corresponding geoid(s) into the user's computer. In the given case:

 the Setup tab of the Coordinate System item of the Configuration dialog box will display the geoid file format in the list of geoid and installed geoid(s):

	Denmark		ature Description jinal bin geoid *.01	
Configuration Display Coordinate Systems Seve	Setup Conversion Geoids List			
E Save	I Name	Path	Minimum Longit	Maximum Lon
E Compute Coordinates	🕪 dvr90g2002	c:\program files	6°00'00.00000E	17°00'00.00
Compute Coordinates	👎 fe95g	c:\program files	8°00'00.00000W	6°00'00.000
	👎 gr2000g	c:\program files	75°00'00.00000W	10°00'00.000
	🗭 nkg96g	c:\program files	1°00'00.00000E	33°00'00.00

- the installed projection(s) will be displayed in the list of

projections for conversion:



To add/remove the desired regional projection or geoid to/from the installing, click the desired feature and select the corresponding command from the pop-up menu:



The following rules is used for adding projection and geoid:

1. It is not possible to highlight a geoid without highlighting of the corresponding projection:

2. It is possible to highlight only the desired

projection:



Without reference to the selected projection type, Topcon Link installation will install all datums

If the user did not select any geoid file in the process of installation, after finishing Topcon Link installation process it is possible to add (using *Configuration* dialog box) **only** the following geoids (global (\*.glc), custom regional (\*.rgm) and topcon geoid (\*.jff and/or \*.gff) files):



It the user selected some regional geoid file in the process of installation, after finishing Topcon Link installion process it is possible to add (using *Configuration* dialog box) **only** the following

geoids (selected official geoid, global (\*.glc), custom regional (\*.rgm) and topcon geoid (\*.jff and/or \*.gff) files):





Without reference to the selected projection/geoid type, Topcon Link installation saves geoid(s), which were added in the previous version to the geoid list

To add the desired geoid(s) or the desired projection(s) after finishing Topcon Link installion process, the user needs to do the steps is described in "How to add a feature after installation" on page 1-10

To continue Topcon Link installation, click Next.

- 3. Either keep the default installation folder or click **Browse** to select a different folder in which to install the Topcon Link. Click **Next** to continue (Figure 1-2 on page 1-4, picture B)).
- 4. If desired, type in a new folder in which to add program icons. For automatically creating Topcon Link shortcut check the *'Create on Desktop'* box. Then click **Next** (Figure 1-4).
- 5. Click **Next** to start the installation process (Figure 1-4)

6. Topcon Link is installed on the computer (Figure 1-4)

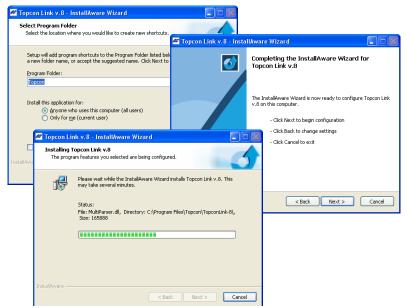


Figure 1-4. Select Program Folder and Installation Progress

- 7. Click **Finish** to exit the installation.
- 8. Before the user can use Topcon Link, we recommend restarting your computer.
- 9. Create a shortcut on the computer's desktop for easy access (Figure 1-5).



Tiepeen Link

Figure 1-5. Topcon Link Desktop Shortcut

# How to add a feature after installation

The user can add any features from *Custom Setup* window after finishing Topcon Link installion process and restarting Windows. To do it, make the following steps:

- 1. Click Settings > Control Panel > Add or Remove Programs
- 2. Select *Topcon Link v.8* in the *Add or Remove Programs* and click *Change* (Figure 1-7):



Figure 1-6. Add and Remove Programs

3. Select *Modify Available Options* and click **Next** (Figure 1-8)



Figure 1-7. InstallAware Wizard

4. Highlight the desired features (projection or projection and geoid) in the *Custom Setup* window (Figure 1-9)



Figure 1-8. Custom Setup Window

## Installing Microsoft ActiveSync for Use With CE-based Devices

ActiveSync® is free software from Microsoft® that establishes a connection between a computer (with operation system Windows XP) and an external device. ActiveSync is used for file transfers and software downloads between a computer and mobile device running the Windows® CE operating system, such as a hand-held controller or CE-based Total Station.

After installing ActiveSync, it will be associated with a port on the computer. This means that the port will be considered "busy", and may need to be freed up for use with other devices.

ActiveSync will start automatically when connecting a CE-based device (such as, Topcon's FC-120/FC-200/FC-200/FC2200/FC2500, GMS-2/GMS-2Pro, or GTS-720/GTS-750/GPT-7000/GPT-7000i/GPT-7500/GPT-9000)or Sokkia's SHC 2500 or SRX/SET X).

1. Log on to the Microsoft website (www.microsoft.com) to download ActiveSync. Install the program onto the computer.

After installing ActiveSync, start the application and click
 File ➤ Connection Settings. Apply the following settings based on the number of ports on the computer (Table 1-2).



Refer to the help topics in ActiveSync for more details on connecting with devices.

ActiveSync Settings for Computers With One Port	ActiveSync Settings for Computers With Two or More Ports	
If using a port for multiple purposes, select either "Work Network" or "The Internet". In this case, ActiveSync will free up the port for other uses after disconnecting a device.	If multiple ports are available, the default settings are sufficient. In this case, ActiveSync will retain use of the port after disconnecting a device. If using a USB cable to connect the device to the computer, select the option.	
Waiting for device to connect Connect Show status icon in taskbar Allow USB connections Allow connections to one of the following: This computer is connected to: Automatic Upen ActiveSync when my device connects Help Automatic Work Network The Internet	Connection Settings       Image: Connect in the set of the	

#### Table 1-2. About ActiveSync Connection Settings



If the user's computer operates under Windows Vista, ActiveSync is not needed. A connection between the computer and an external device with Windows CE will be automatically established after connecting your device to your PC.

## **Getting Acquainted**

The Topcon Link interface is designed for easy, integrated use with a PC-compatible computer, a connected Topcon instrument, and industry-standard data types. The following sections introduce the various functions available in Topcon Link for transferring, viewing, configuring/converting, and editing data files.

### **Main Screen**

The main screen has the following components (Figure 1-9):

- Title bar contains the program name and the name of the currently active file.
- Menu bar contains drop-down menus for all functions.
- Toolbar –contains shortcut buttons to frequently used functions.
- Work area displays dialog boxes, job file information, and popup menus.
- Status bar displays informative messages about Topcon Link and various files, as well as pop-up boxes for quickly changing units and coordinate systems (inactive if no file is open).

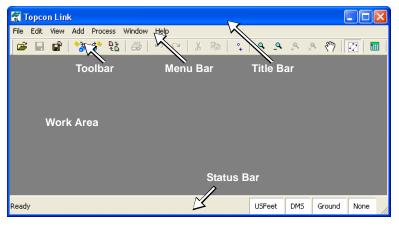


Figure 1-9. Topcon Link Main Screen Components

#### **Menu Bar**

The menu bar (Figure 1-10) provides access to all available options.

File Edit View Add Process Window Help

#### Figure 1-10. Topcon Link Menu Bar

Table 1-3 briefly describes the functions in each drop-down menu.

Table 1-3. Topcon Link Menu Options

Menu	Functions
File menu  File Open File Open File Save File Save As Alt+Ctl+S Import from Device Shift+F3 Export to Device Shift+F4 Convect File F5 Print. Proview Page Setup Configuration Ctl+P File Properties I PROJECT RTK.tlsv Ext	<ul> <li>opens and saves a file</li> <li>imports and exports data from a device</li> <li>converts a file from one format to another compatible format<sup>a</sup></li> <li>prints information from an active file</li> <li>displays configuration parameters</li> <li>displays file properties</li> <li>displays recently accessed files</li> <li>closes Topcon Link</li> </ul>
Edit menu Undo Ctri+Z Redo Ctri+Y Cut Ctri+X Copy Ctri+C Delete Del Properties Ctri+Enter	<ul> <li>allows an undo or redo of the last operation</li> <li>cuts, copies, or deletes selected data</li> <li>adds a point</li> <li>displays the properties for selected data</li> </ul>
View menu voltar vol	<ul> <li>displays or hides the CAD view and/or layers view</li> <li>displays or hides the Topcon Link toolbar and/ or status bar</li> <li>sets the pan or zoom mode</li> <li>sets view options for the tabular and CAD views</li> </ul>
Add menu	• adds a point
Process menu Compute Coordinates F8 Process Properties Alk+Ctrl+P	<ul><li> computes coordinates</li><li> sets processing properties</li></ul>

Menu	Functions
Window menu           Close         Ctrl+F4           Close All         Ctrl+F4           Cascade         Tte VetCrafty           Title VetCrafty         Tte Horizontally           Arrange Conts         1 CAD View           V 2 CrifWr Data/PROJECT RTK.tBv< <topsurv job="" pc=""></topsurv>	<ul> <li>closes the current window or all open windows</li> <li>arranges open windows in a cascade (stacked) or tile (adjacent) order</li> <li>arranges icons</li> <li>shows all open windows, and selects a window to be active</li> </ul>
Help menu Context Help Feedback	<ul> <li>accesses the Topcon Link context help</li> <li>accesses customer feedback options for sending bug reports and questions to TPS support</li> <li>access the Topcon GPS website on the Internet</li> <li>access the Topcon University website on the Internet</li> <li>displays version, publisher, and build date information for Topcon Link</li> </ul>

Table 1-3. Topcon Link Menu Options (Continued)

a. Compatible formats - the formats containing the common data

### Toolbar

The toolbar for Topcon Link (Figure 1-11) contains buttons for frequently used functions.

Figure 1-11. Topcon Link Toolbar

Upon startup, the toolbar displays beneath the menu bar. To display or hide the toolbar, click View > Toolbar.

Table 1-4 describes the various buttons available on the toolbar.

#### Table 1-4. Topcon Link Toolbar Button Functions

Button	Description	
<b>A</b>	Open File – Opens an existing file.	
	1. Click the button to display the Open dialog box.	
	2. Navigate to and select the desired file.	
	3. Click Open.	

Button	Description
	Save – Saves a file to the current directory.
E	Save As – Saves the current file with a new name and/or in a new directory and/or to save in other compatible format.
<b>◆</b> ₽ <i>₽</i>	Import File from Device – Imports files from Topcon and Sokkia GPS+ receivers, Topcon memory cards, Topcon and Sokkia controllers, Topcon and Sokkia Total Stations (CE-based, robotic, conventional), or Topcon and Sokkia digital levels See Chapter 4 for details.
<b>8</b> *	Export File to Device – Exports data to a Topcon and Sokkia controller or Total Station and Sokkia (CE-based, conventional, robotic). See Chapter 8 for details.
87 10	Convert files between formats – Converts data in a file from one format to another compatible format. See "Converting A File" on page 5-2 for details.
6	Print – Prints the current window or table.
5	Undo – Reverses the last action.
2	Redo – Returns the last action.
Ж	Cut – Removes the selected object(s).
Ē	Copy – Copies the selected object(s).
° +	<ul> <li>Add point –Adds a point to the current file.</li> <li>1. Click the button to display the Add point dialog box.</li> <li>2. Enter the point name, coordinates, and codes for the new point.</li> <li>3. Click Ok.</li> <li>See "Add a Point" on page 6-2 for details.</li> </ul>
<b>a</b>	Zoom In – Changes the pointer to a magnifying wand for zooming in on a clicked area of the CAD view. You can also click and drag a square around the area to zoom in on.

Table 1-4. Topcon Link Toolbar Button Functions (Continued)

Button	Description
<u>_</u> Q	Zoom Out – Changes the pointer to a magnifying wand for zooming out on a clicked area of the CAD view. You can also click and drag a square around the area to zoom out on.
\$	Zoom back – Returns the CAD view to the previous zoom magnification.
<b>~</b>	Restore All – Fits all data in the active CAD view into the viewable extents of the view.
<u></u> শ্	Pan – Changes the pointer to a "hand" with which to "grab" and dynamically move the CAD view.
$\langle \mathcal{Q} \rangle$	CAD View – Available for TopSURV PC Jobs, displays design data (points, linework, roads, and surface).
	Compute coordinates of points – Calculates the point coordinates in the current file. See "Computing Point Coordinates for Raw Data and Field Software Files" on page 7-1 for more details.
<b>K</b> ?	<ul> <li>Context Help – Displays a pop-up tip with information about the selected view, button, field, etc.</li> <li>1. Click the button. The pointer changes to a question mark.</li> <li>2. Click the object you want additional information on. A pop-up tip gives further information.</li> <li>3. Click outside the pop-up tip to close it.</li> </ul>

Table 1-4. Topcon Link Toolbar Button Functions (Continued)

### **Status Bar**

The status bar (Figure 1-12 on page 1-18) displays:

- various informative messages about current Topcon Link activities and opened file.
- the information boxes provide quick information about the current linear/angular units and coordinate type/system used in the file. These boxes also provide drop-down lists for quickly

converting the linear or angular units used in the file, or the coordinate type or system used in the file.

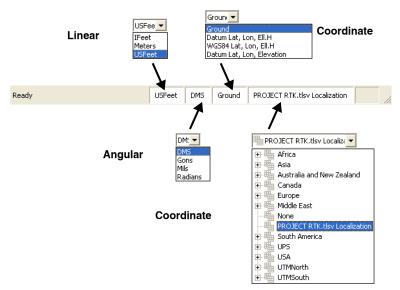


Figure 1-12. Topcon Link Status Bar

#### Topcon and Sokkia Device Directories in Windows Explorer

The Topcon Link installation process also installs device directories on the computer's hard drive (Figure 1-13). These directories are used to easily access data on a connected device for import/export activities.



#### Figure 1-13. Topcon Device Folders in Windows Explorer



On computers with Windows XP, the "Mobile Device" folder displays after installing Microsoft ActiveSync.

On computer with Windows Vista, the "Windows CE" folder automatically displays after connecting a external device with Windows CE.

This device directory displays the contents of the connected TPS controller or TPS CE-based total station.

After connecting a device to the computer, open Windows Explorer and navigate to the My Computer window. Click the device icon/ directory to transfer data files.



Because some devices require special settings or setups to use this feature, see the appropriate section in Chapter 2 for more details.

## Sending Feedback and Bug Reports to Topcon Support

The Feedback option in the *Help* menu offers a way to provide feedback and direct connection with the Topcon GPS website (http://www.topconpositioning.com/) and Topcon University website (http://

Help		
Context Help		1 3 3 3 8 87
Feedback	•	Send Bug Report
About Topcon Link		Question To Support
		Topcon on Web
		Topcon University

www.topconuniversity.com/):

These options require Internet access.

To send a bug report:

Click **Help** → **Feedback** → **Send Bug Report**. An email opens with short descriptions of the current version of Topcon Link and OS of the computer, and log files for Topcon Link are automatically attached. Describe activities being performed when the "bug" occurred and send the e-mail to TPS Support:

😫 Topcon Tools Log File - Message (Plain Text)		
· · · · · · · · · · · · · · · · · · ·		
🗄 🖃 Send   💂 🎒   🐰 🗈 隆   🎯   💷 & / 🔜 📍   🖉   🎽 Options A*   🎯 📑		
Elle Edit View Insert Format Iools Actions Help		
This message has not been sent.		
To =SMTP:topcontechnicalsupport@topcon.com <topcontechnicalsupport@topcon.com></topcontechnicalsupport@topcon.com>		
<u></u>		
<u>B</u> cc		
Subject: Topcon Tools Log File		
Attach MessageLog.xml (53 KB); MessageLog.xml.prev (51 KB) Attachment Options		
Enter you comment here  AppInfo: Topcon Link v.8 build data is Friday, July 30, 2010 Language: 0x409		
OS: Microsoft Windows XP Professional Service Pack 3 (Build 2600)		

Figure 1-14. Example E-mail for the Send Bug Report Option

To ask a question:

Click **Help** > Feedback > Question To Support. Enter any questions, describing activities in detail, and send the email to TPS Support:

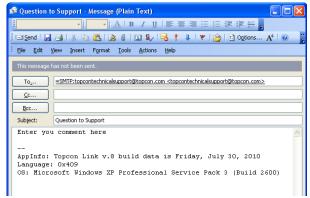


Figure 1-15. Example E-mail for the Question to Support Option

# **Notes:**

Topcon Link Reference Manual
TOPCON LINK Reference Manual
• •

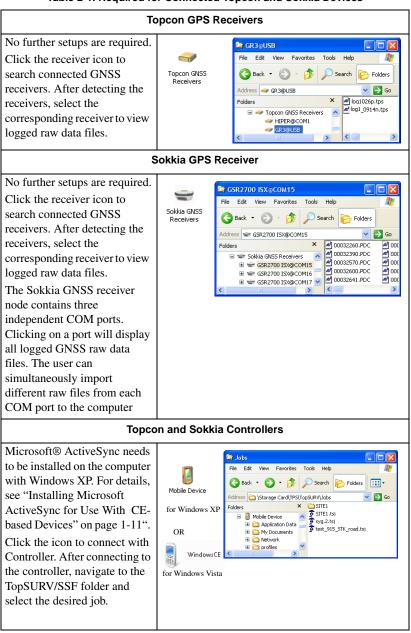
# Setting up Topcon Link for Transferring Data

Topcon Link provides two methods for transferring data between the computer and a connected device: via the Topcon Link interface or the installed directories in Windows® Explorer. See "Adding Devices" on page 2-1 for a quick look at what each device requires for data transfers.

- For Topcon and Sokkia Total Stations and Topcon and Sokkia Digital Levels, the instrument' information and connection parameters must be set up before it's files can be viewed. The instrument setup will only need to be done once per computer.
- For Topcon Memory Cards (flash cards used for data storage in a Topcon receiver), the card must be formatted before data can be recorded. The card will need to be formatted once.

# **Adding Devices**

Depending on the device, an initial device setup may be required before a successful data transfer can be completed. The following table briefly describes the setups required for transferring data between a computer and a connected device (Table 2-1 on page 2-2). See the sections below for specific details.



#### Table 2-1. Required for Connected Topcon and Sokkia Devices

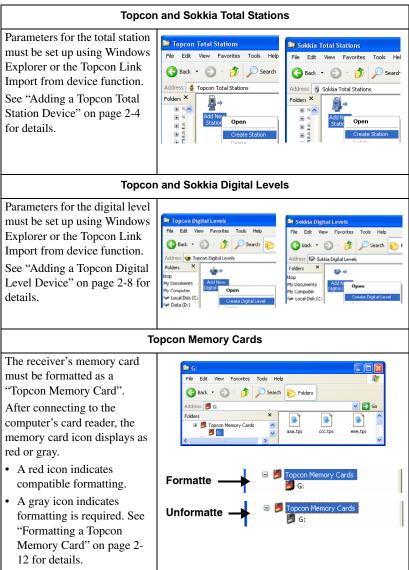


Table 2-1. Required for Connected Topcon and Sokkia Devices

#### **Adding a Topcon Total Station Device**

Before Topcon Link or Windows Explorer can read data on a Topcon Total Station, the device must be added to the directory.

- 1. Navigate to the *Topcon Total Station* directory (Figure 2-1 on page 2-4).
  - From Topcon Link Click File > Import from Device. In the left pane, double-click the *Topcon Total Station* directory.
  - From Windows Explorer Open the *My Computer* window. Double-click the *Topcon Total Station* directory.

The procedure will be the same whether using Topcon Link or Windows Explorer.

2. Double-click Add New Station (Figure 2-1).



😴 Import from Device		? 🛛
Look in: 🛛 🚦 Topcon Total Stations 💌 🗲 💼 🛒	Look in:	🔁 1 🔹 🗲 🖻 📸
Add New Station	>>> 🔁 1 2 2 3 3 4	☐ 77 ☐ 88 ☐ 99 ☐ 111
	<	
	Open Files after Import	
	Close	

Figure 2-1. Add a New Topcon Total Station

- 3. On the *General* tab, enter and select the following information (Figure 2-2 on page 2-5):
  - Name enter a unique name for the device
  - Notes enter any necessary notes
  - Port select the COM Port the device typically connects to
  - Model enter the model number

4. On the *Advanced* tab, select the baud rate, parity, data bits, stop bits, and protocol used for communication with the Total Station (Figure 2-2). Refer to the Topcon Total Station operator's manual for details.

<b>Create Station</b>				
General Advan	ced			
Name:	GPT3005W T	Create Station		
Note:		General Advar Baudrate:	nced    9600 -	
Port:	СОМ1	Parity:	None	
Model:	GPT-2000	Data bits:	8	
		Stop bits:	1	
		Protocol:	ACK/NACK	
	OK Cancel			
			OK Cancel Ap	ply

Figure 2-2. Enter Topcon Total Station Device Information

5. Click **OK** to save device information to the computer.

When connecting to this device, you will select the created device and then follow the instructions on the Total Station.

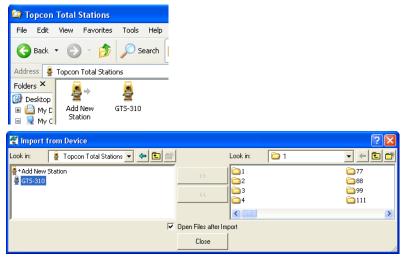


Figure 2-3. Created Topcon Total Station

### **Adding a Sokkia Total Station Device**

Before Topcon Link or Windows Explorer can read data on a Sokkia Total Station, the device must be added to the directory.

- 1. Navigate to the *Sokkia Total Station* directory (Figure 2-1 on page 2-4).
  - From Topcon Link Click File > Import from Device. In the left pane, double-click the Sokkia Total Station directory.
  - From Windows Explorer Open the *My Computer* window. Double-click the *Sokkia Total Station* directory.

The procedure will be the same whether using Topcon Link or Windows Explorer.

2. Double-click Add New Station (Figure 2-1).

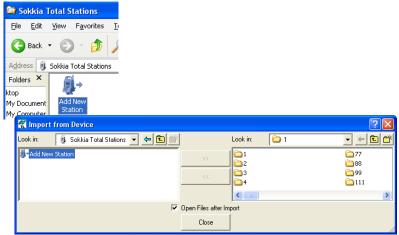


Figure 2-4. Add a New Sokkia Total Station

- 3. On the *General* tab, enter and select the following information (Figure 2-2 on page 2-5):
  - Name enter a unique name for the device
  - Notes enter any necessary notes
  - Port select the COM Port the device typically connects to
  - Model enter the model number
  - SRD Format -select the corresponding format for your device from the SDR 20 and SDR 33 formats:

4. On the *Advanced* tab, select the baud rate, parity, data bits, stop bits, and set checksum (*Set* or *Not Set*) and flow control (*None* or *Xon/Xoff*) used for communication with the Sokkia Total Station (Figure 2-2). Refer to the Sokkia Total Station's documentation for details.

<b>Create Station</b>		Create Station		×
General Advar	ced	General Advar	nced	
Name:	SET630RK3	Baudrate:	9600 💌	
Note:		Data bits:	8	
NULE.		Parity:	None	
Port:	COM1 💌	Stop bits:	1	
Model:	Series 30RK	Checksum:	Not set	
SDR Format	SDR 33	Flow control:	None	
	OK Cancel Apply		OK Cancel Apply	

#### Figure 2-5. Enter Sokkia Total Station Device Information

5. Click **OK** to save device information to the computer.

When connecting to this device, you will select the created device and then follow the instructions on the Sokkia Total Station.

😂 Sokkia To	tal Stations								
File Edit 1	view Favorites	Tools	Help						
G Back 🝷	ی خ	🔎 Se	arch 🙀						
Address 👸 S	okkia Total Statior	ns							
Folders × ktop My Document My Computer	JJ→ Add New S Station	J ET630RK3							
in a comparison	🐖 Import from	n Device							
	Look in: 🛛 🕖	Sokkia To	tal Stations	• 🗢 🗈	<b>M</b>		Look in:	<b>D</b> 1	
	Ø → Add New Stat	ion				**	1 2 3 4		277 288 299 2111
					V 00	ien Files after Im			
					ie op	Close	pon		
						CIUSE			

Figure 2-6. Created Sokkia Total Station

#### **Adding a Topcon Digital Level Device**

Before Topcon Link or Windows Explorer can read data on a Digital Level, the device must be added to the directory. Topcon Link supports the following Topcon Digital Level types: DL-101C, DL-502, DL-503. Refer to the digital level operator's manual for connecting the computer and device.

- 1. Navigate to the *Topcon Digital Level* directory (Figure 2-7).
  - From Topcon Link Click File ▶ Import from Device. In the left pane, double-click the *Topcon Digital Level* directory.
  - From Windows Explorer Open the *My Computer* window. Double-click the *Topcon Digital Level* directory.

The procedure will be the same whether using Topcon Link or Windows Explorer.

2. Double-click Add New Digital Level (Figure 2-7).

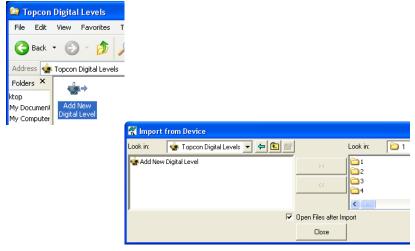


Figure 2-7. Add a New Topcon Digital Level

- 3. On the *General* tab, enter and select the following information (Figure 2-2 on page 2-5):
  - Name enter a unique name for the device
  - Model select the desired Digital Level model
  - Port specify the COM Port the device typically connects to

• Baud rate and Parity – select the baud rate and parity used for communication with the Digital Level.

Create Digital Level	
General	Topcon DL-101C
Name:	Topcon DL-101C Topcon DL-502 Topcon DL-503
Model	
Port: Baudrate: COM1	
Parity: Even	
OK Cancel A	עוקנ



4. Click **OK** to save the device information to the computer.

When connecting to this device, you will select the created device and then follow the instructions on the Topcon Digital Level.

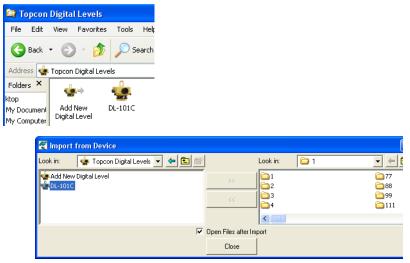


Figure 2-9. Created Topcon Digital Level

### **Adding a Sokkia Digital Level Device**

Before Topcon Link or Windows Explorer can read data on a Digital Level, the device must be added to the directory.

- 1. Navigate to the Sokkia Digital Level directory (Figure 2-7).
  - From Topcon Link Click **File** ▶ **Import from Device**. In the left pane, double-click the *Sokkia Digital Level* directory.
  - From Windows Explorer Open the *My Computer* window. Double-click the *Sokkia Digital Level* directory.

The procedure will be the same whether using Topcon Link or Windows Explorer.

2. Double-click Add New Digital Level (Figure 2-7).

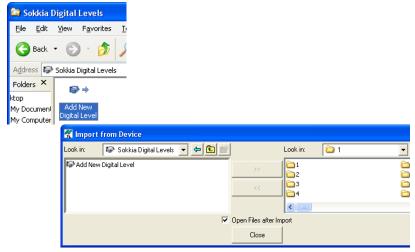


Figure 2-10. Add a New Sokkia Digital Level

- 3. On the *General* tab, enter and select the following information (Figure 2-2 on page 2-5):
  - Name enter a unique name for the device
  - Note enter any necessary notes
  - Port select the COM Port the device typically connects to
  - Model enter the model number
  - SDR Format select the corresponding data format for your device from the SDR20 and SDR 33 formats

4. On the *Advanced* tab, select the baud rate, parity, data bits, stop bits, and set checksum (*Set* or *Not Set*) and flow control (*None* or *Xon/Xoff*) used for communication with the Sokkia Total Station (Figure 2-2). Refer to the Sokkia Digital Level's documentation for details.

Create Digital	Level 🔀	Create Digital	Level	×
General Adva	nced	General Adva	nced	
Name:	SDL30	Baudrate:	9600 💌	
Note:		Data bits:	8	
140(6.		Parity:	None	
Port:	COM1	Stop bits:	1	
Model:	SDL30	Checksum:	Not set	
SDR Format	SDR 33	Flow control:	None	
	OK Cancel Apply		OK Cancel Apply	

Figure 2-11. Enter Sokkia Digital Level Device Information

5. Click **OK** to save the device information to the computer.

When connecting to this device, you will select the created device and then follow the instructions on the Sokkia Digital Level.

😂 Sokkia D	igital Levels							
<u>F</u> ile <u>E</u> dit	<u>V</u> iew F <u>a</u> vorite	es <u>T</u> ools						
G Back 🔹		5 🔎 Se						
Address 🚱	Sokkia Digital Lev	/els						
Folders × ktop	<b>8</b> ≱⇒	6						
My Document My Computer	Add New Digital Level	SDL30						
stanting l	🗑 Import fro	om Device						
	Look in: 🛛 🖡	🎐 Sokkia Digita	I Levels 🔻 🤇	🛍 🖻 🖻		Look in:	i 🔁 🔁	•
	Add New Dig SDL30	jital Level			>>	1 2 3		67 68 69
						4		i 1
				~	Open Files after Im	port		
					Close			

Figure 2-12. Created Sokkia Digital Level

#### **Formatting a Topcon Memory Card**

Before Topcon receiver can record data to a Topcon Memory Card the card must be formatted. Formatting a Topcon Memory Card prepares it for data recording.

- A card removed from a Topcon receiver has already been formatted. The device icon is red.
- A card from another device will need to be formatted before being used with a Topcon receiver. The device icon is gray



#### Formatting an SD card will erase all data.

.If a Topcon Memory Card is already installed in a Topcon receiver, the device will have formatted the card. For some devices—such as the GR-3 and NET-G3—the card can be manually inserted and removed. While cards typically remain in the receiver once inserted, it can be removed for accessing via a card reader connected to the computer. The length of time required to format a card depends on the size of the card and the device formatting the card. For example, Topcon Link formats a card in a couple of minutes while the GR-3 can take around half an hour.

- 1. Navigate to the Memory Card device directory (Figure 2-13 on page 2-13).
  - From Topcon Link Click File > Import from Device. In the left pane, double-click the *Topcon Memory Card* directory.
  - From Windows Explorer Open the *My Computer* window. Double-click the *Topcon Memory Card* directory.

The procedure is the same whether using Topcon Link or Windows Explorer.

2. Right-click the gray card icon and click **Format** to format the flash card for access by Topcon programs (Figure 2-13 on page 2-13).

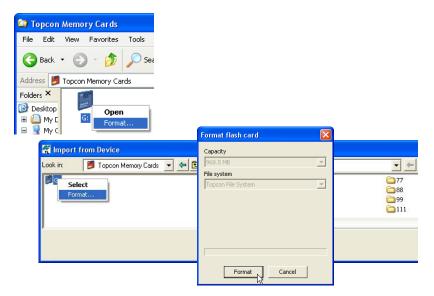


Figure 2-13. Format Memory Card

When selecting a formatted memory card device, you will view its data in the corresponding screen/pane.

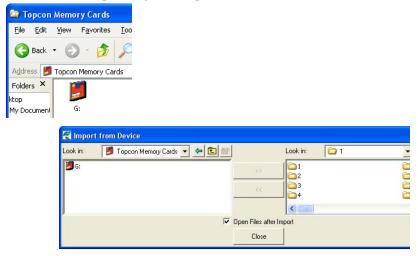


Figure 2-14. Formatted Memory Card Device

# **Adding a Geoid**

When working with data in Topcon Link, a geoid may be required to ensure correct elevation of the GPS network points. A geoid transforms the ellipsoidal heights measured by GPS to heights based on a physical reference surface. When working with coordinate data, you may want add a geoid, or you can create a regional geoid



Make sure:

- The geoid used to take point measurements is loaded into Topcon Link before opening a file

- The geoid covers the area where file's points are located

- The geoid used to take point measurements is loaded into Topcon Link before opening a file.

The orthometric heights will be equal to ellipsoidal heights if a geoid file is not downloaded to Topcon Link and/or the geoid does not cover the area where file's points are located and/or if the geoid used to take point measurements is missing.

- 1. Click **File ► Configuration** and click **Coordinate Systems** in the menu tree.
- 2. Click Add.

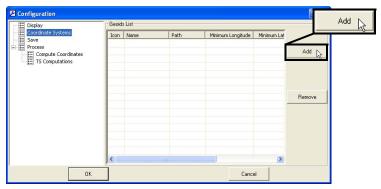


Figure 2-15. Add Geoid

- 3. Navigate to the location of the geoid and select the format of the geoid.
- 4. Select the desired geoid and click **Open**.

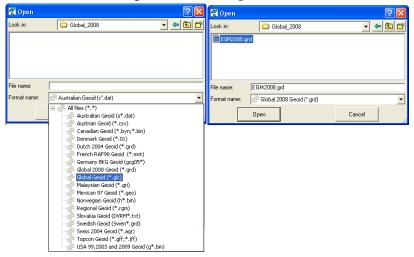


Figure 2-16. Select Geoid Format and Geoid



To add a geoid to Topcon Link, select ONLY corresponding formats in the Format name field

5. Repeat these steps for any other geoids. The geoids will be listed in the right pane (Figure 2-17).

Display Coordinate Systems Save Process		Setup Conversion Geoids List							
E Process	I	Name	Path	Minimum Longit	Maximum L				
TS Compute Coordinates		EGM2008	D:\Geoids\Glob	180°00'00.000	180°00'00.	Add Remove			
	<								

Figure 2-17. Added Geoids

- 6. Any Geoid from the list will be automatically used when Topcon Link opens files.
- 7. Click **OK** to save the configuration and exit.

#### **About Geoids**

A geoid model is used to transform the ellipsoidal heights measured by GPS (purely geometrical) to heights that are based on a physical reference surface, such as mean sea level. Over small regions there is little difference between the two reference surfaces, but for large projects the differences may be unacceptable. Working with a geoid model when surveying with GPS will ensure proper point measurements.

Geoid models for the United States have been developed by the National Geodetic Survey (NGS). The most recent model is called Geoid 2003. To keep the file size smaller, the continental United States is divided into a grid with eight zones; each zone has a geoid. Use Figure 2-18 to help you determine the geoid file to use for your project. For Geoid 2003, the files are numbered "g2003u01" to "g2003u08" to correspond to grids 1 to 8. For other regions, or if you have questions, contact your local representative or Topcon Support.

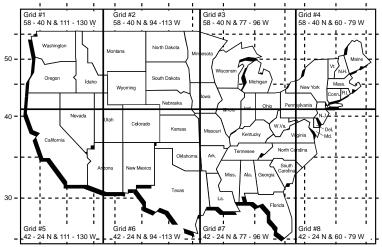


Figure 2-18. Geoid Grid Example – Approximate Grid for US

Using Topcon Link, you can create a Topcon geoid file for a specific area from a supported geoid model, and then export the file into Field Software Jobs. See "Geoid File Conversion Parameters" on page 5-20 for file conversion details.

#### **Creating a Regional Geoid Model**

If geoid heights (the differences between ellipsoidal and orthometric heights) for the nodes of a regular grid are known, you can create a Regional Geoid Model File (\*.rgm). After creating the file, use Topcon Link to convert the regional geoid model file to a Topcon geoid file (\*.gff).

To create a regional geoid model file, do the following steps:

- 1. Open an ASCII text editor (such as Notepad).
- 2. Enter geoid heights in the format shown in Table 2-2, where each row in the table corresponds to a line in the file. See below for a description of the fields in this format.

Format Fields	Example
LAT, LON, n_row, n_column, step_lat, step_lon, geoid_direction, ellipsoid;	40 30 10, -4 30 00, 3, 5, 2 00, 2 00, NE, WGS84;
H1 H2 H3 H4 H5	1.1 6.6 11.11 16.16 2.2
H6 H7 H8 H9 H10	7.7 12.12 17.17 3.3 8.8
H11 H12 H13 H14 H15	13.13 18.18 4.4 9.9 14.14

Table 2-2. Regional Geoid Model Format

- 3. Save the file with an ".rgm" extension.
- 4. Open Topcon Link and convert the regional geoid model file to a Topcon geoid file. See "Converting A File" on page 5-2 and "Geoid File Conversion Parameters" on page 5-20 for details.

The fields in the regional geoid model format

correspond to the following information:

• LAT, LON – latitude (GG MM SS) and longitude (GG MM SS) of the start point for the Regional Geoid Model

- Latitudes are positive for the Northern Hemisphere.

- Longitudes are positive for the Eastern Hemisphere.

Enter latitudes and longitudes in this format: dd\* mm' ss"

- n\_row the number of rows in the file
- n\_column the number of columns in the file
- step\_lat grid step along parallels (MM SS)
- step\_lon grid step along meridians (MM SS)
- geoid\_direction direction for entering geoid heights along the grid (Table 2-3)

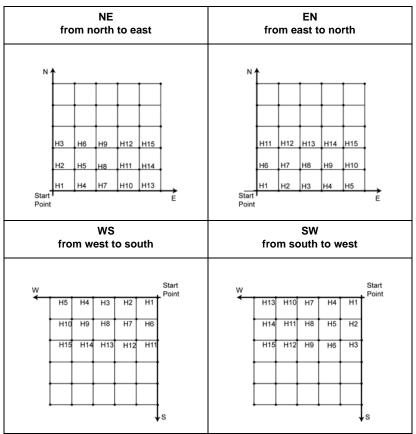


Table 2-3. Direction For Entering Geoid Heights

- ellipsoid the ellipsoid type that the given regional geoid is based on
- H1,H2... geoid height in the node (meter)

# **Notes:**


# File Operations and Data Views

Topcon Link works with individual data formats rather than importing data into an application-based, project-style file. This feature allows Topcon Link to provide robust import/export and conversion utilities for multiple data types, as well as the ability to work with a data type in its native format. To this end, Topcon Link uses standard file opening/closing and saving operations. Most files can be opened, saved, and closed. However, a few formats may need to be converted before opening and working with the data, or converted to another format before saving changes.

- See "File Operations" on page 3-2 for details on opening/closing files, and for details on setting file properties and printing.
- See "Saving the File as Another Format" on page 3-12 for details on saving proprietary or device-specific formats.

Topcon Link includes a standard configuration for viewing data, such as distance precisions, applicable coordinate systems, and computation parameters. To change any of these settings, see "Applying Configuration Parameters" on page 3-15.

The Tabular view initially contains default data columns and settings for viewing and working with data. The CAD view can display information for data points. These columns and settings can be shown/hidden or re-arranged.

- See "Setting Tabular View Options" on page 3-19 for details on setting up data columns for the different tabs.
- See "Setting CAD View Options" on page 3-26 for details on viewing data information in the CAD view.

# **File Operations**

Topcon Link uses standard file opening/closing and saving operations for all file types. A properties feature allows job and company specific information to be saved with the file. The selected view can be printed for further study.

## **Opening a File**

Because Topcon Link is a utility program that works with various file types, it does not have a type of file specifically associated with this software. Some types of files can be directly opened in Topcon Link. Table 3-1 lists the file types that Topcon Link can open.

File Type	Format Extensions
Code Library	*.las; *.dbf; *.tdd; *.xml
Coordinates	*.sdr; *.pt3; *.mgn; *.txt; *.xml; *.cr5; *.csv; *.xyz; *.fc4; *.pnt; *.fc5; *.rw5; *.*
Digital Level Observations	*.sdr;*.dl;*.lev;*.txt
GPS+ Raw Data	*.sdr; *.pdc; *.tps; *.jps; *.tpd; *.??O; *.??D; *.??G; *.??N; B*.*; *.lb2; *.mdb; *.m00; *.sbf; *dat
Field Software Jobs	*.tsj; *.tlsv
Total Station Observations	*.sdr;*.dat; *.raw; *.fc5; *.gts; *.gt6*, gts6; *.gts7; *.gt7; *.*; *.xml

Table 3-1. File	Types th	at can be	Opened
-----------------	----------	-----------	--------

Other file types must be converted first before Topcon Link can read the data. See Chapter 5 for details.

- 1. Open Topcon Link and click **File > Open File**.
- 2. Select the file format.
- 3. Navigate to and select the file to open.
- 4. If needed, select desired Advanced Options
- 5. Click Open.

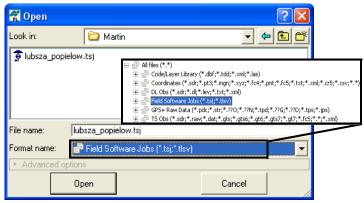


Figure 3-1. Select Format and File to Open

#### Creating a Custom Text File Format for a Coordinate File

To open or save a file of arbitrary coordinate format, you can create and save a custom format. A custom text format allows you to customize the data included in the coordinate file. Text formats are saved as an ASCII format (\*.txt, \*.csv, etc.).

To create an arbitrary text coordinate file, take the following steps:

- 1. Click **File ▶ Open File**.
- 2. On the *Open* dialog box, navigate to and select a desired coordinate file in the File name field.
- 3. On the *Open* dialog box, select the Custom text format from the list of coordinate formats in the *Format name* field. Click **Open**.
- 4. On the Custom format properties dialog window select the delimiter that separates data in a line and the coordinate system used to create the data.



Do not use the "Space" delimiter if the file contains codes with attributes.

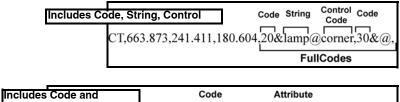
- 5. Select data types for the custom format:
  - In the left column, select the data type(s) to include and click the **Move Right** button.
  - In the right column, use the **Move Up/Move Down** button to arrange the data types into the same order used in the opened file.

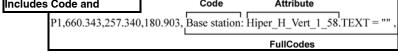
NOTICE

Always include "PointNum" in the right column and always have it as the first data type. If including "FullCodes" in the right column, always have it as the last data type.

- 6. Select the rule(s) to use for displaying data:
  - Ignore first line if the first line if informational only.
  - FullCodes include Code, String and ControlCode if these codes are included as shown in Figure 3-2 on page 3-4.
  - FullCodes include Code and Attribute if these codes are included as shown in Figure 3-2.

If the custom format has mixed FullCodes, select both options.







- 7. Enter a name for the format and an extension type.
- 8. Click **Ok** to store the format in the Formats folder (installed with Topcon Link) and include it in the format name list. This format is added to the list of coordinate formats for *Open*, *Save As* and *Convert File* dialog boxes.

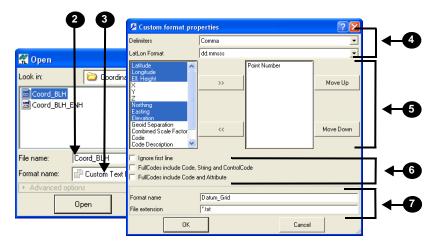


Figure 3-3. Create Custom Text Coordinate Format (new picture with Code Description)



Topcon Link applies the default file name, UnName\*.\*, if no file name accompanies the new coordinate file format. In this case, Topcon Link deletes the created file format when closed.

As a rule any coordinate file format (and Custom file format too) does not contain information about the coordinate system and linear units. These files contain ONLY the values of coordinates. To open the point coordinates in the corresponding coordinate system, the user has to:

- know the coordinate system / projection, and linear unit,
- select this coordinate system / projection and corresponding linear unit as current before importing using *Advanced Option* in the *Open* dialog window:

😭 Open		? 🛛		
Look in:		1		
1 2 3 4		<ul> <li>☐ 77</li> <li>☐ 88</li> <li>☐ 99</li> <li>☐ 111</li> </ul>		
<		>		
File name:	lubsza_	popielow.tsj		
Formet nam		ne,N.E.Z.Code - Coordinates (*.csv)		
<ul> <li>Advanc</li> </ul>	ed options	)		
Metric unit:		Meters		
Coordinate type:		Ground or Localization		
Coordinate system: None				
Point type:		Design		
	Open	Cancel		

Figure 3-4. Using Advanced Option for Coordinates File

The coordinate custom text format allows one to insert different types of coordinates (Latitude/Longitude/Height or/and Norhing/Easting/ Ortho Height or/and XYZ) into this format (see Figure 3-3 on page 3-5). If the user selects several coordinate types for the created format, the coordinate file will have the following form:

 Base,54.532100302,38.472078683,127.472,6085019.206,486466.725,127.472,137.286

 Name
 Latutude
 Longitude
 Height
 Northing
 Easting
 Ortho Height
 El Height

To correctly open this file in Topcon Link, the user has to select the desired coordinate type and corresponding projection/datum.

If the user (before importing) selects the given Grid coordinate system, the *Points* tab will display the Grid coordinates. But if the user selects the given datum, the *Points* tab will display the Latitude/ Longitude/Height coordinates (Figure 3-5 on page 3-7).

🗖 D:\C	D:\Coordinate Files\Coord_BLH_ENH <datum_grid -="" coordinates=""> 🔲 🗖 🔀</datum_grid>								
•° Poir	nts								
Icon	Name	Grid Northing (m)	Grid Easting (m)	Elevation (m)	Code	Note			
<b></b>	Base	6085019.206	486466.725	127.472					
									_
<			File name:	Coord_BLH_ENH					
			Format name:	🗗 Datum_Grid - C	oordinates	(*.txt)			-
			<ul> <li>Advanced of</li> </ul>	options					
			Metric unit:	Meters					•
			Coordinate type	e: Grid					-
			Projection:	Zone_	7 : 36E to 4	2E	•	Custom	
			Datum:	SK42					~
			Point type:	Design					•
				Open			Cancel		

#### For Grid Coordinate System

For Datum Coordinate System

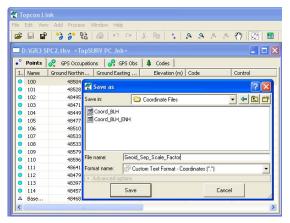
🗖 D:\Ce	oordinate	Files\Coord_BLH	i_ENH <datum_< th=""><th>Grid - Coordinates &gt; 🔳 🗖</th><th><math>\mathbf{X}</math></th></datum_<>	Grid - Coordinates > 🔳 🗖	$\mathbf{X}$
•° Poir	nts				
Icon	Name	Latitude	Longitude	Ell.Height (m) Code Note	
<b></b>	Base	54.532100302N	38.472078683E	137.286	
			File name: Formal name: Advanced of Metric unit: Coordinate type Datum: Point type:	Meters	Lancel

#### Figure 3-5. Examples of Opening Custom Text file with sets of coordinate system

Using the coordinate custom text format the customer can save the Geoid Separation and Combined Scale Factor for the opened Field Software Job. To do this, take the following steps:

- 1. Add the Geoid used in the Field Software Job to Topcon Link
- 2. Open the corresponding Field Software Job

3. Click File > Save As, select *Custom Text Format* and click Save



4. Select the *Geoid Separation* and *Combined Scale Factor* in the *Custom Format Properties* window. After clicking **OK** Topcon Link creates a text file that contains the corresponding values of these parameters (Figure 3-6).

🖉 Custom format pro	perties 💽 🗙	Base2	9 815 1	1.000019302671
Delimiters	Comma 💌	Dubbe	,0.010,	1.000010002011
LatLon Format	dd.mmsss 💌	Name	Geoid	Combined Scale Factor
Latitude Longitude Height X	Point Number Geoid Separation Combined Scale Factor Move Up	Name	Separation	

# Figure 3-6. Examples of creating a text file with Geoid Separation and Combined Scale Factor



Topcon Link creates a file with Geoid Separation and Combined Scale Factor, but does not display them in the opened file. To view and edit these parameters use any text editor.

#### **About Opening TS Raw Data Files**

While a TS raw data file does not record information about the vertical angle mode (Figure 3-7 on page 3-9), you can select the mode under Advanced options when opening the file in Topcon Link.

- Zenith vertical angles are from zenith
- Horizontal Level vertical angles are from horizontal level
- Auto no information available on the vertical angle mode. In this case, angles from 0 to 45° are considered "horizontal" and angles more than 45° are considered "zenith."

If vertical angles measured in a TS raw data file exceed 45°, select the same mode used for these measurements when opening the file. If a different mode or "Auto" is selected, the TS Obs tab will display measurements in the wrong column: - the Vertical Angle column will display values read from zenith - the Zenith Angle column will display values read from horizontal level

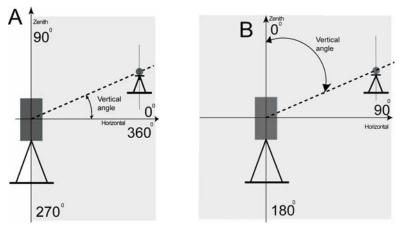


Figure 3-7. Vertical Angle from Horizontal Level (A) and Zenith (B)

#### **Creating a Custom Text File Format for TS Observation file**

To open or save a file of arbitrary TS observation format, you can create and save a custom format. A custom text format allows you to customize the data included in the TS observation file. Text formats are saved as an ASCII format (\*.txt, \*.csv, etc.).

To create an arbitrary text TS observation file, take the following steps:

- 1. Click **File ▶ Open File**.
- 2. On the *Open* dialog box, navigate to and select a desired TS observation file in the *File name* field.
- 3. On the *Open* dialog box, select the Custom text format from the list of TS observation formats in the Format name field. Click **Open**.
- 4. On the Custom format properties dialog window select the delimiter that separates data in a line
- 5. On the Custom format properties dialog window select data types for the custom format:
- 6. In the left column, select the data type(s) to include and click the **Move Right** button.
- 7. In the right column, use the **Move Up/Move Down** button to arrange the data types into the same order used in the opened file.
- 8. Enter a name for the format and an extension type.
- 9. Click **Ok** to store the format in the Formats folder (installed with Topcon Link) and include it in the format name list. This format

are added (will be added) to the list of TS observation formats for *Open*, *Save As* and *Convert File* dialog boxes.

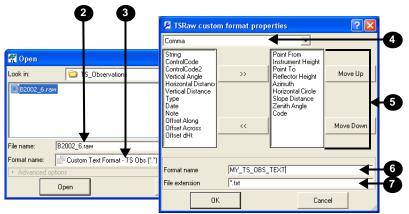


Figure 3-8. Create Custom Text TS Obs Format

#### **Saving a File**

Topcon Link opens and imports many files types, but only saves certain file types in a native Topcon format.

When saving a file that has been edited, Topcon Link automatically saves the original version of the file as "\*.\*.initial" in the current folder. Then the edited file is saved.

Use one of the following methods to save a file:

- Click the Save button on the Toolbar.
- Click File > Save File.
- Press Ctrl+S on the keyboard.

An error message displays if the format is not supported for a save operation.

#### **Saving the File as Another Format**

Topcon Link allows one to save the current file with a new name and/ or in a new directory and/or to save in other format. Saving a file in another format uses the same process as a file conversion. Topcon Link allows the user to save files only to compatible formats (the formats with the common data).

For details on converting files, see Chapter 5.



Use the **Save As** function to keep versions of the same file to show progress. Simply add the date or other indicator to the file name.

- 1. With the desired file open and active, click **File > Save As**.
- 2. Navigate to the location in which to save the file.
- 3. Type in a name for the file.
- 4. Select the format to save to.



Topcon Link will display only compatible formats in the File format field of the **Save As** dialog box.

5. If selecting a different format from the current format, select applicable *Advanced Options*.

For details on the advanced options, see the applicable section in "Converting A File" on page 5-2.

#### 6. Click Save.

Save in:       Image: boot test         Save in:       Image: boot test         Image: boot test       Image:	□       All files (*.*)         □       □      <
File name: Point_From_TS	
Format name: 🗗 Name, N, E, Z, Code - Co	ordinates (*.csv)
Advanced options	
Save	Cancel

Figure 3-9. Save File As...

#### **Closing a File**

To close a file without closing Topcon Link, click the system close button on the Tabular View.

						Close File using System Button on		
1 D	:\GR3	SPC2.tlsv <topsurv< th=""><th>PC Job&gt;</th><th></th><th></th><th></th></topsurv<>	PC Job>					
°.	Points	GPS Occupations	🛛 🤗 GPS Obs 🗎 🌲 Co	odes				
Ι	Name	Ground Northing (m)	Ground Easting (m)	Elevation (m)	Code	Control 🔥		
•	100	48504.712	558493.854	241.454		None		
•	101	48528.871	558538.139	241.541	NAIL	None		
0	102	48495.387	558504.973	240.897	OAK	None		
0	103	48471.950	558478.170	240.765	NAIL	None		
0	104	48449.896	558462.055	241.202	NAIL	None		
<u> </u>	105	48477,868	558456.783	241.856	NAIL	None		

Figure 3-10. Close File

While several files can be open at the same time, it may take longer for Topcon Link to read or compute data if the files have a lot of data. Closing a file before opening another may speed up computations.

#### **Viewing and Entering File Properties**

The *Properties* dialog box is used for viewing and entering filespecific information. This dialog box also includes the location of the file, file type, and date the file was last saved.

- 1. Click **File ▶ File Properties**.
- 2. View the path and format of the file.
- 3. For some file types, you can type in a name for the job, the name of the surveyor or company, and any associated notes.
- 4. Click **OK** to save and exit.

Field Software Job File

	Properties : Field Software Jobs D:		
	General		
	File Name	D:\Road_Long_Sec-1.tsj	
Divited Level File	Format	TopSURV 7 Job	
Digital Level File	Date	7/7/2009 3:51:52 PM	
Properties : DL Obs C:\topcon\Top ? 🔀	Job	Road_Long_Sec-1	
General	Surveyor	John Q.Public	
File Name C:\topcon\TopconLink\DigitalLevel\37w	Note	Foe Demonstration	
Format Topcon DL Obs	Note		
OK 🔓 Cancel Apply	ОК	Cancel Apply	

Figure 3-11. File Properties – Examples

## **Printing the Selected View**

The Tabular and CAD views in Topcon Link can be printed for viewing offline.



Some views print best with a landscape orientation. Use the **File** > **Page Setup** option to apply page and margin settings. Use the **File** > **Print Preview** option to view the potential result of the selected view.

To print the Tabular view, select the tab and click **File > Print**.

To print the CAD view, select the CAD view and click **File > Print**.

# Applying Configuration Parameters

Configuration parameters apply basic settings for such items as how to display angles and the decimal for digits, the coordinate systems available and adding a geoid, and the settings to use for adjustments. These parameters will be saved with Topcon Link and used when opening a file. The default configuration is usually appropriate for most operations.

- 1. Open Topcon Link and click **File > Configuration**.
- 2. In the *Display* pane, select the following parameters for displaying information (Figure 3-12 on page 3-16). Click **Ok** to save and exit.
  - In the *Precisions* tab, select the number of digits to display after the decimal for measurements.
  - In the *Time* tab, select the GPS time zone offset and automatic fixing clock for daylight saving changes
  - In the *Roads* tab, select the term to use for displaying information on the centerline; either *Chainage* or *Station*.
  - In the *Angles* tab, select the form for displaying angles and latitudes/ longitudes.

Daylight Saving Time	(GMT) Monrovia, Reyk (GMT) Casablanca	an Time : Dublin, Edinburgh, Lisb an Time : Dublin, Edinburgh, Lisb javik : Bratislava, Budapest, Liubliana	on, London 🔼	
	Display CL Pos as	Chainage Chainage Station		
		Precisions Time Angles Lat,Lon	Roads Angles dd*mm'ss.s*'	<u>-</u>
Save	nate Systems	Precisions Time R Digits after decimal Distances Coordinates (N.E.X.Y.Z) Heights Angles (seconds) Angles (dec. degrees) Lat.Lon (dec. degrees) Area Time (seconds)	3       3       3       4       7       5       8       2       0	

Figure 3-12. Select Display Parameters

3. The *Coordinate System* item displays the *Setup* and *Conversion* tabs in the right pane. In the *Setup* pane the user can view, add, or remove available geoid file (Figure 3-13). Click **Ok** to save and exit.

Display     Coordinate Systems     Save     Process		Geoids List					
E Save	I	Name	Path	Minimum Longit	Maximum L		
Compute Coordinates		EGM2008	D:\Geoids\Glob	180°00'00.000	180°00'00.	Add Remove	
ОК	<		Tel.	Cance	<u>&gt;</u>		

Figure 3-13. Select Geoid

To add a new Geoid to the list, see "Adding a Geoid" on page 2-14.

The *Conversion* tab allows one to select the way of transformation between NAD27 and NAD 83 datums. The user can apply:

parameters of the NAD27 from Topcon Link database

or

the Federal standard for NAD 27 to NAD 83 datum transformations – NADCON program

Configuration			? 🛛
Display Coordinate Systems Save E Process	Setup Conversion	NAD27 Datum NAD27 Datum NADCON	<b>_</b>

#### Figure 3-14. Job Configuration, Coordinate systems – Conversion Tab

- 4. In the *Save* pane, select the interval in minutes for saving a backup copy of the current file (Figure 3-15). Click **Ok** to save and exit. Topcon Link uses the following rules for saving/deleting backup copies:
  - The file will be saved at the selected interval.
  - If the file has been edited, a backup copy is automatically saved.

- After saving the file (either click **Ctrl+S**, click on the **Save** button, or click **File** ▶ **Save/Save As**), the backup copy is deleted. A new backup copy is saved when at the end of the next time interval.
- Type "0" into the field to turn off the backup save feature.
- If Topcon Link (or the system) shuts down unintentionally, the backup copy of the current files opens and is marked "reserved".

Z Configuration			? 🛛
Coordinate Systems Coordinate Systems Process Compute Coordinates TS Computations	Backup Interval (min)	10	
OK			Cancel

Figure 3-15. Select File Backup Properties

- 5. In the *Process Compute Coordinates* pane (Figure 3-16), type in distance and angle measurement errors to take them into account when computing the coordinates of station using directions observed from the station to points of known positions (resection method). Click **Ok** to save and exit.
- 6. In the *Process TS Computations* pane, select the refraction coefficient to be applied to total station observations during

calculation of the coordinate (Figure 3-16). Click **Ok** to save and exit.

Configuration		
Display Coordinate Systems Save Process Compute Coordinates TS Computations	EDM 3 HA Sigma, (sec) VA Sigma, (sec)	mm + 3 ppm 5 10
Configuration	/stems	Petraction Coefficient C 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

Figure 3-16. Set Processing Properties

## **Setting Tabular View Options**

Topcon Link displays data in two views, a tab view and a CAD view. The Tabular view groups data based on type and displays the information in a series of tables on different tabs (Figure 3-17).

Point	s 🔗 GPS Occupations	🤗 GPS Obs 🛛 🎄	Codes					
. Name	Ground Northing (m)	Ground Easting (m)	Elevation (m)	Code	Control	Layer	Color	Point Symbol
100	48504.712	558493.854	241.454		None	BYCODE(0)	BYLAYER	BYLAYER •
101	48528.871	558538.139	241.541	NAIL	None	BYCODE(0)	BYCODE	BYCODE •
102	48495.387	558504.973	240.897	OAK	None	BYCODE(0)	BYCODE	BYCODE •
103	48471.950	558478.170	240.765	NAIL	None	BYCODE(0)	BYCODE	BYCODE •
104	48449.896	558462.055	241.202	NAIL	None	BYCODE(0)	BYCODE	BYCODE •
105	48477.868	558456.783	241.856	NAIL	None	BYCODE(0)	BYCODE	BYCODE •
106	48510.467	558420.547	243.202	NAIL	None	BYCODE(0)	BYCODE	BYCODE •
107	48533.973	558410.945	242.365	MH	None	BYCODE(0)	BYCODE	BYCODE •
108	48533.069	558408.860	243.283	MH	None	BYCODE(0)	BYCODE	BYCODE •
109	48579.074	558401.220	241.956	NAIL	None	BYCODE(0)	BYCODE	BYCODE •
110	48596.054	558431.970	241.723	NAIL	None	BYCODE(0)	BYCODE	BYCODE •
111	48641.134	558531.859	241.636	NAIL	None	BYCODE(0)	BYCODE	BYCODE •
112	48479.764	558449.898	241.899	NAIL	None	BYCODE(0)	BYCODE	BYCODE •
113	48397.827	558496.581	241.259	NAIL	None	BYCODE(0)	BYCODE	BYCODE •
114	48457.377	558451.377	241.621	NAIL	None	BYCODE(0)	BYCODE	BYCODE •
Base	48468.597	558488.663	242.782		None	0	BYLAYER	BYLAYER •

Figure 3-17. Tabular View

The tabs that display depend on the type of data in the current file. Data columns for each tab can be shown/hidden and re-arranged based on available data and the user's preference.

#### **Displaying Table Columns**

- 1. To edit the order and visibility of a tab's column, click View ► Options ► Tabular View.
- 2. For most of the tabs, select the desired field and use the following buttons to set up the data columns. Figure 3-18 on page 3-21 uses the Lines Tab options as an example.
  - Move right ( ) to include the field in the table and move left ( ) remove the field from the table.
  - Move up ( Move Up ) and move down ( Move Down ) to arrange the order of the selected field.

For the Road Graphic Views and Images tab options, select the desired fields to display on a graphic tab. See page 3-23 and page 3-24 for examples.

3. Click **Ok** to save and apply the settings.

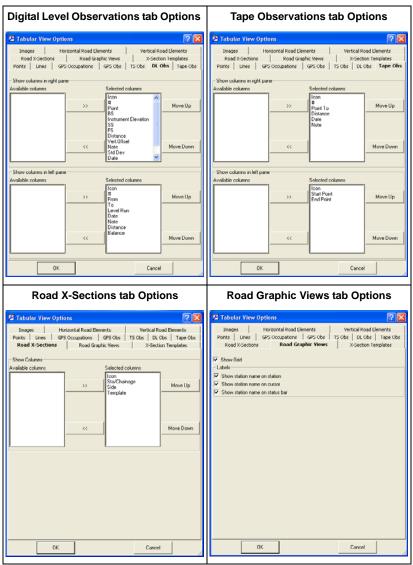
🗵 Tabular View Options	
	Road Elements
	DL Obs Tane Obs
	Include Field in Tab
Show columns right	Arrange Field in Tab
Available columns Selected columns Icon	Arrange Field in Tab
Order	Move V
Distance from start	
Distance from prev Entry azimuth	
Exit azimuth	
	🛽 Tabular View Options 🔹 🛛 🔀
~~	Images Horizontal Road Elements Vertica ?oad Elements
	Road X-Sections Road Graphic Views X-Sect on Templates
Show columns left	Points Lines GPS Occupations GPS Obs TS Obs DL 0 s Tape Obs
Available columns Selected columns	- Show columns right
Area Icon Type	Available columns Selected columns
>> Layer Line Color	loon Dider
Line Style	Hore and a second
Line Width Area Color	Distance from prev
Area Fill Style Fill Transparency	Entry azimuth Exit azimuth
< Point Type Point Color	
Code	<< Move Down
OK Can	Show columns left
	Available columns Selected columns
	Area Icon
	>> Type Laver Move Up
	Line Color Line Style
	Line Width
	Area Color Area Fill Style
	Fill Transparency Point Type Move Down
	Point Color Code
Save Changes	OK Cancel
Sure Changes	

Figure 3-18. Lines Tab Options – Editing Data Columns

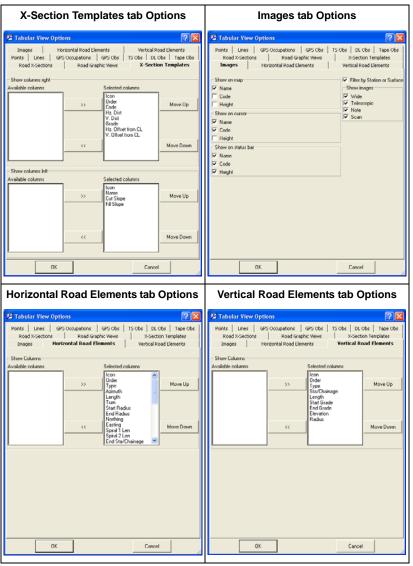
Table 3-2 shows an example of, and the default settings for, each of the Tabular View options tabs. See Figure 3-18 on page 3-21 for an example of the Lines options tab.

Points tab Options	GPS Occupations tab Options
Tabular View Options	Tabular View Options
Images Horizontal Road Elements Vertical Road Elements Road X:Sections Road Graphic Weives X:Section Templates Points Lines GPS Occupations GPS Obs TS Obs DL Obs Tape Obs Show Columns Available onclumes	Imoges         Horizontal Road Elements         Vertical Road Elements           Road X-Sections         Road Graphic Views         X-Section Templates           Points         Lines         GPS Occupations         GPS Obs         TS Obs         DL Obs         Tape Obs           Show Columns         Selected columns         Selected columns         Selected columns         Selected columns
Avvident countries  Sing Certrict Code  Certrict Certrict  Ce	Avroado coutros Acrouh Dites Duk Offse Access H RNS V RMS V RMS Construction Constr
GPS Observations tab Options	TS Observations tab Options
Si S Observations tab Options	
Tabular View Options     Tabular View Options     Images     Horizontal Road Elements     Noad X-Sections     Road X-Sections     Road Graphic Views     X-Section Templates     Ponts     Lines     GPS Occupations     GPS Obs     TS Obs     TS Obs     Lobs     Tape Obs	Tabular View Options     Images     Horizontal Road Liements     Vertical Road Diments     Road X-Sections     Road Graphic Views     X-Section Templates     Ponts     Lines     GPS Occupations     GPS Occupations     GPS Obs     TS Obs     DL Obs     Tape Obs
Store Columns Available columns Elevation Angle Epoch	Store columns in right pare Available columns      Horizons Distance     If con     Prior From     Prior From     Move Up
HDDP Dustion VDDP Note Base Arterna Type Base Arterna Type Base Art Hejdt Meth Rover Anterna Hejdt Meth Rover Anterna Hejdt Meth Rover Anterna Hejdt Meth Rover Anterna Hejdt Meth Solution Type ▼	Otted drit         Type           Otted drit         Hoisonoval Clicle           Storg         Stope Distance           Storg         Zamin Ninghe           HOise Resolution         Astrouth           Voiet Residual         Voiet Residual           Voiet Residual         Note
	Show columns in lott pane Available columns Selected columns Icon Point Name Point Name Induzined Height Enor Reflected Centering Enor Reflected Height Enor Move Down
OK Cancel	OK Cancel

Table 3-2. Tabular View Options Tabs



#### Table 3-2. Tabular View Options Tabs (Continued)



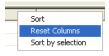
#### Table 3-2. Tabular View Options Tabs (Continued)

#### **Arranging Table Columns**

The columns in the Tabular views can be sorted and arranged (Table 3-3) to best display the file's data. The arrangement is used the next time you open a file.

To reset the table's columns to default settings, right-click the

column's header and click Reset Columns



Column Arranging Options		Examples				
Sort columns	Decr	easing Orde	er Increa	asing Order		
Data in a column can be sorted in	A 6	round Northing (USI	it) 🛛 🔍 d	Ground Easting (USft)		
decreasing/increasing order.		4835.7	59	12654.110		
		4858.72	23	10748.594		
		4858.72	23	10694.174		
Click the column's header, or right-		4923.5	12	10693.274		
		4999.98	36	10685.742		
click and click Sort.		5000.02	24	10597.129		
		5000.02	24	10594.929		
Swap columns	Before	•				
		• Points 📿 Lines	GPS Occupations	🔗 GPS Obs 🛛 🔕 TS Obs		
Columns can be moved from one	I V Name		Ground Northing (USft) Ground Easting (USft)			
location to another in the table.		29412	5697.936	10259.732		
		0 29411A	5691.762	10282.462		
			5691.763	10282.466		
Click the column's header and drag it	Durin					
e		🔹 Points 📿 Lines	s 🔗 GPS Occupations	🔗 GPS Obs 🛛 🛇 TS Obs		
to the desired location.		I V Name	Ground Northing (USR)	d Eastin@(bligft)Easting (USft)		
		29412	5697.936	10259.732		
		0 29411A	5691.762	10282.462		
			5691.763 5111.627	10282.466 10323.941		
		• worker	01111021	100007771		
	After	🔹 Points 📿 Lines	GPS Occupations	🛛 🤗 GPS Obs 🗍 🔷 TS Obs		
		I V Name	Ground Easting (USft)	Ground Northing (USft)		
		29412	10259.732	5697.936		
		0 29411A	10282.462	5691.762		
			10282.466 10323.941	5691.763 5111.627		
		00716H	10525.941	5111.027		

#### Table 3-3. Arranging Table Columns

Column Arranging Options	Examples	
Size columns Columns can be sized to display/hide data.	● Points ■ DL Obs Icon # From To ■ 1 B01 5	<u> </u>
Click the column's right edge and drag left to decrease, right to increase the width of the column.	After	_

Table 3-3. Arranging Table Columns

## **Setting CAD View Options**

Topcon Link displays data in two views: a tab view and a computer aided drawing view. The CAD view is a two-dimensional, graphical representation of linework road and surface data, with associated points. To view the CAD graphic, click **View → CAD View**. Depending on the file's data and the filters used, the following information displays:

- Points with associated symbols. If the point does not have a symbol, the dot symbol ( ) is used.
- Lines using the associated code/layer color, style, and width.
- Control codes (/AS, /AE, /C) display as an arc or closed polyline, respectively.
- Codes with a polygon entity display as closed and filled (if a fill color has been set).

• Surfaces and road display in the color applied to the corresponding layer(s)

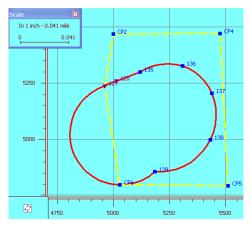


Figure 3-19. CAD View

View options for CAD View include displaying a coordinate grid, applying a background map, and selecting labels to display for points.

- 1. Right-click on an empty portion of the CAD View and click **Options** on the pop-up menu. The **Options dialog** box displays
- 2. On the *Windows* tab, check mark the desired settings (Figure 3-20 on page 3-28). Click **Apply** to apply the changes, then click **OK** to save the settings and make further changes.
  - Show grid makes a coordinate grid visible on the CAD View
  - Background color allows one to set the background color for the CAD View.
  - Show scale bar displays the bar with the current scale value for the CAD View
- 3. On the *Labels* tab, enable the desired settings (Figure 3-20 on page 3-28). Click **Apply** to apply the changes, then click **OK** to save the settings and make further changes.
  - Name enable to display the point's name on selected map, cursor, and status bar positions
  - Code enable to display the point's code on selected map, cursor, and status bar positions

• Height – enable to display the point's height on selected map, cursor, and status bar positions.

🚰 Options	? 🗙		
Window   Labels   Selection   ✓ Show grid	🛱 Options	2×	
Background color	Window     Labels     Selection       Points     Show on map       If Name     Code       If Height     Show on cursor       If Name     Code       If Height     Show on status bar       If Name     Show on status bar       If Name     Code       If Height     Show on status bar       If Name     Code       If Height     Show cursor       If Name     Code       If Name     Code       If Name     Code       If Name     Code       If Name     Code	Options     Window   Labels Selection       Show distance     Show azimuth     Show dimensions     Show area size	2
		OK Cancel	Apply

Figure 3-20. CAD View Options

- 4. On the *Selection* tab enable the desired settings (Figure 3-20). Click **Apply** to apply the changes, then click **OK** to save the settings and make further changes.
  - Show distance enable to display a distance between corners of the rectangle in the Status Bar, when the user drags the rectangle on the CAD View:
  - Show azimuth enable to display an azimuth (from the start point to the end point of the rectangle) in the Status Bar, when the user drags the rectangle on the CAD View (Figure 3-21).

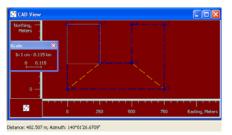


Figure 3-21. Show Distance and Azimuth

• Show dimension – enable to display a dimension (length and height) of the rectangle in the Status Bar, when the user drags the rectangle on the CAD View.

• Show area size – enable to display an area of the rectangle in the Status Bar, when the user drags the rectangle on the CAD View (Figure 3-22)

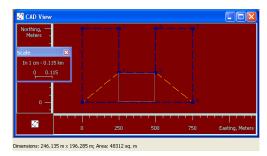


Figure 3-22. Show Area and Dimension

5. Click **OK** to save the settings and close the dialog box.

# **Notes:**

# Importing Data Files From a Topcon Device

Topcon Link provides a simple interface for importing data files directly from a Topcon device (instrument). The imported file is saved to the selected directory, and is immediately available for opening and viewing in Topcon Link.

A unique feature of the software includes the ability to import data from a connected device to the computer using Windows® Explorer, without having to open Topcon Link. Then use Topcon Link to open the files for viewing, editing, converting, or uploading.



Before importing data from some devices, the device must first be set up. See "Adding Devices" on page 2-1 for details

This chapter first discusses the steps to view device properties, or file properties on a device's memory card. The remaining sections in this chapter detail the steps required to import data files from a connected device or an inserted memory card.

- See "Importing Files from a Topcon GNSS Receiver" on page 4-2.
- See "Importing Files from a Sokkia GNSS Receiver" on page 4-6
- See "Importing Files from a Mobile Device" on page 4-8.
- See "Importing Files from Total Station" on page 4-10.
- See "Importing Files from a Digital Level" on page 4-13.

- See "Importing Files from a Memory Card" on page 4-15.
- See "Using Windows Explorer to Import Files from a Device" on page 4-17.

### Importing Files from a Topcon GNSS Receiver

GPS receivers of Topcon family have an internal data storage device to record data in \*.tps format. This family of products includes the following receivers.

Odyssey-E, Odyssey-RS, NET-G3,	HiPer+, HiPer Pro
NET-G3A,HiPer, HiPer GD, HiPer L1,	HiPer Lite, HiPer Lite+
HiPer GGD, HiPer XT, HiPer XR	GR-3
	Man-HP Man-RT

Refer to the receiver operator's manual for details on setup, operation, and connection with other devices.

When importing files from a Topcon GPS receiver, Topcon Link automatically detects the receiver for importing data, and no further setups are required.

Before connecting the receiver's USB port to the computer's USB port, the Topcon USB driver must be installed on the computer. The driver is available on the Topcon website: (http://www.topconsupport.com/documents/view/1743)



This section describes data import using the Topcon Link interface. To import data using Windows® Explorer, see "Using Windows Explorer to Import Files from a Device" on page 4-17

1. Connect your receiver and computer according to the receiver operator's manual.



Bluetooth® connection requires both devices to have Bluetooth wireless technology capabilities.

- 2. With Topcon Link open, click **File > Import from Device**.
- 3. In the left panel, double-click *Topcon GNSS Receivers*. Topcon Link will search for connected devices.

Click **Stop** to quit the search and to display detected devices.

🖌 Import from Device Look in: 🔹 💡 My Computer 💿 🗢 🖻 🞬		Look in:	D 1	× = = -
Topcon Total Stations     Topcon GNSS Receivers     Topcon Digital Levels     Mobile Device	**	1 2 3 4 77	68 99 111 222 333	>
<b>v</b>	Open Files after	Import		
	Close			

Figure 4-1. Selection Topcon GNSS Receiver

- 4. Double-click the desired receiver *Topcon Receivers* to access the receiver's data storage module and view the collected raw files.
- 5. In the right pane, navigate to the folder on the computer in which to save data files.

6. In the left pane, select the desired \*.tps file(s) and click the **Move Right** button. The file import progress displays.

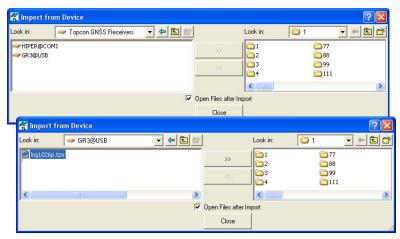


Figure 4-2. Import File from Topcon GNSS Receiver

7. If *Open File After Import* was selected, the import function closes and the \*. tps file opens in Topcon Link:

GPS Occupa	ations								
. Point Name	Original Name	Antenna Type	Antenna H	Ant Height	Start Time	Stop Time	Duration	Method	Note
EPOCA10	EPOCA10	HiPer GD/GGD	1,500	Vertical	05.09.200	05.09.200	0:00:50	Static	NEpoch=10
	EPOCA10_K1	HiPer GD/GGD	1,500	Vertical	05.09.200	05.09.200	0:00:35	Kinematic	NEpoch=7
EPOCA5	EPOCA5	HiPer GD/GGD	1,600	Vertical	05.09.200	05.09.200	0:00:30	Static	NEpoch=6
1	EPOCA5_K1	HiPer GD/GGD	1,600	Vertical	05.09.200	05.09.200	0:00:20	Kinematic	NEpoch=4
EPOCA3	EPOCA3	HiPer GD/GGD	1,600	Vertical	05.09.200	05.09.200	0:00:20	Static	NEpoch=4
	EPOCA3_K1	HiPer GD/GGD	1,600	Vertical	05.09.200	05.09.200	0:00:15	Kinematic	NEpoch=3
EPOCA1	EPOCA1	HiPer GD/GGD	1,600	Vertical	05.09.200	05.09.200	0:00:10	Static	NEpoch=2
	EPOCA1_K1	HiPer GD/GGD	1,600	Vertical	05.09.200	05.09.200	0:00:30	Kinematic	NEpoch=6
1	1	HiPer GD/GGD	1,600	Vertical	05.09.200	05.09.200	0:00:30	Static	NEpoch=6
	1_K1	HiPer GD/GGD	1,600	Vertical	05.09.200	05.09.200	0:00:20	Kinematic	NEpoch=4
2	2	HiPer GD/GGD	1,600	Vertical	05.09.200	05.09.200	0:00:30	Static	NEpoch=6
	2_K1	HiPer GD/GGD	1.600	Vertical	05.09.200	05.09.200	0:00:30	Kinematic	NEpoch=6

Figure 4-3. Display data of the \*.tps file

# How to see information about the receiver and files

Topcon Link allows one to modify the left panel of the *Import from Device* window to obtain extended information about connected receiver(s) and collected raw data file(s). To get this information right-click on the empty place of the left panel and select Details from the pop up menu:



After setting this mode for the receiver page, the left panel will display the serial number, model and port of the computer, which is used for connection with the receiver:

🐔 Import from Device					
Look in:	🧇 Topcon GNSS R	eceivers	- 🗢 🖻 💣		
Name	Serial number	Model	Port		
HIPER@COM1	8PGL0MNZDVK	HIPER	COM1		
IPER@USB	8QC3E39AY2O	HIPER	USB		
	Select Properties				
	Refresh Large Icons Small Icons List • Details				

After setting this mode for the file page, the left panel will display the size and the end time of file logging:

ook in:	IIPER@USB			🗈
Name	Size	Time		
🛃 Hiper10203r.tps	1.2 MB	2/3/2010 6:19:57 PM		
Aiper10203s.tps	1.5 MB	2/3/2010 6:44:57 PM		
Aiper10203sa.tps	1.5 MB	2/3/2010 7:09:57 PM		
Apper 10203t.tps	1.5 MB	2/3/2010 7:34:57 PM		
Aiper10203ta.tps	1.5 MB	2/3/2010 7:59:57 PM		Сору
Aiper10203u.tps	1.4 MB	2/3/2010 8:24:57 PM	-	Refresh
🛃 Hiper10203ua.tps	1.3 MB	2/3/2010 8:49:57 PM		
Aiper10203ub.tps	1.3 MB	2/3/2010 9:14:57 PM		Large Icons Small Icons
Aiper10203v.tps	1.3 MB	2/3/2010 9:39:57 PM		Smail Icons List
Alper 10203 va. tps	1.2 MB	2/3/2010 10:04:57 PM		Details
Aiper10203w.tps	1.3 MB	2/3/2010 10:29:57 PM		Decails
Aiper10203wa.tps	1.3 MB	2/3/2010 10:54:57 PM		
Aiper10203wb.tps	1.5 MB	2/3/2010 11:19:57 PM		
🛃 Hiper10203x.tps	1.5 MB	2/3/2010 11:44:58 PM		
Hiper10203xa.tps	906.8 KB	2/3/2010 11:59:57 PM		

## Importing Files from a Sokkia GNSS Receiver

GPS receivers of Sokkia family have an internal data storage device to record data in \*.pdc and \*.sdr format.

When importing files from a Sokkia GNSS receiver, Topcon Link automatically detects the receiver for importing data, and no further setups are required.

Before connecting the receiver's USB port to the computer's USB port, the Sokkia USB driver must be installed on the computer. The driver is available on the Sokkia website: (http://www.sokkiagps.com/support/s\_gsr2700isx.php)



This section describes data import using the Topcon Link interface.To import data using Windows® Explorer, see "Using Windows Explorer to Import Files from a Device" on page 4-17.

1. Connect your receiver and computer according to the receiver's documentation.



Bluetooth® connection requires both devices to have Bluetooth wireless technology capabilities.

- 2. With Topcon Link open, click **File > Import from Device**.
- 3. In the left panel, double-click *Sokkia GNSS Receivers*. Topcon Link searches for connected devices.

Look in: 🛛 😼 My Con	nputer 🛛 🗲 🔁 🗎		Look in: 🔁 1	
Mobile Device     Sokkia Digital Levels     Sokkia GNSS Receivers     Sokkia Total Stations     Topcon Digital Levels	Topcon GNSS Receivers Topcon Memory Cards Topcon Total Stations	»» «	1 2 3 4 77 88	C 99 C 111 C 222 C 333 C GMS-100PP C kin
	L.	Open Files after Im	port	
		Close		

Click Stop to quit the search and display detected devices.

Figure 4-4. Selection Sokkia GNSS Receiver

- 4. In the right pane, navigate to the folder on the computer in which to save data files.
- 5. In the left pane, double-click the desired Sokkia GSNSS receiver to access the device's data storage module and view the collected raw files.
- The Sokkia GNSS receiver node contains three independent COM ports. Clicking on a port will display all logged GNSS raw data files. The user can simultaneously import different raw files from each COM port to the computer (Figure 4-5 on page 4-7).
- 7. In the left pane, select the desired \*.pdc / \*.sdr file(s) and click the **Move Right** button. The file import progress displays.

🕷 Import from Device			? 🛛
Look in: 🛛 😴 Sokkia GNSS Receivers 💌 🗲 💼 👔		Look in: 🛛 🔁	1 🔹 🗲 🖻 🌁
GSR2700 ISX@COM15 GSR2700 ISX@COM16 GSR2700 ISX@COM17	>> <<		77     38     39     2111
	🗸 Open Files after	1	
	Close	1	
🙀 Import from Device			
🙀 Import from Device Look in: 🛛 🛫 GSR2700 ISX@CDM15 🔽 ⇐ 🖻		Look in:	<b>?</b> × 1 <b>•</b> ∉ ∎ ≝
Look in: GGR2700 ISX@COM15	PE	Look in:	
Look in: GSR2700 ISX@C0M15 - + E	PE >> PE	1	277
Look in: GSR2700 ISX@CDM15  G @ 00032260.PDC  00032250.PDC  00032250.PDC  00032570.PDC  00032750.PDC  000032750.PDC  000032750.P	PE >> PE		77 88 99
Look in: GSR2700 ISX@CDM15  G 00032260.PDC O0032250.PDC O0032250.PDC O0032250.PDC O0032570.PDC O0032570.PDC O0032750.PDC O0032750.PDC O0032750.PDC O0032750.PDC	PE >>> PE	1 2 3 4 4	☐ 77 ☐88 ☐99 ☐111

Figure 4-5. Import File from Sokkia GNSS Receiver

8. If *Open File After Import* was selected, the import function closes and the \*.pdc / \*.sdr file opens in Topcon Link

D D	:\1\00032570.PI	DC -Sokkia P	DC - GPS+ Raw Data>			
<u></u>	GPS Occupations					
Ico	n Point Name	Original Name	Antenna Type	Antenna Hei	Ant Height Method	Start Time
•	60sec	60sec	SOK_GSR2700ISX NONE	0.000	Vertical	9/14/2009 4:08:00 PM
		Ш				>

Figure 4-6. Display data of the \*.pdc file

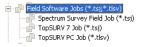
### Importing Files from a Mobile Device

The Topcon and Sokkia family of controller software (such as TopSURV and SSF survey application) run on several Topcon and third-party mobile devices.

Microsoft® ActiveSync needs to be installed on the computer with Windows XP. For details on the installation, see "Installing Microsoft ActiveSync for Use With CE-based Devices" on page 1-11.

If the user's computer operates under Windows Vista, ActiveSync is not needed. A connection between the computer and an external device with Windows CE will be automatically established after connecting your device to your PC.

Topcon Link supports three formats of the Field Software Job files:



- Spectrum Survey Field Job (\*. tsj). This job is created in SSF version 7.3 and later.
- TopSURV Job (\*. tsj). This job is created in TopSURV version 7.0 and later.

• TopSURV PC Job (\*.tlsv). This job is created in TopSURV version 6.11.03 and earlier

There is a difference in formats of these files and a difference in using these files in the computer's software.

In TopSURV version 7.0 and later, and in SSF the \*.tsj file is saved on the controller, this file format can be opened by Topcon Link/Topcon Link/Topcon Tools/Sokkia Spectrum Office/TopSURV PC. Topcon Link is used only for transferring the \*.tsj file from the controller to the computer without format changes. Moreover, the user can use a movable memory card to transfer the \*.tsj file from the controller to the computer.

In TopSURV version 6.11.03 and earlier, the \*.tsv file is saved on the controller. But Topcon Link/Spectrum Link/Topcon Tools/Sokkia Spectrum Office/TopSURV PC version can not open this file format. Topcon Link has to convert mobile device-based formats to computerbased formats. Topcon Link performs the conversion of the \*.tsv file to the \*.tlsv file during the import process. This format (\*.tlsv) is opened by Topcon Link/Spectrum Link/Topcon Tools/Sokkia Spectrum Office/TopSURV PC.



This section describes data import using the Topcon Link interface.To use Windows® Explorer for data importing, see "Using Windows Explorer to Import Files from a Device" on page 4-17.

1. Connect your controller and computer according to the controller's documentation.



Bluetooth® connection requires both devices to have Bluetooth wireless technology capabilities.

- 2. With Topcon Link open, click **File > Import from Device**.
- 3. In the left panel, double-click **Mobile Device**. Topcon Link connects to the internal memory of the controller.

- 4. Navigate to the location in TopSURV / SSF folder and select the desired job.
- 5. In the right pane, navigate to the folder on the computer in which to save data files.
- 6. In the left pane, select the desired file(s) and click the **Move Right** button. The file import progress displays.
- 7. If *Open File After Import* was selected, the import function closes and the file opens in Topcon Link.

🚰 Import from Device		? 🛛	
Look in: 🛛 🛃 My Computer 🔽 🗲 🛍 📺	Look in:	🗀 1 💽 🗲 🖻 🎽	
Mobile Device Topcon GNSS Receivers Solvika Digital Levels Topcon Memory Cards Solvika Tops Receivers Solvika Total Stations Topcon Digital Levels	>> 	99 111 222 333 G45-100P1 Kin	
Import from Device		? 2	k
Look in: 🔄 Jobs 💽 🗲		Look in: 🔁 TopSURV job 🔻 🗲 🛍 🖻	Ť
Default.tsj	>>> k	🗿 07148.tlsv 🗿 AIRPORT.tlsv	
net.tsv	<<	🗿 net.tisv	
	🔽 Open Files after Im	port	
	Close		

Figure 4-7. Import File from Mobile Device

## Importing Files from Total Station

Conventional and robotic Total Stations of Topcon and Sokkia family have an internal data storage device to record data in various formats. Refer to your Total Station operator's manual for details on setup, operation, and connection with other devices.

When importing files from a Topcon and Sokkia Total Station, Topcon Link connects to the device and provides a path for the data transfer. The actual file transfer is performed at the Total Station.

The connection procedure for Topcon and Sokkia Total Stations is different, so refer to the device's documentation for details.

When connecting to a CE-based device, Microsoft® ActiveSync automatically starts up and connects with the device. This connection is required to import files, if your computer operate under Windows XP. If the computer operates under Windows Vista, ActiveSync is not needed.

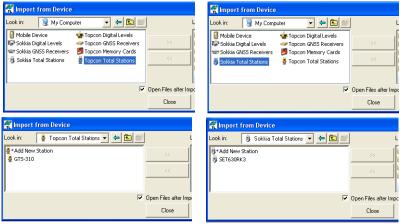
If you need to install ActiveSync, see "Installing Microsoft ActiveSync for Use With CE-based Devices" on page 1-11 for details.



This section describes data import using the Topcon Link interface. To use Windows® Explorer for data importing, see "Using Windows Explorer to Import Files from a Device" on page 4-17

- 1. Connect your computer and Total Station according to the operator's manual.
- 2. With Topcon Link open, click **File > Import from Device**.
- 3. In the right pane, navigate to the folder on the computer in which to save data files.
- 4. In the left pane, double-click *Topcon Total Stations* or *Sokkia Total Stations*.

5. Double-click the desired instrument to connect with the Topcon Link.



For Topcon Total Station

For Sokkia Total Station

Figure 4-8. Select Total Station to Import Data From

- 6. Select the "file1.txt" or "file.sdr" file and click the **Move Right** button.
- 7. Follow all steps listed in the *Download file from Total Station* dialog box. These steps may vary depending on the connected device. Click **Start**.
- 8. If *Open File After Import* was selected, the import function closes and the file opens in Topcon Link.

👫 Import from Device	
Look in: 🛯 🕖 SET630RK3 💌 🗲 🗈 🕋 🛛	ook in: 🧰 1 💽 🗲 🖻
File1.sdr >>	
	A Carl Download file from Total Station
Close	For import from Sokkia TotaStations Series 30 please follow instruction below: 1. Turn on the Total Station by pressing the DN button. 2. Press Ec: 0 to po Status Screen 3. Press F3: CMEM: to switch to Memory mode. 4. Select <10Bb: using a nov keys and Enter', then select <comms outputb.<br="">5. After that select the job file you want to export and press Enter. 6. Press F4:  and select the apolities for the select <comms outputb.<br="">5. After that select the job file you want to export and press Enter. 6. Press F4:  and select the apolities for the select formal. Note that it should be the same with format chorose in Total Station properties.</comms></comms>
	File name: SET630RK3 Status: Waiting for start

Figure 4-9. Import File from Sokkia Total Station

## Importing Files from a Digital Level

Digital Levels of the Topcon and Sokkia family have an internal data storage device to record data. Refer to your Digital Level operator's manual for details on setup, operation, and connection with other devices.

When importing files from a Topcon and Sokkia Digital Level, Topcon Link simply connects to the device and provides a path for the data import. The actual file transfer is performed at the Digital Level.

The connection procedure for Topcon and Sokkia Digital Levels varies, so refer the device operator's manual for details.

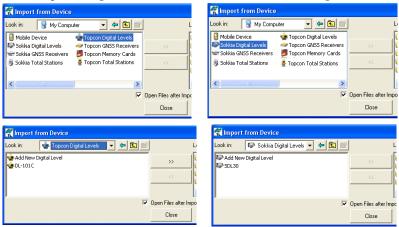


This section describes data import using the Topcon Link interface. To use Windows® Explorer for data importing, see "Using Windows Explorer to Import Files from a Device" on page 4-17.

- 1. Connect your computer and Digital Level according to the operator's manual.
- 2. With Topcon Link open, click **File** > **Import from Device**.
- 3. In the right pane, navigate to the folder on the computer in which to save data files.
- 4. In the left pane, double-click *Topcon Digital Levels* or *Sokkia Digital Levels*.

5. Double-click the desired instrument to connect with the Topcon Link.

For Sokkia Digital Level



For Topcon Digital Level

Figure 4-10. Select Digital Level to Import Data From

- 6. Select the "file.dl"or file1.sdr"" file and click the **Move Right** button.
- 7. Follow all steps listed in the Download file from the *Digital Level* dialog box (Figure 4-11 on page 4-15) to select a file and begin the import. These steps may vary depending on the connected device.
- 8. If *Open File After Import* was selected, the import function closes and the file opens in Topcon Link.

😭 Import from Device		
Look in: 😰 SDL30 🔹 🗲 🖻 🞬		Look in: 🗀 1 💽 🗲 🖻 📸
) file1.sdr		>>
		Download file from Digital Level
,	Dpen	Push Menu' key and select (Job>         2 Push Enter' key         3 Choose Clupt> and push 'Enter' key         4 Select the desired are life using down and right arrows         5 Fush 'Enter' key         6 Click' Start' button in this window         7. Using right arrows select the corresponding file format (CSV or SDR2K)         8. Push Enter' key
		File name: SDL30 Status: Waiting for start Cancel Start

Figure 4-11. Import File from Sokkia Digital Level

### Importing Files from a Memory Card

Most Topcon devices contain internal memory cards. These movable memory cards are used to collect raw data and to transfer the collected data from the device to the computer. The memory cards can be divided into two different types:

- Memory cards formatted in Topcon receiver's file system. These cards are used in a Topcon receiver, such as the GR-3 or NET-G3
- Memory cards formatted using the FAT32 file system. These cards used in controllers, such as the FC-200 or GMS-2.

To download data from the first type of the memory card, use Topcon Link/Topcon Tools. Only these software support such cards.

If a memory (SD) card was used in a Topcon receiver, such as the GR-3 or NET-G3, and contains \*.tps files, it has already been formatted. Topcon Link can read files on a memory card formatted in the Topcon receiver file system. The device icon for a formatted card is red.

Topcon Link can format a memory card for use in a Topcon receiver, such as the GR-3 or NET-G3. The device icon for an unformatted

card is gray. See "Adding Devices" on page 2-1 for details on formatting cards with a gray device icon.



This section describes data import using the Topcon Link interface. To use Windows® Explorer for data importing, see "Using Windows Explorer to Import Files from a Device" on page 4-17

- 1. Insert the memory card into the card reader.
- 2. With Topcon Link open, click *File* > *Import from Device*.
- 3. In the left panel, double-click *Topcon Memory Card*.
- 4. Click the desired, formatted memory card device icon.
- 5. Wait while Topcon Link checks the card's file system and displays the card's data.

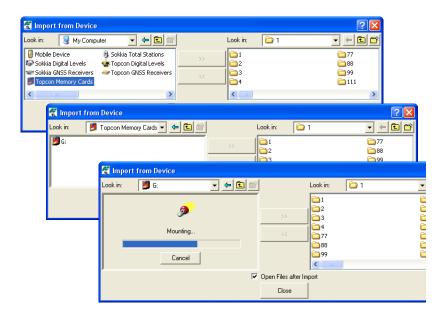


Figure 4-12. Mount Memory Card

- 6. In the right pane, navigate to the folder on the computer in which to save data files.
- 7. In the left pane, select the desired file(s) and click the **Move Right** button. The file import progress displays.
- 8. If *Open File After Import* was selected, the import function closes and the file opens in Topcon Link.

🐖 Import from Device			? 🗙
Look in: 🔰 G: 🗨 🗲 💼 🕋	Look in:	🔁 1 🔍 🗲 🖸	ð 🖆
BaseGR3_fw34p2b3_on_1120n.tps	>> = 1 = 2 = 3 = 4 = 4 = 4 = 99 = 99	<ul> <li>☐ 111</li> <li>☐ 222</li> <li>☐ 333</li> <li>☐ GM5-1</li> <li>☐ kin</li> <li>☐ Rinex</li> <li>☐ road</li> </ul>	00PP
V	Open Files after Import		
	Close		

Figure 4-13. Import File from Memory Card

To download data from the second type of the memory card, one can use the standard Windows procedure.

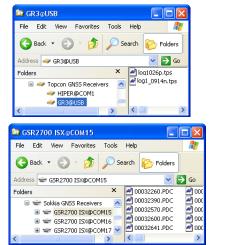
## Using Windows Explorer to Import Files from a Device

After installing Topcon Link, the computer's hard disk contains up to eight virtual drives for accessing Topcon and Sokkia devices to import/export data. These virtual drives provide a quick way to transfer data without opening Topcon Link. Many of the steps are the same as for importing/exporting data via the Topcon Link interface. See the corresponding section above for further details on the steps listed in sections below.

## Import from Topcon/Sokkia GPS Receivers using Windows Explorer

- 1. Connect the receiver to the computer. Turn on the receiver.
- 2. Navigate to the *Topcon Receivers* or *Sokkia Receiver* directory and click the device icon.

- 3. After discovering devices, click the receiver's icon.
- 4. Copy or drag-and-drop this file to a directory on the computer.



From Topcon GNSS Receiver

From Sokkia GNSS Receiver

Figure 4-14. Import Using Explorer – Receiver

# Import from Topcon and Sokkia Mobile Device using Windows Explorer

- 1. Connect the controller to the computer. Microsoft® ActiveSync needs to be installed on the computer with Windows XP.
- 2. Navigate to the *Topcon Mobile Devices* device directory and click the device icon.
- 3. Navigate to the job location in TopSURV / SSF folder and select a desired file.
- 4. Copy or drag-and-drop the desired files to a directory on the computer.

for the job created by TopSURV version 7.0 and later, and the job created by SSF version 7.3 and later



for the job created by TopSURV version 6.11.03 and earlier

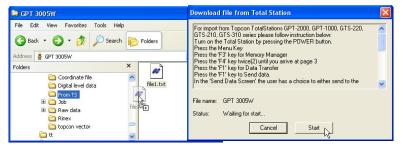
		Copy & Convert to desktop computer format 🛛 🛛 🔀
😂 Jobs		
File Edit View Favorites Tools Help	<b>11</b>	🛆 🤌 👝
🔇 Back 🔹 🌍 🔹 🏂 🔎 Search 🔊 Folders		
Address 🛅 \CF Card\TPS\TopSURV\Jobs	💙 🄁 Go	N270405
Folders ×		Copying (from 'Jabs' to desktop computer)
🖃 🕘 Mobile Device 🛛 🛛 🛣		
Application Data N270405.tsv		
🗷 🧰 CF Card 👘		Converting (from 'TopSURV SSCE database' to 'TopSURV Access database')
🗉 🧰 TPS		8888
🗉 🚞 TopSURV		Cancel
🔁 Jobs 🔍		Cancer

Figure 4-15. Import Using Explorer – Mobile Device

## Import from Topcon and Sokkia Total Station using Windows Explorer

- 1. Connect the total station to the computer. If needed, connect to the total station via ActiveSync.
- 2. Navigate to the *Topcon Total Stations* or *Sokkia Total Station* directory and click the device icon.
- 3. Click the icon for the connected total station and select the "file1.txt" or "file1.sdr" file.
- 4. Copy or drag-and-drop this file to a directory on the computer.

5. Follow instructions on the *Download from Total Station* dialog box.



#### For Topcon Total Station

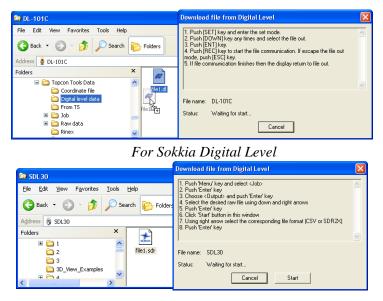
#### For Sokkia Total Station

	Download file from Total Station
SET 630RK3 File Edit Yew Favorites Iools Help Back Folders F	For import from Sokkia TotalStations Series 30 please follow instruction below: 1. Turn on the Total Station by pressing the ON button. 2. Press Tex' to go to Status Screen. 3. Press Tex' (MEM) to switch to Memory mode. 4. Select (JOB) using arrow keys and Enter', then select 'Commo output'. 5. After that select the lob flog our want to export and press Enter. 5. Press T4' (YES) and select the explort format. Note that it should be the same with format choosen in Total Station properties. File name: SET630FK3 Statu: Waiting for start Cancel Start

Figure 4-16. Import Using Explorer – Total Station

## Import from Topcon and Sokkia Digital Level using Windows Explorer

- 1. Connect the digital level to the computer.
- 2. Navigate to the *Topcon Digital Levels* or *Sokkia Digital Levels* directory and click the device icon.
- 3. Click the icon for the connected digital level and select the "file1.dl" or "file1.sdr" file.
- 4. Copy or drag-and-drop this file to a directory on the computer.
- 5. Follow instructions on the *Download from Digital Level* dialog box.



For Topcon Digital Level

Figure 4-17. Import Using Explorer – Digital Level

#### Import from Memory Card using Windows Explorer

- 1. Insert the formatted memory card into the card reader.
- 2. Navigate to the *Topcon Memory Cards* directory and click the device icon.
- 3. Click the icon for the desired memory card.
- 4. Select and copy or drag-and-drop the desired files to a directory on the computer.



Figure 4-18. Import Using Explorer – Memory Card

## Viewing File and Device Properties

The properties of a data file on a device can be viewed after connecting to the device. Once set up in Topcon Link, device properties can be viewed at any time.

To view the properties of a file in a connected Topcon and Sokkia controller or Topcon memory card, right-click the file and click **Properties**. Figure 4-19 gives an example of the *Properties* dialog box for a data file in a connected controller and memory card.

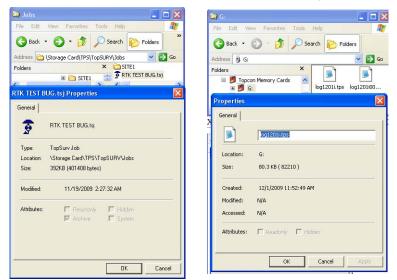


Figure 4-19. Data File Properties

To view the properties of a GNSS Receiver, Total Station or Digital Level device, right-click the device and click **Properties**. Table 4-1 gives examples of the *Properties* dialog box for different devices.

#### Table 4-1. Device Properties Dialog Boxes

Topcon GNSS Receiver	Sokkia GNSS Receiver
----------------------	----------------------

	1
Properties 🔀	Properties
General	General
Name HIPER@COM12	Name GSR2700 ISX@COM17
Model HIPER	
Serial 8PVB4V5HLOG	Serial DAB07430060
Port COM12	Port COM17
OK Cancel Apply	OK Cancel Apply
Topcon Total Station	Sokkia Total Station
Station properties	Station properties
General Advanced	General Advanced
Name: ETS=310	Name: SET630RK3
Note:	Note:
Port: COM1	Port: COM1
Model: GPT-2000	
	SDR Format SDR 33
OK Cancel Apply	OK Cancel Apply
Topcon Digital Level	Sokkia Digital Level
	-
Digital Level properties	Digital Level properties
General	General Advanced
Name:	Name: SDL30
Port: Baudrate:	Note:
COM1 • 9600 •	NUC.
Parity: Even 💌	Port COM1
L von	
	Model: SDL30
	SDR Format SDR 33
	OK Cancel Apply
OK Cancel Apply	
UK Calicer Apply	

Table 4-1. Device Properties Dialog Boxes

For details on editing Digital Level and Total Station device properties, see "Adding Devices" on page 2-1

# **Converting Files Between Formats**

One of the primary functions of Topcon Link is to convert files from one format to another. A file format conversion may be required to access or work with data from multiple, proprietary, or third-party software or systems. The Topcon Link conversion function allows data to be cross-functional and multi-disciplinary. For example, a survey crew may take point measurements in a field adjacent to a city park in preparation for a new shopping center. Using Topcon Link, this data can be converted to a shape file for uploading into the city's GIS database, or it can be converted to a Topcon GC3 file for sharing with the construction crew for three-dimensional grading.

When converting files, a custom projection or custom datum may need to be created. Topcon Link includes a number of pre-defined projections and datums from which to base a custom projection or custom datum.

When applying a projection or datum to a data set, transformation parameters between the jobsite's "grid" and the projection's "ground" can also be specified.

## **Converting A File**

To perform a format conversion, Topcon Link checks the data and its format in the selected file and converts it to the default settings of the selected format. Topcon Link will offer the user to select the desired format of the file to be created from those which are allowed for the data included in the file being converted. If it is desired to change the coordinate system, coordinate order and/or metric units during the process of transformation, use the *Advanced Conversion options*. These options provide further control over the resulting data format.

- 1. Click **File ▶ Convert Files**.
- 2. To select the file to convert, click **Add files** in the *Convert Files* window.
- 3. In the *Open* dialog box select the appropriate format name. Navigate to and select the desired file, then click **Open**. Also, the user can activate the option for automatic recognition of the file format in the process of opening the file. To do this, check the "Recognize the file automatically" check box in the *Open* window and do not select the desired file format.
- 4. If the selected file format is correct, the *File status* field displays "File format is verified" and you can continue converting.
- 5. To create the file, select the appropriate format name and desired folder where this file will be saved.
- 6. Topcon Link will use the name of the converted file to name of the created file (except the RINEX file format). The extension for the created file will be automatically assigned in accordance with the selected file format. The *Destination file name* field displays the name of the created file. To edit the name, click- pause-click on this field.
- 7. To remove a file from the *Convert Files* window, select the desired file and click **Remove files**.
- 8. To remove all files from the *Convert Files* window, click Clear all.
- 9. If needed, click **Advanced Conversion options** and select the parameters to apply to data during the conversion. See the following sections for more details.



Available parameters depend on data in the selected file and the format being converted to.

#### 10. Click Convert.

Topcon Link performs the conversion, saves the file in the selected directory.

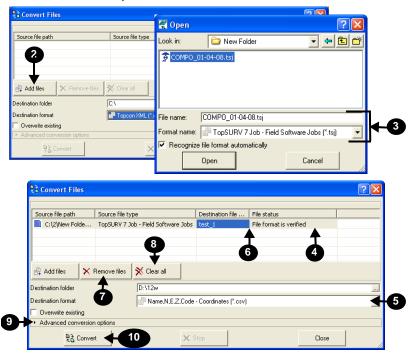


Figure 5-1. Convert File

If the file conversion is successful, the *Convert Files* dialog box displays the following:

Convert Files			? 🛛
Source file path	Source file type	Destination file	File status
C:\2\New Folder\	TopSURV 7 Job - Field Software Jobs	test_1	File is successfully converted

To automatically overwrite the previously created file check the

checkbox: 🔽 Overwrite existing

The user can add unlimited number of files to the *Convert Files* dialog box, if these files contain compatible data. If the user added the files which have incompatible data, the conversion of these files is not performed and the following alarm message displays:

```
Destination format 🔬 Source files contain no compatible data 🖉
```

To perform a conversion, delete file(s) containing data incompatible with other file(s).

If the user selects other format for the converted file in the *Open* widow, he can select the desired file format from the format list of the *Source file type* column. To activate this list, double click on the name of the selected format:

tonvert Files				
Source file path           Source file path           C:\Examples_for converting files	Source file type Name,N,E,Z,Code - Coord	De:		
	Source file path C:\Examples C:\Examples Destination folder Destination format C Overwrite existi Advanced com	-	Source file type Name,N,E,Z,Code - Coordinates Code,Layer Library Code,Layer Library Coordinates Code,Layer Library Custom Text Format Custom Text Format FullCode_Coord_BLH 	Destin

The *Advanced conversion option* dialog box contains a group of fields. They are necessary to input the data used for the coordinate transformation/metric unit/coordinate order, etc. during the file conversion. Each converted file should be supplied with information that is absent in the file but needed for the correct transformation. For example, the user can set the coordinate system, metric units for the converted coordinate file, if these data are available. These data are entered to the From fields. For the created file, one should enter the parameters that appear in this file after conversion. For example, the

coordinate system in the file should be NAD 83, metric units - US Feet, orthometric heights - take into account the usage of Geoid 2003. These data are entered to the To fields.

In general, the data entered to the *Advanced conversion option* dialog box can be divided into following groups:

- 1. Convert coordinate type and system, including Grid to Ground conversion
- 2. Convert ellipsoidal/orthometric height
- 3. Convert coordinate order
- 4. Convert metric unit
- 5. Convert angular unit
- 6. Convert vertical angle
- 7. Convert distance format
- 8. Change geoid bounds
- 9. Filter raw data

Topcon Link analyses the data type of the converted/created file, automatically selects the needed group parameter(s) used for each format. *Advanced conversion option* will display only those parameters which are needed for given types of input/output data.

The groups are independent in selecting and can be enabled/disabled independently.

Depending on the data type of the converted/created file some fields of any group can be disabled or not presented.

## **Convert Coordinate Type and System**

Using the fields in the *Convert coordinate type and system* tab the user can specify a coordinate system for converting and creating file.

Depending on the data type of the converted/created file, the user can select the following coordinate type in the To/From fields:

Grid	-
Ground or Localization Grid	
Grid, Ell.H Lat, Lon, Ell.H WGS84 Lat, Lon, Ell.H	
	Ground or Localization Grid Grid, Ell.H Lat, Lon, Ell.H

If the user selected the Ground or Localization coordinate type, the coordinate system is set to None for the converted/created file:

Coordinate type:	Ground or Localization	•
Coordinate system:	None	

If the user selected the Grid (Grid coordinate system with orthometric heights) or Grid Ell (Grid coordinate system with ellipsoidal height) coordinate type, the user can select a desired projection type from the list of projections available or create a new projection. For details on how to create a projection, see "Adding a Custom Projection" on page 5-37:



If the user selected the Lat,Lon,Ell.H (a datum with ellipsoidal heights) or Lat,Lon,Ellevation (a datum with orthometric heights) coordinate type, the user can select a desired datum from the list of datums available, or create a new datum. For details on how to create a datum, see "Adding a Custom Datum" on page 5-41.

Coordinate type:	Lat, Lon, Ell.H	•
Datum:	NAD83	Custom
	NAD83 More	

If the user selected the WGS-84 Lat,Lon,Ell.H coordinate type, the datum will be selected automatically:



Using this tab the user can perform transformation between Grid and Ground coordinate systems. The transformation will be enabled if:

• the converted file contains points in the Ground coordinate system but a created file has to contain points in a Grid or a Datum coordinate system. In this case Topcon Link performs Ground to Grid transformation:



• the converted file contains points in the Grid coordinate system but a created file has to contain the point in the Ground coordinate system. In this case Topcon Link performs Grid to Ground transformation:

Г	Co	invert coordinate type	e and system			
		From			То	
		Coordinate type:	Grid	•	Coordinate type:	Ground or Localization
I	~	Projection:	Haska (Zone 8)	▼ Custom	Coordinate system:	None
		Datum:	NAD83	•	coordinate operation	
I Grid to ground						

For all other combinations of coordinate systems for input/output files

the Grid and Ground is disabled: Fird to ground

For details on setting these parameters, see "About Grid->Ground Parameters" on page 5-42

## **Convert Height**

The conversation of heights is enabled if is needed to obtain orthometric heights for the points of the created file from the ellipsoidal heights of the points in the converted file and vise versa.

The transformation will be enabled if:

• the converted file contains points in the Ground or Grid/Datum coordinate system with orthometric heights, but a created file must contain points in a Grid/Datum coordinate system with ellipsoidal heights:

- Co	nvert coordinate typ	e and system				
	From			To		
	Coordinate type:	Ground or Localization	-	Coordinate type:	Grid, Ell.H	•
•	Coordinate system: None			Projection:	California (Zone3) 💌	Custom
				Datum:	NAD83	•

• the converted file contains points in the Grid/Datum coordinate system with ellipsoidal heights, but a created file has to contain points in a Grid/Datum coordinate system with orthometric heights:

Coordinate type: Grid, Ell.H Coordinate type: Lat, Lon, Elevation	
	<u> </u>
Projection: Alaska (Zone 8) Custom Datum: NAD83 C	Custom
Datum: NAD83	

In these cases Topcon Link offers to select the desired Geoid from the list of geoids used. The user can add any Geoid file to this list by clicking the **Geoid List** button (see "Adding a Geoid" on page 2-14):

	- om <elevation></elevation>		To <ei< th=""><th>. Hb</th><th></th></ei<>	. Hb	
7	Use geoid		•	Geoids List	
		g2003u01			
		g2003u02 g2003u03	6		
		g2003u04 Egm96			

Field Software Job is the most informative file format. This format can contain both ellipsoidal and orthometric heights and also the name of the geoid used for height calculation. If Field Software Job is converted, Topcon Link automatically uses the height information contained in the job. The height conversion will be available if the geoid used in TopSURV/SSF is presented in the Topcon Link geoid list. In an example below, the geoid selection from the geoid list is not available:

Use geoid	From source job	-	Geoids List
Use geoid	r toin source job		

If the geoid used in TopSURV/SSF is not presented in the Topcon Link geoid list, the following message will appear:



## **Convert Coordinate Order**

This type of conversion allows one to select the order of the horizontal coordinate (Easting and Northing) for the points of the created file if Ground/Grid/Grid Ell coordinate system is set for this file:



If the user selected Name,N,E,Z,Code or Name,E,N,Z,Code coordinate file format, the fields of coordinate order selecting will display the order which defined by the corresponding file format:

Convert coordinate order		
From ENH	To NEH	<b>_</b>

## **Convert Metric Unit**

This type of conversion allows one to select the desired metric unit for converted and created files:

Convert metric unit		
From Meters	▼ To USFeet	-
	Meters	
	IFeet	
	USFeet	

## **Convert Angular Unit**

This type of conversion allows one to select the desired format of angular values for converted/created Total Station raw files:

Convert angular unit		
v	To DMS	•
	DMS	
	Gons	

## **Convert Vertical Angle**

If TS raw data file does not have information about vertical angle mode, the user can select the mode under *Advanced conversion option* when such file is converted/created by Topcon Link:

Convert vertical angle		
From Auto (ZA if angle > 45 degrees)	To ZA	•
	ZA	
	V/A	

- ZA vertical angles are from zenith
- VA- vertical angles are from horizontal
- Auto no information available on vertical angle mode. In an example below, angles from 0 to 45° are considered "vertical" and angles more than 45° are considered "zenith."

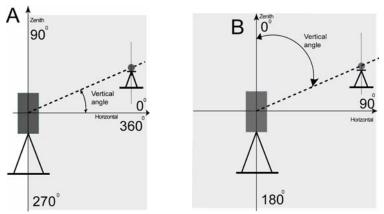


Figure 5-2. Vertical Angle from Horizontal (A) and Zenith (B)

## **Convert Distance Format**

This type of conversion allows one to select the desired format of distance values for a created Total Station raw file: the distance between a station and a measured point can be recorded either as slope distance and vertical angle or as horizontal and vertical distances. Selecting Auto records distances into the created file using the distance format of the converted file:

Convert distance format		
	To HD & VD	•
L	Auto	
	SD & Angle	
	HD & VD	

## **Change Geoid Bounds**

This option allows one to define the area of a created geoid file from any supported geoid model. When converting from a Geoid file, the following parameters are available in the right pane:

• Minimum / Maximum Latitude – enter the minimum and maximum latitude of the points that limit the use of this model. Latitudes are positive for the Northern hemisphere.

Minimum / Maximum Longitude – enter the minimum and maximum longitude of the points that limit the use of this model. Longitudes are positive for the Eastern hemisphere.

## **Filter Raw Data**

This option allows one to include:

- GPS or GLONASS satellites
- pseudorange and phase measurements on L1 or L2 frequency to created RINEX/Compact RINEX/Topcon TPD file formats:

i kon data
Channels
🔽 GPS
🔽 🔽 GLONASS
✓ L1

To remove any item, uncheck a desired checkbox.

The following sections describe the file format conversions, as well as list which files can be converted to which format.

- "Code Library File Conversion Parameters" on page 5-12
- "Coordinate File Conversion Parameters" on page 5-13
- "Example of Conversion Coordinates File" on page 5-14
- "Geoid File Conversion Parameters" on page 5-20
- "GPS+ Raw Data File Conversion Parameters" on page 5-21
- "Localization GC3 File Conversion Parameters" on page 5-27
- "Road File Conversion Parameters" on page 5-27
- "Topcon XML File Conversion Parameters" on page 5-29
- "Field Software Job File Conversion Parameters" on page 5-30
- "TS Obs File Conversion Parameters" on page 5-35
- "X-Section Template File Conversion Parameters" on page 5-36

## **Code Library File Conversion Parameters**

A code library file contains a description of codes, such as code name, plotting style, and attribute. Table 5-1 lists the formats that a code library can be converted to.

From a	То а
Code Library file:	Code Library file
DBF Code Library, TDD Code Library, XML Code Library, Autodesk Layer	Field Software Job file
States Code Library	
Field Software Job file	Code Library file

Table 5-1. Code Library File Conversion Formats

When converting from a Code Library file, no further parameters are required.

## **Coordinate File Conversion Parameters**

A coordinate file contains a list of points in some coordinate system. Table 5-2 lists the formats that a coordinate file can be converted to/ from.

From a	То а
Coordinate file:	Coordinate file
Custom Text Format; Topcon FC-4; Topcon FC-5; Topcon GTS-210/310-10; Topcon GTS 210/310-12; Topcon GTS- 7; Sokkia SDR;LandXML; Topcon XML; Field Software Jobs; Name,E,N,Z,Code; Name,N,E,Z,Code; Name,Lat,Lon,Ht,Code; SBG Geo; SBG Pxy; TDS; KOF	Design GIS: ESRI Shape Topcon XML file Field Software Job file
Field Software Job file	Coordinate file
Design	Coordinate file
TS Obs (if the format contains point coordinates)	Coordinate file
GIS: ESRI Shape	Coordinate file

Table 5-2. Coordinate File Conversion Formats	Table 5-2.	Coordinate	<b>File Conversion</b>	Formats
---	------------	------------	------------------------	---------



Available parameters depend on the data in the selected file and the format being created.

When converting from/to a coordinate file the user can select the following parameters:

- 1. Convert coordinate type and system (see "Convert Coordinate Type and System" on page 5-6)
- 2. Convert height (see "Convert Height" on page 5-8)
- 3. Convert coordinate order (see "Convert Coordinate Order" on page 5-9)
- 4. Convert metric unit (see "Convert Metric Unit" on page 5-9)

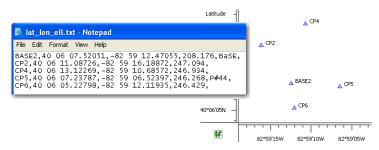
These parameters are selected independently and can be enabled/ disabled independently:

-	Advanced conversion o				
	Advanced conversion o onvert coordinate type a				
~	From	ng tysten			
	Coordinate type:	Ground or Localization	•		
7	Coordinate system:	None			
			🚛 Grid to gro	and	
	onvert height From <elevation></elevation>		To	CEIL HO	
2			Use geoid g2003.01	Geoid: List	
0	From NEH				for created coordinate file
c	onvert metric unit				
v	From Meters			•	
	93 C	onvert		- To Coordinate type:	Grid, Ell.H
_				Projection:	Tuston.
				Datum	NAD83
					190003
			of Gr	d to ground	
				To KEIL HID	
			Use geoid 92003u01	Geoids Li	st
				To ENH	<u>×</u>

Figure 5-3. Convert Coordinate File – Example

#### **Example of Conversion Coordinates File**

The following pages describe the example of conversion of the coordinate file ('lat\_lon\_ell.txt'), which contains the points in the datum coordinates (NAD83). This file has Lat, Lon, Ht, Code file format, and height is ellipsoidal height in meters:



The task is to convert this file to other coordinates file, which will contain the points in Grid coordinates system (SPC83-Ohio (North)), with orthometric height in US Feet.

To create such a file, we do the following steps:

- 1. Click **File->Convert Files** and click **Add Files** in the window. The *Import* window appears.
- 2. Navigate to the desired file, highlight it and select the corresponding file format in the *Format name* field:

Source file path	_	Source file type Destin	ation file name File st
	🖀 Open		? 🛽
	Look in:	🗀 Raw Data	- 🗧 🖻
Add files	CMH SEN	Unprocessed	
Destination folder	lat_lon_e		
	at_lon_e		

3. The converted file appears in the list of the converted files:

Source file path	Source file type	Destination file name	File status
C:\Raw Data\lat_lon_ell.txt	Name,Lat,Lon,Ht,Code - Coor	lat_lon_ell.csv	Not converted

4. Check the Advanced conversion option checkbox:



5. Select the format name for the grid coordinate system of the created file in the *Destination format* field:

Destination format	Rame, N, E, Z, Code - Coordinates (*.csv)

6. Select or create the folder where this file will be saved (by clicking ):



7. Change the name of the created file in the *Destination field name* field:

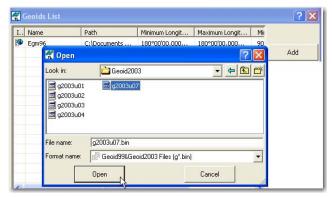


8. Select the Grid coordinate system and Ohio (North) projection in the corresponding fields:



9. Add the 'g2003u07.bin' geoid file to the list of geoids used. To do this, click the **Geoid List** button, click **Add** 

and select the folder where the desired geoid file is located:



Then activate this geoid for conversion of the coordinate file:



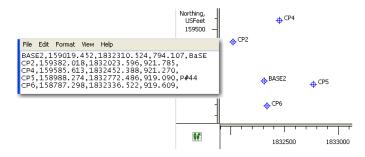
10. Select 'Meters' for the converted and 'Us Feet' for the created file in the *Convert metric unit* fields:

Convert metric unit		
From Meters	▼ To USFeet	•
	Meters IFeet	

11. Click the **Convert** button.If the file conversion is successful, the *Convert Files* dialog box displays the following:

Source file path	Source file type	Destination file name	File status
C:\Raw Data\lat_lon_ell.txt.csv	Name,Lat,Lon,Ht,Code - Coor	Grid_Ortho.csv	File is successfully converted

12. The created file has the following coordinates and heights:



## Design and Surface File Conversion Parameters

A design file contains CAD information (points, linework, surfaces). Table 5-3 lists the formats that a design file can be converted to/from.

From a	То а
Design file: AutoCAD Drawing, AutoCAD DXF; KOF; LandXML, Microstation 95/ISFF, MX GENIO Line, SBG Geo, SBG Pxy, Topcon 3D Linework, Topcon 3D Surface,	Design file Coordinate file Field Software Job file Surface file
Coordinate file	Design file: AutoCAD Drawing, AutoCAD DXF; KOF; LandXML,SBG Geo, SBG Pxy,
TS Obs	Design file: AutoCAD Drawing, AutoCAD DXF; KOF; LandXML,SBG Geo, SBG Pxy,
Field Software Job file	Design file: AutoCAD Drawing, AutoCAD DXF; KOF; LandXML,SBG Geo, SBG Pxy, Microstation 95/ISFF, Microstation V8, Topcon 3D Linework
Topcon XML file	Design file: AutoCAD Drawing, AutoCAD DXF; KOF; LandXML,SBG Geo, SBG Pxy,
GPS Obs	Design file: LandXML

Table 5-3. DWG, DXF, LandXML Design File Conversion Formats

From a	То а
	Design file: AutoCAD Drawing, AutoCAD DXF; LandXML

Table 5-3. DWG, DXF, LandXML Design File Conversion Formats (Continued)



Available parameters depend on the data in the selected file and the format being created.

When converting from/to a Design file, the user can enable and select the following parameters:

- 1. Convert coordinate type and system (see "Convert Coordinate Type and System" on page 5-6)
- 2. Convert height (see "Convert Height" on page 5-8)
- 3. Convert coordinate order (see "Convert Coordinate Order" on page 5-9)
- 4. Convert metric unit (see "Convert Metric Unit" on page 5-9)

#### for converted design file:

	Advanced conversion of	stions					
¢	onvert coordinate type ar	nd system					
	From						
	Coordinate type:	Ground or Localization					
Þ	Coordinate system:	None					
			dia gui to	ground			
C	onvert height						
Þ	From (Elevation)		Use geoid g2003.01	To dell	Geoids List	for created de	sign file:
с	onvert coordinate order						
V	From NEH				To		
c	onvert metric unit				Coordinate type:	Grid, EILH	-
V	From Meters				Projection	The Ohio (North)	Custom
	55 C	onvert			Datum:	NAD 83	
				Grid to	ground		
					To KEIL HID		
			Use geoid 92003u0	11	Geoids List		
					To ENH		¥
					To USFeet		-

Figure 5-4. Convert Design File – Example

## Digital Level File Conversion Parameters

A digital level file contains level measurements from a station to points. Table 5-4 lists the formats that a digital level file can be converted to.

From a	To a
Topcon Digital Level:	Topcon XML file
DL, LEV, TXT, Topcon XML	Field Software Job file
Sokkia SDR	
DL BlueBook	

Table 5-4. Topcon Digital Level Conversion Formats

When converting from Digital Level file the user can select only the *Convert metric unit* option (see "Convert Metric Unit" on page 5-9).

## **Geoid File Conversion Parameters**

A geoid file contains data on a physical reference surface. The shape of the geoid reflects the distribution of mass inside the earth. The rise and fall of the surface in a geoid is important for converting GPSderived ellipsoidal height differences to orthometric height differences.

Using Topcon Link, you can create a Topcon geoid file (\*.gff) for a defined area from any supported geoid model—creating a sub-section of the selected geoid file. This file can then be exported into Field Software Jobs. Table 5-4 lists the formats that a geoid file can be converted to.

From a	То а
Geoid file	Topcon Geoid file

When converting from a Geoid file, the user can enable and select only the *Change geoid bounds* option (see "Change Geoid Bounds" on page 5-11)

## GPS+ Raw Data File Conversion Parameters

GPS+ Raw Data file contains GPS/GLONASS code and carrier phase measurements collected for point or points where was mounted a GPS antenna. Topcon Link directly converts (that is using its own technique) the following GPS+ raw data files:

- TPS/JPS files are the raw data files logged by Topcon receivers.
- TPD files are a Topcon proprietary format for storing GPS raw data, and can be used to backup raw data or exchange raw data between different jobs.
- Sokkia PDC files are the new raw data files logged by Sokkia receivers (GSR2600, GSR2700 and GSR1700).
- Sokkia Stratus files are the raw data files logged by Sokkia Stratus receiver.
- RINEX 2.11 and RINEX 3.0 is the version of standard format for exchanging GPS Raw Data. For a static/kinematic observation(s) (session(s)) 2 or 3 files are created; the first usually having an extension beginning with the letter 'O' and stores the observations; the second usually has extensions beginning with the letter 'N' or 'G', depending on GPS/GLONASS capability, and stores GPS and GLONASS navigational data (orbits) for those observations.
- Compact RINEX/Compact Rinex3 file (or a Hatanaka compressed file) is the compression of RINEX 2.11 / RINEX 3.0 observation files. This file type contains a "D" extension.

Also Topcon Link allows the user to convert native binary formats of GPS receivers manufactured by Ashtech (B\*.\*, E\*.\*, S\*.\*), Leica Geosystems (\*.lb2, \*.mdb,\*.m00), Trimble (\*.dat), Septentrio Satellite Navigation NV (\*.sbf) companies. For converting these formats, Topcon Link applies TEQC software (http://facility.unavco.org/software/teqc/teqc.html).

When the user converts one of the above formats in Topcon Link, the following scheme of converting the file starts to work automatically:

- 1. TEQC converts the native binary format to RINEX 2.11 file format.
- 2. Topcon Link will convert the created RINEX file to a user-selected file format.

#### NOTE:

- 1. The current default setting for the TEQC allows converting only static occupations (provided there is **only one** *Marker Name* in the file for this occupation). In other words, it is impossible to convert kinematic and Stop&Go files of native formats of these companies into Topcon Link.
- 2. When converting binary files of third-party companies, Topcon Link uses default settings of the TEQC program. If a binary file failed to be converted by Topcon Link, we recommend to repeat the conversion to the RINEX file using settings of TEQC (out of the Topcon Link program) for the given binary file. After obtaining an appropriate RINEX file, this file can be converted by Topcon Link.

Table 5-6 lists the formats that a GPS+ raw data file can be converted to/from.

From a	То а
Topcon/JPS file	Compact RINEX (ver 2.11)
	Compact RINEX3 (ver 3.00)
	RINEX (ver 2.11)
	RINEX 3 (ver 3.00)
	TPD file
Sokkia PDC	Compact RINEX (ver 2.11)
	Compact RINEX3 (ver 3.00)
	RINEX (ver 2.11)
	RINEX 3 (ver 3.00)
	TPD file

Table 5-6. GPS+ Raw Data File Conversion Formats	Table 5-6.	GPS+ Raw Data	File Conversion Formats
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Sokkia StratusCompact RINEX (ver 2.11) Compact RINEX3 (ver 3.00) RINEX (ver 2.11) RINEX 3 (ver 3.00) TPD fileTPD fileCompact RINEX (ver 2.11) Compact RINEX3 (ver 3.00) RINEX (ver 2.11) RINEX 3 (ver 3.00)Compact RINEX (ver 2.11) fileCompact RINEX3 (ver 3.00) RINEX (ver 2.11) RINEX 3 (ver 3.00)Compact RINEX (ver 2.11) fileCompact RINEX3 (ver 3.00) RINEX (ver 2.11) RINEX 3 (ver 3.00) TPD fileCompact RINEX (ver 3.00) fileCompact RINEX3 (ver 2.11) RINEX 3 (ver 2.11) RINEX 3 (ver 2.11) RINEX 3 (ver 2.11) RINEX 3 (ver 3.00) TPD fileRINEX (ver 2.11) fileCompact RINEX3 (ver 2.11) RINEX 3 (ver 3.00) TPD fileRINEX (ver 2.11) fileCompact RINEX3 (ver 2.11) RINEX 3 (ver 3.00) TPD file
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Compact RINEX3 (ver 3.00)
RINEX (ver 2.11)
TPD file
Ashtech file by teqc Compact RINEX (ver 2.11)
Compact RINEX3 (ver 3.00)
RINEX (ver 2.11)
RINEX 3 (ver 3.00)
TPD file

Table 5-6. GPS+ Raw Data File Conversion Formats (Continued)

From a	То а
Leica file by teqc	Compact RINEX (ver 2.11)
	Compact RINEX3 (ver 3.00)
	RINEX (ver 2.11)
	RINEX 3 (ver 3.00)
	TPD file
Septentrio file by teqc	Compact RINEX (ver 2.11)
	Compact RINEX3 (ver 3.00)
	RINEX (ver 2.11)
	RINEX 3 (ver 3.00)
	TPD file
Trimble file by teqc	Compact RINEX (ver 2.11)
	Compact RINEX3 (ver 3.00)
	RINEX (ver 2.11)
	RINEX 3 (ver 3.00)
	TPD file

Table 5-6. GPS+ Raw Data File Conversion Formats (Continued)

• When converting to a RINEX or Compact RINEX file, the user can enable and select only the Filter raw data option (see "Filter Raw Data" on page 5-11).

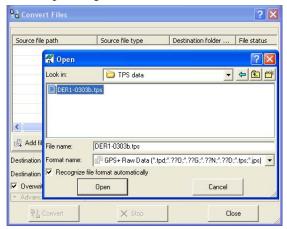
## Example of Conversion Topcon File to RINEX File

The following pages describe the example of conversion of the Topcon file ('DER1-0303b.tps'). This file was collected by dual frequency GPS/GLONASS Topcon receiver. It needs to create the RINEX file with GPS L1 raw data only.

To create this file, do the following steps:

1. Click **File->Convert Files** and click **Add Files** in the window. The *Import* window displays

2. Navigate to the desired file, highlight it and select the corresponding file format in the *Format name* field:



3. The converted file appears in the list of the converted files:

Convert Files			?
Source file path	Source file type	Destination folder	File status
C:\Examples_for converting files for TLink\TPS data\DER1-0303b.tps	TPS - GPS+ Raw Data	1	File format is verified

4. Check the Advanced conversion option checkbox:



5. Select the RINEX file format for the created file in the *Destination format* field:

Destination format	RINEX - GPS + Raw Data (1.220,7.226,7.22N)
6.	Type in a name of a new folder in the <i>Destination folder name</i> field:

Destination folder	C:\RINEX DATA	

The created files will be stored in the folder.

7. Uncheck the desired channels:

гC	hannels
•	GPS
Г	GLONASS
~	L1
Г	L2

8. Click the **Convert** button. The following message appears:

Topcon	Link	X
♪	Folder C:\RINEX_Data\ not	found. Create?
	Yes No	

Press **Yes** to create this folder. If the file conversion is successful, the *Convert Files* dialog box displays the following:

💱 Convert Files			2 🛛
	1	T	
Source file path	Source file type	Destination folde	File status
C:\Examples_for converting files for TLink\TPS data\DER1-0303b.tps	TPS - GPS+ Raw Data	1	File is successfully converted

9. The created file has the following data:

2. Topcon I build Ju DER1-03	ink 7 11y 25,		OBSERU (c) to			GPS) NOV-07 20:58 Systems	RINEX VERSION / TYPE PGM / RUN BY / DATE Comment Marker Name Marker Number
-Unknow	1-		-Unkno	own-			OBSERVER / AGENCY
AFFRRRF	JFGG		-Unkna	own-	-Un	known-	REC # / TYPE / VERS
-Unknow	n-		-Unkna	own-			ANT # / TYPE
285 07	16.2627	219	9374.17	97 53	247224.3437		APPROX POSITION XYZ
	0.0000		0.0	300	0.0000		ANTENNA: DELTA H/E/N
1	0						WAVELENGTH FACT L1/2
2005	3	3	1	0	0.000000	GPS	TIME OF FIRST OBS
2005	3	3	1	59	59.0000000	GPS	TIME OF LAST OBS
1.1	999						INTERVAL
13							LEAP SECONDS
13							# OF SATELLITES
4	C1	P1	L1	D1			# / TYPES OF OBSERV
65	821	706	821	891			PRN / # NF NRS

## Localization GC3 File Conversion Parameters

A localization file contains coordinate points in both the local and global coordinate systems. These systems are used in the calculation of localization points. Table 5-7 lists the formats that a localization file can be converted to.

From a	То а
Localization file: Topcon 3D	Field Software Job file
Field Software Job file If the Field Software file contains pairs of point coordinates in WGS84 and local system for each Control point.	Localization file

When converting from a Localization file, no further parameters are required.

When converting to a Localization file, the user can enable and select only the *Convert metric unit* option (see "Convert Metric Unit" on page 5-9)

## **Road File Conversion Parameters**

A road file contains information about the stations/chainages, alignments, cross-sections, and grades required for creating a road. Table 5-8 lists the formats that a road file can be converted to/from.

From a	То а
Road file: CLIP, ISPOL, LandXML, MX GENIO, SBG, SSS, TDS, Tekla, Topcon 3D, Topcon XML, Field Software Job	Road file Field Software Job file Topcon XML X-Section Templates Design file: LandXML
Field Software Job file If the Field Software file contains road data.	Road file

Table 5-8. Road File Conversion Formats

When converting from a Road file, the user can select:

- 1. Convert coordinate type and system (see "Convert Coordinate Type and System" on page 5-6)
- 2. Convert metric unit (see "Convert Metric Unit" on page 5-9.
- 3. Convert coordinate order (see "Convert Coordinate Order" on page 5-9)
- 4. Convert metric unit (see "Convert Metric Unit" on page 5-9 no further parameters are required.

Convert coordinate type and system				
From				
Coordinate type: Ground or Localization	•			
Coordinate system: None				
	de Grid to gr	round	for created road f	ile:
Convert metric unit		- To		
From Meters			0.1	
D2 -		Coordinate type:	Grid	
응급 Convert	×	Projection:	Chio (North)	Custom
for converted road file:		Datum:	NAD83	•
	Grid to	o ground		
		To NEH		•
		To USFeet		•

Figure 5-5. Convert Roads File – Example

## **Topcon XML File Conversion Parameters**

A Topcon XML file can contains points, roads, TS measurements, DL measurements, and/or any GPS observations. Table 5-9 lists the formats that a Topcon XML file can be converted to/from.

From a	То а	
Topcon XML file	Coordinate file	
	Design (except TN3) file	
	GIS: ESRI Shape file	
	Field Software Job file	
	GPS Obs	
	DL Obs	
	TS Obs	
	Road	
	X-Section	
	Topcon XML	
Coordinate file	Topcon XML file	
Design (except TN3and LN3)	Topcon XML file	
Field Software Job file	Topcon XML file	
DL obs	Topcon XML file	
TS Obs	Topcon XML file	
GPS Obs	Topcon XML file	
Land XML	Topcon XML file	
Road	Topcon XML file	
X-Section	Topcon XML file	

Table 5-9. Topcon XML File Conversion Formats	Table 5-9.	Topcon	XML	File	Conversion	Formats
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Available parameters depend on the data in the selected file and the format being created.

When converting from/to a Design file the user can select the following options:

- 1. Convert coordinate type and system (see "Convert Coordinate Type and System" on page 5-6)
- 2. Convert height (see "Convert Height" on page 5-8)
- 3. Convert coordinate order (see "Convert Coordinate Order" on page 5-9)
- 4. Convert metric unit (see "Convert Metric Unit" on page 5-9)
- 5. Convert angular unit (see "Convert Angular Unit" on page 5-10)
- Convert vertical angle (see "Convert Vertical Angle" on page 5-10)

## Field Software Job File Conversion Parameters

A Field Software Job file can contain the following measurements:

- Total Station measurements (the distance, vertical angle, and horizontal angle measurements from a station to a point).
- Digital Level measurements (the level measurements from a station to a point).
- GPS Observation (the coordinate increment in the current projection and solution type for the measurement).

Table 5-10 lists the formats that a Field Software Job file can be converted to/from.

From a	То а		
Spectrum Survey Job:	Code/Layer Library		
TopSURV 7 Job,	Coordinate file		
TopSURV PC Job	GPS Obs		
	TS Obs		
	DL Obs		
	GIS: ESRI Shape file		
	Design file		
	Topcon XML file		
	Localization file (if the Field Software file contains pairs of point coordinates in WGS84 and local system )		
	Cut Sheet file (if the Field Software file includes Stakeout points)		
	Road file (if the Field Software file includes road data)		
	X-Section Template file (if the Field Software file includes an X-section template)		
	Field Software Job		
Coordinate file	Field Software Job file		
DL Obs	Field Software Job file		
TS Obs	Field Software Job file		
GPS Obs	Field Software Job file		
Topcon XMLr	Field Software Job file		
Localization file	Field Software Job file		
Design file	Field Software Job file		
Road file	Field Software Job file		
X-Section Template file	Field Software Job file		
Code/Layer Library	Field Software Job file		
Spectrum Survey Job/TopSURV 7 Job/ TopSURV PC Job	Spectrum Survey Job/TopSURV PC Job/ TopSURV 7 Job		

Table 5-10. Field Software Job File Conversion Formats



Available parameters depend on the data in the selected file and the format being created.

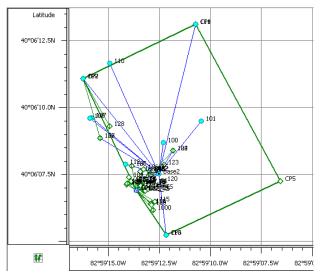
When converting from a Field Software Job file, no further parameters are required.

When converting to a Field Software Job file the following parameters are available:

- 1. Convert coordinate type and system (see "Convert Coordinate Type and System" on page 5-6)
- 2. Convert height (see "Convert Height" on page 5-8)
- 3. Convert coordinate order (see "Convert Coordinate Order" on page 5-9)
- 4. Convert metric unit (see "Convert Metric Unit" on page 5-9)
- 5. Convert angular unit (see "Convert Angular Unit" on page 5-10)
- 6. Convert vertical angle (see"Convert Vertical Angle" on page 5-10)

## Example of Conversion Field Software File to Topcon Vector File

The following pages describe the example of conversion of the TopSURV 7 Job file ('columbus\_rtk\_ts.tsj'). This file was collected by Topcon Controller FC -200 with TopSURV version 7.0 and was saved on the controller's removable flash memory card. This job contains the TS measurements and GPS RTK observations:



The task is to create the Topcon Vector file and save this file on the computer.

To create this file, we do the following steps:

- 1. Insert the controller's removable flash memory card into the computer's card reader.
- Click File->Convert Files and click Add Files in the window. The *Import* window displays.
- 3. Navigate to the desired file, highlight it and select the corresponding file format in the *Format name* field:

	🚰 Open			? 🗙
Source file path	Look in:	topSURV_Job_7	-	
Add files	File name:	columbus_rtk_ts.tsj		
Destination format	Format name:	TopSURV 7 Job - TopSU	JRV Job (*.tsj)	-
	✓ Recognize	file format automatically		
Overwrite existing				

4. The converted file appears in the list of the converted files:

🕈 Convert Files			?
Source file path	Source file type	Destination file name	File status
G:\topSURV_Job_7\columbus_rtk_ts.tsj	TopSURV 7 Job - TopSURV Job	columbus rtk ts.xml	File format is verified

5. Check the Advanced conversion option checkbox:

Advance	ed conversion options
ß	

6. Select the Topcon vector file format for the created file in the *Destination format* field:

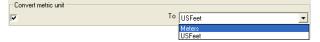
Destination format	Topcon Vectors - GPS Obs (*.tvf)	
		۰.

7. Type in a name of a new folder in the *Destination folder name* field:

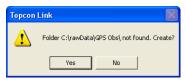
Destination folder	C:\raw Data\GPS 0B	

The created files will be stored in this folder.

8. Select the desired metric unit for the created file:

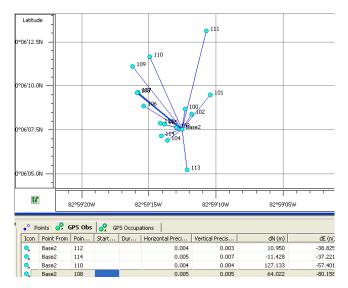


9. Click the **Convert** button. The following message appears:



10. Press **Yes** to create this folder. If the file conversion is successful, the *Convert Files* dialog box displays the following:

Convert Files			? 🛛
Source file path	Source file type	Destination file name	File status
G:\topSURV_Job_7\columbus_rtk_ts.tsj	TopSURV 7 Job - TopSURV Job	columbus_rtk_ts.tvf	File is successfully converted



11. The created file has the following data:

### **TS Obs File Conversion Parameters**

A total station observation file contains the distance and vertical/ horizontal angles measurements from a station to a point. Table 5-11 lists the formats that a total station observation file can be converted to.

From a	То а
TS Obs file:	Measurement file
Custom Text Format, FC-5 Raw,	Coordinate file
GTS-210_310 Raw, GTS-6 Raw, GTS-7	Design file
Raw, GTS-7+ Raw, Topcon XML TS	GIS: ESRI Shape file
Obs; Sokkia SDR	Topcon XML file
	Field Software Job file
	TS Obs file
Field Software Job file	TS Obs file
Topcon XML file	TS Obs file
TS Obs file	TS Obs file

Table 5-11. TS Obs File Conversion Formats



Available parameters depend on the data in the selected file and the format being created.

When converting from/to a Field Software Job file, the following parameters are available:

- 1. Convert coordinate system (see "Convert Coordinate Type and System" on page 5-6)
- 2. Convert height (see "Convert Height" on page 5-8)
- 3. Convert coordinate order (see "Convert Coordinate Order" on page 5-9)
- 4. Convert metric unit (see "Convert Metric Unit" on page 5-9)
- 5. Convert angular unit (see "Convert Angular Unit" on page 5-10)
- 6. Convert vertical angle (see "Convert Vertical Angle" on page 5-10)
- 7. Convert distance format (see"Convert Distance Format" on page 5-11)

### X-Section Template File Conversion Parameters

A cross-section template file contains information used for creating a road. Table 5-12 lists the formats that a cross-section template file can be converted to/from.

From a	То а
X-Section Template file	X-Section Template file Field Software Job file
Field Software Job file If the Field Software file contains cross- section data.	X-Section Template file

Table 5-12. X-Section Template File Conversion Formats

When converting from/to X-section Template file, the user can select only the *Convert metric unit* option (see "Convert Metric Unit" on page 5-9).

# **Adding a Custom Projection**

A projection contains pre-defined transformation data that is used for conversions between local and global positions. While Topcon Link includes a number of pre-defined projections, a custom projection may be needed for your job site or geographical area. Custom projections are included in the projection list.

- 1. On the *Convert Files* dialog box, click **Custom** next to the *Projection* selection box.
- 2. Click Add.

🔚 Custom Proje	ctions List		? 🛛
Name	Region	Datum	Note
<			>
Add D	Remo	ove	Close

Figure 5-6. Custom Projections List

- 3. Enter a name for the new projection.
- 4. Select the type of projection and edit the parameters to create a custom projection. See Table 5-13 on page 5-39 for details and a description of editable parameters for each projection type.
- 5. Set remaining information for the custom projection.
- 6. Enter a region for the projection (for example: USA)
- 7. Enter any applicable notes, such as the projection used (for example: CA, Zone 5)

🚰 New Custom P	rojection : Projection None	? 🛛						
General					_			
Name	My New Projection		-		3			
Projection Type	Transverse-Mercator			7				
Name	Value							
Central meridian	0°00'00.000							
Scale	1.5				4			
Lat0	0°00'00.000							
East0 (m) North0 (m)	50 50			😴 Custom Project	tions Lis	a		? 🗙
Northo (III)	50		H.				1	
				Name	Region	Datum	Note	Projection Type
				My New Proje	CA	WGS84	My notes	Transverse-Mercator
<		>	Ľ			_	1	
· · · · ·	-			Add		Remo	ve	
Region	CA		-					
	My notes				_			
Note					5			7
_								
Datum	WGS84							
ок Б	Cancel A;			(	6			

#### 8. Select the datum for the projection

Figure 5-7. Enter Custom Projection Parameters – Example

- 9. Click **Apply** to set the information, then **Ok** to add the projection to the list of custom projections.
- 10. Click **Close** to exit the custom datum function.

The following table (Table 5-13 on page 5-39) describes projection types and lists the parameters available for creating a custom projection. A map projection is a systematic representation of all or part of the surface of a round body (the Earth) on a plane. Each projection is specified using a particular set of parameters and can be used for different territories or customized uses.

Projection Type and Editable Settings	Examples (With Defaults)
<b>Transverse-Mercator</b> A cylindrical projection of the Earth rotated at 90° relative to the equator. This projection creates little distortion of scale where the projected surface is tangent to the sphere representing the Earth. This projection is useful in areas of narrow longitudinal range.	Name       My New Projection         Projection Type       Transverse Mercador         Name       Value         Central meridian       0°00'00.000         Scale       1         Lato (m)       0         Northol (m)       0
<b>Lambert</b> A conic conformal projection of the Earth. This projection is useful in areas with a predominant east-west expanse.	New Custom Projection : Projection None       Image: Constraint of the second sec
<b>Double Stereographic</b> A spherical projection of the Earth first on conformal sphere, then on a plane, from a single point. This projection provides a perspective view while conformally mapping a sphere onto a plane. This projection is useful in single hemispheres.	New Custom Projection : Projection None       Image: Comparison of the state of th
<b>Stereographic</b> A spherical projection of the Earth on a plane from a single point. This projection conformally maps shapes and angles, but creates areal distortion farther from the projection point. This projection is useful in single hemispheres.	Name     Value       Name     Value       Lat0     0°0000.000       Lot0     0°0000.000       Scato(m)     0       Northo (m)     0

Table 5-13. Projection Types

Projection Type and Editable Settings	Exa	mples (With Defaul	ts)
Oblique Mercator			
A cylindrical projection of the Earth rotated at some angle relative to a central line. This projection creates little distortion of scale where the projected surface is tangent to the sphere representing the Earth. This projection is useful in areas that are oblique from a other Mercator projections, that is an area predominantly neither east-west nor north-south.	Area Control of C	Value       00000.000       1       00000.000       1       00000.000       0	
Albers Equal Area		Projection : Projection None	? 🛛
A conical, equal area projection of an	General	потресной потресной коле	
area that uses two standard parallels to	Name	My New Projection	
minimize distortion. This projection	Projection Type	Albers Equal Area	•
	Name South Lat	Value 0°00'00.000	
creates little distortion of angle and scale	North Lat	30°00'00.000N 0°00'00.000N	
between two parallel lines. This	Lat0	0°00'00.000	
projection is useful in equal-area,	East0 (m) North0 (m)	0	
predominantly east-west regions.			
			Ĩĸ
Cassini-Soldner	Rew Custom	Projection : Projection None	? 🗙
A cylindrical, equidistant	General	<b>E</b>	
	Name Projection Turne	My New Projection Cassini-Soldner	
projection of the Earth rotated at	Projection Type Name	Value	
90° along the central meridian	Lat0	0°00'00.000	
with lines plotted along an X,Y	Lon0 Axis azimuth	0°00'00.000 0°00'00.000	
· ·	East0 (m) North0 (m)	0	
graph. This projection creates			
little distortion of scale along the			
meridian and lines perpendicular			
to the meridian. This projection			l N
<u> </u>			
is useful in simple mappings.			

#### Table 5-13. Projection Types (Continued)

# Adding a Custom Datum

While Topcon Link includes a number of pre-defined datums from around the world, a custom datum may be needed for your particular jobsite or geographical area. Custom datums are included in the datum list.

- 1. On the *Convert Files* dialog box, click **Custom** next to the Datum selection box.
- 2. Click Add.

🚰 Custom Dati	ms List		? 🔀
Name	Note	Ellipsoid	DX (m)
<			>
Add	Rem	ove	Close

Figure 5-8. Custom Datums List

- 3. Set the following information for the new datum:
  - enter the new datum name
  - select the ellipsoid used for the datum
  - enter the DX, DY, DZ values for the ellipsoid's shift parameters (the default values are zero)
  - enter the RX, RY, RZ values for the ellipsoid's angle rotation parameters (the default values are zero)
  - enter the Scale by which to adjust the ellipsoid (the default value is zero)
  - enter any identifying notes for the datum



The shifts, rotations and scale parameters specify a coordinate transformation from the newly created reference datum to WGS84 according to the following equation:

$$\begin{bmatrix} X \\ Y \\ Z \end{bmatrix}_{WGS-84} = \begin{bmatrix} DX \\ DY \\ DZ \end{bmatrix} + (1 + Scale \cdot 10^{-6}) \cdot \begin{bmatrix} 1 & RZ & -RY \\ -RZ & 1 & RX \\ RY & -RX & 1 \end{bmatrix} \cdot \begin{bmatrix} X \\ Y \\ Z \end{bmatrix}_{new-datum}$$

🖳 New Cu	ıstom Datum : Datu	m None ?
General		
Name	CA	
Ellipsoid	WGS84	
DX (m)	3	
DY (m)	3	
DZ (m)	3	
RX ('')	1.5	
BY ('')	1.5	
RZ ('')	1.5	
Scale (ppm)	1.5	
	My New Datum	
Note		
OK	Cancel	Apply

Figure 5-9. Enter Custom Datum Parameters

- 4. Click **Apply** to set the information, then **Ok** to add the datum to the list of custom datums.
- 5. Click **Close** to exit the custom datum function.

## About Grid->Ground Parameters

A ground projection is a grid mapping projection re-scaled, rotated and shifted to convert point coordinates to another reference surface (up to average project elevation) to produce near ground values. To set a grid-to-ground transformation, Topcon Link rotates the ground system relative to the origin of the grid coordinate system.

- 1. To enter grid->ground parameters, enable the corresponding check box and click the browse button.
- 2. Set the scale factor using one of the following methods:
  - Select Avg. Job Height. Then enter an average height from all points in the job and enter the value of the Map Scale Factor.
  - Select Scale Factor. Then enter the value of the Map Scale Factor.

- 3. Enter the northing and easting offsets in meters from the origin of the grid coordinate system.
- 4. Enter the azimuth rotation angle in degrees/minutes/seconds between the grid and ground coordinate systems. This angle defines the reference direction for ground azimuths.
- 5. Click Ok.

🖑 Grid->Groun	nd Parameters 🛛 💽 🔀	🖑 Grid->Groun	nd Parameters	? 🛛
Scale Factor		Scale Factor		
Avg Job Height	•	Scale Factor		•
Avg Job Height (m)	8.23	Avg Job Height (m)	0	
Scale Factor		Scale Factor	3	
Mapping Scale	]1	Mapping Scale	1	
Northing Offset (m)	5	Northing Offset (m)	5	
Easting Offset (m)	5	Easting Offset (m)	5	
Azimuth Rotation	8*15'00.0000	Azimuth Rotation	8*015'00.0000	
ОК	Cancel	ОК	Ę.	Cancel

Figure 5-10. Enter Grid->Ground Parameters

# **Notes:**


# Editing Data in Topcon Link

After opening a file in Topcon Link, you may want to edit some data before saving it for post-processing or exporting it to a device. The following list describes just some of the edits you can perform to prepare data for other activities.

- Add a point
- Edit/add a GPS antenna
- Assign photo notes
- Edit codes/attributes and layers
- Edit lineworks parameters
- Edit total station observation offsets
- Edit horizontal/vertical alignments and X-sections of the opened road

Because many editing activities are similar, the sections in this chapter are set up to provide editing details based on data tables.

# **Editing Points**

Among other editing activities, Topcon Link can be used to edit coordinates or point names, delete a measurement taken for another point, edit or enter the antenna height.

### Add a Point

- 1. Open a file (excepting a GPS+ Raw Data file)
- 2. Click Edit > Add > Point (or click Add Point on the toolbar).
- 3. Enter a new name for the point.
- 4. Edit other parameters as needed. See "Edit in the Point Properties Dialog Box" on page 6-3 for more details.
- 5. Click **Apply** to save the new point. Click **Ok** to exit. The new point is added to the end of point listing.

· Add Po	oint : Point U	ser1	? 🔀
General	Coordinates	Codes and Style	
Name	U	ser1	
Note			
Control	N	one	•
Code	tt		•
Source	Γ		
	ок	Cancel	Apply

Figure 6-1. Edit New Point Parameters

If the user added a point with a code into a Field Software Jobs file, the CAD View displays this point:

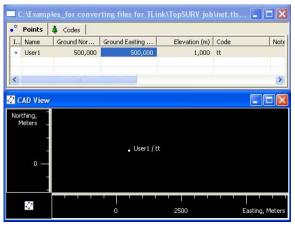


Figure 6-2. Points tab and Cad View

### **Edit on the Points Tab**

You can edit all fields directly on the *Points* tab except the *Icon* and *Photo Notes*. Click-pause-click to access editable fields. Figure 6-3 shows an example of editing fields on the *Points* tab.

e2-REF	48468.5	7		NAIL MH NAIL OAK	•					
State of Concession, State of	Process Window Hel	6								
🛎 🖬 💣 😘	8 83 @ S	× X Ral		3 3 8	9 2		R.	1		
								1		
D-10-1002 6000 41	TanSI IDV DC In	B = 1								
and the second	sv. «TopSURV PC Jo							/		
	S Occupations   🔗 🤅	b > GIS Obs   🌡 Codes round Easting	Elevation (m)	Code	Co	strol		yer	Color	
🔹 Points 🧬 GP	S Occupations   🔗 🤅	GE Obs 🛛 🌡 Codes		Code	Co		1	yer	Color BYLAYER	
Points     Points     GP     Iname	S Occupations 6	GLS Obs   🌡 Codes	Elevation (m)	Code		h	-	yer CODE(0)		
Points g GF     Mome     A Base2	S Occupations 3 C Ground Northin 4 48468.500	GLS Obs & Codes round Easting 558488.663	Elevation (m) 242.782	Code	Bol	h Ne	-	0.5	BYLAYER	
Points g GF     Mana     A Base2     O 100	S Occupations Ground Northin G Ground Northin G 48468.500 96509.711	50 Obs & Codes round Easting 558488.663 558493.855	Elevation (m) 242.782 241.472		Bol	h ve ie	511	0.5	BYLAYER BYLAYER	
Points	S Occupations Ground Northin	a Obs 4 Codes round Easting 558488.663 558493.855 558538.140	Elevation (m) 242.782 241.472 241.559	OAK	Bol No No	h ne ne	e Bri	0.5	BYLAYER BYLAYER BYLAYER	
Points      P	25 Occupations Ground Northin	als Obs 8 Codes round Easting 558488.663 558493.855 558538.140 558594.973	Elevation (m) 242.782 241.472 241.559 240.915	OAK	Bol No No	h ve ve ve	511 511 0 0	0.5	BYLAYER BYLAYER BYLAYER BYLAYER BYCCOE	
Points      A     Rese2     Tot	S Occupations Ground Northin	Obs         Image: Codes           round Easting         558488.663           558498.663         558493.855           558538.140         536504.973           558478.170         558478.170	Elevation (m) 242.782 241.472 241.559 240.915 240.783	OAK NAIL NAIL	Bol No No No	h Ne Ne Ne	8m 0 0 0	0.5	BYLAYER BYLAYER BYLAYER BYCCOE BYCCOE	

Figure 6-3. Editable Fields on the Points Tab – Example

### Edit in the Point Properties Dialog Box

The available property tabs depend on the information in the file. For example, the *Offset* tab is only available if a point-to-line offset was measured.



If the file currently lacks the data being edited in the Properties dialog box, Topcon Link will ask to save to another format before continuing.

- 1. To edit a point's properties, double-click the desired point.
- 2. Edit the point's general properties:
  - Name the name of the point
  - Note any notes associated with the point
  - Code the code of the point

3. Edit the point's coordinates (Latitude\Northing, Longitude\Easting and Elevation).

Properties : I	Point occ	? 🗙	
General Coordi	nates Codes and Style		
Name	occ	Properties : Point	st and
	#1		
Note		General Coordinate	es Codes and Style
Control	None	Ground Northing (m)	500
Code	Station	Ground Easting (m)	500
Source		Elevation (m)	145,16
ок	Cancel Apply		
		OK	Cancel Apply

Figure 6-4. Edit General and Coordinate Properties

4. Edit the point's CAD information. The user can edit the data in the following field: *Code*, *String*, *Control Code* and *Control Code*2, *Color* and *Point Symbol*.

Properties : Point 500							
General Coordin	ates   Photo Note:	s Codes and St	yle				
Code	String	Attribute	Value				
• 3	AA	Lamp	1				
<	>						
String	AA						
Control Code	Lamp#1323		-				
Control Code 2			-				
Color			•				
Point Symbol	<b>A</b>		•				
ОК	Can	cel	Apply				

Figure 6-5. Edit CAD and Style Properties

- 5. The *Photo Notes* tab is available only for points of Field Software Jobs. The user can select a desired photo note from the list, or add/remove a photo note for the point. (The user can add \*.jpg or \*.bmp files of type).
  - To add a photo note, click **Add Photo Note**. Browse for and select the desired photo, click **Open**. The photo is added to the list, in the order added, and automatically applied to the point.

• To delete a photo note, select the photo from the list and click **Remove Photo Note**.

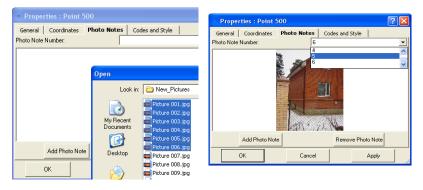


Figure 6-6. Edit Photo Note and Offset Properties

 For PTL (point to line) points, edit the point's offset. To obtain new coordinates of the point after editing offset parameters, need click Calculate Coordinates. See ("About Editing Offsets in Topcon Link" on page 6-53) for more details

** Properties : Point ptl1						
General Coordinates	Offset	Photo Not	es	Codes and Style	1	
Offset Dist (m)	15					
Offset Ht (m)	1					
Offset Across (m)	6					
From Point	P_12				•	
To Point	P_13				•	
- Height is						
Relative						
C Absolute						
ОК	0	Cancel		Apply		

Figure 6-7. Edit Offsets for the PTL point

7. Click Apply to save the changes. Click OK to exit.

# **Editing GPS Occupations**

Among other editing activities, Topcon Link can be used to edit the height of the antenna and the point name, associated with the occupation. A custom antenna can also be created and applied to an occupation.

### **Edit on the GPS Occupations Tab**

You can edit the *Point Name*, *Antenna Type/Height/Height Method*, and *Note* fields directly on the *GPS Occupations* tab. Click-pause-click to access editable fields. Figure 6-8 shows an example of editing fields on the *GPS Occupations* tab.

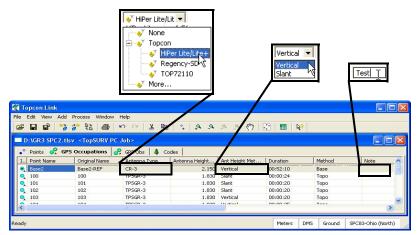


Figure 6-8. Editable Fields on the GPS Occupations Tab – Example

### Edit in the GPS Occupations Properties Dialog Box

The available property tabs depend on the information in the file. For example, the *Offset* tab is only available if a line with known azimuth offset was measured.



Note the following restrictions when editing a GPS occupation: - If making changes to a GPS occupation in a Field Software Jobs, the file must be saved to the same file format.

- If the RTK base station does not have any information about the antenna, Topcon Link will recalculate the coordinates of the rover's points from the phase center of the base antenna. In the given case, after clicking **Compute Coordinate**, the following message appears:



- 1. To edit a GPS occupation's properties, double-click the desired occupation.
- 2. Edit the GPS occupation's general properties. The Point Name and Note can be edited.

3. Edit the GPS occupation's antenna. To create/edit a custom antenna type, see "Add a Custom GPS Antenna" on page 6-9.

• Properties :	GPS Occupation Start_Pt 💦 🛛 🛛	• Properties : GPS Occupation Start_Pt ?X
General Occup	ation Antenna Offset	General Occupation Antenna Offset
Point Name Original Name	Start Pt	Antenna Type 🔮 GR-3 💽 Custom
Note		Antenna Height (m)   2.06 Ant Height Method Vertical
Method	Торо	
Start Time	12.12.2007 10:01:49	
Stop Time	12.12.2007 10:01:58	
Duration	0:00:09	
OK	Cancel Apply	OK Cancel Apply

Figure 6-9. Edit General Coordinate Properties

4. Edit the GPS occupation's offsets. See ("About Editing Offsets in Topcon Link" on page 6-53) for more details.

Properties : GPS Occupation Start_Pt							
General Occup	ation Antenna Offset						
Azimuth	270*00'00,0000						
Offset Dist (m)	25						
Offset Ht (m)	0,43638						
Offset Across (m)							
OK	Cancel Apply						

Figure 6-10. Edit Offset Properties

5. View information for the occupation (the number of epochs, the record interval, the GPS week and day of the occupation start time):

🤹 Ргоре	Properties : GPS Occupation topo							
General	Occupation	Antenna	Offset					
NEpoch	10							
Interval	1000	)						
GPS week,	day 1457	,346						
Receiver	8RE	5SNA5L34						
0	ĸ	Cancel		Apply				
	·							

Figure 6-11. View Occupation Properties

6. Click Apply to save the changes. Click OK to exit

### Add a Custom GPS Antenna

Each antenna type has unique phase center parameters obtained through factory calibration. These parameters are not viewable nor editable, but a custom antenna can be added to the Topcon Link list of antennas. You will need the measurements (calibrations) shown in Figure 6-12 to properly add a custom antenna and ensure correct coordinate computations.

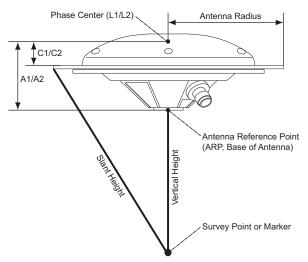


Figure 6-12. Determining Antenna Parameters

- 1. Measure or record the antenna's offset parameters as shown in Figure 6-12.
- 2. To add a custom antenna, double-click a GPS occupation.
- 3. On the *Antenna* tab, click **Custom**. Then click **Add**.

• Properties : GPS Occupation CHKPT	1 ? 🛛		
General Antenna Offset			
Antenna Type 😽 HiPer Lite/Lite+	Custom		
Antenna Height (USft) 6.562			
Ant Height Method Vertical	•		
	🚰 Custom Antennas List		? 🛛
	Icon NGS Name Name	Radius (mm)	.1 Base offset(A1) (mm)   L2 Ba:
	<		>
	Add R	Remove	Close
OK Cancel	Apply		

Figure 6-13. Add Custom Antenna

4. Enter the NGS name for the antenna and the display name for Topcon Link. NGS (National Geodetic Services) provides a common database for distributing official antenna designators and offset measurements. 5. Enter the measured offsets for the antenna and select the method used to measure the height.

🔹 New Custom Anten	na	? 🛛	
General Parameters	PCV		
NGS Name	Cust_Ant	1	
Name	Ant_01	🔹 New Custom Anter	ına 🛛 🖓 🔀
Manufacturer	Anywhere Inc.	General Parameters	PCV
	My custom antenna	Radius (mm)	0.4
Note		L1 Base offset(A1) (mm)	0.5
	,	L2 Base offset(A2) (mm)	0.6
		L1 Plane offset(C1) (mm)	0.2
		L2 Plane offset(C2) (mm)	0.3
		L1 Easting offset(E1) (mm)	0.2
		L2 Easting offset(E2) (mm)	
		L1 Northing offset(N1) (mm)	0.1
ОК	Cancel	L2 Northing offset(N2) (mm)	
		Measured Height Method	Vertical
		ОК	Cancel Apply

Figure 6-14. Enter General and Offset Parameters

- 6. Enter the PCV values. These values represent the antenna phase center variations.
- 7. Click **OK** to save the custom antenna and exit.

• New C	ustom Antenna			? 🛛
General PCV, GPS			PCV, GPS L2 (mm)	
0°	50*	0		50*
5*	55*	5	•	55*
10*	60*	<b></b>  11	0*	60*
15*	65*		5*	65*
20*	70*	21	0*	70*
25*	75*	2	5*	75*
30*	80*	31	0*	80*
35*	85*	3	5*	85*
40*	90*	41	0*	90*
45*		4	5*	
	ок 🔓	Cancel		Apply

Figure 6-15. Enter PCV Parameters

To edit a custom antenna, double-click the antenna on the antenna in the custom antenna list. The antenna's properties dialog box displays.

Cu	stom Anten	nas List		?×	
Icon	NGS Name	Name	Radius (mm)	L1 Base offset(A1) (mm)	L2 Bas
¢۳	Cust_Ant	Ant	0.4	0.5	
<					>
	Add	]	Remove	Close	

Figure 6-16. Custom Antennas

# **Editing TS Observations**

Among other editing activities, Topcon Link can be used to edit the height of the reflector, the number of the observation, the point the observation was made to. You can also apply sting and control code values to the observation.

### **Edit on the TS Observations Tab**

In the left panel, you can edit all fields except the Icon directly on the *TS Observations* tab. In the right panel, you can only edit the following fields: *Point To, Type* of measured point (except BKB

points), *Azimuth* (only for BKB points measured from the point with unknown coordinates), *Reflector Height*, *Note*, *String* and *Control Code*, *Offsets*, etc.—directly on the *TS Observations* tab. Click-pause-click to access editable fields. Figure 6-17 shows an example of editing fields on the *TS Observations* tab.

	27 27 A1 More	<b>T</b>			<u>57</u>					
🖁 Торсоп	Link				1					
ile Edit '	View Add Proc	cess Window Help			1					
📽 🖬	🖻 🔧 😭	8 8 8 8 8	B .	<u>a</u> a	2 9	🖑 🖾 🖬 🕏				
							244			
	ILIS TRAV HOW									
U.(C-0	00 1101.11	<topsurv job="" pc=""></topsurv>								
-										
-		🛇 T5 Obs 🎄 Codes	I #	Point From	Point To	Reflector Heigh	Azim	uth	Horizontal Ci	rcle Slope
•° Point	s 🛛 📿 Lines	🛇 T5 Obs 🎄 Codes	I #	Point From CP1	Point To CP3	Reflector Heigh	Azim	uth	Horizontal Ci 61°20'20.00	
•° Point: I #	s 📿 Lines ' Point Name	◇ TS Obs & Codes Instrument Hei Instrume	♦, 7 ♦, 8				-			100"
•° Point: I # ◇ 1	s 📿 Lines Point Name	Isobs         Codes           Instrument Hei         Instrume           5.330	\$, 7	CP1	CP3	5.000	Azim		61°20'20.00	100" 100"
•° Point: I # ◇ 1 ◇ 2	s 📿 Lines Point Name CP1 CP2	◆ <b>TS Obs</b> & Codes <u>Instrument Hel</u> Instrume 5.330 5.330	<ul> <li>♣ 7</li> <li>♣ 8</li> </ul>	CP1 CP1	CP3 CP3	5.000 5.000	-		61°20'20.00 241°20'00.00	100" 100" 100"
• Point: I # ◇ 1 ◇ 2 ◇ 3	s 📿 Lines Point Name CP1 CP2	TS Obs         Codes           Instrument Hel         Instrume           5.330         5.330           5.490         5.490	<ul> <li>↓ 7</li> <li>↓ 8</li> <li>↓ 9</li> </ul>	CP1 CP1 CP1	CP3 CP3 100	5.000 5.000 5.000	-		61°20'20.00 241°20'00.00 325°05'10.00	100" 100" 100" 100"
•° Point:     1 #	Point Name CP1 CP2 CP4 CP4	TS Obs         Codes           Instrument Hel         Instrume           5.330         5.330           5.490         5.344	<ul> <li>3, 7</li> <li>4, 8</li> <li>5, 9</li> <li>4, 10</li> </ul>	CP1 CP1 CP1 CP1 CP1	CP3 CP3 100 101	5.000 5.000 5.000 9.000	-		61°20'20.00 241°20'00.00 325°05'10.00 352°38'50.00	100" 100" 100" 100" 100"
•° Point: I # ◇ 1 ◇ 2 ◇ 3 ◇ 4 ◇ 4 ◇ 5	Point Name CP1 CP2 CP2 CP4 CP5		<ul> <li>7</li> <li>8</li> <li>9</li> <li>10</li> <li>11</li> </ul>	CP1 CP1 CP1 CP1 CP1 CP1	CP3 CP3 100 101 102	5.000 5.000 5.000 5.000 5.000 5.000	-		61°20'20.00 241°20'00.00 325°05'10.00 352°38'50.00 356°05'05.00	100" 100" 100" 100" 100" 100"

Figure 6-17. Editable Fields on the TS Observations Tab – Example

### Edit in the TS Observations Properties Dialog Box

The available property tabs depend on the information in the file and in the selected observation. For example, the *Image* tab is only available if an image is associated with the observation.

#### **Edit Left Panel TS Obs Properties**

- 1. To edit a TS observation's left panel properties, double-click the desired observation in the left panel.
- 2. Edit the TS observation's general properties (point name, instrument height, order number).

• Properties : TS Occupation 1.27							
General							
Point Name	Point Name 27						
Instrument Height (USft)	5.18						
#	1	*					
ОК	Cancel Apply						

Figure 6-18. Edit General Properties for the Left Panel

#### **Edit Right Panel TS Obs Properties**

- 1. To edit a TS observation's right panel properties, select the observation in the left panel then double-click the desired measurement in the right panel.
- 2. Edit the TS observation's general properties. The following information can be edited in the *General* tab: Note, Code, String and Control Code.

• Properties : TS Obs 1.occ-8.101									
Observation	General Offset Adjustment Image								
Point From	occ								
#	8								
Note	for 1243 area								
Date									
Code	plane 💌								
String	1								
Control Code	•								
ОК	Cancel Apply								

Figure 6-19. Edit General Properties

- 3. Edit data in the *Observation* tab. The following information can be edited:
  - Point To,
  - Type of measured point for side shot point (SS), backsight point (the previous occupation point) (BS), foresight point (the next occupation point) (FS), Horizontal/Vertical Resection/Resection points,
  - Azimuth only for backsight bearing point (BKB)

🗣 Properties : TS Obs 1.occ-8.101									
Observation Gen	ral   Offset   Adjustment   Image								
Point To	101	•							
Туре	SS	-							
Reflector Height (m)	1.45								
Horizontal Circle	0*00'00,0000								
Zenith Angle	90*00'00,0000								
Slope Distance (m)	20								
Vertical Angle	0*00'00,0000								
Horizontal Distance (m)	20								
Vertical Distance (m)	0								
Exclude									
Horizontal Circle									
Vertical Angle									
Slope Distance									
ОК	Cancel Apply								

Figure 6-20. Edit Observation Properties

4. Edit the TS observation's offset properties. See ("About Editing Offsets in Topcon Link" on page 6-53) for more details.

Obs 1.occ-8	.101		? 🗙
eral Offset	Adjustment	Image	
2.1			
4.2			
0.90			
From Observat	ion Line		
	1		
Can	cel	Apply	
	aral Offset 2.1 (4.2 (0.90) From Observat	2.1 4.2	aral Offset Adjustment Image   [2.1 [4.2 [0.30] [From Observation Line

Figure 6-21. Edit Offset Properties

- 5. View the image(s) associated with the observation measurement in the *Image* tab.
- 6. View the residuals for observations after calculating coordinates in the *Adjustment* tab. Non-zero values of the residuals will be presented for repeated or redundant measurements.

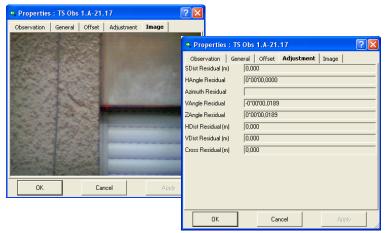


Figure 6-22. View Image and Adjustment Properties

## **Editing GPS Observations**

Since GPS observations are based on GPS occupation measurements, the user can select/add antenna parameters for the base and the rover stations of the observation and can edit notes for the observation. To edit an occupation, see "Editing GPS Occupations" on page 6-6.

### **Edit on the GPS Observations Tab**

You can only edit the *Note* field directly on the *GPS Observations* tab. All other fields are static in this tab. Click-pause-click to access editable fields. Figure 6-17 shows an example of editing this field on the *GPS Observations* tab.

Topcon Link								
<b>ĕ</b> ∎∎' *}	Process Window	N N N B	₽.   <u>°</u>	<u> </u>	s 🖑 🖸 🖡	I   <b>k</b> ?		
	ISV <topsurv p<br="">PS Occupations</topsurv>	C Job> GPS Obs 4 Co Start Time	des	Note	Horizontal Preci	Vertical Precisio	dN (m)	
						0.003	36,115	
Base2-REF	100	5/5/2006 9:33:	00:00:24		0.003			
		5/5/2006 9:33: 5/5/2006 9:36:	00:00:24 00:00:20		0.003	0.005	60.274	
Sase2-REF	100							
<ul> <li>Base2-REF</li> <li>Base2-REF</li> </ul>	100 101	5/5/2006 9:36:	00:00:20		0.005	0.006	60.274	
Base2-REF     Base2-REF     Base2-REF	100 101 102	5/5/2006 9:36: 5/5/2006 9:39:	00:00:20 00:00:20 00:00:20		0.005	0.006	60.274 26.789	

Figure 6-23. Editable Field on the GPS Observations Tab – Example

### Edit and View in the GPS Observations Properties Dialog Box

The antenna parameters for the base and the rover stations and the notes associated with a GPS observation can be changed; all other fields are informational.

- 1. To edit a GPS observation's properties, double-click the desired observation.
- 2. As needed, edit the GPS observation's note in the General tab.

Proper	Properties : GPS Obs Base1-Pt2										
General	Quality	Observation	Observation   Base Antenna   Rover Antenna								
Point From		Base1									
Point To		Pt2									
Note		for Road_A34	for Road_A34								
Start Time		12.12.2007 10	:01:49								
Duration		0:00:09									
Stop Time	Stop Time		12.12.2007 10:01:58								
GPS week,day		1457,346									
Method		ВТК Торо									
0	К	Car	icel	Apply							

Figure 6-24. Edit General Properties

3. As needed, edit the antenna parameters for the base/rover stations in the corresponding tab:

• Properties : GPS Obs Bas	se1-Pt2		
General Quality Observati	on Base Antenna	Rover	Antenna
Antenna Type 🛛 🔊 CR-3	Custo	m	• Properties : GPS Obs Base1-Pt2
Antenna Height (m) 1.77			General Quality Observation Base Antenna Rover Antenna
Ant Height Method Vertical			Antenna Type 💽 GR-3 💽 Custom
Vertical Slant			Antenna Height (m) 2,05
			Ant Height Method Vertical
ОК	Cancel	Арр	
			OK Cancel Apply

Figure 6-25. Edit Antenna Parameters

- 4. View the quality information about the observation measurement in the *Quality* tab (Precision, RTK Solution Type, Number of epochs, the common number of SV's observed by the base and rover in the last common epoch, the horizontal/vertical/total position dilution of precision in the last common epoch for RTK observation).
- 5. View the GPS observations solution components in the *Observation* tab.

General Quality	Observation Base Antenna	Rover Antenna	
Horizontal Precision (m)		• Properties : GP	rS Obs Base1-Pt2
Vertical Precision (m) Solution Type	0,023 Fixed,Phase Diff	General Quality	Observation Base Antenna Rover Antenna
Epochs	10	d×(m) dY (m)	2099,293
GPS Satellites GLONASS Satellites	9	dZ (m)	506,747
PDOP	1,915	Azimuth Elevation Angle	281°38'25,9879 -0°04'02.0111
HDOP VDOP	0,943	Distance (m)	4496,671
*Dor	11,000	dN (m)	988,407
ОК	Cancel	dE (m) dHt (m)	-4386,965 -3,779
			,
		OK	Cancel Apply

Figure 6-26. View Quality and Observation Properties

# Editing Digital Level Observations

Among other editing activities, Topcon Link can be used to edit the level run of an observation, the point, and the vertical offset. Figure 6-27 shows typical observations taken with a digital level.

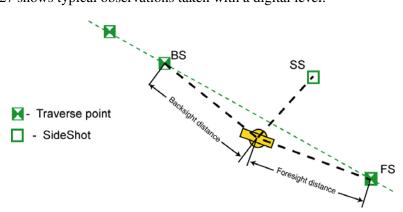


Figure 6-27. Example Digital Level Observation

The *DL Obs* tab displays a table containing two panels. The left panel displays the start and end level points of a job, and the right panel displays all level measurements of the selected job.

### **Edit on the DL Observations Tab**

In the left panel, you can directly edit order, note, and level run fields directly on the *DL Observations* tab. In the right panel, you can only edit fields that correspond to available data — such as *Point, Vertical Offset,* and *Note*—directly on the *DL Observations* tab. Click-pause-click to access editable fields. Figure 6-28 shows an example of editing fields on the *DL Observations* tab.

		1			[	1 More			
Topcon	Link								
		Process \	Window	Help		1			
e car '									
<b>3</b>					₽ 2 4 4	s s 🖑 🛛	■   <sup>k</sup> ?		
🛎 🖬 🗆 D:\Top		s Data\DL			▶   ♀   ♀ 오 <topcon -="" dl="" obs=""></topcon>	\$ \$ <b>{7</b>   Ø	I ■ I <b>k</b> ?		
🗳 🖬 D:\Top	pcon Too s 🛤 Di	s Data\DL				≗ .≗ १ <sup>4</sup> 7   ⊘ 85 (m)		55 (m)	
D:\Top D:\Top Point: Icon	pcon Too s 🖳 Di #	s Data\DL Obs		Job\file1.dl	<topcon -="" dl="" obs=""></topcon>		Instrument Elev		
D:\Top D:\Top ° Point: Icon	pcon Too s 🖳 Di #	s Data\DL Obs		_Job\file1.dl	<topcon -="" dl="" obs=""></topcon>	85 (m) 2.032	Instrument Elev 87.870 87.870		
D:\Top D:\Top ° Point: Icon	pcon Too s 🖳 Di # 1	s Data\DL Obs		_Job\file1.dl +	<topcon -="" dl="" obs=""></topcon>	BS (m)	Instrument Elev 87.870		
D:\Top D:\Top ° Point: Icon	pcon Too s 🖳 Di #	s Data\DL obs From BM1 BM1 BM3 BM2		Job\file1.dl	<topcon -="" dl="" obs=""> Point BM1</topcon>	B5 (m) 2.032 1.862	Instrument Elev 87.870 87.870 88.428 88.428		
Con	pcon Too s 🖳 Di #	s Data\DL Obs		_Job\file1.dl	<topcon -="" dl="" obs=""></topcon>	85 (m) 2.032	Instrument Elev 87.870 87.870 88.428 88.428		

Figure 6-28. Editable Fields on the DL Observations Tab – Example

### Edit in the DL Observations Properties Dialog Box

The available property tabs depend on the information in the file and in the selected observation. For example, the *Image* tab is only available if an image is associated with the observation



If making changes to a digital level observation in a Field Software Jobs, the file may be saved to a \*.tlsv / \*.tsj and \*.dl/ \*.lev file format.

#### **Edit Left Panel DL Obs Properties**

- 1. To edit a DL observation's left panel properties, double-click the desired observation in the left panel.
- 2. Edit the DL observation's general properties (level run name, note and level run order).

💐 Properties : DL Run 1.J0111 🛛 🕐 🔀								
General								
Level Run	<u>J0111</u>							
From	B001							
То	4							
Date								
Note								
#	1	÷						
Distance (m)	36,135							
Balance (m)	0,025							
ОК	Cancel	Apply						

Figure 6-29. Edit General Properties for the Left Panel

#### **Edit Right Panel DL Obs Properties**

- 1. To edit a DL observation's right panel properties, select the observation in the left panel then double-click the desired measurement in the right panel.
- 2. Edit the DL observation's general properties.

Properties	: DL Obs 1.J0111-2.1 ? 🔀
Observation	General Adjustment
Level Run	J0111
#	2
Note	
Date	01.01.1999 19:57:00
ОК	Cancel Apply

Figure 6-30. Edit General Properties for the Right Panel

3. Edit the Vertical offset and the measured point for the DL observation in the *Observation* tab.

•, Properties : DL	Obs 1.J0111-2.1	? 🗙
Observation Gene	ral Adjustment	
Туре	FS	-
Point	1	-
Ht. Measurement (m)	1,42	
Vert.Offset (m)	0	
Distance (m)	6,19	
Instrument Elevation (m)	11,417	
Std Dev (m)		
ОК	Cancel Apply	

Figure 6-31. Edit Observation Properties

4. View the calculated elevation for the DL observation.

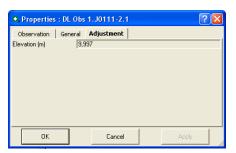


Figure 6-32. View Elevation Adjustment Properties

### **Editing Codes**

Among other editing activities, Topcon Link can be used to edit codes and their attributes. New codes can also be created.

### **Edit on the Codes Tab**

In the left panel, you can edit the code name (if this code is not used for point(s) of the current job) and layer for this code fields directly on the *Codes* tab; you can also add new codes and attributes to codes (if this code is not used for point(s)) using the pop-up menu. In the right panel, you can only edit the attribute name and default value fields directly on the *Codes* tab. Click-pause-click to access editable fields. Figure 6-28 shows an example of editing fields on the *Codes* tab.

			st_code_at	0 fi fi Fi	aver trees	▼ ob>						Ţ		
		Name	Description	Туре	Layer	Line Color	Line Style	Li '	I	Attribute Name	D	efault Value	Туре	
		code_tree		Line	layer_2		· · · · · · · · · · · · · · · · · · ·	в	E	age			Menu	
	•	fence	for woo	Line	fence	BYLAYER	BYLAYER	в	12	length			Real N	lumber
4	$\diamond$	fire hydr		Point	Fire_hydrant	BYLAYER	BYLAYER	В						
	•	field		Area	field	BYLAYER	BYLAYER	в						
	•	AA		Line	0	BYLAYER	BYLAYER	В						
Read	łv					7					Met	ers DMS	Ground	None

Figure 6-33. Editable Fields on the Codes Tab – Example

### Add a Code

- 1. To add a code, right-click in the left panel and click **New Code**. Enter a name and plotting style for the code. Click **Ok** to save
- 2. The new code is added to the bottom of the code list. For more information, see "Edit in the Code or Attribute Properties Dialog Box" on page 6-25.

I	Name	Description	Туре	A Layer	Line Color	L	ine St	Gene	rallı	ine Point	Area		
	AA		Line	New Code			BYLAY	Name		New Code	MICO	<u> </u>	
	fire hydr	6	Point Line	New Attribute	•		BYLAY BYLAY	Descrip	tion				
	fence field	for woo	Area	Cut	Ctrl+X		BYLAY BYLAY	Descrip	aon				
	code_tree		Line	Сору	Ctrl+C		DTLAT	Туре		Line		-	
1	code_dee		LIN	Delete	Del	_		Layer		17		-	
				Properties				Cayor		19			
У				Propercies			F:\code\Tes		OK tribute	Cancel		aly	
У				Propercess			F:\code\Tes	t_code_att	tribute_	_1.tsj <topsu< th=""><th></th><th>oly</th><th></th></topsu<>		oly	
У				Propercess			° Points 🛛 📿	t_code_att	t <mark>ribute</mark> TS Obs	_1.tsj <topsu< td=""><td></td><td>Line Style</td><td></td></topsu<>		Line Style	
У				Propervision			° Points 🛛 📿	t_code_att	t <mark>ribute</mark> TS Obs	_1.tsj <topsu &amp; Codes</topsu 	RV 7 Job>		
У				Properces			Points	Lines	t <mark>ribute</mark> TS Obs Type	_1.tsj <topsu &amp; Codes A Layer</topsu 	RV 7 Job>	Line Style	
У				Properces			<ul> <li>Points </li> <li> Name</li> <li>AA</li> <li>♦ fire hydr</li> </ul>	t_code_att	TS Obs TS Obs Type Line	_1.tsj <topsu ♣ Codes ▲ Layer 0</topsu 	RV 7 Job> Line Color BYLAYER	Line Style BYLAYER -	
У				Properces			<ul> <li>Points </li> <li> Name</li> <li>AA</li> <li>♦ fire hydr</li> </ul>	t_code_att	TS Obs TS Obs Type Line Point	_1.tsj <topsu Codes Layer O Fire_hydrant</topsu 	RV 7 Job> Line Color BYLAYER BYLAYER	Line Style BYLAYER - BYLAYER -	
lv.				Properces			Points     Z      Name     AA     fire hydr     fence	t_code_att	TS Obs TS Obs Type Line Point Line	_1.tsj <topsu &amp; Codes ▲ Layer 0 Fire_hydrant fence</topsu 	RV 7 Job>	Line Style ByLAYER - BYLAYER - BYLAYER -	

Figure 6-34. Add New Code

### Add an Attribute

As many attributes can be assigned to a code as needed. Attributes can be an integer, a real number, a text string, or selected from a menu.

- 1. To add an attribute, right-click in the left panel, click **New Attribute**, then select the type of attribute.
- 2. Enter a name and default value for the attribute. Click **Ok** to save.

🔚 Spectrum Link												
File Edit View Add Process Window Help												
🖻 🖬 💣 🔧 🌮 🏗 🎒 🗠 🖂 🐰 🛍 🗠	°+   +											
(C												
F:\code\Test_code_attribute_1.tsj <topsurv 7="" job=""></topsurv>	📩 🖪 Properties : Attribute New Attr ? 🔀											
🗣 Points 📝 Lines 🔷 TS Obs 🌲 Codes	General											
I 🔺 N Description Type Layer Line Cold	or											
AA Line 0 BYLAYE												
New Code     New Code     New Code	R Default Value 1											
fence for New Attribute     Integer	Type Integer											
field     Cut Ctrl+X Real Number	Required											
♦ fire hydr Copy Ctrl+C Text												
Delete Del Menu Date/Time	OK Cancel Apply											
Properties Boolean												
🔽 Spectrum Link												
File Edit View Add Process Window Help												
F:\code\Test_code_attribute_1.tsj <topsurv 7="" jo<="" th=""><th colspan="12"></th></topsurv>												
• Points 🖓 Lines 🗛 TS Obs 🌲 Codes												
	Attribute Name Default Value Type Required											
	Jumber 1 Integer No											
code_tree     Line     layer_2												
Ready	Meters DMS Ground None											

Figure 6-35. Add New Attribute

### Edit in the Code or Attribute Properties Dialog Box

The property tabs create or edit a new code and assign plotting styles to lines and points associated with that code.

#### **Edit Left Panel Code Properties**

- 1. To edit the properties for a code, double-click the desired code in the left panel.
- 2. Edit the Code's general properties (code name and layer).
- 3. Edit the Code's plotting styles for line and points.
- 4. Click **Ok** to save.

<ul> <li>Properties</li> </ul>	: Code New Cod	• Properties : Code New Code 🛛 ? 🔀					
General Plot	ting styles		General	Plot	ting styles		
Code	New Code		Line Style		BYLAYER -		<b></b>
Layer	Line Width		BYLAYER	1 pt			
			Color		BYLAYER		•
			Point Symbo	ol	BYLAYER •		•
ОК	Cancel	Apply	ок		Cancel		Apply

Figure 6-36. Edit Properties for the Code

#### **Edit Right Panel Attribute Properties**

1. To edit the attribute properties for a code, select the code in the left panel then double-click the desired attribute in the right panel.

2. For Integer, Real Number, Text, Boolean and Date attributes, edit the name and default value properties.

🛂 Properties	: Attribute	Number 🛛	? 🔀		🏶 Prop	erties	: Attribute age	? 🛛
General					Genera			
Attribute Name	Number				Attribute N	lame	age	
Default Value	1				Default Va	alue	9/21/2009 2:36	:10 PM
Туре	Integer							
Required					Туре		Date	
ок	Cance	Apply Apply	. 1		🗌 Requi	red		
		Appy			01	<	Cancel	Apply
😐 Properties	: Attribut	e gate	? 🗙					
General					📑 Prop	erties	: Attribute usi	ng 🛛 💽 🔀
Attribute Name	gate				General			
Default Value	False				Attribute N	ame	using	
Туре	Boolean	Properties	· Attribut	e lenoth	? 🗙	le		
Required				e tengen			Text	
	1 .	General				d		
ОК	Lanc	Attribute Name	length				Cancel	Apply
		Default Value						
		Туре	Real Numbe	il.				
		Required						
		Cance		Apply				

Figure 6-37. Edit General Properties for Integer, Real Number, Text, Boolean and Date Attributes

- 3. To add a value to a Menu attribute, type the value and click **Add**. The value is saved in the file and with the attribute to be selected for other attributes with the same name
- 4. All these dialog boxes contain the *Required* check box. This parameter is used in the software for surveying. If it is set to "Yes", the user will be asked to enter the attribute value every time he (or she) uses the corresponding code. If it is set to "No", the default attribute value will be used automatically. In Topcon Link this parameter is used only for displaying attribute status for the corresponding codes during data collection.

5. To delete the value, select it and click delete.

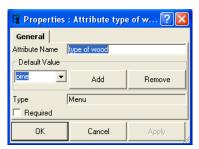


Figure 6-38. Edit General Properties for a Menu Attribute

## **Editing Line**

Among other editing activities, Topcon Link can be used to edit layer, line type (line or area), and line segments.

## **Edit on the Line Tab**

In the left panels, you can edit line type (Line/Area), plotting style for line (Line Color/Line Style/Line Width/Area Color/Area Fill Style/Fill Transparency), plotting style for point (Point Type/Point Color) and select new layer directly on the *Lines* tab (Figure 6-39 on page 6-28).

In the right panels, you can edit only the name of the line's vertex (*Point* field). Click-pause-click to access editable fields. Figure 6-39 shows an example of editing fields on the *Lines* tab.

Poi	nts 🙋	Lines 🔷	TS Obs   🌲 Ci	odes									
on	Type	Layer	Line Color	Line Style	Line Width	Area Color	Area Fill Style	Fill Transparency	Point Type	Point Color	Code	String	Distance (m
	Area	field	BYCODE	BYCODE-	BYCODE2 pt -	BYCODE	BYCODE SESSES	BYLAYER 0%	BYCODE .	BYCODE	field	1	122.382
	Line	layer_2	BYCODE	BYCODE-	5 pt	BYCODE	BYCODE HIMMIN	BYLAYER 0%	BYCODE .	BYCODE	code_tree	2	38.428
	Line Area	fence	BYCODE MAL	• •	BYCODE3	8YC 🔳 💌	BYCODE None 🔻	BYLAYER 0% -	8YC + 🔻	BYCODE 🔳 👻	fence	1	390.045
				None	4 pž 🗕 🔨	_	None		• ^	^			
					5 pt			95%	•				
					6 pt			96%	•				
					7 pt		300000000000000000000000000000000000000	97%	•				
					8 pt 🚥			98%	×				
					9 pt			99%	+				
			Custom	BYLAYER -	10 pt	Custon	BYLAYER None	100%	None	Custom			
			BYLAYER	BYCODE -	BYLAYER3	BYLAY 🔳	BYCODE None	BYLAYER 0%	BYLA +	BYLAYER			

#### The right panel

Icon	Order	Point	Distance from s	Distance from p	Entry azimuth	Exit azimı
•	1	100				175°45'44.124
	2	101	114.829	114.829	175°45'44.1248"	314°00'00.00(
	3	102 -	115.248	0.419	314°00'00.0000"	43°00'00.00(
	4	102	259.248	144.000	43°00'00.0000"	220°26'13.58
	5	103	390.045	130.797	220°26'13.5874"	
		104				
		105				
		107				

Figure 6-39. Editable Fields on the Line Tab – Example



*Line segments (in the right panel) can only be edited in the Tabular view as shown above.* 

## **Edit and View in the Line Properties Dialog Box**

Only line information and plotting styles can be changed; all other fields are informational.

#### **Edit Left Panel Line Properties**

- 1. To edit the properties for line, double-click the desired line in the left panel.
- 2. Edit the line's general properties and view its length.
- 3. Edit the line's plotting styles.
- 4. View CoGo information.

- 5. View and edit the photonotes of this line.
- 6. Click Ok to save.

Properties : Line 0	Prope	rties : Line 0 🛛 💽 🔀
Photonotes Line Plotting styles Coo	io Photonot	es Line Plotting styles CoGo
Type Line Layer 🗓	Line Style Line Width Color	BYLAYER V BYLAYER 1 pt V BYLAYER V
🖉 Properties	2×	Properties : Line 0
Photonotes Line Plotting sty	les CoGo	Photonotes Line Plotting styles CoGo
Distance (m) 133,304		Photo Note Number: 1
Area (Sq.m) [37.21	DK	Add Photo Note Remove Photo Note
OK Cancel	Apply	OK Cancel Apply

Figure 6-40. Edit Properties for the Line

## **Editing Tape Dimensions**

Among other editing activities, Topcon Link can be used to edit start and end points, tape distance, and point to for a tape dimension.

Tape dimensions are measurements of lines perpendicular to a reference line. The reference line is defined using two points with known coordinates. Figure 6-41 shows tape dimensions measured from a reference line (between points 1 and 2).

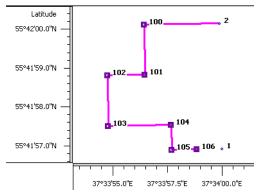


Figure 6-41. Example Tape Dimension Measurements - CAD View

## **Edit on the Tape Dimensions Tab**

In the left panel, you can edit all fields, directly on the *Tape Dimensions* tab. In the right panel, you can edit all fields, except the *Date*, directly on the *Tape Dimensions* tab. Click-pause-click to access editable fields. Figure 6-42 shows an example of editing fields on the *Tape Dimensions* tab.

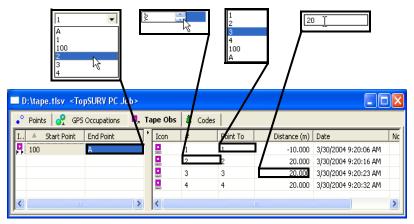


Figure 6-42. Editable Fields on the Line Tab – Example

## Edit in the Tape Dimensions Properties Dialog Box

Available tabs depend on the selected object, either a tape or a dimension.

#### **Edit Left Panel Tape Dimension Properties**

- 1. To edit the properties for the tape dimension, double-click the desired tape in the left panel.
- 2. Edit the tape dimension's start and end point.
- 3. Click Ok to save.

📮 Proper	ties : Tape Dimension Re ? 🔀
General	
Start Point	100 💌
End Point	2
ОК	Cancel Apply

Figure 6-43. Edit Properties for the Tape Dimension

#### **Edit Right Panel Dimension Properties**

- 1. To edit the properties for the dimension, double-click the desired dimension in the right panel.
- 2. Edit the dimension's general properties and view the date it was measured.
- 3. Click **Ok** to save.

Properties	Properties : Tape Dimension 2 ? 🔀										
General											
Point To	2	-									
Distance (m)	20										
Date	3/30/2004 9:20:16 4	AM									
#	2	*									
ок	Cancel	Apply									

Figure 6-44. Edit Properties for the Dimension

## **Edit Image Properties**

The *Images* tab displays when the file contains data associated with captured images, such as data obtained using the GPT-7000i total station.

Adding a photo note to data will also cause the Images tab to display.



Note the following restrictions when editing Images: - Topcon Link expects images to reside in a folder with the same name as the data file. For example, data from the "050119.tlsv" filewillbeassociated with images in the "050119" folder. - The data file and image folder must reside in the same directory for the images to display.

The *Images* tab contains thumbnails of images in the file in the left panel and the selected image, with associated points and line, in the right panel. Figure 6-42 shows an example of the fields on the *Images* tab.

- A red cross indicates the point that the image is associated with.
- The currently selected point(s) is indicated with corner edges.
- The currently selected line(s) is highlighted.

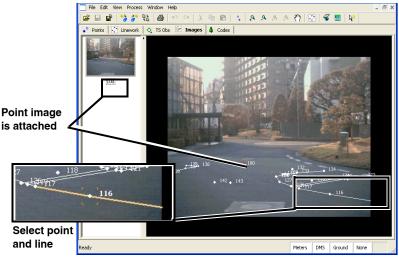


Figure 6-45. Viewing Images

While photo images cannot be edited, any points or lines associated and displayed on the image in the right panel can be edited. Doubleclicking the point/line will open the corresponding *Properties* dialog box. See the following sections for editing this data:

- "Edit Image Point Properties" on page 6-34
- "Edit Image Line Properties" on page 6-35

## **View Image Properties**

- 1. To view the properties for the image, double-click the desired image in the left panel.
- 2. View the image's general properties.
- 3. View a larger size of the image without associated points/line.
- 4. Click **Ok** to exit.

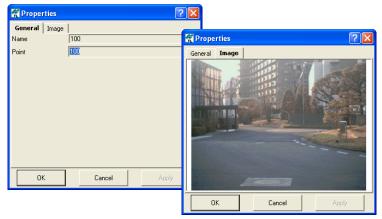


Figure 6-46. View Properties for the Image

## **Edit Image Point Properties**

- 1. To view the properties for a point on an image, double-click the point on the image in the right panel.
- 2. Edit desired fields as described in "Edit in the Point Properties Dialog Box" on page 6-3.
- 3. View the image associated with the point.

Properties : Point	nt 100	? 🛛		
General Coordinate	es   CAD   String   Images   Photo	Properties : Po	int 100	? 🛛
Name	100	General Coordina		Images Photo Notes
Note				The
Code		I RESTRICT	1 200	1 ALEAN
Control	None	1.58.711		Contraction of the
Layer	0			
ОК	Cancel		Ŧ	
		ОК	Cancel	Apply

Figure 6-47. Edit Properties for Point on Image

## **Edit Image Line Properties**

- 1. To view the properties for a line on an image, double-click the line on the image in the right panel.
- 2. Edit the line's general properties (line or area type, ordered sequence, layer assigned to). View the line's code and its from/to points.
- 3. Edit the line's plotting styles.
- 4. Edit the control codes used to for the line View the string assigned to the code.
- 5. Click Apply to save the changes. Click OK to exit.

Properties	: Line 0	? 🗙				Propertie	s : Line	0	? 🗙
Photonotes	Line Plotting styles	CoGo				Photonotes	Line	Plotting styles	CoGo
_	L.								
Туре	Line	-				Line Style	BYLAY	'ER	
Layer	C	-				Line Width	BYLAY	'ER 1 pt ——	
			operties	: Line 0		Color	BYLAY	ΈR	•
			onotes	Line Plotting	styles				
			Note Numb	er: 1					
ОК	Cancel Ap	ply	82		2	ОК		Cancel A	pply
		 [	Add Photo M	Note Ren Cancel	nove Pho	to Note			

Figure 6-48. Edit Properties for Line on Image

## **Editing X-Section Templates**

Among other editing activities, Topcon Link can be used to edit much of the information associated with cross section template, including the slopes, distances, and grades of the template items.

## **Edit on the X-Section Templates Tab**

In the left panel, you can edit all fields, except the Icon, directly on the *X-Section Templates* tab. In the right panel, you can edit all fields, except the Icon and Hz/V Offset, directly on the *X-Section Templates* tab. Click-pause-click to access editable fields. Figure 6-49 shows an example of editing fields on the *X-Section Templates* tab.

	© Ţ ESP S S/Brk Vflo												
•° Po	° Points 🛷 Roads 🗁 X-Section Templates 🎄 Codes												
Icon	Name	Cut Slope	ill Slope 🔼	2	Icon	Order	Code	H	. Dist (m)	V. Dist (m)	Grade (%)	Hz. Offset	V. Offset fro
÷.	88150L	0.000	0.000		H	1		1	0.003	-1.219	-40000.000	0.000	(
÷.	88150R	0.000	0.000		-	2			6.703	1.119	16.689	0.003	-1
÷	88200L	0.000	0.000		-	3			1.219	0.049	3.998	6.706	-(
÷	88200R	0.000	0.000		-	4			1.219	0.049	3.998	7.925	-( 🗸
÷.	88500L	0.000	0.000		<								>
÷.	88500R	0.000	0.000	ĥ		_	1						
÷	88700L	0.000	0.000		V. Of						1	α I	
÷	88800R	0.000	0.000		from	ш, <u> </u>					`		
<u> </u>	89200L	0.000	0.000				ï	_					
÷	89200R	0.000	0.00C ⊻				Γ			0		E0 Ha /	Official from Cl. m
<		IIII					-50			- 0		50 HZ. (	Offset from CL, m

Figure 6-49. Editable Fields on the X-SEction Templates Tab – Example

## **Edit in the X-Section Templates Properties Dialog Box**

Much of the information associated with cross section templates can be edited, except segment offsets.

#### **Edit Left Panel X-Section Template Properties**

- 1. To edit the properties for the x-section template, double-click the desired template in the left panel.
- 2. Edit the x-section template's name and cut/fill slopes.
- 3. Click **Apply** to save the changes. Click **OK** to exit.

+ Properties	: X-Section Ter	nplat ? 🔀
General		
Name	88200R	
Cut Slope (1:n)	0	
Fill Slope (1:n)	0	
ок	Cancel	Apply

Figure 6-50. Edit Properties for the X-Section Template

#### **Edit Right Panel Segment Properties**

1. To edit the properties for a segment of the cross section template, double-click the desired segment in the right panel



You can also double-click the segment in the graph to open the **Properties** dialog box.

- 2. Edit the segment's order, horizontal/vertical distance, percentage of grade, and code. View the horizontal/vertical offsets from the centerline.
- 3. Click **Apply** to save the changes. Click **OK** to exit.

Properties : X	-Sect	tion Segm	ent 3		?×
General					
Order	3				*
Hz. Dist (m)	1.21	9			
V. Dist (m)	0.04	9			
Grade (%)	3.99	8			
Hz. Offset from CL (m)	6.70	6			
V. Offset from CL (m)	-0.10	01		 	
Code					•
ОК		Cance	1	Apply	

Figure 6-51. Edit Properties for a Segment of the X-Section Template

## **Editing Roads**

Among other editing activities, Topcon Link can be used to edit alignments of center line, cross-section information (for a road with X-section) and string set that describe the parameters of the surface road (for a road with String Set).

TopSURV version 8.0 and later allows one to create a road using one of two following ways:

1. Through horizontal and vertical projections of the center line (alignments) and lines representing the surface of the road and

lying in the planes perpendicular to the center line (X-Section) (see "Road with X-Section" on page A-30).

2. Through a set of several strings (String Set). Every separate string in the set is defined by one or several pairs of the horizontal and vertical alignments (see "Road with String Set" on page A-35).

Using Topcon Link the customer can edit road with X-section and road with String Set.

### **Editing Roads with X-Section**

A road with X-section as an object can be described through the horizontal and vertical projections of the center line, called alignments, and the line describing the surface of the road and lying in the plane perpendicular to the center line, called a cross section (x-section). An alignment can be divided into sections, each of which can be described using algebraic functions.

- The horizontal alignment can be described through lines, spirals, curves and intersection points.
- The vertical alignment can be described through grade, parabola and circular arc.
- The cross-section can be described using templates. (To edit the templates for cross-sections, see "Editing X-Section Templates" on page 6-36.)
- 1. To edit the properties for a road, double-click the desired road in

the left panel of the Roads tab:



2. Edit the name of the road, the coordinates of the start point, Start Sta/Chainage and Stationing Stakeout Interval.

3. Select a horizontal/vertical alignment and X-section from the list of the used alignments/ X-sections in the given Field Software job.

Properties : Road CONV	EYANCE2							
General Alignment names	1	🖌 Prope	Properties : Road HIAA EOG					
Name	Road-333	General	Alignment na	mes				
- Start Coordinates		Horizontal A	Alignment Name	H-1				-
Start Point		Vertical Alig	inment Name	V-22	!			•
Northing (USft)	406,90	X-Section S	iet Name	X-17	_left_right			-
Easting (USft)	1751,10							
Elevation (USft)	10							
Start Sta/Chainage (USft)	10							
Stationing Stakeout Interval (USft)	30							
Layer	C							
ок	Ca							
			ОК		Cancel		Apply	

Figure 6-52. Edit Properties for the Road

#### **Edit on the Roads Tab**

In the horizontal alignment panel, you can edit the following fields directly on the *Roads* tab. Click-pause-click to access editable fields.

- order
- azimuth
- length
- turn
- start radius
- tangential to previous element
- spiral direction
- delta
- chord

- tangent
- mid ord
- external
- start degree chord
- start degree curve

Figure 6-53 shows an example of editing fields on the *Roads* tab, horizontal alignment panel.

3				Rigt V Left Right			873.19	Ţ			
🔹 Points 🖉 Roads		-Section	Templates	🌲 Codes				1			
🖃 🥢 6220-A12Grade	Icon	Order	Туре	Azimuth	Length (m)	Turn	Start Rad	.nd Rad	North	East	^
E Z Horizontal al	1	1	Line	60°57'59.0000	250.948						
Table	P	2	Spiral TS	60°57'59.0000	88,392	Right		873.190			
2 Graphic	$\bigcap$	3	Curve	63°51'58.9963	624.177	Right	873.190	873.190			
⊡ ⊡ Vertical align	0	4	Spiral CS	104°49'21.9835	88.392	Right	873.190				v
2 Graphic	<			)						>	
Table	North	ning, - m			25867.8979 6.949		29288689859 26883.		492.261		
			5895	00 590000	590500	59	91000 591	1 1 1 1	592000	Easting,	m

Figure 6-53. Editable Fields on the Roads Tab – Horizontal Alignment Example

• In the vertical alignment panel, you can edit only the Sta/ Chainage, Length, and Elevation fields directly on the *Roads* tab. Click-pause-click to access editable fields. Figure 6-54 shows an example of editing fields on the *Roads* tab, vertical alignment panel.

29772.8	sŢ	₹		487.6	581	Ī	367.73	Ţ		
🔹 Points 🖉 Roads	A ×	-Sectio	Templates 🛛 🌲 C	odes						
- / 6220-A12Grade	Icon	Туре	Sta/Chainage (m)	Orde		Length (m)	Start Grade (%)	End Grade (%)	Elevation (m)	Radiu
🖃 📿 Horizontal al	Ð	Parab	25616.949	1	١	0.000	0.000	0.000	478.866	
	Ð	Parab	28870.168	2	Ι	304.801	-3.000	-1.500	381.269	
C Graphic		Parab	29772.850	3	I	487.681	-1.500	4.500	367.730	
Uertical align		Parab	30047.171	4		0.000	4.500	4.500	380.074	
2 Graphic	<									>
i → ↓ X-Sections	Elevatio	on, m -	<sub>×</sub> 25616.949	_				×29022.56	8	47.17
			260+0	1	27	'0+0	280+0	290+0	CL Position	ıs, m

Figure 6-54. Editable Fields on the Roads Tab – Vertical Alignment Example

In the x-sections panel, you can edit all fields, except the Icon, directly on the *Roads* tab. Click-pause-click to access editable fields.

Figure 6-55 shows an example of editing fields on the *Roads* tab, X-Sections panel.

26883.4	14 <u>]</u>	ļ	Right Left Right	- C	88200R 88150R 88200R More	
🔹 Points 🖉 Roads	🖂 X-Sect	ion Templates	🌲 Codes 📄			
- / 6220-A12Grade	Icon Sta	/Chainage (m)	Side	Template		<u> </u>
🖃 📿 Horizontal al	<del>^</del>	26868.174	Right	88150R		
Table	<u></u>	26868.174	Left	88150L		
C Graphic	-	26883.414	Right	88200R		
Table	÷.	26883.414	Left	88200L		
2 Graphic	÷	26974.854	Right	88500R		×
X-Sections	V. Offset from CL, m -			EP	X	
		-50	-25	0	25 50	Hz. Offset from CL, m

Figure 6-55. Editable Fields on the Roads Tab – X-Sections Example

#### Edit in the Horizontal Alignment Properties Dialog Box

The user can edit the type of element in the *Properties* dialog box. The user can select the following horizontal element:

Туре	Line	-
	Line	
	Curve Spiral TS to SC Spiral CS to ST Spiral CS to SC Intersection	

If the current type of element is changed, the corresponding *Properties* dialog box will be appeared for the selected element.

#### **Edit Line Segment Properties**

1. To edit the properties for a line segment, double-click the desired segment in the horizontal alignment table



In the graph view, double-click the segment to open the **Properties** dialog box.

2. View the end position for the line segment.

- 3. Edit the general properties for the line segment.
  - The tangential to previous element is unavailable if the first segment is a line.
  - Edit the type of element, the azimuth, order, and length as needed.
- 4. Click Apply to save the changes. Click OK to exit.

		21	Properties : H	orz E	lement	? 🛛
		Ge	neral End Pos	ition	1	
		Туре	e	Line		<b></b>
Properties : Horz Element		Leng	gth (m)	5,12	!	
General End Position End Sta/Chainage (m) 9,103		□ 1 Azim	Tangential to prev nuth		nt 22'57,2913	
	709		ОК		Cancel	Apply
End Easting (m) -2,2	227					
End Azimuth 214	4°22'57,2913					
ОК	Cancel	App	aly			



#### **Edit Curve Segment Properties**

1. To edit the properties for a curve segment, double-click the desired segment in the horizontal alignment table.



In the graph view, double-click the segment to open the **Properties** dialog box

- 2. View the end position for the curve segment.
- 3. Edit the general properties for the curve segment.
  - Select whether or not the segment is tangential to the previous element.
  - Edit the type of element.
  - Edit the azimuth and order of the curve segment.
  - Edit the length for the curve segment.
  - Edit the radius of the curve segment.

	:	C	Prope	rties : Ho	rz Elem	ent			? 🗙
		Ge	neral	End Posi	tion				
		Тур	е	Curve		-	Curve		[
		Len	gth (m)	3,983		_	Deg Curve	2373*25'41,1062	
		Turr		Right		-	Deg Chord		
C		Rad		2,414		_	Delta	94*32'31,8697	
<b>Properties</b> : Hor	z Element			tial to prev	element		Chord (m)	3,547	
General End Positi		, Azin		121*56'03			Tangent (m)	2,613	
End Sta/Chainage (m)	3,983				,		Mid Ord (m)	0,776	
End Northing (m)	-3,484						External (m)		
End Easting (m)	0,664	— r						,	
End Azimuth	216*28'34,9366		1	ок		C	Cancel		
				1					
OK	Cancel		Apply						

Figure 6-57. Edit Properties for a Curve Segment in a Horizontal Alignment

#### **Edit Spiral Segment Properties**

1. To edit the properties for a spiral segment, double-click the desired segment in the horizontal alignment table.



In the graph view, double-click the segment to open the **Properties** dialog box

- 2. View the end position for the spiral alignment.
- 3. Edit the general properties for the spiral alignment.
  - Select whether or not the segment is tangential to the previous element.
  - Edit the type of element
  - Edit the azimuth and order of the spiral segment.
  - Edit the length and spiral constant for the spiral segment.
  - Edit the spiral direction.
  - Edit the radius of the spiral segment.

	C Propert	ties : Horz Elem	ent				? 🗙
	General	End Position					
	Туре 🚺	Spiral CS to ST	<u> </u>	urve			
	Length (m) 📑	3,941	Spi	iral Const (m)			
	Turn F	Right	▼ De	g Curve	2291*49'52,3	2499	
	Radius 2	2,5	- De	g Chord			
	🗌 Tangentia	al to prev element					
C Properties : Horz Element	Azimuth 3	34°23'39,7735					
General End Position		ок		Cancel		Apply	
End Sta/Chainage (m) 408,334							_ ///
End Northing (m) -6,355							
End Easting (m) 10,729							
End Azimuth 79°33'17,6938							
OK Cancel		Apply	1	-			

Figure 6-58. Edit Properties for a Spiral Segment in a Horizontal Alignment

#### Edit in the Vertical Alignment Properties Dialog Box

1. To edit the properties for the vertical alignment, double-click the desired alignment in the vertical alignment table.



In the graph view, double-click the segment to open the **Properties** dialog box

2. Edit the type of the alignment (Parabola Long Section and Arc Long Section), alignment's station/chainage, length/radius, and elevation.

🗅 Properties : Vert Element 🛛 💽 🔀							
General							
Туре	Parabola Long Section 📃 👤						
Length (m)	10						
Sta/Chainage (m)	41,632						
Elevation (m) 134,07							
ок	Cancel Ap	<sub>ply</sub> 1					

🗇 Properties : Vert Element 🛛 🕐 🔯						
General						
Туре	Arc Long Section 💌					
Radius (m)	100					
Sta/Chainage (m)	41,632					
Elevation (m)	134,07					
ОК	Cancel	Apply				

Figure 6-59. Edit Properties for the Vertical Alignment

#### **Edit in the X-Section Properties Dialog Box**

#### **Edit Template Properties**

- 1. To edit the properties for the x-section template, double-click the desired template in the *X-Section* table.
- 2. View the name of used x-section template for the road.
- 3. Click Apply to save the changes. Click OK to exit.

🗸 Properties	c ?🛛	
General   Name	0	
ОК	Cancel	Apply

Figure 6-60. Edit Properties for the X-Section

## **Editing Roads with String Set**

For a Field Software Job that contains a road with String Set, the Roads tab displays two panels:

- the left the name of every road in the job and the names of components of the road,
- the right in table and graphic view, parameters of horizontal and vertical alignment of the center line, and string sets for the road selected in the left panel.

The left panel contains a data tree with the following entries for each road in the job.

• Horizontal alignment of the center line can be described through lines, spirals, curves and intersection points

- Vertical alignment of the center line can be described through grade, parabola and circular arc
- String set can be described through set of the strings. Every road string is described by the pair or pairs of the horizontal/vertical alignments (HA-VA)
- 1. To edit the properties for a road, double-click the desired road in

the left panel of the Roads tab:



2. In the *General* tab edit a name of the road, the starting station or chainage for the road, the stationing stakeout interval in current linear units, the layer in which to store the road, the working corridor is set to use in the Road Stakeout.

🖌 Proper	🖊 Properties : Road Common 🛛 💽 💽					
General	Alignment names					
Name		Common				
- Start Coor	dinates					
Start Point			~			
Northing (m)	)	6168145.589				
Easting (m)		415798.752				
Elevation (m	1)	0				
Start Sta/Ch	iainage (m)	0				
Stationing S	takeout Interval (m)	100				
Left Corridor	Offset (m)	5				
Right Corrido	or Offset (m)	14				
Layer		0	-			
	ОК	Cancel Apply				

Figure 6-61. Edit Properties for the Road with String Set: General Tab

Note: Entering the working corridor values in Topcon Link does not change the view of the road in this software. These values will be applied only in TopSURV. There is the following rule for creating the working corridor: the value of the left corridor offset has to be less or equal to the value of the right corridor offset.

3. In the *Alignment names* tab select the desired alignment from the list of pre-defined alignments for horizontal and/or vertical

alignments, and select a road string set that describes the parameters of the surface road.

			H4 H5 H6 H7 H8
			H5 UC
			HD U7
			H8
🖌 Properties : Road Cor	mmon	? 🛛	H9 H10
General Alignment name	es		H10 H11
Horizontal Alignment Name	CENT_Line-1	-	
Vertical Alignment Name	CENT_Line-1	<b>_</b>	
X-Section Set Name		<b>_</b>	V2 V3
Road String Set Name	Crossing-1	•	V3 V4 V5 V6 V7
	Crossing-1		V5
	Crossing-2		V6
			V/ V8
ОК	Cancel	Apply	

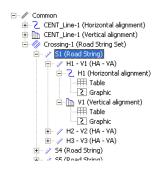
Figure 6-62. Edit Properties for the Road with String Set: Alignment Names Tab

## Edit horizontal/vertical alignments of center line

All types of lines, curves, spirals, intersections, grades, parabola and circular arks used for creating horizontal and vertical alignments of a road with String set, are the same as used for alignments editing of a road with X-section. See "Edit on the Roads Tab" on page 6-40 for details.

#### **Edit in the String Set Properties Dialog Box**

The left panel of the *Road* tab displays the String Set configuration, as set of the strings. Every road string is described by the pair or pairs of the horizontal/vertical alignments (HA-VA). And every alignment is editable:



To edit any object of the road string set (road string, pair, alignment) of the road, highlight this object and select the *Properties* from the pop-up menu:



To delete any object of the road, select *Delete* from the pop-up menu. Each object of the road has different editable parameter(s):

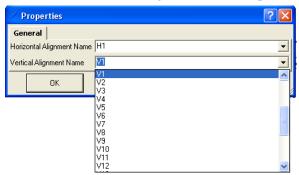
• The name for the String Set:

🚟 Properties : Road String Set Na ? 🔀					
General Name	Crossing-1				
	Cancel	Apply			

• The name and order for the string:

🛛 Properties : Road String Name S1 ? 🔀				
General				
Name	S1			
Order [	1	*		
OK	Cancel	Apply		

• The horizontal and/or vertical alignment from the predifined list:



In the right panel of the *Road* tab, the user can delete and/or edit the existing element. To perform any operation, right click the desired elements and select the corresponding command from the pop-up menu:

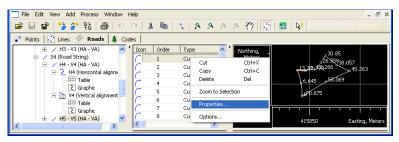


Figure 6-63. Operations with Road Element

When editing the existing element, the user can change any parameters of this element and as well as type of the element:

				Line		1
				Curve		
				Spiral I	'S to SC 'S to ST	
				Spiral C	.5 to 5 C	
				Intersed		
🥂 Ргоре	erties : Ho	orz Eler	nent			' ? 🔀
General	End Posi	tion				
Туре	Curve		•	Curve		
Length (m)	7.93			Deg Curve	95*29'34.6729''	
Turn	Left		-	Deg Chord	112*53'07.3622''	
Radius	60			Delta	7°34'22.1210''	
🗌 Tangei	ntial to prev	element		Chord (m)	7.924	
Azimuth	147°05'41	.1255''		Tangent (m)	3.971	
				Mid Ord (m)	0.131	
				External (m)	0.131	
	ОК		C	ancel	App	9

Figure 6-64. Editing the Road Element Parameters

Topcon Link allows to save all changes which were entered in the road with String Set and export this data to TopSURV and LandXML file formats.

## **Editing Layers**

Among other editing activities, Topcon Link can be used to edit the layers in a file, including the layer name, line and point styles, and the color to use for objects on the layer.

#### **Edit on the Layers Tab**

In the Layers screen, you can edit all fields directly on the screen. Figure 6-65 shows an example of editing fields on the *Layers* tab.

🗲 Layers	🖻 Layers : C: Wocuments and Settings\layer_33.tlsv								
Name	Visible	Line Style	Line Width	Color	Point Symbol	Breakline Type	Note	Area Fill Style	Fill Transparency
<i>€</i> 0	Yes		1 pt		•	Auto		None	0%
🛃 Layer-1	Yes 🔻		1 pt — 🔻	-	1	Auto 👻	for Road-1	None 🔻	0% 🔻
	No Yes	None	1 pt // A			Auto Breakline Boundary Exclusion		None	0% A 1% 2% 3% 4% 5%
I			7 pt 8 pt 9 pt			8			6% 7% 8%

Figure 6-65. Editable Fields on the Layers – Example

## Edit in the Layer Properties Dialog Box

- 1. To edit the properties for the layer, double-click the desired layer in the Layers screen.
- 2. Edit the general properties for the layer.
  - The notes.
  - Whether the layer is visible or not.
  - The layer's breakline type.
- 3. Edit the plotting styles for the layer.
  - The line style and width.
  - The color to use for lines and points.
  - The point symbol.
- 4. Edit the following plotting information for the area:
  - Select the area fill style in the corresponding field.
  - The *Fill Transparency* field displays the value of an area's transparency. Changing of this value does not affect transparency of the area because this option does not work in graphical mode in Topcon Link ver 7.3.
- 5. Click **Apply** to save the changes. Click **OK** to exit.

Properties : Layer L1	?	×			
General Plotting styles A	🤗 Properties	: Layer L1	?		
Note	General Plot	ting styles	Area Properties	: Layer O	? 🗙
Breakline Type Auto	Line Style Line Width		General Plot Area Fill Style	ting styles Area	
Visible OK Cancel	Point Symbol	-	Fill Transparency	0%	•
	ОК	Cancel			
			ОК	Cancel	Apply

Figure 6-66. Edit Properties for the Layer

## About Editing Offsets in Topcon Link

Using the associated Properties dialog box, you can edit the offsets for TS or GPS measurements and for PTL (point to line) points. Topcon Link recognizes offsets from an observation line, point-toline offsets, and offsets from a line with a known azimuth.

#### Offsets from an observation line in Total Station measurements

- Offset Along the distance from the Prism Point to the projection of the Offset Point along the line of sight
- Offset Across the distance from the offset Point to the line of sight, either to the left or to the right of the line
- Offset Height the height difference from the prism point to the offset point

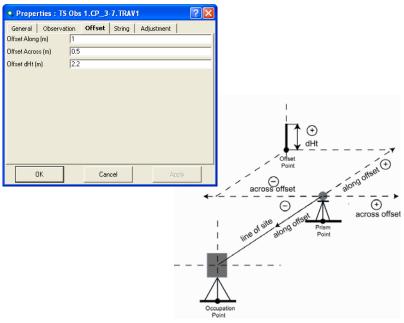


Figure 6-67. Measuring/Editing Offsets From Observation Line

Offsets from the reference line formed by reference points (point-toline offsets) in TS and GPS measurements

•

- From Point the start point of the reference line (Point 1)
- To Point the end point of the reference line (Point 2)
- Offset Dist the distance along the reference line from the prism or the rover GPS antenna point to the offset point
- Offset Across the distance perpendicular to the reference line from the prism or the rover GPS antenna point to the offset point
- Height is relative the height difference from the prism point to the offset point
- Height is absolute the absolute height of the offset point



Field Software Job sets only absolute elevation for a PTL point

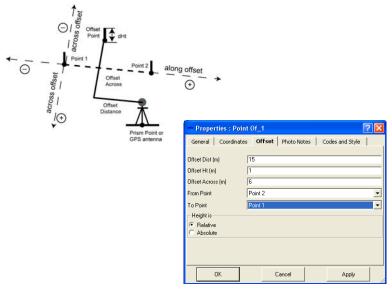


Figure 6-68. Measuring/Editing Offsets From Point-to-Line

## Offsets from a line with a known azimuth in TS and GPS measurements

- Azimuth offset line azimuth
- Offset Dist the distance along the line with known azimuth from the rover GPS antenna point to the offset point
- Offset Across the distance perpendicular to the line with known azimuth from the rover GPS antenna point to the offset point
- Offset Ht the height difference from the rover GPS antenna to the offset point
- Height is relative the height difference from the prism point to the offset point
- Height is absolute the absolute height of the offset point

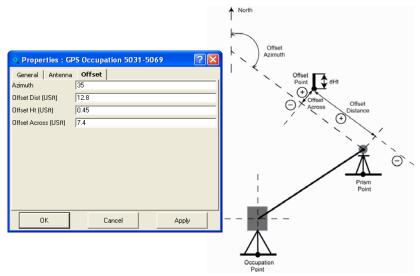


Figure 6-69. Measuring/Editing Offsets From Observation Line

# **Notes:**

# Working with Point Data in Topcon Link

Topcon Link includes a function for working with point data: computing coordinates of TS and GPS network.

## **Computing Point Coordinates for Raw Data and Field Software Files**

Topcon Link allows computing point coordinates for raw data and Field Software files.

## **Compute Coordinates**

Note the following restrictions for coordinate computations:



When editing data, coordinate computations (re-calculation) are not automatic. You must manually select the Compute Coordinate function



If there is no antenna information ('Antenna Type' field is empty) for Base RTK station, the phase center of the Base station will be used to compute Rover positions.

For details on setting the parameters for computations, see "Set Process Properties for Computations" on page 7-2.

- 1. Open a raw data or Field Software file.
- 2. Click **Process > Compute Coordinates**.

Any new point coordinates are added and written to the file.

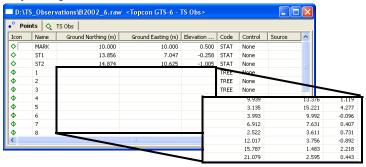


Figure 7-1. Coordinate Calculation – Before and After Example

## Set Process Properties for Computations

Typically, the default parameters are sufficient for most coordinate computations of TS network. In the *Process Compute Coordinates* pane, the user can set distance and angle measurement errors to take them into account when computing the coordinates of the station using directions observed from the station to points of known positions (resection method):



Figure 7-2. Apply Coordinate Computation Parameters

1. Click **TS Computations** in the left pane and select the refraction coefficient for total station observations.

The refraction coefficient corrects the vertical angle between the earth's curvature and refraction in the atmosphere.

2. Click **OK** to save the settings.

🕑 Process properties			? 🗙
	Refraction Coefficient 0 0 0.14 0.2 Without Curvature		
OK		Cancel	

Figure 7-3. Apply Total Station Computation Parameters

# **Notes:**

_	

# **Exporting Data Files to a Topcon Device**

Topcon Link provides a simple interface for exporting data files directly to a Topcon device (instrument). Topcon Link exports any file type to a hand-held controller, coordinate files to a total station.



Before you can export data to a total station, the device must first be set up. See "Adding Devices" on page 2-1 for details.

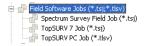
This chapter discusses the steps to export data files to a connected device.

- See "Exporting Files to a Mobile Device" on page 8-1.
- See "Exporting Files to a Total Station" on page 8-3.

# Exporting Files to a Mobile Device

The Topcon and Sokkia family of controller software (such as TopSURV and SSF survey application) run on several Topcon and third-party mobile devices.

Topcon Link supports three formats of the Field Software Job files:



• Spectrum Survey Field Job (\*. tsj). This job is created in SSF version 7.3 and later.

- TopSURV 7 Job (\*. tsj). This job is created in TopSURV version 7.0 and later.
- TopSURV PC Job (\*.tlsv). This job is created in TopSURV version 6.11.03 and earlier

There is a difference in format of these files and a difference in using these files in the computer's software.

In TopSURV version 7.0 and later, the \*.tsj file is saved on the controller, that this file format can be opened by Topcon Link/ Spectrum Link/Topcon Tools/Sokkia Spectrum Office/TopSURV PC. Topcon Link is used only for transferring the \*.tsj file from the controller to the computer without format changes. Moreover, the user can use a movable memory card to transfer the \*.tsj file from the controller to the computer.

In TopSURV version 6.11.03 and earlier, the \*.tsv file is saved on the controller. But Topcon Link/Spectrum Link/Topcon Tools/Sokkia Spectrum Office/TopSURV PC version can not open this file format. Topcon Link has to convert mobile device-based formats to computerbased formats. Topcon Link performs the conversion during the import process the \*.tsv file to the \*.tlsv file. This format (\*.tlsv) is opened by Topcon Link/Spectrum Link/Topcon Tools/Sokkia Spectrum Office/TopSURV PC.

When connecting to a CE-based device, Microsoft® ActiveSync automatically starts up and connects with the device. This connection is required to properly export files. If you need to install ActiveSync, see "Installing Microsoft ActiveSync for Use With CE-based Devices" on page 1-11 for details.



This section describes data export using the Topcon Link interface. To use Windows® Explorer for data exporting, see "Using Windows Explorer to Export Files to a Device" on page 8-6.

1. Connect your controller and computer according to the controller's documentation.

Note that a Bluetooth® connection requires that both devices have Bluetooth wireless technology capabilities.

- 2. With Topcon Link open, click **File** > **Import from Device**.
- 3. In the right panel, double-click **Mobile Device**. Topcon Link connects to the internal memory of the controller.
- 4. Navigate to the location in the controller's memory in which data files are saved. For example, Field Software Jobs are saved to the TopSURV/SSF folder.
- 5. In the left pane, navigate to the folder on the computer in which the file is saved.
- 6. Select the desired file(s) and click the **Move Right** button. The file export progress displays.

# Exporting Files to a Total Station

The Topcon and Sokkia family of conventional and robotic Total Stations have an internal data storage device to record data to in various formats. Refer to your Total Station operator's manual for details on setup, operation, and connection with other devices.

When exporting files to a Topcon and Sokkia Total Station, Topcon Link simply connects to the device and provides a path for the data transfer. The actual file transfer is performed at the Total Station.

The connection procedure for Topcon and Sokkia Total Stations varies, so refer to the device's documentation for details.

When connecting to a CE-based device, Microsoft® ActiveSync automatically starts up and connects with the device. This connection is required to properly export files. If you need to install ActiveSync, see "Installing Microsoft ActiveSync for Use With CE-based Devices" on page 1-11 for details.



This section describes data export using the Topcon Link interface. To use Windows® Explorer for data exporting, see

"Using Windows Explorer to Export Files to a Device" on page 8-6.

- 1. Connect your computer and Total Station according to the operator's manual.
- 2. With Topcon Link open, click **File > Export to Device**.
- 3. In the left pane, navigate to the folder on the computer in which the file is saved.
- 4. In the right pane, double-click *Topcon Total Stations* or *Sokkia Total Stations*.
- 5. Double-click the desired device to connect with the Total Station.
- 6. Select the coordinate file to export and click the **Move Right button**.

Export to Device	? 🛛
Look in: 🔁 Data_Top: 🗸 🖨 🖻 📸 🔰	Look in: 🚦 GTS-310 💌 🗲 🖻 📂
ENU-111.csv	🚰 file1.txt
>>>	Upload file(s) to Total Station
	For export to Topcon TotalStations GPT-2000, GPT-1000, GTS-220, GTS-210, GTS-310 series please follow instruction below: Turn on the Total Station by pressing the POWER button.
	Turn on the Todal Station by pressing the PUWER button. Press the Keru Key Press the F3' key for Memory Manager Press the F4' key twice(2) until you arrive at page 3
	Press the 'F1' key for Data Transfer Press the 'F2' key for Load Data
Close	Press the F1' key for Coordinate Data
	File name: Status:
	Cancel Start
Export to Device	
Look in: 🔁 Data_Sokkia 🗸 🗢 🗈 🎬	Look in: 🛯 SET630RK3 🗸 🗢 🔁 🕋
Base_Coordinate.sdr	file1.sdr
<u> </u>	
	Upload file(s) to Total Station
	Turn on the Total Station by pressing the ON button.     Push Esc' key.
Close	3. Push F3 key 4. Select <known data="">. 5. Push Enter key</known>
	6. Select <commis input="">. 7. Push Enter key.</commis>
	File name: C:\Data_Sokkia\Base_Coordinate.sdr Status:
	Jidius.

#### For Topcon Total Station

Figure 8-1. Export File to Topcon and Sokkia Total Station

 Follow all steps listed in the Upload file(s) to Total Station dialog box. These steps may vary depending on the connected device. Click Start in Topcon Link to export the data and save it in the Total Station.

# Using Windows Explorer to Export Files to a Device

After installing Topcon Link, the computer's hard disk contains up to eight virtual drives for accessing Topcon and Sokkia devices to import/export data. These virtual drives provide a quick way to transfer data without opening Topcon Link. Many of the steps are the same as for importing/exporting data via the Topcon Link interface. See the corresponding section above for further details on the steps listed in sections below.

Export to a Topcon and Sokkia Mobile Device using Windows Explorer

- 1. Connect the controller to the computer. Connect to the controller via ActiveSync.
- 2. On the computer, navigate to and copy the file(s) to export.
- 3. Navigate to the *Mobile Devices* device directory and click the device icon.
- 4. Navigate to the *TopSURV* or *SSF* folder and the desired job file(s).

5. Copy and paste, or drag-and-drop, the desired file(s) to the controller.

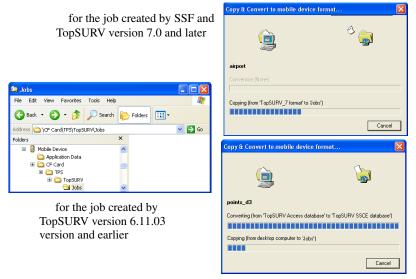


Figure 8-2. Export Using Explorer – Mobile Device

# Export to a Topcon and Sokkia Total Station using Windows Explorer

- 1. Connect the total station to the computer. If needed, connect to the total station via ActiveSync.
- 2. On the computer, navigate to and copy the coordinate file to export.
- 3. Navigate to the *Topcon Total Stations* or *Sokkia Total Stations* device directory and click the device icon.
- 4. Click the icon for the connected total station.
- 5. Copy and paste, or drag-and-drop, the file to a directory on the computer.

6. Follow all instructions on the Upload file(s) to *Total Station* dialog box.

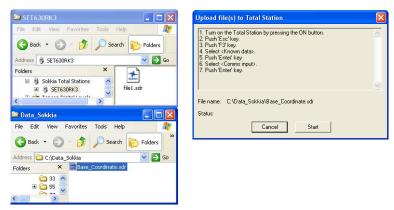


Figure 8-3. Export Using Windows Explorer – Sokkia Total Station

# **Data Views Reference**

Topcon Link can open three views to display file data: a tabular view, CAD view, and layers view. Topcon Link displays CAD view only for Field Software job file. When opening a coordinate file, or total station raw data, or GPS + raw data, or digital level, or Field Software job file, Topcon Link reads the file and displays an appropriate tab or a set of tabs:

- Coordinate file Points tab
- Total Station raw data file Points and TS Obs tabs
- Digital Level file Points and DL Obs tabs
- GPS+ raw data file GPS Occupations tab
- Field Software job tabs:
  - Points tab, if the job contains points
  - GPS Occupations, if the job contains GPS occupations
  - TS Obs, if the job contains total station observations
  - GPS Obs, if the job contains GPS observations
  - Codes, if the job contains codes
  - Linework, if the job contains linework
  - Tap Dimensions, if the job contains tape measurements
  - Images, if the job contains images (such as data obtained using the GPS-7000i total station)
  - X-Section Templates, if the job contains road data
  - Roads, if the job contains road data

When viewing a Field Software job, the CAD view displays points and linework, and a Layers view can be displayed if the job file contains layers.

# **Coordinate View**

Coordinate files contain data on points taken with total station, digital levels, or GPS receivers. The coordinate file data table contains only one tab to display data. Because coordinate files do not store unit and system information, you can select these settings using the advanced options while opening or in the status bar.

For details on editing coordinate information, see "Edit in the Point Properties Dialog Box" on page 6-3 (coordinate data can be contained in TS, DL, or GPS measurements).

# **Points Tab**

For coordinate files, the Points tab has the following default columns.

- Icon the symbol used for the point
- Name the name of the point
- Latitude\Northing the measured northing coordinate for the point and coordinate type
- Longitude\Easting the measured Easting coordinate for the point and coordinate type
- Elevation the elevation of the point
- Note any notes associated with the point
- Code any codes associated with the point

•°	Points										
I.,	Name	Latitude	Longitude	Ell.Height (m)	Code	Note					
▲	BASE2	40 06 07.52051N	82 59 12.47055W	808,095	Base						
∆	CP2	40 06 11.08726N	82 59 16.18872W	810,591							
⊿	CP4	40 06 13.12269N	82 59 10.68572W	809,265							
∆	CP5	40 06 07.23787N	82 59 06.52397W	807,545							
∆	CP6	40 06 05.22798N	82 59 12.11935W	808,409		Base for TS					
	Meters None										

Figure A-1. Coordinate File Data Table

# **Icon Descriptions**

Table A-1 lists the icons used to represent different information in the data table.

Location	lcon	Description
	•	Unknown point
Points Tab	Δ	Fixed coordinates point
	<del>(*)</del>	Offset point (only for GTS-7 Points)

# **TS Observations View**

Total Station observation files contain data on points and observations taken with a total station instrument. The TS observations file data table contains two tabs to display data. Because total station files do not store system information, you can select these settings using the advanced options while opening or in the status bar.

For details on editing total station observation information, see "Editing TS Observations" on page 6-12.

# **Points Tab**

For files which contain TS observations, the *Points* tab has the following default columns:

- Icon the symbol used for the point
- Name the name of the point
- Latitude\Northing the measured northing coordinate for the point and coordinate type
- Longitude\Easting the measured easting coordinate for the point and coordinate type
- Elevation the elevation of the point
- Code any codes associated with the point

- Control the coordinate fix of the point (None, Horizontal, Vertical, Both)
- Note any notes associated with the point

•° Poi	ints 👌	TS Obs							
Icon	Name	Ground Northing (USft)	Ground Easting (USft)	Elevation	Code	Control	Source	Note	
	T501	0.000	0.000	0.000		None		Base#1	1
Φ	BS01	40.580	-67.500	3.570		None			
Φ	31	1.140	-4.715	-0.155		None			
Φ	001	3.470	13.145	-1.945	TWW	None			
Φ	002	12.330	12.960	-1.880	TWW	None			
Φ	003	0.280	16.580	-7.375	BWW	None			
Φ	004	14.960	15.625	-5.900	BWW	None			
Φ	005	-21.880	33.960	1.460	X01	None			
Φ	006	-50.275	38.020	-2.490	X01	None			
*	007	4 200	01.040	0.000	V04	Alere -			

Figure A-2. TS Obs File Data Table – Points Tab

# **TS Obs Tab**

For raw files, which contain TS observations, the *TS Obs* tab has two panels, the left for points with known coordinates, the right for points with unknown coordinates measured from the point selected in the left panel.

The left panel contains the following default columns:

- Icon the symbol of the point
- # the number of the point
- Point Name the name of the point
- Instrument Height the height of the instrument in the selected units
- Instrument Centering Error/ Reflector Centering Error centering error of Total Station/Reflector over the mark. This error will be take into account when estimating adjustment results.
- Instrument Height Error/Reflector Height Error measurement error of the Total Station/Reflector height over the mark. This error will be take into account when estimating adjustment results.

The right panel contains the following default columns:

• Icon – the symbol of the point

- *#* the number of the point
- Point From the beginning of the vector
- Point To the end of the vector
- Reflector Height the height of the reflector
- Azimuth, Horizontal Circle, Zenith Angle, Slope Distance angular and linear measurements in the selected units (DMS, qon, mil, radian, ft, m)
- Note any notes associated with the point
- Code any code associated with the point
- Type the type of point
  - SS: side shot point
  - BS: backsight point (the previous occupation point)
  - FS: foresight point (the next occupation point)
  - BKB: backsight bearing point
  - Center and Side: These two types of TS measurements are created if the user selected Horizontal Angle Offset in the Total Station or TopSURV/SSF software. The Center measurement contains only horizontal angle to the target (offset point), Side measurement contains: horizontal/vertical angles and distance to the prism (see Figure A-3). Both measurements (Center and Side) relate to one point. After clicking Compute Coordinates, Topcon Link calculates the coordinates of this point using both measurements:

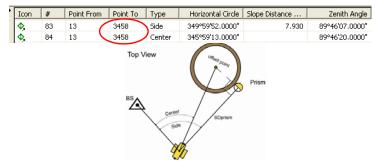
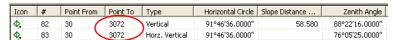
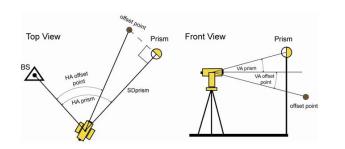


Figure A-3. Example of Horizontal Angle Offset in Total Station or TopSURV/SSF

Vertical and Horz. Vertical: These two types of TS measurements are created if the user selected Horizontal/ Vertical Angle Offset in the Total Station or TopSURV/SSF. The Horz. Vertical measurement contains only angle (horizontal/vertical) measurements to the target (offset point), Vertical measurement contains horizontal/vertical angles and distance to the reflector (see Figure A-4). Both measurements (Vertical and Horz. Vertical) relate to one point. After clicking Compute Coordinates, Topcon Link calculates the coordinates of this point using both measurements





#### Figure A-4. Example of Horizontal/Vertical Angle Offset in Total Station or TopSURV/SSF

 Horizontal Resection/Vertical Resection: plane / vertical coordinates of station point are computed using measurements from two (or more) points with known coordinates *Resection*: plane and vertical coordinates of station point are computed using measurements from two (or more) points with known coordinates

left panel

•	Point	s 🚺 Line	s Q, T	5 Obs 🗍 Code	•							
I.,		Point Nar	ne Instr	ument Height (USR	) Instrument	Centering Error (U	Instrument Hei	ght Error (U	Reflector Height Erro	r (U Reflect	tor Center	ing Error (USPt)
٥	1	CP1		5.33	D	0.000		0.000		0.007		0.005
¢,	2	CP2		5.33	0	0.000	1	0.000		0.007		0.005
0	3	CP2		5.49	D	0.000	1	0.000		0.007		0.005
Q,		CP4		5.34	6	0.000		0.000		0.007		0.005
٥	5	CP5		5.64	6	0.000	1	0.000		0.007		0.005
yks.	2	Lines 🔍 T	5 Obs	Codes				1181	nt pane	-		
_		Lines Q T Point From			Horizontal Circle	Slope Distance	Zenith Angle	Reflector Heigh	-		Code	HAngle Resi
_	1000				Horizontal Circle	Slope Distance	Zenith Angle	-	-			Hingle Resi
_	1000	Point From		Туре		Slope Distance	Zenith Angle 89°45'10.0000"	-	t (USit) Azimuth	Date		HAngle Resi
_	<b>s</b> 1	Point From OP1		Type (K)	0°00'00.0000"	Slope Distance		-	t (USft) Azimuth 0°00'00.0	Date 1/2/2004 1:27:		HAngle Resi
_	# 1 2 3 4	Point From OP1 OP1 OP1 OP1	Point To	Type (KD B5 (KD B5	0°00'00.0000" 0°00'00.0000" 0°00'00.0000" 0°00'00.0000"		89°45'10.0000" 89°45'05.0000"	-	t (USR) Azimuth 0°00'00.0 5.000 0°00'00.0	Date 1/2/2004 1:27: 1/2/2004 1:27: 1/2/2004 1:29: 1/2/2004 1:29:		Hångle Resi
_	# 1 2 3 4 5	Point From OP1 OP1 OP1 OP1 OP1 OP1	Point To	Type  (KI)  BS  (KI)  BS  (SS  SS	0°00'00.0000" 0°00'00.0000" 0°00'00.0000" 0°00'00.0000" 0°00'05.0000"	460.525	89°45'10.0000" 89°45'05.0000" 09°45'15.0000"	-	t (USIt) Azimuth 0°00'00.0 5.000 0°00'00.0 5.000	Date 1/2/2004 1:27: 1/2/2004 1:27: 1/2/2004 1:29: 1/2/2004 1:29: 1/2/2004 1:29:	NAD,	HAngle Resi
nts I	# 1 2 3 4	Point From (P1 (P1 (P1 (P1 (P1 (P1 (P1 (P1	Point To CP2 CP2	Type 0K0 B5 0K0 B5 55 55	0°00'00.0000* 0°00'00.0000* 0°00'00.0000* 0°00'00.0000* 0°00'05.0000*	460.525 468.525	89°45'10.0000" 89°45'05.0000" 09°45'15.0000" 270°15'00.0000"	-	(USR) Asimuth 0°0000.0 5.000 5.000 5.000	Date 1/2/2004 1:27: 1/2/2004 1:27: 1/2/2004 1:29: 1/2/2004 1:29: 1/2/2004 1:29: 1/2/2004 1:30:	 	
_	# 1 2 3 4 5	Point From OP1 OP1 OP1 OP1 OP1 OP1	Point To	Type (KI) B5 (KI) B5 S5 S5 F5	0°00'00.0000" 0°00'00.0000" 0°00'00.0000" 0°00'00.0000" 0°00'05.0000"	460.525	89°45'10.0000" 89°45'05.0000" 09°45'15.0000"	-	t (USIt) Azimuth 0°00'00.0 5.000 0°00'00.0 5.000	Date 1/2/2004 1:27: 1/2/2004 1:27: 1/2/2004 1:29: 1/2/2004 1:29: 1/2/2004 1:29:		HAngle Res

Figure A-5. TS Obs File Data Table – TS Obs Tab

# **Icon Descriptions**

Table A-2 lists the icons that represent different Topcon Link parameters in the data table.

Location	lcon	Description
	<b>\$</b>	TS station
	$\Phi$	TS point
Points Tab	Δ	Fixed coordinates point
	Δ.	Fixed Horizontal control
		Fixed Vertical control
<i>TS Obs</i> Tab, Left Panel	\$_	TS station
	٥,	ForeSight measurement
<i>TS Obs</i> Tab, Right Panel	Ф,	SideShot measurement
		BackSight

Table A-2. Total Station Raw Data File Icons

Location	lcon	Description
<i>TS Obs</i> Tab, Right Panel (Continued)	<b>(</b>	BackSightBearing point measurement
	<b>⊕</b> <sup>s</sup>	TS Resection Observation

Table A-2. Total Station Raw Data File Icons (Continued)

# **GPS+ Raw Data View**

GPS+ Raw Data file contains GPS/GLONASS code and carrier phase measurements collected for point or points where was mounted a GPS antenna. Topcon Link directly (that is using its own technique) opens the following GPS+ raw data files:

- RINEX 2.11 and RINEX 3.0 is the version of standard format for exchanging GPS Raw Data. For a static/kinematic observation(s) 2 or 3 files are created; the first usually having an extension beginning with the letter 'O' and stores the observations; the second usually has extensions beginning with the letter 'N' or 'G', depending on GPS/GLONASS capability, and stores GPS and GLONASS navigational data (orbits) for those observations.
- Compact RINEX/Compact Rinex3 file (or a Hatanaka compressed file) is the compression of RINEX 2.11 / RINEX 3.0 observation files. This file type contains a "D" extension.
- TPS/JPS files are the raw data files logged by Topcon receivers.
- TPD files are a Topcon proprietary format for storing GPS raw data, and can be used to backup raw data or exchange raw data between different jobs.
- Sokkia PDC files are the new raw data files logged by Sokkia receivers (GSR2600, GSR2700 and GSR1700)
- Sokkia Stratus files are the raw data files logged by Sokkia Stratus receiver

Also Topcon Link allows the user to open native binary formats of GPS receivers manufactured by Ashtech (B\*.\*, E\*.\*, S\*.\*), Leica

Geosystems (\*.lb2, \*.mdb,\*.m00), Trimble (\*.dat), Septentrio Satellite Navigation NV (\*.sbf) companies. For opening these formats, Topcon Link applies TEQC software (http:// facility.unavco.org/software/teqc/teqc.html).

When the user opens one of the above formats in Topcon Link, the following scheme of converting the file begins to work automatically:

- 1. TEQC converts the native binary format to RINEX 2.11 file format.
- 2. The created RINEX file is opened by Topcon Link.

NOTE:

- 1. The current default setting for the TEQC allows opening only static occupations (provided there is **only one** *Marker Name* in the file for this occupation). In other words, it is impossible to open kinematic and Stop&Go files of native formats of these companies into Topcon Link.
- 2. When opening binary files of third-party companies, Topcon Link uses default settings of the TEQC program. If a binary file failed to be opened by Topcon Link, we recommend to repeat the conversion to the RINEX file using own settings of TEQC (out of the Topcon Link program) for the given binary file. After obtaining an appropriate RINEX file, this file can be opened by Topcon Link.

After opening a raw data file in Topcon Link, the GPS Occupations tab displays all information about occupation(s), which the raw data file contain.

# **GPS Occupations Tab**

For a GPS+ raw data file, the *GPS Occupations* tab has the following columns:

- Icon displays a symbol associated with the occupation.
- Point Name displays the name of the occupation.
- Original Name displays the original occupation name.
- Antenna Type the antenna type used on the occupation.
- Antenna Height the antenna height.

- Antenna Height Method the method used to measure the antenna height, either Vertical or Slant.
- Start Time and Stop Time displays the beginning and end dates (day/month/year) and starting and stopping epoch time of the occupation.
- Duration the duration of time in which the observational data was acquired (duration = start time/stop time).
- Method the surveying method used at the occupation; either Static, Stop-and-Go, Kinematic, RTK (RTK base, RTK Topo, and RTK Autotopo), or Autonomous.
- Note displays user comments.
- Source displays the path of the raw data on the computer disk drive, local area network, or storage media.
- Interval displays the occupation logging interval.
- Receiver displays the TPS receiver serial number used for the occupation.
- GPS week, day displays the GPS week and day of the occupation start time.
- NEpoch displays the number of epochs for the given GPS occupation.
- Antenna Centering Error centering error of Antenna Reference Point (ARP) position over the mark. This error will be take into account when estimating adjustment results.
- Antenna Height Error measurement error of the antenna height over the mark. This error will be take into account when estimating adjustment results.
- Azimuth offset line azimuth.
- Offset Dist displays the occupation's distance offset.
- Offset dHt displays the occupation's height offset.
- Offset Across displays the occupation's across offset.
- H RMS horizontal position error for the given occupation
- V RMS vertical position error for the given occupation

• Receiver vendor - displays the name of the vendor which developed this GPS receiver. The user can select a desired company from the list. This selects a vendor of the receiver to accommodate differences in post - processing GLONASS measurements by different companies. If the receiver's class is not included in the IGS list, select "*Unknown*" from the list. **for the file that contains static and kinematic occupations** 

File Edit View	Add Process Win	dow Help									- 8
2 🖬 🖬 🔧	🐉 🔂 💣	10 CX   3	- Ph   5   5	8 8 8 B	🐴 🛛 🔚	<b>R</b> ?					
GPS Occupation	15										
L. Point Name	Original Name	Antenna Type	Antenna Hei	Art Height Met	Start Time	Stop Time	Duration	Method	Receiver	Interval (msec)	GP.
Rover_ZDW	Rover_20VK	GR-3	2.080	Vertical	6/30/2007 1:37	6/30/2007 1:37	00:00:05	Static	8PGL0MN2DVK	1000	14:
9	Rover_ZDVK_K1	GR-3	2.080	Vertical	6(30)2007 1:37	6/30/2007 1:41	00:03:51	Kinematic	<b>SPGLOMNZDVK</b>	1000	140
Rover_ZDWK_51	Rover_20/K_S1	GR-3	2.080	Vertical	6f30f2007 1:41	6/30/2007 1:41	00:00:23	Static	8PGL0MN2DVK	1000	14:
0	Rover_20//K_K2	GR-3	2.000	Vertical	6/30/2007 1:41	6/30/2007 1:47	00:05:24	Kinematic	<b>OPGLOMNZDVK</b>	1000	14:
Rover_ZDVK_S2	Rover_20VK_S2	GR-3	2.080	Vertical	6/30/2007 1:47	6/30/2007 1:47	00:00:22	Static	8PGL0MN2D4K	1000	14:
3	Rover_20//K_K3	GR-3	2.080	Vertical	6/30/2007 1:47	6/30/2007 1:50	00:03:05	kinematic	6PGL0MNZDVK	1000	14:
Rover_ZDWC_53	Rover_20VK_S3	GR-3	2.080	Vertical	6/30/2007 1:50	6/30/2007 1:50	00:00:24	Static	SPGLOMNZD/K	1000	140
	Rover_20VIX_K4	GR-3	2.000	Vertical	6/30/2007 1:50	6/30/2007 1:55	00:04:23	Kinematic	EPGL0MN2DWK	1000	14:
Rover_ZDWK_54	Rover_ZDVK_S4	GR-3	2.080	Vertical	6/30/2007 1:55	6/30/2007 1:55	00:00:18	Static	8PGL0MNZDVK	1000	140
2	Rover_201X_KS	GR-3	2.080	Vertical	6/30/2007 1:55	6/30/2007 2:07	00:12:09	Kinematic	8PGL0MN2DVK	1000	14:
Rover_ZDWK_55	Rover_ZDVK_S5	GR-3	2.080	Vertical	6/30/2007 2:07	6/30/2007 2:08	00:00:22	Static	8PGL0MNZD4K	1000	140
2	Rover_201K_K6	GR-3	2.080	Vertical	6/30/2007 2:08	6/30/2007 2:13	00:05:08	Kinematic	8PGL0MN2DVK	1000	14
Rover_ZDWK_56	Rover_20//K_56	GR-3	2.000	Vertical	6/30/2007 2:13	6/30/2007 2:13	00:00:21	Static	<b>OPGLOMNZDVK</b>	1000	143
2	Rover 20VK K7	GR-3	2.080	Vertical	6/30/2007 2:13	6/30/2007 2:16	00:03:15	Kinematic	8PGL0MNZD/K	1000	14:

#### for the file that contains static occupation

	File Edit View	Add Process Win	dow Help								- 8
ŝ	i 🖬 🖬 🤺	😚 🚷 🖨	10 Cr 3	h 1 1 A	9888	) 🛛 🗖 🕯	2 <sup>7</sup>				
0	GPS Occupation	15									
I	Point Name	Original Name	Antenna Type	Antenna Hei	Ant Height Met	Start Time	Stop Time	Duration	Method	Receiver	Interve
•	Base_HGQO	Base_HGQO	HPer Ga/Gb	1.670	Slant	6/30/2007 1:36	6/30/2007 2:24	00:47:08	Static	POHS9FSHGQO	1000

Figure A-6. GPS+ Raw Data File – GPS Occupations Tab

# **Digital Level Data View**

Digital level files contain data on points measured with a digital level instrument. The DL observations file data table contains two tabs to display data.

For details on editing level measurements, see "Editing Digital Level Observations" on page 6-19.

# **Points Tab**

For a Digital Level file, the *Points* tab has the following default columns:

- Icon the symbol used for the point
- Name the name of the point
- Latitude\Northing the measured northing coordinate for the point and coordinate type
- Longitude\Easting the measured easting coordinate for the point and coordinate type
- Elevation the elevation of the point
- Code any codes associated with the point
- Control the coordinate fix of the point (None, Horizontal, Vertical, Both)
- Note any notes associated with the point

🔲 D:\fi	D:\file1.dl <topcon -="" dl="" obs=""></topcon>											
•° Poi	• Points B, DL Obs											
Icon	Name	Ground Northing (m)	Ground Easting (m)	Elevation	Code	Control	Source	Note				
	BM123			12.354		Vertical						
	1					None						
	2					None						

Figure A-7. DL Obs File Data Table – Points Tab

## **DL Obs Tab**

For a Digital Level file, the *DL Obs* tab has two panels, the left for start and end points of a job, the right for all level measurements for the job selected in the left panel.

The left panel contains the following columns:

- Icon the symbol of the leveling job
- *#* the number of the leveling job
- From the start leveling point of the job
- To the finish leveling point of the job
- Level Run the name of the leveling job created in a Topcon digital level
- Date the start date (day/month/year) and time of job creation
- Note displays user comments
- Distance the sum of all backsight and foresight distances
- Balance the sum of differences between DL to BS point and DL to FS point of the job

The right panel contains the following columns:

- Icon displays a symbol associated with turning points
- *#* the number of the measurement
- Point the name of the turning point
- BS the measurement for backsight point
- FS the measurement for foresight point
- Distance measured distance
- Elevation the orthometric heights of the point (or the height of the point is calculated from a point with known height)
- Vert. Offset displays the vertical offset from the horizontal plane for traverse and sideshot points
- Note any comment for the level measurement

- Std Dev standard deviation for the level measurement. This value is created in the digital level
- Date the date and time of level measurement
- Level Run the name of the leveling job created in a Topcon digital level

	left panel											
Ľ	D:\file1.dl <topcon -="" dl="" obs=""></topcon>											
ſ	• Points		🔩 DL Obs									
	Icon	#	From	To	Level Run	Date	Note	Distance (m)	Balance (m)			
	<b>.</b>	1	BM123	2	TS	10/18/200		21.404	-0.732			

#### right panel

Point	s 🗳	DL Obs										
Icon	#	Point	BS (m)	Instrument Elev	SS (m)	FS (m)	Elevation (m)	Distance (m)	Vert.Offset (m)	Note	Std Dev (m)	Date
	1	BM123	0.095	12.449			12.354	5.026	0.000		0.000	10/18/20
α,	2	1		12.449		0.099	12.350	6.473	0.000		0.000	10/18/20
Π.	3	1	1.497	13.847			12.350	5.310	0.000		0.000	10/18/20
Π.	4	2		13.847		0.107	13,740	4.595	0.000		0.000	10/18/20

Figure A-8. DL Obs File Data Table – DL Obs Tab

#### **Icon Descriptions**

Table A-3 lists the icons that represent different Topcon Link parameters in the data table.

Location	lcon	Description
		Traverse Point for digital level observation
	₽	Side Shot
Points Tab	Δ	Fixed coordinates point
	Δ	Fixed Horizontal control
		Fixed Vertical control
DL Obs Tab, Left Panel	8,	Leveling job

Table A-3. DL OBS File Icons

Location	lcon	Description
	<b>↓</b> <sub>2</sub>	BackSight level measurement
<i>DL Obs</i> Tab, Right Panel	۵,	ForeSight level measurement
	●,	SideShot level measurement

Table A-3. DL OBS File Icons (Continued)

# **Field Software Job View**

A Field Software job contains information on the various GPS, total station, digital level, tape dimension, and cross-section template data measured/recorded with an instrument running TopSURV/SSF. The type of information in the Field Software job determines the tabs that will display. Field Software jobs also display linework and points in a graphical CAD view. If the Field Software job includes layers, another view is available for managing this data.

If Field Software job contains localization, Topcon Link displays the point coordinates in the both coordinate systems (WGS-84/Datum and Ground/Localization). Topcon Link does not recalculate localization parameters which were created in TopSURV/SSF.

•° Poi	nts 🔾	💡 GPS Occ	cupations 🗍 🤗 י	GPS Obs	;   🌲 (	Codes						
Icon		Name	Ground Northing	(Ift) (	Ground Ea	asting		Elevation (Ift)	Code		Note	
Δ	А		3273.76	1800	4142	.383900		100.00000	1			
Δ	В		3313.55	2600	4038	.771800		100.00000	1			
۲	BASE	F1	4934.17	9000	4983	.853000		200.00000	<sup>1</sup> in 1	ocal	coordinate	system
Δ	С		3415.51	4200	3632	.428900		100.00000	m	ocai	coorumate	system
0	F1-1		4010.03	8539	4449	.902470		200.00000	2			
0	F1-2		4011.29	6856	4492	.716598		200.00000	2			
<												
						_						
						IFeet	DM	S Ground	06.0789	TCL CDS	7.tlsv Localization	
eady						1 660		5 Grodina	00_0/01	nac_arb_	7.05V EUCalizacion	
eady		•° Point	s 🔗 GPS Occ	upations	: 8		4	-	00_070	ncc_ars_	7.05V LOCalization	
eady			s 🔗 GPS Occi		; 🛛 🤗 .atitude		4	-	_		Note	Photo Notes
ady		Icon N	1		atitude	GP5 Obs	<b>4</b> ude	Codes	Code			Photo Notes
eady		Icon N	lame	33°38'	.atitude 24.8	GPS Obs	<b>4</b> ude	Codes   Ell.Height (Ift)	Code			Photo Notes
eady		Icon M A A	Jame A	33°38' 33°38'	atitude 24.8 39.0	GP5 Obs Longiti 111°55'31	ude	Codes Ell.Height (Ift) 1438.19224	Code 1		Note	
eady		Icon M A A I	Jame A B	33°38' 33°38' 33°38'	atitude 24.8 39.0 29.8	GP5 Obs Longiti 111°55'31 111°55'32	ude [	Codes   Ell.Height (Ift) 1438.19224 1453.17121	Code			
eady		Icon M A A I A I A	Jame A B BASE_F1	1 33°38' 33°38' 33°38' 33°38'	atitude 24.8 39.0 29.8 29.3	GP5 Obs Longitr 111°55'31 111°55'32 111°55'32	ude	Codes Ell.Height (Ift) 1438.19224 1453.17121 1443.57057	Code 1 1 1		Note	
eady		Icon M A A I A I A I A I I A I I A I I I I I	Jame A B BASE_F1 C	1 33°38' 33°38' 33°38' 33°38'	atitude 24.8 39.0 29.8 29.3 29.3	GP5 Obs Longiti 111°55'31 111°55'32 111°55'32 111°55'32	ude	Codes Ell.Height (Ift) 1438.19224 1453.17121 1443.57057 1443.11139	Code 1 1 1 1 1 1 1 1 1 2		Note	
eady		Icon M A A I A I A I A I I A I I A I I I I I	Aame A B BASE_F1 C F1-1	1 33°38' 33°38' 33°38' 33°38' 33°38'	atitude 24.8 39.0 29.8 29.3 29.3	GP5 Obs Longiti 111°55'31 111°55'32 111°55'32 111°55'32 111°55'38	ude	Codes Ell.Height (Ift) 1438.19224 1453.17121 1443.57057 1443.11139 1445.09037	Code 1 1 1 1 1 1 1 1 1 2		Note	
sady		Icon M A A I A I A I A I I A I I A I I I I I	Aame A B BASE_F1 C F1-1	1 33°38' 33°38' 33°38' 33°38' 33°38'	atitude 24.8 39.0 29.8 29.3 29.3	GP5 Obs Longiti 111°55'31 111°55'32 111°55'32 111°55'32 111°55'38	ude	Codes Ell.Height (Ift) 1438.19224 1453.17121 1443.57057 1443.11139 1445.09037	Code 1 1 1 1 1 1 1 1 1 1 2 2		Note	

For details on editing Field Software job information, see Chapter 6 (Field Software job can contain TS, DL, or GPS measurements).

# **CAD** View for Field Software Job

The CAD view is a two-dimensional, graphical representation of linework road and surface data, with associated points, in a Field Software Job. To view the CAD graphic, click View ► CAD View. Depending on the file's data and the filters used, the following information will be displayed. To set filters, see "Setting CAD View Options" on page 3-26.

- Points display with the associated symbols. If the point does not have a symbol assigned, its survey symbol will be used.
- Lines display with the associated code/layer color, style, and width.
- Control codes (/AS, /AE, /C) display as an arc or closed polyline, respectively.
- Codes with a polygon entity display as closed and filled (if a fill color has been set).
- Roads display in the color applied to the corresponding layer(s).

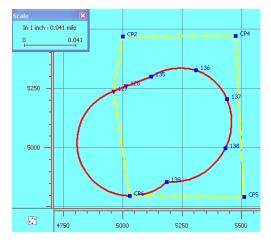


Figure A-9. Field Software Job CAD View



The Roads tab and X-Section Templates tab have independent CAD graphical views associated with the selected data element.

### **Layers View for Field Software Job**

The Layers view lists all layers in the file with associated properties. To view the layers, click View ► Layers. The following information will be displayed for each layer. To edit a layer's properties, see "Editing Layers" on page 6-51.

- Name the name of the layer
- Visible if the layer is visible in the CAD view
- Line Style the style used for lines in this layer
- Line Width the width of lines in this layer
- Color the color of points and lines in this layer
- Point Symbol the icon used for points in this layer
- Breakline Type the type of breakline for the layer (Auto, Breakline, Boundary, or Exclusion)
- Note any notes associated with the layer
- Area Fill Style displays the type of fill.
- Fill Transparency displays the value of an area's transparency. Changing of this value does not affect transparency of the area because this option does not work in graphical mode in Topcon Link ver 7.3.

Name	Visible	Line Style	Line Width	Color	Point Symbol	Note	Area Fill Style	Fill Transparency
<i></i> 0	Yes		1 pt ——		•		None	0%
∉Layer_trees	Yes		3 pt —		+	Desc_la		0%
∉layer_2	Yes		2 pt —		0		None	0%
∉fence	Yes		3 pt —		•	wood fe	None	0%
<i> F</i> ire_hydrant	Yes		1 pt		$\diamond$	for street	None	0%
🕖 field	Yes		2 pt —		•	for field	2000000	0%

Figure A-10. Field Software Jobs Layers View

# **Points Tab**

For a Field Software Job, the *Points* tab has the following default columns:

- Icon the symbol of the point
- Name the name of the point
- Latitude\Northing the measured northing coordinate for the point and the coordinate type
- Longitude\Easting the measured easting coordinate for the point and the coordinate type
- Elevation the elevation of the point
- Code any codes associated with the point
- Control the coordinate fix of the point (None, Horizontal, Vertical, Both)
- Note any notes associated with the point
- Photo Notes displays the number of a photo note per point.
- Layer the layer for the point
- Color the color of points and lines
- Point Symbol the icon used for point

° Poi	ints 📿	Lines 🛛 🗞 TS Obs 🛛 🌲	Codes 📝 Images									
Icon	Name	Ground Northing (USft)	Ground Easting (USft)	Elevation	Code	Control	Note	Photo Notes	Layer	Color	Point Symbol	ŀ
۸	CP1	5000.000	5000.000	700.000	NAIL	Both	metallic_r	1	BYCODE(0)	BYCODE	BYCODE •	
٥	CP2	5468.521	4999.994	702.357	NAIL	None			BYCODE(0)		BYCODE •	
٥	CP3	5042.995	5078.657	698.490	NAIL	None			0		BYCODE •	
٥	100	5034.322	4976.046	701.023	BC	None			0		BYCODE •	
٥	101	5035.779	4995.384	700.328	BC	None			0	BYCODE	•	
٥	102	5036.734	4997.487	700.237	BC	None			BYCODE(0)	BYCODE	•	
٥	103	5039.104	4998.116	700.135	BC	None			BYCODE(0)	BYCODE	+	
٥	104	5055.094	4996.895	699.664	BC	None			BYCODE(0)	BYCODE	BYCODE •	
٥	105	5058.128	5043.674	698.499	BC	None			BYCODE(0)	BYCODE	BYCODE •	

Figure A-11. Field Software Job – Points Tab

### **GPS Occupations Tab**

For a Field Software Job, the *GPS Occupations* tab has the following default columns:

- Icon displays a symbol associated with the occupation.
- Point Name displays the name of the occupation.
- Original Name displays the original occupation name.
- Antenna Type the antenna type used on the occupation.
- Antenna Height the antenna height.
- Antenna Height Method the method used to measure the antenna height, either Vertical or Slant.
- Start Time and Stop Time displays the beginning and end dates (day/month/year) and starting and stopping epoch time of the occupation.
- Duration the duration of time in which the observational data was acquired (duration = start time/stop time).
- Method the surveying method used at the occupation; either Static, Stop-and-Go, Kinematic, RTK (RTK base, RTK Topo, and RTK Autotopo), or Autonomous.
- Note displays user comments.
- Source displays the path of the raw data on the computer disk drive, local area network, or storage media.
- Interval displays the occupation logging interval.
- Receiver displays the TPS receiver serial number used for the occupation.
- GPS week, day displays the GPS week and day of the occupation start time.
- NEpoch displays the number of epochs for the given GPS occupation.
- Antenna Centering Error centering error of Antenna Reference Point (ARP) position over the mark. This error will be take into account when estimating adjustment results.

- Antenna Height Error measurement error of the antenna height over the mark. This error will be take into account when estimating adjustment results.
- Azimuth offset line azimuth.
- Offset Dist displays the occupation's distance offset.
- Offset dHt displays the occupation's height offset.
- Offset Across displays the occupation's across offset.
- H RMS horizontal position error for the given occupation
- V RMS vertical position error for the given occupation
- Receiver vendor displays the name of the vendor which developed this GPS receiver. The user can select a desired company from the list. This selects a vendor of the receiver to accommodate differences in post processing GLONASS measurements by different companies. If the receiver's class not included in the IGS list, plase select "Unknown" from the list

•° Po	oints 😪 GPS	Occupations	💡 GPS Obs 🛛 🕯	Codes							
Icon	Point Name	Original Name	Antenna Type	Antenna Hei	Ant Height Met	Start Time	Stop Time	Duration	Method	Receiver	Inter -
۲	Base2-REF	Base2-REF	CR-3	2.150	Vertical	5/5/2006 9:33:	5/5/2006 10:25	00:52:10	Base		
•	100	100	TPSGR-3	1.830	Slant	5/5/2006 9:33:	5/5/2006 9:33:	00:00:24	Торо	R83ZY5WMK8W	1000
•	101	101	TPSGR-3	1.830	Slant	5/5/2006 9:36:	5/5/2006 9:36:	00:00:20	Торо	R83ZY5WMK8W	1000
٩.	102	102	TPSGR-3	1.830	Slant	5/5/2006 9:39:	5/5/2006 9:39:	00:00:20	Торо	R83ZYSWMK8W	1000
٩.	103	103	TPSGR-3	1.630	Vertical	5/5/2006 9:41:	5/5/2006 9:41:	00:00:20	Торо	REGIZYSWMKEW	1000
٩.	104	104	TPSGR-3	1.830	Vertical	5/5/2006 9:42:	5/5/2006 9:43:	00:00:25	Topo	R832YSWMK8W	1000
٩.	105	105	TPSGR-3	1.830	Vertical	5/5/2006 9:49:	5/5/2006 9:49:24 P	M 0:00:20	Topo	R83ZYSWMK8W	1000
0	106	106	TPSGR-3	1.830	Vertical	5/5/2006 9:51:	5/5/2006 9:51:	00:00:23	Торо	R83ZY5WMK8W	1000
۹.	107	107	TPSGR-3	1.830	Vertical	5/5/2006 9:52:	5/5/2006 9:53:	00:00:21	Торо	R83ZY5WMK8W	1000
۹.	108	108	TPSGR-3	1.830	Vertical	5/5/2006 9:53:	5/5/2006 9:53:	00:00:23	Торо	R83ZY5WMK8W	1000
0	109	109	TPSGR-3	1.830	Vertical	5/5/2006 9:55:	5/5/2006 9:55:	00:00:31	Торо	R83ZY5WMK8W	1000
0	110	110	TPSGR-3	1.830	Vertical	5/5/2006 9:56:	5/5/2006 9:57:	00:00:20	Торо	R83ZY5WMK8W	1000
<											>

Figure A-12. Field Software Job – GPS Occupations Tab

# TS Obs Tab

For a Field Software Job, the *TS Obs* tab has two panels, the left for points with known coordinates, the right for points with unknown coordinates measured from the point selected in the left panel.

The left panel contains the following default columns:

- Icon the symbol of the point
- # the number of the point
- Point Name the name of the point

- Instrument Height the height of the instrument in the selected units (ft, m)
- Instrument Centering Error/ Reflector Centering Error centering error of Total Station/Reflector over the mark. This error will be take into account when estimating adjustment results.
- Instrument Height Error/Reflector Height Error measurement error of the Total Station/Reflector height over the mark. This error will be take into account when estimating adjustment results.

The right panel contains the following default columns:

- Icon the symbol of the point
- # the number of the point
- Point From the beginning of the vector
- Point To the end of the vector
- Reflector Height the height of the reflector
- Azimuth, Horizontal Circle, Slope Distance, Vertical Angle, Zenith Angle – angular and linear measurements in the selected units (DMS, qon, mil, radian, ft, m)
- Code any code associated with the point
- Type the type of point
  - SS: side shot point
  - BS: backsight point (the previous occupation point)
  - FS: foresight point (the next occupation point)
  - BKB: backsight bearing point
  - Horizontal/Vertical Resection: plane or vertical coordinates of station point are computed using measurements from two (or more) points with known coordinates
  - Resection: plane and vertical coordinates of station point are computed using measurements from two (or more) points with known coordinates
  - Note any notes associated with the point
  - Date date and time of the point measurement

- Center and Side: These two types of TS measurements are created if the user selected Horizontal Angle Offset in the Total Station or TopSURV/SSF. The Center measurement contains only horizontal angle to the target (offset point), Side measurement contains: horizontal/vertical angles and distance to the prism (see Figure A-3 on page A-5). Both measurements (Center and Side) relate to one point. After clicking Compute Coordinates, Topcon Link calculates the coordinates of this point using both measurements
- Vertical and Horz.Vertical: These two types of TS measurements are created if the user selected Horizontal/ Vertical Angle Offset in the Total Station or TopSURV/SSF. The Horz.Vertical measurement contains only angle (horizontal/vertical) measurements to the target (offset point), Vertical measurement contains horizontal/vertical angles and distance to the reflector (see Figure A-4). Both measurements (Vertical and Horz.Vertical) relate to one point. After clicking Compute Coordinates, Topcon Link calculates the coordinates of this point using both measurements

left panel	

•°	Points	📿 Lines	🔍 TS Obs	Codes				
I	\$	Point Name	Instrument H	leight (USft)	Instrument Centering Error (U	Instrument Height Error (U	Reflector Height Error (U	Reflector Centering Error (USft)
Q.	1	CP1		5.330	0.000	0.000	0.007	0.005
٥,	2	CP2		5.330	0.000	0.000	0.007	0.005
٥,	3	CP2		5.490	0.000	0.000	0.007	0.005
Q.	4	CP4		5.344	0.000	0.000	0.007	0.005
Q.	5	095		5.644	0.000	0.000	0.007	0.005

con		Point From	Point To	Туре	Horizontal Circle	Slope Distance	Zenith Angle	Reflector Height (USR)	Azimuth	Date	Code	HAngle Resid
	1	OP1		BKB	0*00'00.0000"				0°00'00.0	1/2/2004 1:27:		
	2	OP1		85	0*00'00.0000"		89945'10.0000"	5.000		1/2/2004 1:27:		
	3	OP1		BKB	0*00'00.0000"				0°00'00.0	1/2/2004 1:29:		
	4	CP1		85	0*00'00.0000"		89*45'05.0000"	5.000		1/2/2004 1:29:		
	5	CP1	CP2	55	0*00705.0000*	468.525	89*45*15.0000*	5.000		1/2/2004 1:29:	NAB.	
	6	OP1	CP2	55	179*59'50.0000"	468.525	270°15'00.0000"	5.000		1/2/2004 1:30:	NAB.	
	7	CP1	CP3	PS	61*20'20.0000"	89.660	91°10'40.0000"	5.000		1/2/2004 1:35:	NAIL	-0°00'09.0510'
	8	CP1	CP3	PS .	241*20'00.0000"	89.660	268*49'35.0000"	5.000		1/2/2004 1:36:	NAIL	0°00'10.1482"
	9	CP1	100	PS .	325*05'10.0000"	41.060	09*03/05.0000*	5.000		1/2/2004 1:39:	DC .	-0°00'00.2070
	10	CP1	101	PS .	352*30'50.0000"	36.075	90*00'10.0000"	5.000		1/2/2004 1:39:	DC .	-0°00'00.0537"
	11	CP1	102	PS .	356*05'05.0000"	36.820	90°00'40.0000"	5.000		1/2/2004 1:39:	DC .	-0°00'00.0201"
	10	204	100	82	APRIL 200 00000	20.152	AAAA **** A AAAA**	F 000		1202004-0-00-	0.0	0000000 010/3

right panel

Figure A-13. Field Software Job – TS Obs Tab

# **GPS Obs Tab**

For a Field Software Job, the *GPS Obs* tab has the following default columns for baseline measurements from the Base station to the Rover point:

- Icon the symbol of the point
- Point From the starting point of the baseline measurement
- Point To the ending point of the baseline measurement
- Start Time the date and time of the start of the measurement
- Duration the time during which the measurement was taken
- Note any note for the baseline measurement
- Horizontal Precisions, Vertical Precisions the horizontal and vertical precisions of the measurement
- dN, dE, dU the coordinate increments of the measurement in the current projection
- Method the measurement method (RTK Topo or RTK AutoTopo)
- Solution type the type of solution used for the measurement
  - Float, Phase Diff: float phase difference measurement
  - FixeMd,Phase Diff: fixed phase difference measurement
  - Float,Phase Diff, mm GPS: float phase difference measurement with mm GPS
  - Fixed,Phase Diff, mm GPS: fixed phase difference measurement with mm GPS

Po	ints 🛛 🔗 GPS	Occupations	🔗 GPS O	ibs 🎄 Code	ns							
Icon	Point From	Point To	Start Time	Duration	Horizontal Preci	Vertical Precisio	dN (m)	dE (m)	dHt (m)	Method	Solution Type	-
•	Base2-REF	100	5/5/2006	00:00:24	0.003	0.003	36.115	5.191	0.730	RTK Topo	Fixed, Phase Diff	
•	Base2-REF	101	5/5/2006	00:00:20	0.005	0.006	60.274	49.476	0.817	RTK Topo	Fixed, Phase Diff	
•	Base2-REF	102	5/5/2006	00:00:20	0.006	0.003	26.789	16.309	0.173	RTK Topo	Fixed, Phase Diff	
•	Base2-REF	103	5/5/2006	00:00:20	0.002	0.002	3.353	-10.494	0.040	RTK Topo	Fixed, Phase Diff	
۰,	Base2-REF	104	5/5/2006	00:00:25	0.003	0.004	-18.701	-26.609	0.477	RTK Topo	Fixed, Phase Diff	
•	Base2-REF	105	5/5/2006	00:00:20	0.005	0.004	9.270	-31.880	1.132	RTK Topo	Fixed, Phase Diff	
•	Base2-REF	106	5/5/2006	00:00:23	0.006	0.006	41.870	-68.116	2.478	RTK Topo	Fixed, Phase Diff	
•	Base2-REF	107	5/5/2006	00:00:21	0.007	0.005	65.376	-77.718	1.641	RTK Topo	Fixed, Phase Diff	
•	Base2-REF	108	5/5/2006	00:00:23	0.005	0.005	64.472	-79.804	2.558	RTK Topo	Fixed, Phase Diff	
۰.	Base2-REF	109	5/5/2006	00:00:31	0.007	0.006	110.477	-87.444	1.232	RTK Topo	Fixed, Phase Diff	
•	Base2-REF	110	5/5/2006	00:00:20	0.004	0.004	127.457	-56.693	0.999	RTK Topo	Fixed, Phase Diff	
•	Base2-REF	111	5/5/2006	00:00:22	0.006	0.003	172.537	43.196	0.912	RTK Topo	Fixed, Phase Diff	~

Figure A-14. Field Software Job – GPS Obs Tab

# **Codes Tab**

For a Field Software Job, the *Codes* tab has two panels, the left for all available codes, the right for all attributes associated with the object (code) selected in the left panel.

The left panel contains the following default columns:

- Icon the symbol of the object
- Code the code of the object
- Layer display the layer in which the code is used

The right panel contains the following default columns:

- Icon the symbol of the attribute
- Name a unique name for the attribute
- Default value the value of the attribute
- Type the type of attribute (integer, real number, text, menu, boolean or date)

D:\code	es_for_linework.	tlsv <topsurv p<="" th=""><th>С</th><th>files &gt;</th><th></th><th></th><th></th></topsurv>	С	files >								
• Points	• Points 2 Linework & Codes											
Icon	Code	Layer	۲	Icon	Attribute Name	Default Value	Туре					
•	C-1	For Line1		E	List for ob18	pipe	Menu					
•	C-2	for_Points		<u>12</u>	exam	4	Real Number					
•	C-3	For Points 3		a) 12	quiz	lamp	Text					
				12	test	6	Integer					

Figure A-15. Field Software Job – Codes Tab

# Lines Tab

For aField Software Job, the *Lines* tab has two panels, the left for all lines (codes, layers, and strings) in the job, the right for all line segments associated with the line selected in the left panel.

The left panel contains the following default columns:

- Icon the symbol associated with the line
- Code the primary code used for the line
- String the string for the line
- Layer the layer for the selected line

- Color/Line Style/ Point Symbol/Line Width the plotting style of the selected line
- Area Fill Style displays the type of fill.
- Fill Transparency displays the value of an area's transparency. Changing of this value does not affect transparency of the area because this option does not work in graphical mode in Topcon Link ver 7.3

The right panel contains the following default columns:

- Icon the symbol associated with the line segment
- Order the order of points associated with the line segment
- From the beginning point of the line segment
- To the end point of the line segment. If the line is closed, the "To" point for the last segment will be the same as the start point of the line.
- Control Code (enable in Tabular view options) the control code of the point
  - Arc Start: the starting point of the arc
  - Arc End: the ending point of the arc
  - Close: the last point in a closed line

left panel

Icon	Туре	Layer	Line Color	Line Style	Line Width	Area Color	Area Fill Style	Fill Transparency	Point Type	Point Color	Code	String	Distance
7	Area	fence	BYCODE	BYCODE	BYCODE3	BYC	BYCODE None	BYLAYER 0%	BYC •	BYCODE	fen	1	500.63
/	Line	layer_2	BYCODE	BYCODE	BYCODE	BYC	BYCODE #####	BYLAYER 0%	BYC ●	BYCODE	cod	2	38.42
7	Area	field	BYCODE	BYCODE	BYCODE	BYC	BYCODE 0000	BYLAYER 0%	BYC •	BYCODE	field	1	122.3

#### right panel

Icon	Order	Point	Distance from s	Distance from p	Entry azimuth	Exit azimuth 🔼
	1	100				175°45'44.1248"
÷	2	101	114.829	114.829	175°45'44.1248"	314°00'00.0000"
$(\mathbf{r}_{i})$	3	102	115.248	0.419	314°00'00.0000"	43°00'00.0000"
+	4	104	259.248	144.000	43°00'00.0000"	220°26'13.5874"
	c	105	200.045	120 707	22002212 E074"	

Figure A-16. Field Software Job – Linework Tab

### **Tape Dimensions Tab**

For a Field Software Job, the *Tape Dimensions* tab has two panels, the left for all tape dimensions in the job, the right for tape measurements of the tape dimension selected in the left panel.

The left panel contains the following default columns:

- Icon the symbol associated with the tape dimension
- Start Point the name of the starting point for the dimension
- End Point the name of the ending point for the dimension

The right panel contains the following default columns:

- Icon the symbol of the point
- # measurement sessions
- Point to measurement direction
- Distance the length of the line
  - the "-" sign stands for a left turn
  - the "+" sign stands for a right turn relative to the direction of the measurement the last line
- Date the date and time of the measurement finished
- Note any notes associated with the measurement

D:\tape.tlsv <topsurv job="" pc=""></topsurv>											
•°	Points 🛛 🤗 GPS	Occupations	<b>□</b> , T	ape Obs	🎄 Codes						
I	🔺 Start Point	End Point		Icon	#	Point To	Distance (m)	Date	Nc		
<b>P</b>	100	A			1	1	-10.000	3/30/2004 9:20:06 AM			
					2	2	20.000	3/30/2004 9:20:16 AM			
					3	3	20.000	3/30/2004 9:20:23 AM			
					4	4	20.000	3/30/2004 9:20:32 AM			
<			>	<					>		

Figure A-17. Field Software Job – Tape Dimensions Tab

# Images Tab

For a Field Software Job, the *Images* tab has two panels, the left for a thumbnail of all images in the job, the right for larger version of the thumbnail image selected in the left panel.

The left panel contains a thumbnail image of all images in the job, with the lowest image title (either numerically or alphabetically) listed first.

The right panel contains the selected image with measured points and linework associated with the image. The symbols of the points correspond to the settings selected in the Line and Code properties dialog boxes. The size of the symbol depends on the distance from the station.



Topcon Link expects images to reside in a folder with the same name as the data file. For example, data from the "050119.tlsv" file will be associated with images in the "050119" folder. The data file and image folder must reside in the same directory for the images to display.



Figure A-18. Field Software Job – Images Tab

# **X-Section Templates Tab**

For a Field Software Job, the *X-Section Templates* tab has two panels, the left for all cross-section templates in the job, the right for segments used in the cross-section template selected in the left panel.

The left panel contains the following default columns:

- Icon the symbol associated with the template
- Name the name of the template
- Cut Slope (1:n) the percentage of cut for the slope
- Fill Slope (1:n) the percentage of fill for the slope

The right panel contains the following default columns and a graph for the x-section template selected in the left panel:

- Icon the symbol of the segment
- Order the sequential order of the segment
- Code the code used for the segment
- Hz. Dist the horizontal offset from the central line for the segment
- V.Dist the vertical offset from the horizontal plane for the segment. If a value is entered for this parameter, the Grade will be automatically calculated.
- Grade% the ratio of Hz. Dist and V.Dist multiplied by 100%. If a value is entered for this parameter, the V.Dist will be automatically calculated.
- Hz. Offset from CL (m) horizontal offset from the central line for the segment start point. Calculated using the corresponding values of the previous segment(s).

• V. offset from CL (m) – vertical offset from the horizontal plane for the start point of the segment. Calculated using the corresponding values of the previous segment(s).

Points   🔗 Roa	ds 📥 X-Section Te	mplates 🛔 Co	des							
. Name	Cut Slope (1:n)	Fill Slope (1:n)	<b>،</b> I	Order	Code	Hz. Dist	V. Dist (m)	Grade (%)	Hz. Offset from	V. Offset from
Station-121	0.000	0.000	E F	- 1		1.000	-0.020	-2.000	0.000	0.00
right-left	0.000	0.000	P	2		4.000	-0.200	-5.000	1.000	-0.02
				V. Offset from CL, m						
					-			_		

Figure A-19. Field Software Job – X-Section Templates Tab

### **Roads Tab**

TopSURV version 8.0 and later allows one to create a road using one of two following ways:

 Through horizontal and vertical projections of the center line (alignments) and lines representing the surface of the road and lying in the planes perpendicular to the center line (X-Section). To use this way in TopSURV, the user has to click *X-Sec Set* in the *Surface* tab of the Edit Road screen and select a pre-defined X-section set:



Figure A-20. TopSURV: Creating Road with X-Section

2. Through a set of several strings (String Set). Every separate string in the set is defined by one or several pairs of the horizontal and vertical alignments. To use this way in TopSURV, the user

has to click *String Set* in the *Surface* tab of the **Edit Road** screen and select a pre-defined string set:

Add Road	🖌 🗶
Alignment Surface	
String Set none> 💌	)
<none></none>	
Crossing-1 Working C Crossing-2	

Figure A-21. TopSURV: Creating Road with String Set

#### **Road with X-Section**

For a Field Software Job that contains a road with X-sections, the Roads tab displays two panels:

- the left the name of every road in the job and the names of components of the road,
- the right in table and graphic view, parameters of horizontal alignments/vertical alignments/x-section templates for the road selected in the left panel.

The left panel contains a data tree with the following entries for each road in the job.

- Horizontal alignment select to show both table and graph; expand to select and show just the table or graph
- Vertical alignment select to show both table and graph; expand to select and show just the table or graph
- X-Sections select to show both table and graph; expand to select and show just the table or graph

The right panel contains information for the object selected in the left panel, whether a road or an alignment/x-section.

C:\topcon\TopconLink	lgradework_road.tls	v <topsurv pc<="" th=""><th>C Job&gt;</th></topsurv>	C Job>
🔹 Points 🥢 Roads	X-Section Templates	🌲 Codes	
<ul> <li></li></ul>	I Order 1 2 3	Type	Northing, m
E-M Vertical alignment Table 2 Graphic	4	Spiral CS to S	590000 Easting,
X-Sections	I Type	Sta/Chainage (n 25616.94	Liovedony
HHI Table	Parabola Long Parabola Long Parabola Long	28870.16 29772.85	25616.94929022.56
	🛆 Parabola Long	30047.17	
		2	
	I Sta/Chainage (m)	Side ^ Right	
<	26868.174	Left 🗸	0 Hz. Offset from CL,

Figure A-22. Field Software Job – Roads Tab for Road with X-Section

The horizontal alignment table has the following default columns and/or a graph for the road or horizontal alignment selected in the left panel.

- Icon the symbol associated with the element of the alignment
- Order the order of the element in the horizontal alignment
- Type the type of element (line, curve, spiral, or intersection)
- Azimuth the azimuth of the element
- Length the length of the element; editable for all types of elements except Intersection, where the length is calculated for the compound curve consisting of two spirals and one curve
- Turn the direction of the turn for a curve, a spiral, and intersection; "Right" is a clockwise direction, "Left" is a counter-clockwise direction
- Start Radius/End Radius the radius of the curve or spiral
- Northing/Easting the grid/ground coordinates of the intersection point
- Spiral 1 Len/Spiral 2 Len the length of the spiral at the intersection point
- End Station the number of the end station for the element

- Intersection Pt the name of the intersection point
- Tangential to prev element displays "True" if the azimuth for this element is the end azimuth for the previous element; displays "False" if the azimuth for this element is arbitrary
- End Northing /End Easting the grid/ground coordinates of the end station of the element
- End Azimuth the azimuth that sets the tangent to the end station of the element
- Spiral Dir the spiral direction
- Delta the angle between the radii corresponding to the curve
- Chord the length of the segment joining start and end points of a curve
- Tangent the length of the segment which touches the given curve
- Mid Ord the distance from the midpoint of a chord to the midpoint of the corresponding curve
- External the distance from the midpoint of the curve to the intersection point of the tangents
- Spiral Const the square root of the product of the length and the radius of the spiral
- Spiral Const 1/Spiral Const 2 the spiral constants used to define a compound curve

• Start Deg Chord/End Deg Curve – the angle in degrees used to compute the radius of curve whose chord is 100 units long.

6220-A12GradeWork		Туре	Azimuth			
Table	A		H2IMUCN	Length (m)	Turn	1
	/ 1	Line	60°57'59.0000	250.948		
	P 2	Spiral TS to SC	60°57'59.0000	88.392	Right	
C Graphic	<u>(</u> 3	Curve	63°51'58.9963	624.177	Right	
Vertical alignment	P 4	Spiral CS to ST	104°49'21.9835	88.392	Right	
Z Graphic	/ 5	Line	107°43'21.9798	214.555		
X-Sections	/ 6	Line	107°43'21.9798	488.263		
Table	P 7	Spiral TS to SC	107°43'21.9798	100.584	Right	
	Northing,	255675.5979 25616.949		3.414 ×273274	9 <u>7</u> 261	>

Figure A-23. Field Software Job – Roads Tab, Horizontal Alignment Panel

The vertical alignment table has the following default columns and/or a graph for the road or vertical alignment selected in the left panel.

- Icon displays an image associated with the elements.
- Type the type of the element (grade, parabola, or long section)
- Sta/Chainage the number of the start station or chainage for the grade, parabola, and long section element
- Order the order of the element in the vertical alignment
- Length the length of the vertical element for the grade and parabola, and the length of the curve of the long section
- Start Grade / End Grade the starting and ending percentages of grade of the element. If the grade is rising, the value should be positive; if the grade is falling, the value should be negative
- Elevation the elevation value on the end station for the grade and parabola and the elevation value of the station used for creating of the long section

C:\topcon\TopconLink		ad.tlsv	<pre>/ <topsurv pc<="" pre=""></topsurv></pre>	Job >		
🗣 Points 🥢 Roads 🚽	X-Section Tem	plates	🌲 Codes			
🖃 🥒 6220-A12GradeWork 🏻	I Type		Sta/Chainage (m)	Order	Length (m)	Start Grade (
E Z Horizontal alignme	ሰ Parabola Lo	ong	25616.949	1	0.000	0.(
Table	🗇 Parabola Lo	ong	28870.168	2	304.801	-3.(
C Graphic	ሰ Parabola Lo	ong	29772.850	3	487.681	-1.5
Vertical alignment	ሰ Parabola Lo	ong	30047.171	4	0.000	4.5
2 Graphic						
E A Sections						
Table						
	<					>
	Elevation, m 	*	25616.949		<u>x29022.56</u>	
<			260+0 27	0+0 280+0	) 290+0	EL Positions, m

Figure A-24. Field Software Job – Roads Tab, Vertical Alignment Panel

The x-section table has the following default columns and/or a graph for the road or cross section selected in the left panel.

- Station the station at which the template is applied
- Side the left or the right side of the road relative to the central line where this template is used
- Template the name of the template (selected from the list of existing templates in the current job)

C:\topcon\TopconLink	gradework_r	oad.tlsv	<topsurv .<="" pc="" th=""><th>lob&gt;</th><th></th><th></th></topsurv>	lob>		
🔹 Points 🥢 Roads	X-Section Ter	nplates	🌲 Codes			
🖃 🥒 6220-A12GradeWork 🍐	I., Sta/Chair	iage (m)	Side	Template		<u>~</u>
E Z Horizontal alignme	26	868.174	Right	88150R		
Table		868.174	Left	88150L		<b></b>
C Graphic	- 26	883.414	Right	88200R		
Vertical alignment     Table		883.414	Left	88200L		
2 Graphic		974.854	Right	88500R		
X-Sections	- 26	974.854	Left	88500L		
IIII Table		035.814	Left	88700L		
	+ 27	188.214	Left	89200L		~
	V. Offset from CL, - m				20 Hz, Offse	et from CL, m
			,	10	20 112; 01156	at from etc, m

Figure A-25. Field Software Job – Roads Tab, X-Section Template Panel

#### **Road with String Set**

For a Field Software Job that contains a road with String Set, the Roads tab displays two panels:

- the left the name of every road in the job and the names of components of the road,
- the right in table and graphic view, parameters of horizontal and vertical alignment of the center line, and string sets for the road selected in the left panel.

The left panel contains a data tree with the following entries for each road in the job.

- Horizontal alignment of the center line– select to show both table and graph; expand to select and show just the table or graph
- Vertical alignment of the center line select to show both table and graph; expand to select and show just the table or graph
- String set select to show the list of strings; expand to show all strings which are included in the given set

The left panel of the *Road* tab displays the String Set configuration, as set of the strings. Every road string is described by the pair or pairs of the horizontal/vertical alignments (HA-VA).

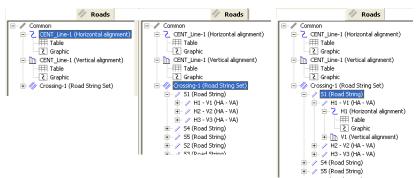


Figure A-26. Roads Tab for road with X-Section: Left Panel

The right panel contains information for the object selected in the left panel.

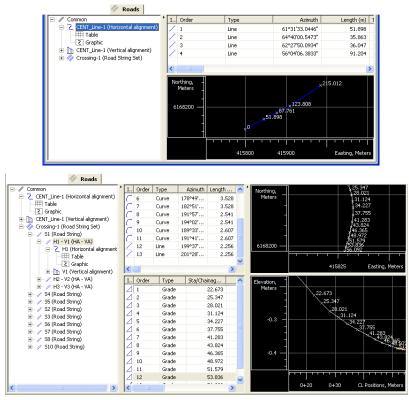


Figure A-27. Roads Tab for road with X-Section: Right Panel

All types of line, curves, spiral, intersection, grade, parabola and circular ark that are used for creating horizontal and vertical alignments of a road with String set are the same that are used for creating alignments of a road with X-section. See "Road with X-Section" on page A-30 for details.

# **Stakeout Report View**

The *Stakeout Report* tab is displayed only if a TopSURV job that was opened into Topcon Link, contains a stake report. This stake report involves information about stake of different objects (point, line/arc, road, slope, surface). In Topcon Link, the view of this report depends on components which were included by the user during configuration of the TopSURV job. All parameters of this report are not editable:

I Name	Туре	Τ,	Design Reference	Design Pt.	Design Note	Design Code	Design N	Design E
🖉 arc	Line or Arc		<b>∰</b> ↑0+02.000	5	5	12	6178507.179	415411.444
			∰ <sup>↑</sup> 0+04.000	6	6	14	6178505.486	415412.471
			⊞↑0+06.000	7	7	14	6178504.471	415414.171
			∰^0+08.000	8	8	14	6178504.371	415416.149
			10+10.000	9	9	14	6178505.210	415417.943

Figure A-28. Figure A-28. The Stakeout Report Tab

# Displaying Check Points in Points Tab

With repeated measurements of a single point (for both GPS and TS measurements), the software TopSURV allows the user to select one of the following three methods (Figure A-29):

- to write the point with a new name
- to use the new coordinates and raw measurements and remove previous coordinates of this point
- to save this point as a check point

#### for TS measurements for GPS measurements 🔗 Point Check 🔗 Point Check 22 A1 Already Exists! A2 Already Exists! Offsets(m) -Offsets(m)dE 0.000 dE 0.011 dN 0.018 dN -0.001 dH -0.001 dH 0.000 C Overwrite? C Overwrite? C Rename? A4 C Rename? A2 Store As Check Point? Store As Check Point? 🗌 Use in Weighted Average Correct Base



When saving repeated measurements as measurements for check points, TopSURV shows the coordinates of only the first point in the *Points* screen. And the check points with their coordinates and offsets from the first point will be shown in the *Edit Point ->Check Points* tab (Figure A-30).

Points: Ground					
Point	Code	North(m)	East(m)	Elev(m)	Control Nr
1 A		500.000	500.000	100.000	
😝 A2		482.349	598.430	100.000	
	<i>64</i>	Edit Point		🖌 🔀	
	Poin	t   Layer/Style	Check Points	Photo Note	
	Na	me dN	dE	dH	
	A2		0.084	-0.8	
	A2 A2		0.000 0.116	-0.4 -1.1	
	A2		0.049	-0.0	
	<			>	
<					
Delete	Edit	≜dd	Find by Q	ode Find by <u>P</u> oint	Find <u>N</u> ext

Figure A-30. TopSURV: Check Points Tab

TopSURV does not change the names of the check points: the all have the name of the first point. The repeated measurements are displayed in the *Raw Data* screen.

When you open a job in the Topcon Link, the software will display ALL control points in the *Points* tab and ALL repeated measurements in the *TS Obs/GPS Observations* tab. The names of these point

(except the name of the first point) will contain the prefix *check n*, where n - number of the check points.

on	Name		Ground	Ground Easting	Elevation (m)	Code		Control
1	A		500.000	500.0	00 100.000			None
	A2		482.349	598.4	30 100.000			None
	A2 check 1		482.274	598.5	14 99.126			None
>	A2 check 2		482.467	598.4	30 99.564			None
>	A2 check 3		482.357	598.5	46 98.821			None
Þ	A2 check 4		482.626	598.4	79 99.942			None
* •°	Points 🛇 TS OL	_	1	1				
* •°	# Point Narr 1.	. #	Point From	Point To	Azimuth	Horizontal Circle	Slope Dis	Zenith Angle
	# Point Nam I.	. #	Point From	Point To	Azimuth 45°00'00.0000"	Horizontal Circle 0°00'00.0000"	Slope Dis	Zenith Angle
I	# Point Nam I.	. #		Point To			Slope Dis	Zenith Angle 92°10'00.0000"
I	# Point Narr I. 1 A	# 1 2	A	Point To A2		0°00'00.0000"	Slope Dis 100.000	
I	# Point Nam 1 I.	# 1 2 3	A A			0°00'00.0000" 45°27'00.0000"		92°10'00.0000"
I	# Point Nam 1 I.	# 1 2 3 4	A A A	A2		0°00'00.0000" 45°27'00.0000" 55°10'00.0000"	100.000	92°10'00.0000" 90°00'00.0000"
I	# Point Nam 1 I.	, # 1 2 3 4 5	A A A A	A2 A2 check 1		0°00'00.0000" 45°27'00.0000" 55°10'00.0000" 55°12'00.0000"	100.000	92°10'00.0000" 90°00'00.0000" 90°30'00.0000"
I	#         Point Nam         I.           1         A         Image: Comparison of the second	# 1 2 3 4 5 6	A A A A	A2 A2 check 1 A2 check 2		0°00'00.0000" 45°27'00.0000" 55°10'00.0000" 55°12'00.0000" 55°06'00.0000"	100.000 100.100 99.980	92°10'00.0000" 90°00'00.0000" 90°30'00.0000" 90°15'00.0000"

Figure A-31. Points Tab and TS Obs Tab Display Check Points

If the user saved repeated GPS measurements as measurements for check points, and selected the applying these measurements to weighted averaging in the TopSURV job, the software calculates point coordinates taking into account all repeated measurements for

the point with 🚺 mark

Point Check           A1 Already Exists!           Offsets(m)           dE         0.000           dN         -0.001	Paint: Graund	Code	East(m) Lat:55°43'18	North(m)	Elev(m) ht:162.307	Control No
dH -0.001		Point   La	Point /er/Style Check	Points WA Phi	oto Note	
Rename? A2     Store As Check Point?		Name A1	E Resid	N Resid		
Use in Weighted Average		• A1 • A1	0.005 0.003	0.003		
		A1	0.001	0.004 n nns 💌		
				Exclude from WA		
	<		- Mar-			>
	Delete	Edit	Add	Find by <u>C</u> ode	Find by <u>P</u> oint	Find Next

Figure A-32. TopSURV: Using Weighted Average

After opening this TopSURV job in Topcon Link, the *Points* tab will display the weighted averaging for the points and coordinates all

check points, The *GPS Observations* tab will display all repeated measurements of this job. The observations for points with name "*A1 check n*" were not used in calculation of the weighted averaging for the point "*A1*":

•° Po	ints 🤗 GP	S Occupations	🤗 GPS Obs	🌲 Codes				
Icon	Name	🛛 🔻 Latitude	Longitude	Ell.Height	Control	Layer	Color	~
۲	Base1	55°43'19.3	37°39'08.1	166.985	None	0	BYLAYER	
•	A1 check 2	55°43'18.7	37°39'08.3	162.311	None	0	BYLAYER	
•	A1 check 1	55°43'18.7	37°39'08.3	162.308	None	0	BYLAYER	
0	A1	55°43'18.7	37°39'08.3	162.307	None	BYCODE(0	) BYLAYER	×
							>	
<			1111					
	ints 🛛 🤗 GP:	5 Occupations	🔗 GPS Obs	🌲 Codes		_		
	ints 🔗 GP:			🌲 Codes   Duration	n  +	lorizontal Preci	Vertical Precisio	
•° Poi Icon	1 ***	Point To	🤗 GPS Obs	Duratio		lorizontal Preci 0.014	Vertical Precisio	^
• <sup>°</sup> Poi	Point From	Point To A1	🔗 GPS Obs	Duration PM 00:00:0	12			
•° Poi Icon •,	Point From Base1	Point To A1 A1 check 1	GP5 Obs Start Time 7/2/2010 3:59:13	Duration           PM         00:00:0           PM         00:00:0	02	0.014	0.017	
•° Poi Icon 9,	Point From Base1 Base1	Point To A1 A1 check 1 A1 check 2	GPS Obs     Start Time 7/2/2010 3:59:13 7/2/2010 3:59:35	Duration           PM         00:00:0           PM         00:00:0           PM         00:00:0           PM         00:00:0	)2 )2 )2	0.014 0.014	0.017 0.015	

Figure A-33. Points Tab and GPS Obs Tab Displays Weighted Averaging Coordinates and Measurements

### **Icon Descriptions**

Table A-4 lists the icons that represent different Topcon Link parameters in the data table. Note that the icons for codes and linework are user-selectable, and are not listed below.

Location	lcon	Description
	<b>◇</b>	TS station
	•	TS point
	•	TS BackSight point
	•	Point coordinates input manually
	•	Point coordinates calculated by means of COGO
	<b></b>	Design point
	Φ	Stakeout point
	Δ	Fixed coordinates point
Points Tab	Δ	Fixed Horizontal control
		Fixed Vertical control
	۲	Base station
	0	Topo point <sup>a</sup>
	٢	Auto Topo point <sup>b</sup>
	**	PTL (point to line) offset point
	<del></del>	GPS offset point
		Tape Measurement Point

Table	Δ-4	Field	Software	.loh	Icons
Table	-Τ.	i iciu	Contware	000	100113

Location	lcon	Description
TS Obs Tab, Left	~	TS station
Panel	$\sim$	
	$\diamond_{\mathbf{x}}$	ForeSight measurement
	<b>∲</b> *	SideShot measurement
TC Obe Tel Diele	٠,	BackSight measurement
<i>TS Obs</i> Tab, Right Panel	( <b>†</b>	BackSightBearing point measurement
	<b>\$</b> 5	TS Resection Observation
	*	TS MLM Observation
	•	Base station occupation
GPS Occupations	0,	Auto Topo occupation <sup>c</sup>
Tab	•	Topo occupation <sup>d</sup>
GPS Obs Tab	0	Baseline from the base station to a Topo point
	Ø	Baseline from the base station to an Auto Topo point
<i>Tape Dimensions</i> Tab		Start reference line
Left Panel		
<i>Tape Dimensions</i> Tab		Tape Measurement Point
Right Panel		

Table A-4. Field Software Job Icons (Continued)

Location	lcon	Description		
	2	Horizontal Alignment		
<i>Roads</i> Tab		Vertical Alignment		
	r <del>in</del> ,	X-Section Template		
	·III	View Table		
	2	View Graphic		
<i>Roads</i> Tab Horizontal Alignment Table	$\checkmark$	Line element		
	٢	Curve element		
	0	Spiral element		
	7	Intersection element		
<i>Roads</i> Tab Vertical Alignment Table		Grade element		
	$\square$	Parabola element		
		Long Section element		

Table A-4. Field Software Job Icons (Continued)

a. Topo point – the point collected during a static RTK measurement

- b. Auto Topo point the point collected during a kinematic RTK measurement
- c. Auto Topo occupation the kinematic occupation in the RTK survey
- d. Topo occupation the static occupation in he RTK survey

# **Notes:**


# **Sample File Formats**

## **Coordinate File Formats**

Topcon Link can send, receive, and convert a number of different coordinate file data types. ASCII file formats are listed below.

#### **KOF Coordinates Format**

05	CP1	NAIL	48450.534	558462.743	246.368
05	CP2	NAIL	48579.742	558401.918	247.067
05	CP3	NAIL	48472.603	558478.853	245.887
05	100	BC	48456.890	558451.681	246.684
05	101	BC	48459.802	558456.825	246.468
05	102	BC	48460.338	558457.281	246.439
05	103	BC	48461.074	558457.147	246.408

### Name,E,N,Z,Code/Name,N,E,Z,Code Coordinate Format

This file has the following format:

Name, Easting/Northing, Northing/Easting, Elevation, Code

CP1,1832223.183,158958.128,808.292,NAIL CP2,1832023.626,159382.035,810.585,NAIL CP3,1832276.036,159030.533,806.714,NAIL 100,1832186.891,158978.979,809.329,BC 101,1832203.767,158988.534,808.619,BC 102,1832205.263,158990.294,808.526,BC 103,1832204.823,158992.706,808.423,BC 104,1832196.907,159086.653,807.951,BC

If the code information is absence in the file:

CP2\_NAD83,1832023.616,159382.018,810.587,

#### Name,Lat,Lon,Ht,Code Coordinate Format

This file has the following format:

Name, Lat, Lon, Ht, Code

CP1,40 06 06.90974,-82 59 13.59001,808.292,NAIL CP2,40 06 11.08744,-82 59 16.18833,810.585,NAIL CP3,40 06 07.62810,-82 59 12.91513,806.714,NAIL 100,40 06 07.11376,-82 59 14.05850,809.329,BC 101,40 06 07.20911,-82 59 13.84203,808.619,BC 102,40 06 07.22658,-82 59 13.82291,808.526,BC 103,40 06 07.25040,-82 59 13.82875,808.423,BC

If the code information is absence in the file:

CP2\_NAD83,40 06 11.08726,-82 59 16.18847,810.587,

### **FC-4 Coordinate Format**

This file has the following format:

Name

Northing

Easting

Elevation

Code

CP1 158958.12838 1832223.18323 808.29207 NAIL CP2 159382.03548 1832023.62629 810.58455 NAIL

#### GTS-210/310-10 Coordinate Format

Ъ +CP1 x+001524003\_y+001524003\_z+000213360\_\*NAIL\_+CP2 x+001666808\_\_\_\_\_v+001524001\_\_\_\_z+000214079\_\*NAIL\_+CP3 00485 Ъх+801537190\_\_у+801547977\_ z+808212980\_\*NAIL\_+188 у+801516782\_ z+888213672\_\*8С\_+181 \_\_\_\_х+881534 x+001534464 x+001534908\_y+010735 0\_\*BC\_+102 x+001535200 y+001523237 x+001535922\_y+001523429\_z+0002132023% x+001540796\_y+001523056\_z+000213258\_\*BC\_+105 **Ђ01522596\_ z+000213460\_\*ВС\_+102** z+000213433\_\*BC\_+103 Ъ401\_\*BC\_+1<mark>0</mark>4 x+001541721\_ y+001537314\_ z+000212903 \*BC +100 3057Ђ 
 δ
 x+001541078
 y+001541972
 z+000212840
 \*BC\_+107

 y+001534145
 z+000213366
 \*BC\_+108
 x+0015275
 x+001528084 ѣ001532304\_z+000213372\_\*BC\_+109 BC\_+109 \_\_x+001527571\_y+001531580\_ \_\_x+001526026\_y+001531069\_z+000215019% z+000213377\_\*BC\_+110

#### **GTS-7 Coordinate Format**

This file has the following format:

Name, Northing, Easting, Elevation, Code

CP1,5000.0000,5000.0000,700.0000,NAIL CP2,4999.9943,5468.5286,702.3573,NAIL CP3,5078.6555,5042.9982,698.4903,NAIL 100,4976.0449,5034.3210,701.0230,BC 101,4995.3832,5035.7784,700.3283,BC 102,4997.4859,5036.7339,700.2372,BC 103,4998.1150,5039.1041,700.1345,BC 104,4996.8930,5055.0934,699.6638,BC 105,5043.6716,5058.1299,698.4984,BC

If the code information is absent in the file

CP2\_NAD83,4999.9771,5468.5091,702.3597,

#### **Field Software Job Coordinate File**

This file has the following format:

Name, Northing, Easting, Elevation, Note, Code

CP1,5000.000,5000.000,700.000,Base St,NAIL

If the note information is absence in the file:

CP3,5042.998,5078.655,698.490,,NAIL

If the note and code information is absence in the file

CP2\_NAD83,5468.509,4999.977,702.360,,

### **GPS Vector File Format**

#### GPS Vector files have the following format:

Header(//Topcon Vector Format:v.number of the version,linear units,) VPP(for vector),Name\_Point1,Name\_Point2,dX,dY,dZ,sigma\_dX,sigma\_dY,sigma\_dZ,cor\_XY,cor\_XZ,cor\_YZ,

P(for point),Nane\_Point,Lat(DD MMSS.ss),Lon(DD MMSS.ss),Ell.Height,Code,Note,

//TopconvectorFormat:v.1, USFeet, vRrk Topo, Basel, 154, 161, 2419, -89, 8123, -68, 3288, 0.00773025, 0.01944847, 0.01418940, 0.0900, -0.0300, -0.2800, LT+T vRrk Topo, Basel, 155, 75, 3292, -27.0161, -17.1042, 0.00894811, 0.02141176, 0.0095958, 0.2500, -0.1300, -0.2800, LT+T vRrk Topo, Basel, 156, 27, 2449, -40.4948, -43, 0569, 0.00766278, 0.01099455, 0.01267762, 0.2000, -0.0300, -0.3500, LT+T vRrk Topo, Basel, 157, 29, 8279, 14. 0509, 26, 5551, 0.00803481, 0.01357403, 0.01057974, 0.4300, -0.1200, -0.4200, LT+T vRrk Topo, Basel, 157, 29, 8279, 14. 0509, 26, 5551, 0.00803380, 0.0135740, 0.0135704, 0.4300, -0.1200, -0.4200, LT+T P, Basel, 39, 32, 17.80191, -104, 54, 00.37541, 5879, 325, CP, LT+T PL COR P, 154, 59, 32, 17. 0009, -104, 53, 59, 57981, 5877, 202, CP, LT+T P, 155, 59, 32, 17. 27157, 104, 53, 59, 57981, 5877, 202, CP, LT+T P, 156, 59, 32, 17. 27157, 104, 53, 59, 57981, 5877, 820, CP, LT+T P, 156, 59, 32, 17. 27157, 104, 53, 59, 57981, 5879, 843, CP, LT+T P, 157, 39, 32, 18.13790, -104, 54, 00.05369, 5879, 843, CP, LT+T



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