Terramodel®
Field Data Module

User Guide

Version 10.2
Part Number 0321-0812
Revision C
July 2003

Trimble®

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CHAPTER

1

Introduction

Welcome to the *Terramodel Field Data Module User Guide*. This manual describes the basic functions of the Field Data Module (FDM).

This publication assumes that you are familiar with the Microsoft Windows® operating system and know how to use a mouse, select options from menus and dialogs, make selections from lists, and refer to online help.

About the Field Data Module

The Field Data Module is the core of the Terramodel® software, which is a full-featured, civil engineering design software package. Terramodel includes contouring, digital terrain modeling, Computer Aided Design (CAD), Coordinate Geometry (COGO), and road design modules. Each module contains commands that add specific functions to the basic FDM features. Terramodel also includes a macro language, Terramodel Macro Language (TML), to create custom commands.

Use the Field Data Module to:

- import survey data
- compute coordinates
- create a draft-quality map of the data
- export data

The FDM is now included with several Trimble® survey instruments. You can also purchase it separately. To purchase additional modules, contact your local Trimble distributor.

Related Information

Sources of related information are:

- Help – the software has built-in, context-sensitive help that lets you quickly find the information you need. Access it from the Help menu. Alternatively, click the **Help** button in a dialog, or press F1.

- Release notes – the release notes describe new features, information not included in the manuals, and manual updates. They are provided as a .pdf file on the CD, they appear at the end of the program installation, and they are installed in the C:\Program Files\Trimble\Terramodel\Locale\ folder that points to the currently installed language. To view the release notes, use Adobe Acrobat Reader.
- Trimble training courses – consider a training course to help you use your software to its fullest potential. For more information, visit the Trimble website (www.trimble.com/terramodel_trn.html).

Technical Assistance

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

Your Comments

Your feedback about the supporting documentation helps us to improve it with each revision. E-mail your comments to ReaderFeedback@trimble.com.

CHAPTER

2

Quick Tour

- Introduction
- Getting Started
- Importing Survey Data
- The Raw Data Editor
- Automatic Drafting
- Exporting to AutoCAD
- Exporting Coordinates

Introduction

This chapter provides a quick tour of the Terramodel Field Data Module (FDM) software.

For more information on each feature, see the following chapters or refer to the Help.

Tip – To access the help system, use the *Help* menu or click F1 when you are running a command.

Note – *In this Quick Tour, measurement units are in feet.*

Sample data

The Quick Tour uses the following sample data:

This file called …	is …
Fdm_proto.pro	a basic Terramodel project file to be used as a prototype
Fdm_sample.job	a file with raw survey data collected using a Geodimeter® instrument
Fdm_sample.ade	a file used to create lines and symbols from the point descriptors
In addition, the following two new files are created:	
Fdm_sample.pro	a Terramodel project file with data and a preliminary map of the data.
Fdm_sample.dwg	exported data formatted for AutoCAD

The files are in the C:\Program Files\Trimble\Samples\FDM folder.

Starting the Terramodel Software

Once you have installed Terramodel, double-click the Terramodel software icon () on the desktop to run it. In the upper part of the main window that appears, the title bar identifies the view, project name, and rotation.

Figure 2.1 shows the upper part of the main window.

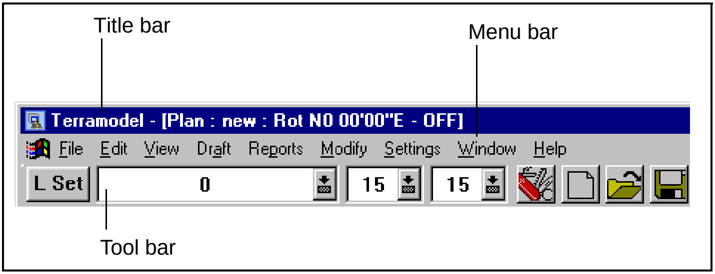


Figure 2.1 Terramodel Main window – upper part

When a project is open, the graphical area of the main window is black. When no project is open, the graphical area is gray. The graphical area of the main window displays project data and provides a graphical user interface.

The lower part of the main window contains a command bar, a status bar, and a message scroll. Use the command bar to enter command names. The status bar displays the name and a brief description of the command. The message scroll displays informational messages.

Figure 2.2 shows the lower part of the main window.

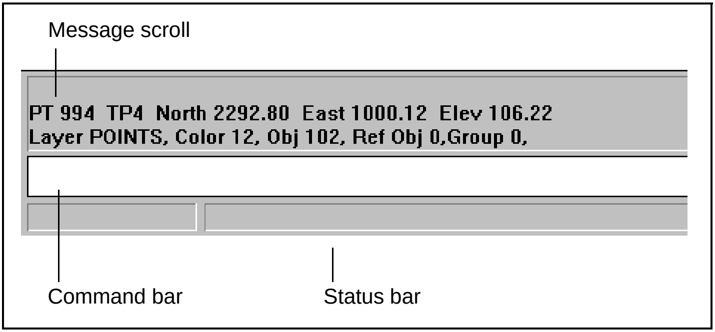
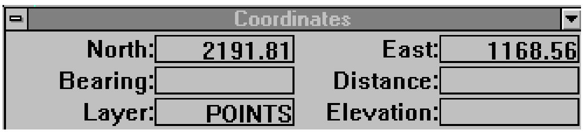


Figure 2.2 Terramodel main window – lower part

When the Terramodel software starts, the *Coordinates* window appears as a separate window:



The *Coordinates* window displays real-time information about the location of the cursor. To modify the data that appears in this window, select *Window* / *Coordinate Scroll*. To reposition the window, click and drag its title bar.

Setting the prototype file

When you create a new project, Terramodel creates a new project file based on an existing file. The existing file is called a ***prototype file***.

To set the prototype file for the Quick Tour:

1. Select *File* / *System Configuration* / *System*. The *System configuration* dialog appears.
2. In the *Toolpac* group, click **Browse**.
3. Go to the C:\Program Files\Trimble\Sample\FDM folder and select the FDM_proto.pro file. Click **Open**.
4. In the *System configuration* dialog, click **OK**.

Creating a project

Before you can use Terramodel, you must create or open a project file. You can have only one project open at a time.

To open a project file:

1. Select *File* / *New*. The *New project name* dialog appears.
2. Go to the C:\Program Files\Trimble\Sample\FDM folder. In the *File name* field, enter **FDM_Sample.**
3. Click **Save**.

This creates a new project based on the selected prototype file.

Verifying basic project settings

When you create a prototype file, you select the project settings. For more information, see Chapter 3, Using Terramodel. To view details of a project, run the settings commands.

For example, you select the following commands from the menu bar:

To find the …	select …
basic unit of measurement	*File / Measurement Unit*
format for an angle	*Settings / Units Settings*
convention for coordinate display	*Settings / View settings*
setting to define slope definition	*Settings / Convention settings*

Importing Survey Data

You can use Terramodel to import many different kinds of data, including raw survey, point, project, and CAD data. This data can be collected on a variety of instruments and stored in a variety of formats. To customize the data, you can use script files. The Import/Export wizard uses the files when you transfer data to the office computer.

A script file contains details that you have previously entered for each instrument and/or file format used so that you do not have to enter the details each time that you transfer data.

To create, edit, display, manage, and delete scripts, use the Import and Export script managers.

For this exercise, use the provided script file to import the sample data.

Using the Import script manager

Use the Import script manager to run the script that imports the sample data. To do this:

1. Select *File* / *Download*/*Import* / *Import script manager*. The *Import script manager* dialog appears.

Tip – All available scripts appear in the *File* / *Download*/*Import* submenu. To add a script to this submenu, place a check mark next to it in the *Import script manager* dialog.

2. Click **FDM_sample_import** and click **Run**. The *Raw source files* dialog appears.

Tip – To view all the available import options, select this script and click **Edit**. A dialog appears. Several options are “turned off” so that they do not appear when you run the script.

3. In the *File(s)* field, check that the file selected is called *FDM_Sample.job*. This is the raw data source file.

4. In the *Template* field, accept the default for the template file (C:\Program Files\Trimble\Shared\Formats\Geodimeter Raw.lgr), then click **Next**. The *Import summary* dialog appears.
5. Review the import summary information, and click **Import** to continue**.**

   Once the files are transferred, the report is also updated and the import information is shown at the bottom of the report.
6. Click **Finish**.

   The raw data is imported and the Raw Data Editor (RDE) starts automatically. The imported survey data appears in the RDE as a list.

When raw data is first imported into Terramodel, a point is associated with each observation. These points are assigned XYZ coordinates in the RDE. The primary task of the RDE is to compute coordinates for the set of raw data points.

The coordinates are computed as the RDE appears and each time, the data or the computation settings are edited. Information about the least squares computations is sorted in the tabs in the lower half of the window.

Examples:

- Select the *Tolerance Failures* tab. One horizontal angle is outside the tolerances set for this project.

- Select the *Results* tab. View statistical results for the computation. In this case, the data is within 95% probability of being correct. The red cross marks indicate data below this precision level.

The Raw Data Editor (RDE)

The Raw Data Editor (RDE) software performs calculations on surveyed data. Figure 2.3 shows the layout of the RDE window.

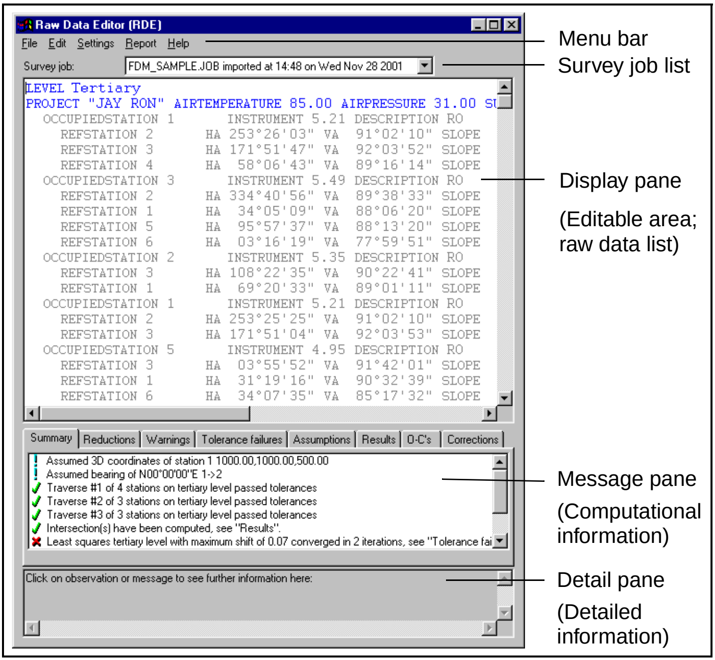


Figure 2.3 The RDE window

Features of the RDE

The RDE processes surveyed data very quickly. This section summarizes some of its main features.

Total station, GPS (RTK), and Level data

The RDE normally uses raw data measured and recorded with a total station, but it is not limited to data collected in this way. With the Terramodel *Import* command, survey information stored in a file in almost any ASCII format can be imported into the RDE. Raw data can be imported from a file regardless of its source. The RDE automatically finds and calculates traverses, resections, and intersections. Then, if the appropriate options are set, the RDE automatically adjusts the resulting coordinates by Least Squares variation of coordinates. The RDE can automatically compute any station, regardless of the backsight and foresight information, or the order of station occupation. The RDE requires only that a point ID is recorded with each observation and that good surveying technique is used in the field.

With the RDE, you can import GPS Real-Time Kinematic data. This data consists of the vector difference between a local base station and the receiving instrument, and the associated covariance matrix. If you import GPS data, you must define a local geodetic grid with the *GPSsys* command (select *Settings* / *GPS Geodetic system*) before you import data and before you compute data with the RDE.

The RDE also processes level data, such as the data created by the Trimble DiNi® digital level. Use this feature to gather very accurate elevation data. You can import level data or enter it manually. To preserve elevation accuracy, the RDE automatically computes level data before any other gathered elevation data.

Multiple data formats

Terramodel imports data in many different ASCII formats, including almost all formats produced by modern total stations. The RDE can also import survey information from data files created by other programs, or files created manually. The RDE displays all these types of raw data in the same simple format, which you can define, regardless of the source.

Assigning computation levels to data

The RDE uses primary, secondary, and tertiary levels of computation to coordinate stations. These levels determine the order in which parts of a control network are computed, and can be used to control traverse routing. The levels can also be used when you have multiple types of survey data, that is, total station, GPS, and/or level data, within a single project.

Each one of the three levels is assigned separate computation settings and tolerances.

Interactive data editing

Using the RDE edit commands, you can change, delete, or insert survey information. Since the original imported survey data is stored in a separate file on the hard drive of the office computer, you can safely modify the data displayed in the RDE. You can update observations based on field notes, new information, or field data that you query.

Feedback on computations

The RDE processes data in the background. However, you can monitor progress through a series of messages. These messages include multi-angle reduction results, traverse and least squares reports, and tolerance failures.

For more information on the RDE features, see Chapter 6, Computing Coordinates with the Raw Data Editor. Alternatively, access the Help by starting the RDE and pressing F1.

When you have completed the review of survey data, close the RDE to see a graphical display of the data points, survey traverses, and computed error ellipses, as shown in Figure 2.4.

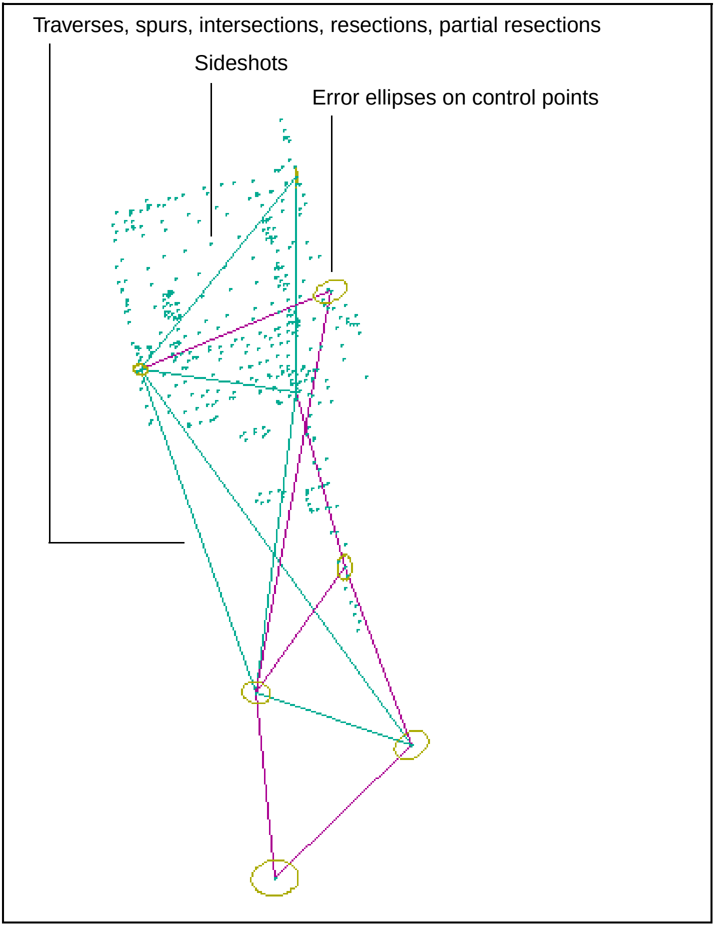


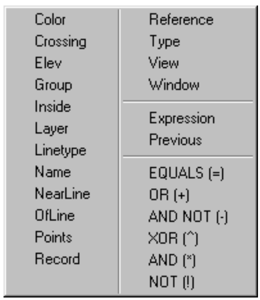
Figure 2.4 Survey data coordinates computed with RDE

Automatic Drafting

The survey data in the FDM_Sample.job file was collected in the field to use as sample data with the automated drafting feature (the **AutoDraft** command) of Terramodel. Each point includes a description, a code that identifies the object that was surveyed, such as OAK (Oak Tree), CBL (curb-left), CBR (curb-right), and LP (light pole). To create lines, text, and blocks for the plotted points, the automated drafting feature uses a configuration file that you define. For more information, see Chapter 7, Automated Drafting Tools.

Using the AutoDraft command

1. Select *Draft / Automated drafting from points* (the **Autodraft** command).
2. In the command bar, click the *Record* control to highlight it.
3. Right-click in the graphical display area. The following shortcut menu appears:
4. Select *View* and then click one point. Terramodel selects as “active points” all objects that are in the same view as the point that you clicked.



Selected points appear gray and a message appears with the number of objects selected.

***Note** – This powerful selection capability is used throughout Terramodel.*

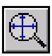
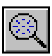
5. On the command bar, click the *Config file* field.

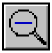
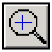
6. Click **Browse**. Go the folder C:\Program Files\Trimble\Samples\FDM and open the FDM_Sample.adc file. The automated drafting feature uses the information in this configuration file to draw lines and text.

7. On the command bar, click **OK**. A draft of the field data appears.

The AutoDraft toolbar

Use the following toolbar buttons to explore the data that is displayed in the graphical display area:

Click this button …	to …
	zoom to the extent of the data
	redraw the data
	return to the previous zoom setting
	zoom to the extent of the window (click and drag)

Click this button …	to …
	zoom out to view the data in less detail
	zoom in to view the data in greater detail

Exporting to AutoCAD

The data is now ready to be exported into an AutoCAD format.

Tip – To ensure that the project file matches the exported project, save the project before you export any data. Select *File / Save project*.

Exporting data in AutoCAD file format

Terramodel contains a generic script that translates the project data into an AutoCAD .dwg format. To export the data in this format:

1. Select *File* / *Export/Upload* / *Export script manager*. The *Export script manager* dialog appears.
2. In the *Script file name* list, select the *fdm_export_AutoCAD* check box and click **Run**. The *AutoCAD target file* dialog appears.
3. In the *Dwg/Dxf file* field, click **Browse.**

4. Go to the C:\Program Files\Trimble\Samples\FDM folder and select the fdm_sample.dwg file. Accept the defaults and click **Next**. The *Select objects* dialog appears.

5. Click **Pick objects**. A select control appears on the command bar.

6. Right-click in the graphical display area to display the shortcut menu. Select the *View* command and click on any object. All objects in the current Plan view will appear gray to indicate that they are selected. On the command bar, click **OK**. The *Select objects* dialog re-appears.

7. The *Number of objects selected* control is filled in. Accept all the defaults and click **Next**. The *Export summary* dialog appears.

8. Review the export summary information and click **Export** to continue.

   The files are transferred, the report is updated, and the export information appears at the bottom of the report.

9. Click **Finish** to close the script. The export is complete.

Exporting Coordinates

To export coordinates, the survey instrument and the office computer must be connected to each other and communicating with each other. The dialogs that appear depend on the instrument that you are using. The following procedure describes how to export coordinates:

1. If you need to create a script for the instrument, do so before you start the export process. Verify that the script has a check mark next to it, so that it appears as a menu option in the main Terramodel menu. For more information on creating a script, see Creating a script, page 65.
2. Select *File* / *Export/Upload*, then choose an appropriate export script for your instrument. The *Points target file* dialog appears. Click **Browse** to find the required folder and file.
3. Click **Pick points**. A select control appears on the command bar. Right-click in the graphical display area to display the shortcut menu. Select the *Color* command, and click any point. All points in the current Plan view will appear gray to show that they are selected. If any test and line data is selected, Terramodel ignores that data while exporting coordinates. Click **OK**. The *Points target file* dialog re-appears.
4. The *Number of points selected* field is filled in. Accept all the defaults and click **Next**. The *Points setting* dialog appears.
5. Accept all defaults and click **Next**. The *Export summary* dialog appears.
6. Click **Export**.
7. Click **Finish** to close the script. The export is complete.

CHAPTER

3

Using Terramodel

In this chapter:

- Introduction
- The Terramodel Main Window
- The Terramodel User Interface
- Using a Terramodel Project
- Localizing Terramodel Settings
- Creating a Prototype Project

Introduction

This chapter introduces the Terramodel main window and user interface. It also describes how to configure a prototype project file, create a project file, configure project and localization settings, and create a customized prototype file for your office environment.

The Terramodel Main Window

Figure 3.1 shows the Terramodel main window.
Table 3.1 explains the parts of the user interface that are shown.

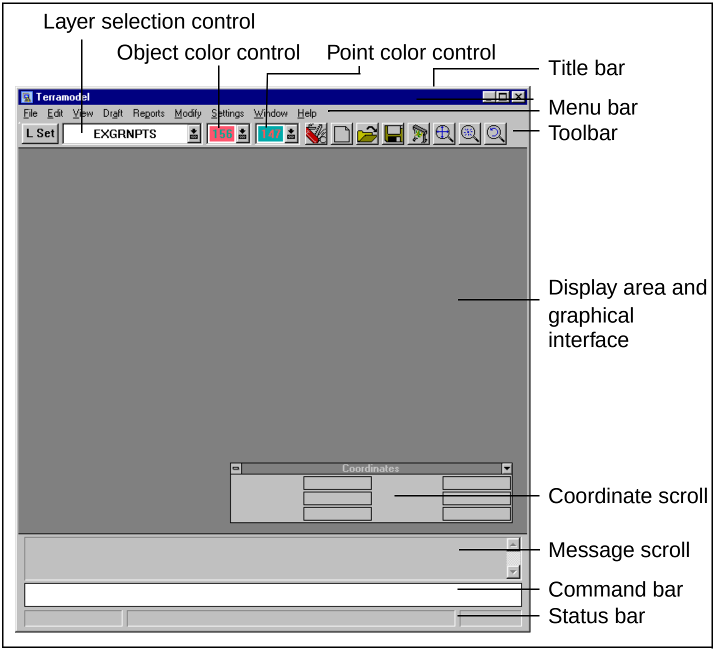


Figure 3.1 The Terramodel main window

Table 3.1 Parts of the Terramodel main window

Part	Description
Title bar	When a project is open, the title bar displays the name of the current project file and the view.
Menu bar	The menu bar allows you access to all commands, the Help, and version information about Terramodel.
Toolbar	The toolbar allows you quick access to the layer setup and to setting the current layer, control of object and point colors, and common pan and zoom commands.
Graphical display area	A view of the project data appears in this area when you open a file. In the graphical display area you can also select data to work with for many commands. *Note – The FDM is restricted to a Plan view.* **Tip** – In any of the module add-ons to the FDM, Terramodel allows you to create multiple views of the data, such as Plan, Profile, and Sheet. These views appear in separate windows in the graphical display area.
Coordinate scroll display	The coordinate scroll tracks the cursor location. To define the type of data that is displayed in the coordinate control, select *Window / Coordinate scroll*. To move the coordinate scroll away from the graphical display area, click and drag the title bar of the coordinate scroll display.
Message scroll area	Terramodel displays one-line messages and can display up to three messages at a time. Use the scroll bar on the right to review old messages. To change the height of the scroll, click and drag on the top border of the scroll area.
Command bar	Use this area to type in any command. You can also layer commands inside one another. Once you become familiar with the command names, the command bar is a quick way to interact with Terramodel.

***Note – For non-English versions of Terramodel**, the menus, command bar buttons and labels, dialogs, and Help are translated. However, the Terramodel commands themselves are not translated. Many of the commands names are abbreviations of two or three words; some are initials and would have no recognizable translation. Many commands are Terramodel macro language (TML) commands for which the text file and the names in the command must be consistent.*

The Terramodel User Interface

Read the following section to become familiar with the user interface.

Running a Terramodel command

There are two ways to run a Terramodel command:

- Select a command from a menu
- Enter the command in the command bar and press Enter.

Tip – Take the time to learn the command names. Although a command name may be less obvious than the equivalent menu option, it will enable you to work faster.

When you run a command in Terramodel, a dialog or prompts on the command line appear. To help you respond to each prompt, Terramodel displays the currently active control type in the right-hand side of the status bar. As you move through the prompts, watch the status bar to see which control is active.

Tip – Terramodel uses a wide range of custom user interface controls to manipulate the survey, engineering, and graphical data that it stores. For more information about the controls, refer to the Help.

Navigating the command bar or a dialog

Use the following keys to move between fields in dialogs and to move in the command bar:

Press this button …	in a …	to …
Tab	dialog or command bar	move from control to control. Alternatively, click the mouse over the required control.
Enter	command line or dialog	to complete the command or close the current dialog.
Space bar	blank command line	to repeat the previous command.

Press this button …	in a …	to …
Esc	–	exit from the current command or activity. It is possible to run most commands within another Terramodel command. If you find that you are several command levels deep, press Esc until you return to a blank command line.
Alt and the underlined letter (hot keys)	menu or dialog option	move the focus to that option.

Highlighted items

In this area …	the current focus is indicated by …
the command bar	a flashing cursor
the toolbar or menu bar	the highlighted area
a command button	a bold border

Moving around the Display area

Use the left mouse button to control the focus and to select objects. Click the right mouse button to open a shortcut menu of additional options that are valid for the current control.

Creating and Customizing a Terramodel Project

Before you can use Terramodel, you must create or open a project file. You can only open one project file at a time. A project file holds all the information for a project. You can put your project file(s) in any folder, but Trimble recommends that you keep your project files separate from the Terramodel software files. This makes it easier to organize your files and simplifies the process of updating the Terramodel software.

Creating a new project

1. Select *File* / *New*. The *New project name* dialog appears.
2. Select a folder to store the project, otherwise Terramodel uses the default folder.
3. Enter a filename for your project and click **Save**. Your project is ready for you to create or import data.

Tip – When you create a new project, it is based on the current prototype file, which is set by selecting *File* / *System Configuration* / *System*. For more information about this setting, refer to the Help.

Customizing a project

Terramodel has many settings that enable you to customize its operation for local standards and terminology.

Before you start working, establish the settings for the commands shown below. Run each of the commands and review the Help for specific instructions. Please note that not all of the program settings are listed here.

Settings are saved either in a project file or external to a project file. Settings saved in a project file are intended to remain the same in the event the project is moved from system to system. External settings are intended to remain the same regardless of the project file in use. Typically, these settings may relate to your preferences and the computer system in use.

System settings

These settings are saved in the Tmodwin.ini file and remain the same regardless of the project file.

- *File* / *System Configuration* / *Autosave* (**AutoSave** command)
- *Settings* / *Convention settings* (**ConvSet** command)
- *Window* / *Coordinate scroll* (**Coords** command)
- *File* / *System Configuration* / *Favorites* (**Favorites** command)
- *File* / *System Configuration* / *System* (**System** command)

When you choose *File* / *System configuration* / *System* (the **System** command) command, settings are saved in the ToolPak (P3server.ini) and Client (Tmodwin.ini) INI files. The names of both INI files are displayed in the dialog box. The prototype project setting of this command is established during the installation of Terramodel based on the selected localization option.

When you use *Settings* / *Convention settings* (the **ConvSet** command), the run and rise options are saved in the project; all other settings are saved in the Tmodwin.ini file.

Project settings

Settings for the following commands are saved in the current project file:

- *Settings* / *Abbreviations* (**AbbrevSet** command)
- *Settings* / *Convention settings* (**ConvSet** command)
- *Settings* / *Display settings* (**DisplaySet** command)
- *Settings* / *Layer settings* (**LayerSet** command)
- *Settings* / *Linetype settings* (**LinetypeSet** command)
- *Settings* / *Running snaps* (**ObjSnap** command)
- *Settings* / *Snap settings* (**SnapSet** command)
- *View* / *View settings* (**ViewSet** command)
- *File* / *System configuration* / *System* (**System** command)

Warning – A few commands maintain three sets of settings that change with the project units in use. When you use *File / Measurement units* (the **MeasUnit** command) to change from feet to meters, these three sets of settings change ***without warning***.

Project settings that reflect unit settings

These settings are saved in each project file and always reflect the current measurement units (meters, feet or other).

- *File* / *Measurement units* (**MeasUnit** command)
- *Settings* / *Units settings* (**UnitsSet** command)

The *Settings* / *Units settings* **(**the **UnitsSet** command) command controls the basic format of distances, bearings, angles, and other settings.

Localizing Terramodel Settings

A few Terramodel settings typically vary from location to location. These settings are highlighted below.

Rise/Run or Run/Rise

The *Settings* / *Convention settings* (the **ConvSet** command) command controls the format for the entry and reporting of the rise/run slope definition.

North, South, East Azimuths, or Bearings

The zero direction for azimuth angles is set in the *Settings* / *Units settings* (the **UnitsSet** command.) This command also sets the angle format to degrees minutes seconds, decimal degrees, grads, or mils. This value is set during installation based on the region and language selected. You should not need to change it.

Extended ASCII characters

In the P3server.ini file, the setting [Show8BitChars] is set to 0 or 1. When set to 1, editing text objects with ASCII characters over 127 will show the font character. When set to 0, the ASCII equivalent will be shown with the “\”, that is, \176. You should not need to change this setting.

Creating a Prototype Project

A prototype project is any project that you designate as a standard. Prototype project settings should be company standards that remain relatively constant. If you have different standards for different kinds of projects, you may want to create several prototype projects.

To build a prototype project:

1. Select *File* / *Open*. The *Open file* dialog appears. Select the default prototype that was installed with your software, Tmodel.pro.
2. Select *File* / *Save project*. The *Save current project as* dialog appears. If necessary, select a different folder. In the *File name* field, enter a prototype project name that you want to use. ***Do not use Tmodel.pro as Terramodel may overwrite the file.***
3. Review the project and localization commands discussed in the previous sections. Set the required defaults for your normal operations.
4. Select *File* / *Save* to save the new prototype file.
5. Select *File* / *System configuration* / *System* to set the prototype project to new prototype project file.

Tip – Creating a good prototype file is an iterative process. As you work on a project, take notes of what to add to your prototype project, then remember to update it.

CHAPTER

4

Preparing for Fieldwork

In this chapter:

Introduction

This chapter reviews basic surveying from a Raw Data Editor (RDE) viewpoint, to allow you to apply the best survey practices. It also discusses field codes for the automatic drafting feature (the **AutoDraft** command) and how to set them up before you leave the office.

Preparation is the key to competently using the Terramodel RDE and automatic drafting commands. The ability of the RDE to automatically find traverses and intersections allows you to diverge from the strict traverse surveying procedure. Using a standardized set of field codes allows Autodraft to automatically create a field map of the data with the field codes communicating information between the field and the office. The following sections review the features in the RDE and AutoDraft that could affect your surveying procedures.

Raw Data Editor Terminology

This section presents the basic terminology and assumptions that RDE uses as the basis for its total station computations. RDE computations are based on angle-distance observations. For more information about the RDE, see Chapter 6, Computing Coordinates with the Raw Data Editor.

Observations

An observation is made up of several pieces of data. Although there are many combinations of data, a typical observation consists of a horizontal circle reading, a slope distance, a vertical angle, and a Point ID. To the RDE, every piece of data except the Point ID is optional (although normal survey procedures dictate specific data requirements). In the RDE, a Point ID exists on every observation. Without knowing where an observation is from and to, the other elements of the observation are useless.

Internally, the RDE uses key names to identify each piece of data.

Tip – Key names are in English (a requirement of the software), but the RDE uses a dictionary file to map each key name to a value that is user defined. For a translated version of the RDE Default Data Tag Dictionary (Default.dic), open the folder C:\Program Files\Trimble\Shared\Locale\…\.

Table 4.1 lists the key names and comments for common observation data.

Table 4.1 Common observation data

Key name	Description
Raw observation data	
[Instrument Height] [Target Height]	You should take special care when measuring instrument and target heights. The RDE treats this data as if it is accurate.

Table 4.1 Common observation data (Continued)

Key name	Description
[Horizontal Angle]	The RDE displays horizontal circle readings. The RDE uses horizontal circle readings of sequential observations to calculate the horizontal angle difference.
[Vertical Angle]	Vertical angles are normally measured as zenith (or elevation) angle.
[Slope Distance]	Distances are normally slope distances. However, some observations, such as observations made to a point of intersection, may not have a slope distance recorded.
[Horizontal Distance]	Horizontal distance is not easily measured. Since it is not clear what corrections (other than for slope) have been made to a horizontal distance, the RDE presumes that it needs no further corrections.
Sideshot observations	
[Radial offset]	As it is unlikely that a surveyor could measure along the line of slope with any accuracy, radial offsets are treated as horizontal distances.
[Perpendicular offset]	Calculated at right angles to the direction of the observation. This measurement is also treated as horizontal distance.

Table 4.1 Common observation data (Continued)

Key name	Description
[Elevation difference]	Elevation difference is not easily measured. Since it is not clear what corrections have been made to a elevation difference, the RDE presumes that it needs no further corrections. You can also use this to enter an elevation offset to a point directly above the observed station. Positive is upwards.
[Utility Elevation Difference]	You can use this to enter an elevation offset to a utility pipe directly below the observed station. Positive is downwards. The RDE presumes that it needs no further corrections.
[Remote Elevation Va]	The elevation of a point directly above a target can be calculated by observing a second vertical angle.

Types of observations

A station is a point that is either occupied or is observed more than once.

Occupied station

An occupied station is usually where the instrument is set up. This is not a strict definition. For example, if a distance is imported into the RDE, the RDE needs to know the points the distance is between; one point must be an occupied station (even if the distance is measured with a steel tape).

Normally, an occupied station has very few observation elements associated with it (other than instrument height). However, the RDE accepts a computation level for an occupied station. In this case, all observations from this occupied station are used on that and lower computation levels.

Reference station

This type of observation is used for computing the coordinates of stations. These can be observed on face left and face right and using multiple rounds.

Rough reference station

Rough reference observations are not used for coordinating stations. They are only used for calculating orientation prior to calculating sideshots.

Sideshot

Sideshots are used to observe points of detail. In the RDE, a sideshot can only be observed once. The RDE recognizes the second sideshot observation by the point ID. During the import process, a sideshot that is observed more than once either acquires a unique point ID or is upgraded to a reference station, depending on the RDE settings. (For information on RDE settings, refer to the Help.)

Target/Pogo/Rod/Range Pole

To calculate the elevation of the point on the ground, you must record the height of the object the observation has been made to. Unfortunately there are several names for this in wide usage. You can create a custom data tag dictionary so that the RDE displays the word that is familiar to you.

The RDE has two separate schemes for target heights. One scheme assumes that all observations are made using one target. The second scheme treats reference stations as if tripods have been established.

Station with Fixed Data

Often stations have predefined coordinates. These can be imported, entered into the RDE, or transferred from another project. When there is no fixed data, the RDE will assume information.

Bearing

Bearing information is sometimes required to orient the stations in the survey within the physical world. Bearings can be imported or typed into the RDE. When there is no orientation available, the RDE will assume a bearing.

Traverse

There are two basic types of traverse—a closed traverse and an open traverse. Both have some similar requirements but there are also a number of variations on each type. Both traverse types must start and end on a previously positioned station, although for a loop or closed traverse this positioned station can be assumed. Each traverse leg must have been measured at least once. An angle must have been measured at each station that is not positioned.

A closed or loop traverse starts and ends on the same station. It can be orientated using one of the following techniques:

- Observing another positioned station not included on the traverse from the first station on the traverse.
- Assuming a bearing on the forward or backward leg from the first station on the traverse.
- Using a bearing supplied on any leg on the traverse.
- Using a bearing at any station on the traverse to another station.

An open traverse starts and ends on different positioned stations.

Both traverse types can be computed in 2D or 3D. The positioned stations may be occupied or unoccupied. If one or more of the positioned stations are unoccupied, it means that no angle has been measured at the unoccupied station and therefore there is no angular balance.

Surveying Errors and Tolerances

The RDE assigns a computational level to each observation. This computational level has user-defined ranges of error assigned for each type of measurement (distance, angle, and so forth). This section offers some background information on levels, errors, and tolerances in RDE.

Precision, accuracy, and significant figures

Precision is the measurement of how closely a series of measurements are to each other. If all the values are close to each other they are said to have high precision; if they are widely spread apart they are said to have low precision.

Accuracy is how close a certain measurement is to the true value. Accuracy is always unknown to some degree.

You can define the number of significant figures displayed in the RDE. It should not be confused with the precision or accuracy of the quantity being displayed. Take care when selecting the number of significant figures to display the results to. They should reflect the accuracy of the observations.

Different parts of a surveyed network of points may be observed with more care than other parts. The RDE allows you to place certain observations on different computation levels.

Note that a quantity may be measured very precisely and with considerable care, but the resulting observation will not be accurate if the wrong quantity is measured. In one situation, a precise survey resulted in an unacceptable misclosure. The survey was repeated, again with a similar misclosure. The survey was repeated a third time with the same result. It turned out that one of the benchmarks used was in a wall that had been knocked down and replaced, however the benchmark was not replaced in the same place. The three surveys were very precise, but not accurate because they were not close to the truth.

Errors

There are three basic types of error: systematic, random, and blunders.

Systematic errors

Systematic errors are those which occur in a set pattern. Systematic errors can usually be accounted for in the process between making the observations and calculating the coordinates. For example, a surveyor uses a prism with a zero error and the measures of distances made with the prism are either too long or too short by the same fixed amount. Systematic errors are not necessarily observational errors. The failure to account for an appropriate geodetic correction can also be a systematic error. Systematic errors are dealt with by applying mathematical models.

A zero error is one that is always present and always the same. If a surveyor fails to notice that the first part of a steel tape is missing and records all distances as if measured from zero all the measurements made will have the same constant error.

A scale error is one that is dependent on the magnitude of the quantity being measured. If a surveyor uses a steel tape that has been stretched, the distances measured will have a scale error.

Random errors

Random errors are all those errors remaining in the observations after removing the blunders and systematic errors. It is possible (even probable) that some of these errors could be removed if a system could be established for them. However, the fact that they remain means that they are considered to be random in nature and therefore they should be treated as such. In a Least Squares adjustment, random errors are dealt with by applying probability theory. In a traditional adjustment, the random errors are distributed according to some mathematical scheme.

Blunders

A blunder is usually a mistake, made by a surveyor, such as observing the wrong target or misidentifying the correct one. A blunder such as a misidentified target will probably be obvious because of the magnitude of the resulting misclosures. Other blunders may be much harder to detect. If a target height is measured as 4.54 but recorded as 4.45, the resulting misclosure may be very hard to identify. Every effort should be made to eliminate blunders.

Least Squares Adjustment

The RDE uses a mathematical approach to computing coordinates called ***variation of coordinates***. Variation of coordinates is a specific application of least squares adapted by surveyors to adjust coordinates to fit survey measurements. One of the most common applications of least squares is linear regression where a best fitting line is calculated through a series of coordinates. Variation of coordinates is really only of use to the surveyor in conjunction with a computer. The process is not easily completed by hand because of the intensity of the mathematical calculations. A simple 10-station traverse results in hundreds of thousands of multiplications and additions.

The aim of a least squares adjustment is to adjust the coordinates of the stations so that the discrepancies between the final coordinates and observations (residuals), are as small as possible.

For various good reasons surveyors usually make more observations than is mathematically necessary to position the required stations. Additional observations are sometimes referred as redundancies. Traditional survey adjustments do not cope with redundancies very well, but a least squares adjustment provides an excellent method of incorporating these additional observations and applying probability theory to identify potential errors.

Unique solution

One of the major benefits of a least squares adjustment is that it can give a unique solution. If a series of interconnected traverses have been observed, there can be many different routes through the stations. The problem with adjusting this sort of network using traditional adjustment methods is that there are as many different solutions as there are routes through the network, and as many different solutions for each route as there are types of traverse adjustment. There is no concept of a route in least squares. Therefore least squares produces one unique answer no matter how many interconnecting observations are made.

Suggested Survey Techniques

Because of the flexibility of least squares and its ability to provide a unique answer, survey methods can be changed to take advantage of this adjustment method. The ability to identify non-systematic errors and the accuracy of least squares increases as the number of observations to each station increases. A traditional traverse has few redundancies, in part because of the time it takes to reduce the observations to coordinates by hand. Using the RDE allows you to gather redundant observations and increase the mathematical accuracy of your results.

The most important change to make in field technique is to observe as many stations as possible from each station. In addition, observe landmarks, such as church towers, from each station setup in the network. This immeasurably strengthens the reliability of the least squares computations.

Here are some suggestions for survey field techniques that will increase the computational accuracy of the RDE:

- Start observing on face left, unless there is a vertical angle to indicate otherwise. The RDE assumes face left on the first observation.
- Include all stations to be observed at the setup in the first round of angles on face left.
- When starting a new round of angles move the horizontal plate by more than the HA shift setting (and by less than 180° minus the HA shift setting).

Configuration Files and Standard Field Codes

AutoDraft draws lines, text, and symbols based on the order of surveyed points using each point's field code. Therefore, using a set of standard field codes for all field work is critical to realizing maximum production gains. Both Terramodel and its automatic drafting feature are very flexible and accommodate almost any standard, but you must set the standards for your organization.

Reviewing a configuration file

The **AutoDraft** command requires a configuration file that defines what to do for each field code. Follow these steps to review the configuration file used to create the map in Chapter 1:

1. Start Terramodel and open a project or create a new project.
2. Select *Draft / Automated drafting from points*. The **AutoDraft** command line appears.
3. Click **Browse**. If necessary, go to the folder C:\Program Files\Trimble\Samples. Select the file FDM_Sample.adc for the configuration file.
4. Click **Edit**. The *AutoDraft Configuration File Editor* dialog appears.
5. To generate a list of the field codes, select *Reports* / *Field Codes*.

Creating a custom configuration file

You can create a configuration file from scratch. However, Trimble recommends that you modify an existing file, such as the file called FDM_Sample.adc in the folder C:\Program Files\Trimble\Samples. Open the sample .adc file and save it with a new name.

Creating a standard set of field codes

1. Identify each expected feature (point or line) with a unique field code.
2. Select one survey method for defining curves. Base your choice on the type of curve you want to map (arc or spline) and your company's current field coding method. For a list of curve drafting options, see AutoDraft Curve Definition Options, page 93.
3. Choose *Global Codes* or *Multiple Field Codes* to define optional behavior for different points in a feature.

Tip – If you define a global code to mark the beginning of a line, then you can use the same global code to identify the beginning of any line. However, AutoDraft requires that a global code is separated from the basic field code by a space. If it is inconvenient to change a long-standing field procedure, you can enter a suite of field codes for each feature that defines different aspects of behavior.

CHAPTER

5

Importing Data

In this chapter:

- Introduction
- FDM Import Options
- Import File Formats
- The Import Script Manager
- Data Format Template Files (.lgr)
- Creating a Script versus Running a Script

Introduction

This chapter introduces the basics of transferring and importing data into Terramodel. Terramodel uses a script file to download and import data. Script files, the script file manager, and the Import wizard are described. This chapter also includes instructions to create, edit, and delete an Import or Export script using the Script Manager.

When raw survey data is imported, the Terramodel Raw Data Editor (RDE) allows you to edit the data, create reports, and control the computation settings for coordinate adjustments.

FDM Import Options

Terramodel supports data transfer from current Trimble devices and many older models.

- Trimble devices:
  - Survey Data Card
  - TS315
  - Trimble 3300
  - Trimble 3600 (ACU, Elta®, GDM, TDS)
  - Trimble 5600 (ACU, Elta, GDM, TDS)
  - Trimble Constructor 50/55
  - Trimble DiNi (M5 format)
  - Trimble Survey Controller™ software

  - older devices including Geodimeter devices and Zeiss Elta (M5 format) devices
- TDS devices
  - TDS Survey Pro CE
  - older devices including TDS Husky and TDS running on an HP48
- Other devices and instruments
  - Leica GIF (a/n and gsi)
  - Nikon DTM 310/500
  - Pentax PCS 300
  - SMI V6 or on HP 48 V5
  - Sokkia (SDR 20/33)
  - TPC on Husky

The following devices can be downloaded and imported by using the <Generic Instrument> device format and the appropriate .lgr file.

- DGM
- Ellar
- Nikon AP700/Nik
- NSS
- Panterra
- Psion
- Steanne
- Survpak
- Topcon GTS-3/700

Complete download/import/export/upload capability is not offered for every device listed.

The rage of devices that Terramodel can communicate with is regularly updated, so the lists above are complete at the time of publishing. If your instrument or data file format is not in these lists, please contact your local distributor to see if it has been recently added.

Import File Formats

In addition to importing data from the above-mentioned instruments, the FDM imports data from the following file formats:

- ASCII points file (user-defined formats allowed)
- AutoCAD (.dwg, .dxf)
- Landscape
- LandXML (.xml)
- MicroStation
- Raw survey data (this requires an import .lgr file specific to the instrument the data was collected with.)
- Roading 3D (.dc)
- Roadline (.aln)
- Roadline 3D (.rln)
- Survey Controller job (.job, .dc)
- TDS (.job)
- Terramodel/GeodatWin (.pro)
- Trimble DTM (.ttm)
- USGS Digital elevation model (.dem)

The Import Script Manager

The **Import** command requires a script to run. Each script contains user-defined responses necessary to define an import or export process. The Script Manager (the **ImportSMgr** command) allows you to create, edit, and delete scripts. When creating an script, you can decide:

- which portions of the process can be completely automated and hidden from view
- which settings should be presented with commonly employed default entries (which can be accepted or overriden)
- which settings you require answers to be provided without suggesting defaults

You can create a script that downloads, imports, or both with the Import Script Manager.

Creating a script

1. Do one of the following:
   - To create an import script, select *File* / *Download/Import* / *Import script manager.*
   - To create an export script, select *File* / *Export/Upload* / *Export script manager.*

   The names of all enabled script files of the appropriate type appear in a list. The scripts with a checkmark in the check box next to the script name appear as submenu options.

2. Click **New** to create a script. The *Name script and select source/destination* dialog appears.
3. In the *Script name* field, enter the name of the new script. Use a unique name that differentiates it from other scripts. This script name will appear on the script list.
4. In the *Select action* group, do one of the following:
   - If you are creating an import script, decide if you want the script to download from an instrument or data collector to disk, download data to disk and import, or import data from disk.
   - If you are creating an export script, decide if you want the script to export data to disk, export data to disk and then transfer the data to an instrument or data collector, or to transfer data from a disk.
5. Click **Next** to continue. If you have a question about any field or any dialog, press F1 for access to the Help.

Tip – For most dialogs in the script, you have the choice whether to display it at runtime or not. If the options displayed on that dialog are not necessary, select the Show this page at runtime check box to streamline the import or export script.

6. When you have finished creating the script, the dialog for that script manager appears. Verify that the check box next to the script name you have just created is selected and click **Close** to close the script manager.

Running a script

To run a script, select *File* / *Download/Import* or *File* / *Export/Upload*, then select the script name from the submenu that appears.

Editing a script

1. Do one of the following:

   – To edit an import script, select *File* / *Download/Import* / *Import script manager*.

   – To edit an export script, select *File* / *Export/Upload* / *Export script manager*.

   The selected script manager dialog appears.

2. Existing scripts are listed in this dialog. Terramodel is shipped with a number of scripts. Any scripts that you have created also appear in this dialog.

Tip – To have a script appear as a menu command, select the check box next to the name of the script.

3. Select the script you want to edit and click **Edit**.

   A dialog appears with tabs. These tabs display the same information as when you created the script. The tab titles vary according to the file type and source/destination options used in creating the script. Use the tabs to select the options you want to edit.

4. Click **OK** to accept the edits and close the edit session.

5. Click the check box next to the script name in the list. Click **Close** to close the script manager.

Deleting a script

1. Do one of the following:

   – To delete an import script, select *File* / *Download/Import* / *Import script manager.*

   – To delete an export script, select *File* / *Export/Upload* / *Export script manager.*

   The selected script manager dialog appears.

2. Existing scripts are listed in this dialog. Terramodel is shipped with a number of scripts. Any scripts that you have created also appear in this dialog.

3. Select the script you want to delete and click **Delete**. The message Are you sure you want to delete script <name> appears. Click **Yes**.

4. Click **Close** to close the dialog.

Data Format Template Files (.lgr)

Each ASCII or raw survey file format that Terramodel imports is different, sometimes subtly, sometimes greatly, from other file formats. For example, an ASCII points file and a Geodimeter job file store data very differently. The data itself, the order of data, the tags that label data, the data separators, the units, even the structure of the data all vary from format to format.

The data format template is a file that stores the specific information about how one format arranges data. Since a template is separate from Terramodel, templates can be created or modified to handle format situations that were not originally anticipated.

Terramodel is shipped with a variety of data format templates. These template files, also called ***logger*** or .lgr files, are stored in C:\Program Files\Trimble\Shared\Formats. Trimble can update the files or add to them between releases.

If you have an instrument that does not have a template, contact your Trimble distributor. If you can provide a list of your instrument's output and sample data files, your Trimble distributor may be able to provide you with a template.

Creating a Script versus Running a Script

Before creating a script, think about the file formats you commonly import. Some elements of your import process may not change each time you import a file. Other parts of the process may not be known until you import the file.

When you create a script, every available import parameter is shown. Be aware that data entry in some dialog controls is required when you import a file. If the script does not provide a default value, that particular dialog is displayed when you import the file. When you create a script, there are three possibilities for each control:

- Leave the control blank – You can complete the information as the file is imported.
- Specify a default value for a control – You can check that the default values are correct as the file is imported.
- Specify a default values for all the controls in a dialog and disable the *Show this page at runtime* check box – You cannot change any information when the file is imported.

Not all fields are required when you create a script. To streamline the import and export process, complete the fields that are likely to be standard for your routine import or export. Exclude the dialogs that you do not need by clearing the *Show this page at runtime* check box.

CHAPTER

6

Computing Coordinates with the Raw Data Editor

In this chapter:

- Introduction
- The RDE Process
- Using the RDE

Introduction

This chapter introduces the Terramodel Raw Data Editor (RDE) feature. The RDE collects all imported survey job data and displays it in a single format. The RDE includes an interactive editor that allows you to view, search, edit, and delete raw data that is displayed in a consistent format independent of the data source. The RDE automatically converts the angles and distances of the raw observations taken in the field into best-fitting least squares coordinates. The RDE also allows you to control the settings and tolerances used during computation.

Note – *RDE refers to both the Terramodel RDE command and to the Raw Data Editor feature.*

The RDE Process

Imagine the perfect surveyor assistant to reduce your field data. You give them the field data and you get back the best possible solution, a complete report of what they found, and a final drawing showing error ellipses, points, and line work. They tell you about the assumptions required to get the job done, and they report every problem along the way. You can step in and make any type of change and the entire job is updated automatically. RDE does all of this and more.

For Terramodel to display the computed coordinates of the imported survey data—the reduced data points, error ellipses, and traverse legs, you need to complete just two steps:

1. Use the *Download/Import* command to import raw survey information.
2. Exit the RDE to view the adjusted traverse(s).

Terramodel quickly steps you through downloading, importing, and reducing field data.

Using the RDE

It is important that you confirm the process of reducing your data from your field data into coordinates until you get to know the RDE. After you have verified the process and have confidence in the RDE, you can operate the process in “autopilot”. The following overview describes the process. For more information, refer to the Help.

Tip – To display a table of contents for the Help in the RDE, run the **RDE** command and press F1.

Collecting the data

You can usually continue to collect data the same way that you always have. However, you may need to modify your collection techniques to take advantage of the RDE computational speed and least squares technology (see Least Squares Adjustment, page 56).

Configuring the RDE settings

Some probable settings have been applied as the defaults in Terramodel. You will not know if the settings are suitable until you understand what they mean. Look at each setting and make sure it is set to a value that reflects how you want to do things. To help you, refer to the RDE Help.

You also need to think about what corrections you want to apply. You need to know what corrections are being applied in the instrument used to collect the data and/or in the software. Make sure you only correct for the same thing once.

Importing the data

The download/import wizard is typically used to transfer the data into the RDE. During the import process, the data is translated into the format that the RDE requires. To do this, select the appropriate script file and test it with a typical data file. If the data is imported incorrectly, you must either modify your collection method or request that your distributor modifies the translation file to support your method.

A benefit of the RDE is that data imported from multiple formats are translated to a single format for editing. This enables you to use different types of equipment and combine all the data for the same job.

Note – *The RDE may take from a few seconds to a few minutes to compute and display the data. The RDE does the entire job from reduction to calculating the final adjustments to give you a complete report.*

Editing the data

When you edit the data:

- look for any <Invalid Data>, <Unknown Key>, or <Duplicate Key> tags and correct these as required
- review the messages in the Message pane and correct these as required

Creating a report

When you create a report, enable all of the reports and print a report of the project. Review this report and make any adjustments as required. You may want to revise the job based on the report.

Viewing the results

When you close the RDE, Terramodel automatically zooms to the extent of all of the visible objects. All of the points and lines are ‘coded’ by layer, color, and name to present the reduced data in the most understandable format. You may want to revise the job based on the computed results.

CHAPTER

7

Automated Drafting Tools

In this chapter:

- Introduction
- AutoDraft
- The AutoDraft Editor

Introduction

Several commands that are provided with the FDM automatically place text, symbols, and/or lines in relationship to surveyed data that has been field coded. For information on how to properly code field data, refer to Field Codes in the Help.

Before you use *Draft* / *Automated mapping from points* (the **AutoDraft** command) and *Draft* / *Linework from points* (the **MapPoints** command), you must prepare a standard set of field codes to use when you collect the data. You must also create a configuration file according to a specific format. Use *Draft* / *Label Points with blocks* (the **LabelPoint** command) to quickly create point labels for all selected points. This chapter outlines how to use field codes and how to create a configuration file.

AutoDraft

The Terramodel **AutoDraft** command creates survey drawings from field-coded survey data using a configuration file that you have created. The **AutoDraft** command:

- inserts symbols, text (including smart text), and/or blocks at any point
- inserts a block using two or three points to rotate and scale it
- draws curves as arcs or Overhauser splines

- draws offset lines (vertical and/or horizontal) parallel to surveyed lines
- accepts parameters passed from the field
- assigns linetype, type of line (set, polyline), line smoothness, color, and layer to the points of a line and the line itself as it creates the map
- assigns style (for text only), color, rotation, and layer to text, blocks or symbols as it creates the map

In the field, the surveyor assigns a field code to each surveyed point. A field code (***point descriptor***) describes the point, for example, as a fence, as top of curb, as a monument. Field codes can be very simple (FE = fence, TC = top of curb, MON = monument, CL = center line) or they can be a standardized system of field codes that can convey very detailed information. When the surveyed point is converted to a Terramodel point object, the point descriptor becomes the point name.

The **AutoDraft** command uses the point name to draw a feature in the configuration file. A feature is a point or line. For each feature, the configuration file defines lines, text, or blocks.

Tip – Although there are many features in the AutoDraft command, they are straightforward to use because the AutoDraft Editor provides you with a structured user interface.

The AutoDraft Editor

The **AutoDraft** command requires a configuration file, a binary file that stores the field codes, and the corresponding map features for the field codes. The configuration file is divided into two sections:

- Global information

  Settings that apply to the overall processing of field codes and global field codes, which (at your discretion) apply to all feature field codes.
- Point and line feature definitions associated with field codes

  These features can be organized into feature categories.

In the AutoDraft Editor, a feature is defined as a point or a line. For each feature, you can define a number of field codes. Each field code has several field code options that you can assign to it. These field code options allow you to designate the beginning or the end of a line, the beginning of a curve, or whether a point is to be labeled with text or not. Each feature can also have any number of text objects and blocks associated with it.

Each line feature can have any number of lines associated with it. These lines can be offset both vertically and horizontally.

Creating a configuration file

The simplest way to create a configuration file is to base it on a file that already exists.

1. Open a project file. You will not need to do anything with it, but you need to open one before you can run the **AutoDraft** command.
2. Do one of the following:
   – Select *Draft* / *Automated drafting from points*
   – Enter **AutoDraft** on the command line.

   The AutoDraft command bar appears.
3. If necessary, click **Browse** to select the configuration file that you want to use as a base.
4. Click **Edit**. The *AutoDraft Configuration File Editor* appears.
5. Select *File* / *New*. A new configuration file appears on the tree structure. (Both configuration files will be open at the same time.) This new configuration file will have the same basic global settings as the base file.
6. Select the Global Settings section of the base file. Then, one by one, drag-and-drop the global field codes you want to the new file. Modify these and add new ones as necessary.

7. Select the Feature Definitions section of the base file. Then, one by one, drag-and-drop the feature categories and individual features that you want in the new file.
8. Select the base configuration file and then select *File* / *Close* to close the base configuration file. ***Do not save it*** in case you accidently made a change.
9. Select *File* / *Save* and then *File* / Close to save the new file and close the AutoDraft Configuration File Editor. If the base configuration file was an ASCII file, you may need to select *File* / *Save As*.

Labeling points

You may need to create a set of labels for the points that you have imported.

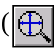
1. Select *Draft* / *Label points with blocks*. The LabelPoint command bar appears.
2. Click **Settings**. The *Point label settings* dialog appears. You can do the following:
    a. Assign a symbol to your points to make them easier to see in the Symbol section. For more information, see The Symbol.fnt File, page 91.
    b. In the *Block label* group, you can select a description option from the *Description* list.

The Block Description format is as follows:

Leading number – Height of font in mm or inches.

Justification – Right, Left, or Center – If Center, then the point itself becomes the decimal point for the elevation.

List of text options – Point number, Elevation, Point Name, Easting, Northing.

3. Click **OK** to return to the command bar.
4. Click in the *Pts* field to highlight it. Then right-click in the graphics area. A short-cut menu appears with options on how to select the points you want to label. If all the points that you want to label are on the same layer, select Layer.
5. Select one point. All points on the same layer turn gray to show that they are all selected.
6. On the command bar, click **Label**. All points are labeled. Because it difficult to view all the information, click the Zoom icon () on the toolbar and click and drag around an area to see it in more detail. Then click the All icon () to return to the big picture.

Tip – For information about Terramodel's symbol font, see The Symbol.fnt File, page 91.

CHAPTER

8

Exporting Data

In this chapter:

- Introduction
- FDM Export Options
- Export File Formats
- The Export Script Manager

Introduction

Terramodel can export data into many formats that can be used by other software programs such as Autodesk AutoCAD, MicroStation, and Trimble Survey Controller. It can also transfer data to many devices.

FDM Export Options

Terramodel supports data transfer to most current Trimble devices and many older models.

- Trimble devices:
  - Survey Data Card
  - TS315
  - Trimble 3300
  - Trimble 3600 (ACU, Elta, GDM, TDS)
  - Trimble 5600 (ACU, Elta, GDM, TDS)
  - Trimble Constructor 50/55
  - Trimble DiNi (M5 format)
  - Trimble Survey Controller
  - older devices including Geodimeter devices and Zeiss Elta (M5 format) devices
- TDS devices
  - TDS Survey Pro CE
  - older devices including TDS Husky and TDS running on an HP48

- Other devices and instruments
  - Leica GIF (a/n and gsi)
  - Nikon DTM 310/500
  - Pentax PCS 300
  - SMI V6 or on HP 48 V5
  - Sokkia (SDR 20/33)
  - TPC on Husky

Complete export/upload capability is not offered for every device listed.

The range of devices that Terramodel can communicate with is regularly updated, however the lists above are complete at the time of publishing. If your instrument or data file format is not in these lists, please contact your local distributor to see if it has been recently added.

Export File Formats

In addition to exporting data to the above-mentioned instruments, the FDM exports data to the following file formats:

- ASCII points file (user-defined formats allowed)
- AutoCAD (.dwg, .dxf)
- Geodimeter Area (.are)
- MicroStation
- Roadline (.aln)
- Roadline 3D (.rln)

- SDMS
- Softdesk Fieldbook (.fbk)
- STAR*NET
- Survey Controller DC points (.dc)
- Survey Controller Roading 3D (.dc)
- TDS (.job)
- TDS (.dtm)
- Terramodel/GeodatWin (.pro)
- Trimble DTM (.ttm)

The Export Script Manager

Use the Export Script Manager to create a script that exports data from Terramodel and transfer it to a device.

The **Export** command requires a script. Each script contain user-defined responses necessary to define an import process. The Export Script Manager (the **ExportSMgr** command) allows you to create, edit, and delete scripts. When creating an script, you can decide:

- which portions of the process can be completely automated and hidden
- which settings should be presented with common default entries (which can be accepted or overriden)
- which settings you will require answers to be provided without suggesting defaults.

For information on creating and editing scripts, see Chapter 5, Importing Data.

APPENDIX

A

Advanced Techniques

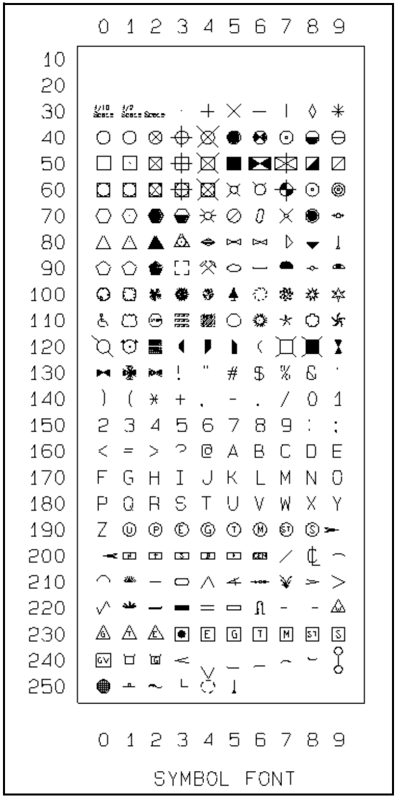
In this chapter:

- Introduction
- The Symbol.fnt File
- AutoDraft Examples
- AutoDraft Curve Definition Options

Introduction

This appendix includes information for advanced users of Terramodel. The Symbol font file is used to assign a symbol to a point or in a string of text. The AutoDraft – Example section lists several example files and directions to access them. The AutoDraft Curve Definitions section will help you pick an appropriate set of field codes for curves that you may map during the course of your surveying.

The Symbol.fnt File



Most symbols that are supplied with the Terramodel software are in a file called Symbol.fnt and can be referenced by the numbers shown opposite.

Use these numbers when you want to associate a point with a symbol. To reference the symbols:

1. Choose a symbol from the file shown here.
2. Read the number to the left of the symbol, then read the number at the top of the symbol. Add the two number together.

For example, to use the A symbol, add 160 and 5 together. That is, A = 165.

AutoDraft Examples

Samples showing what the **AutoDraft** command can do are installed with Terramodel. By default, the .pro and .adc files are installed in C:\Program Files\Trimble \Samples\AutoDraft.

Description	Sample files	
Survey of a parking lot	USStandard1.pro	USStandard.adc
Examples of lines and points drawn with AutoDraft features	UStandard2.pro	USStandard.adc
A more complex survey example with many sophisticated uses of AutoDraft	UKStandard1.pro	UKStandard.adc

To view these sample projects:

1. Open the .pro file.
2. Do one of the following:
   - Select *Draft* / *Automated drafting from points*
   - Type **AutoDraft** in the command line
3. Select all the points.
4. Click **Browse** to find the associated .adc file.
5. Click **OK**.

The **AutoDraft** command processes the point descriptors with the configuration file and displays the results in the Terramodel graphical display area.

AutoDraft Curve Definition Options

The AutoDraft command can interpret four methods of field coding curves. The Classic Terramodel method creates arcs between two points. The Spline, Curve Ahead, and Curve Begin methods create (or approximate) a splined curve through a series of points; these three methods vary in the way the points are field coded.

Table 1.1 Four methods to field-code curved lines

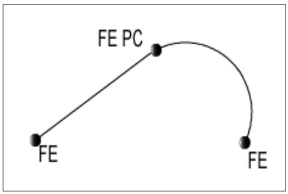
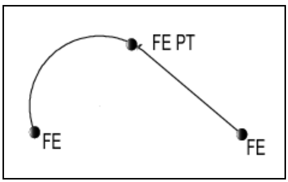
Option	Description	Example
Classic Terramodel		
PC	The point is between a straight (previous segment) and an arc (next segment). *Set lines only.* Identify the point before the arc curve with a PC field code option. The preceding line segment is defined as tangent to the curve at the PC point.	
PT	The point is between an arc (previous segment) and a straight (next segment). *Set lines only.* Identify the point after the arc curve with a PT field code option. The following line segment is defined as tangent to the curve at the PT point.	

Table 1.1 Four methods to field-code curved lines

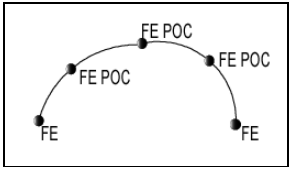
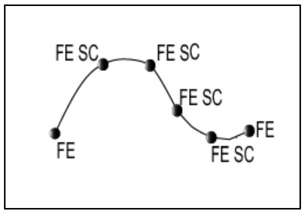
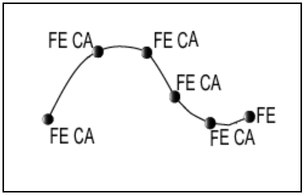
Option	Description	Example
POC	The point is between two equal radius arc segments, that is, a point on a curve. *Set lines only.* Identify the center point of three points with a POC field code option. **Note** – If you string several POC points together to define a curve, you must survey at ***least*** one non-POC point afterwards to close the curve.	
Spline		
SC	The point is between two splined curve segments. If the line is a set, Terramodel creates interpolated points to create a smooth line. Identify the center point of three points with a Spline field code option. Curve will continue until a non-Spline point is found.	

Table 1.1 Four methods to field-code curved lines

Option	Description	Example
Curve Ahead		
CA	The point begins a splined curved segment. The curve continues as long as the CurveAhead code option is present. If the line is a set, Terramodel creates interpolated points to create a smooth line. Identify the point that begins the curve. Curve will continue until a non-Curve Ahead point is found. **Note** – The difference between Spline and Curve Ahead is the labeling of the first point of the curve.	
Begin Curve/Begin Straight		
BC/BS	The point begins a splined curve defined by all points until BeginStraight point. If the line is a set, Terramodel creates interpolated points to create a smooth line. Identify the point that begins the curve with a Begin Curve field code option. Identify the point that ends the curve with a Begin Straight option. Identify the points in-between as part of the line.