

## Trimble Total Control Software

**POWERFUL GEODETIC CONTROL FOR ALL SURVEY PROJECTS**

A survey is only as good as its control elements. Trimble Total Control™ software puts you in total control of any survey project. It provides exceptional geodetic control capability plus powerful processing and tools to enable large data sets to be processed extremely quickly, with extensive analysis and reporting. It is ideally suited to handling large GPS networks and long baselines. Trimble Total Control software is an important component of the Trimble Toolbox™ of Integrated Surveying™ solutions.



**TRIMBLE TOTAL CONTROL SOFTWARE GIVES YOU TOTAL CONTROL OF YOUR SURVEY.** Trimble Total Control software is a powerful, easy-to-use survey processing package for GPS and total station data. The software provides advanced geodetic control and GPS processing and analysis tools, making it useful for surveyors who do a lot of control or photogrammetry work, as well as the research, education, and scientific communities.

### POWERFUL FEATURES MAKE SHORT WORK OF ANY PROJECT

Trimble Total Control software provides an intuitive and fast solution for survey and geodetic data analysis. This includes:

- Automatic internet download of GPS and control data
- GPS baseline processing
- Support of the Russian GLONASS satellite system
- Data processing for static, fast static, kinematic and continuous surveys
- Support of other GPS manufacturers' raw data
- Support of conventional total station and digital level data
- Geodetic network adjustment in one, two, and three dimensions
- Geodetic transformations including residual error distribution
- Geodetic datum and projection support
- Advanced GPS and GLONASS data analysis
- Virtual Reference Station (VRS™) postprocessing
- Continuous deformation analysis
- Manual and automatic quality analysis
- Flexible project reporting

### INTRODUCTION

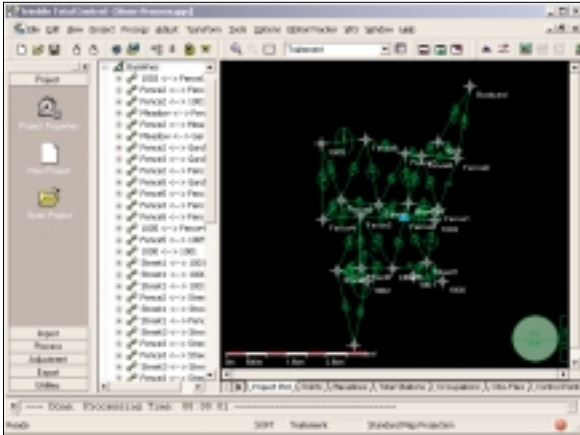
Advanced techniques for **satellite data analysis** give full access to the raw data in various graphical and numerical ways. The incredibly **fast processing** engine handles large networks quickly. And the software allows **seamless transfer** of data from Trimble devices, including the TSCe™ running either Trimble Survey Controller™ or Survey Pro software, Trimble 5600/3600/3300 total stations, and the Trimble DiNi®.

Even with all these features and capabilities, Trimble Total Control software is **easy to use** and ideal for solving daily surveying tasks. Additionally, because Trimble Total Control software supports most third-party raw GPS data formats, it is ideal for customers who do postprocessing work and have mixed-brand GPS equipment. And, because it is available in **eight languages** (English, German, French, Italian, Spanish, Portuguese, Japanese, and Simplified Chinese (Peoples' Republic of China)), it helps you do every job faster and easier.

#### Graphical, Windows-based user interface

Trimble Total Control software operates in the Windows 95, 98, 2000, ME, NT, and XP environment. You interact via graphical control and/or by using the navigator tree. Both methods allow you full access to all the data; for example, GPS baselines, RTK vectors, and conventional total station data.

The **graphical Project Plot view** can be zoomed and moved by using a mouse. Different colors identify the status of GPS baselines. For conventional total station data, specific symbols provide easy identification of measurement types.



*Project Plot View*

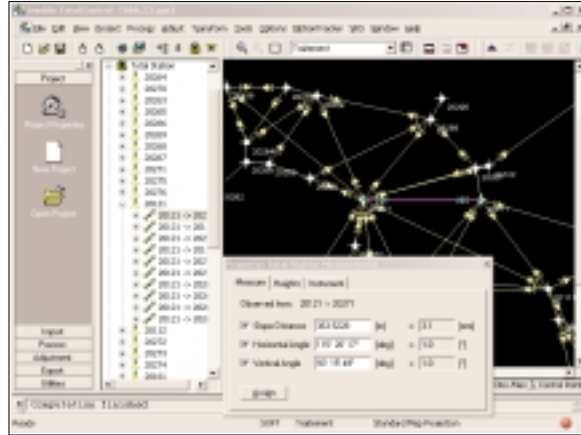
In addition to the Project Plot, various **spreadsheet views** can provide detailed information on the raw and derived data, for both GPS and conventional total station information. You can use the spreadsheets as an alternative to the navigator tree to pick and edit information. The spreadsheet views can be output to MS Excel files for convenient viewing and sharing within your organization and with your clients.

**Smooth data import**

Trimble Total Control software contains import modules for Trimble conventional total stations and digital levels. It also supports the import of Trimble real-time kinematic (RTK) data collected using the Trimble TSCe Controller. You can also download raw GPS from any Trimble GPS receiver using the same workflow.

**Easy access to your data**

You can access surveying data by clicking graphic symbols or individual items in the navigator tree. Property dialog boxes allow you to edit observation data and enable or disable measurements.



*Observation details are easily accessed*

**Comprehensive adjustment, transformation, and reporting**

Modules are included for one-, two-, and three-dimensional least-squares adjustment to support the individual needs of leveling, conventional total stations, and GPS users. Results can be transformed to any global or local reference system, using Trimble's robust transformation algorithms and extensive coordinate system database. Measurements and results can be viewed in HTML reports which are compatible with your word processor or even your website. The HTML reports are not only useful for analysis, but also provide a high-quality presentation document for your client.

TECH NOTES 3

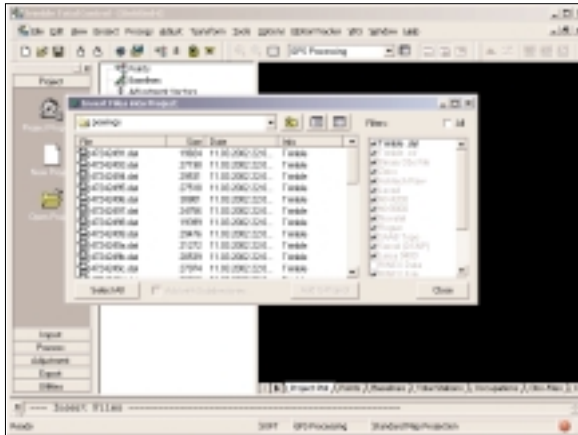
Observation	Distance	#	RA	SD
20120-20211	548.1730m	10	80° 50' 50.0"	1.1" ± 0.41 0.1"
20120-20212	628.1730m	10	80° 50' 50.0"	1.1" ± 0.41 0.1"
20120-20213	128.0870m	8	80° 51' 57.3"	2.0" ± 0.28 0.1"
20120-20214	288.4880m	10	80° 50' 50.0"	1.0" ± 0.37 0.09" ± 0.2"
20120-20215	130.38820m	8	73° 43' 58.4"	2.2" ± 0.70 0.28 0.1"
20120-20216	130.38820m	8	80° 27' 55.0"	1.0" ± 0.12 0.14 0.1"
20120-20217	908.9070m	20	80° 50' 50.0"	1.1" ± 0.41 0.1"
20120-20218	548.1730m	10	80° 27' 58.0"	1.0" ± 0.30 0.14 0.1"
20120-20219	633.86320m	10	80° 50' 50.0"	2.8" ± 0.58 0.21 0.1"
20120-20220	548.1730m	10	80° 27' 52.0"	1.0" ± 0.14 0.21 0.1"
20120-20221	363.86820m	10	80° 27' 58.0"	1.4" ± 0.28 0.42 0.1"
20120-20222	108.86870m	10	80° 43' 55.0"	1.1" ± 0.41 0.20 0.2"
20120-20223	517.12220m	24	80° 15' 40.0"	1.1" ± 0.37 0.09 0.0"
20120-20224	548.1730m	10	80° 43' 52.0"	1.0" ± 0.50 0.14 0.1"
20120-20225	251.7370m	10	80° 29' 48.0"	1.0" ± 0.41 0.14 0.1"
20120-20226	652.7897m	8	80° 50' 17.0"	1.0" ± 0.42 0.08 0.1"
20120-20227	122.8220m	10	80° 50' 50.0"	1.1" ± 0.41 0.20 0.1"
20120-20228	108.86870m	10	80° 50' 50.0"	1.1" ± 0.41 0.20 0.1"
20120-20229	633.86320m	10	80° 51' 57.3"	1.4" ± 0.28 0.20 0.1"
20120-20230	232.17170m	10	80° 27' 42.0"	1.0" ± 0.30 0.14 0.1"
20120-20231	434.1730m	10	80° 43' 58.0"	1.0" ± 0.41 0.20 0.1"

*Typical adjustment report*

## GPS DATA PROCESSING

### Raw data import

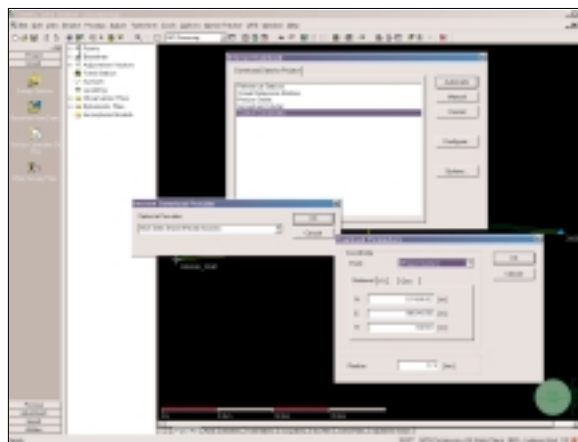
Trimble Total Control software imports raw data and processes GPS and GLONASS data from most GPS manufacturer's receivers; it also supports the Receiver-INdependent EXchange format (RINEX). All known file types are identified automatically, giving you easy access to the different raw files. The Trimble Data Transfer module is integrated in the software, allowing you to upload and download data from a Trimble GPS receiver.



*Importing GPS data*

### Automatic internet download

Automatic downloading of Internet data provides a convenient way to import the following: national control point data (for example, NGS), reference station data, precise ephemeris files, and IONEX data.

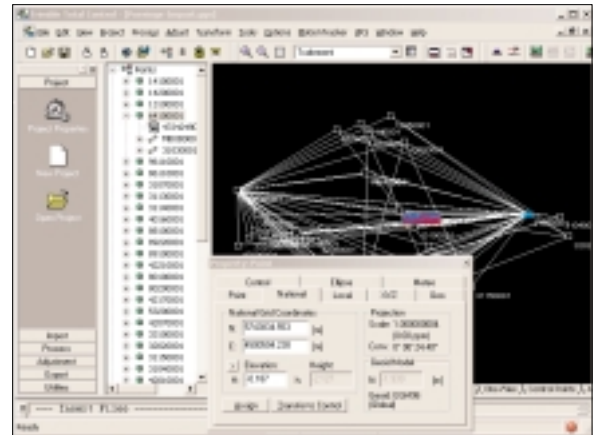


*Automatic downloading from the internet*

### Field data can be checked and edited

Trimble Total Control software is fully interactive, giving you complete control of all processing, viewing and editing of the project data. All field data such as antenna

heights, instrument heights and station names can be checked and edited. All lines to be processed can be selected and processed individually with the mouse, or a complete project can be processed in a single click.

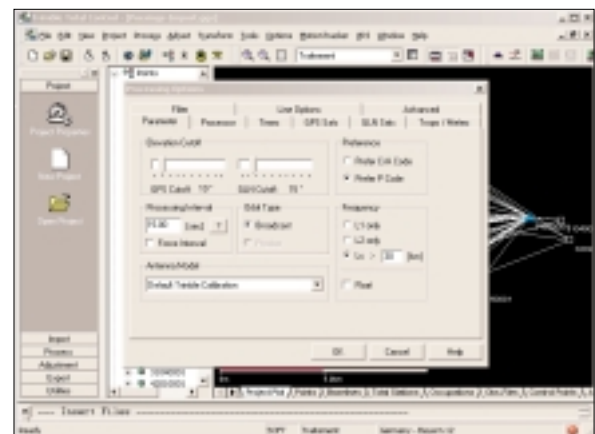


*Viewing point properties*

Toolbars are available for the most frequently used functions. Essential station information, such as initial positions, can be keyed in. Alternatively, an autonomous position can be calculated and used. Continuity between stations is checked automatically.

### Results are calculated in seconds

The Trimble Total Control processor is extremely fast. Processing that can take hours with other software is completed in seconds! This provides significant benefits for projects containing large networks, long baselines and for photogrammetry applications. The data is checked for its type and content; then processing is handled automatically. A progress bar shows you how much of the data has been processed at any time. The program can process all types of GPS and GLONASS data and various options can be set as defaults.



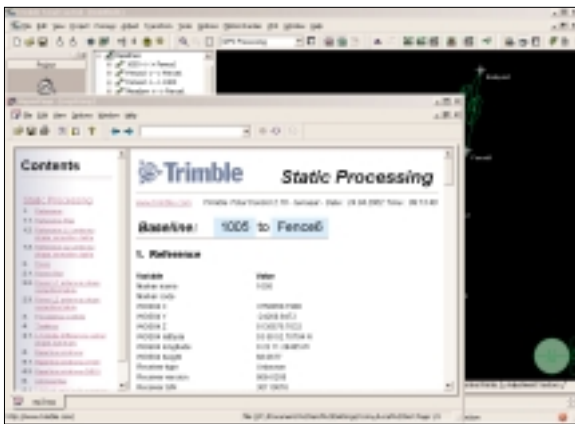
*Determining processing options*

### Easy error analysis

Each result is displayed on the screen with an error ellipse. Problem lines are identified immediately by color codes for further analysis, making the identification of problematic baselines effortless.

### Baseline results are available in detail or summary

As all surveyors know, keeping a record of all survey processing is extremely important. The full set of results can be displayed and saved automatically to a file for future use. These include L1-only, L2-only, wide-lane, ionosphere-free, GLONASS and other combinations. The results include the data for variance-covariance matrices used in the network adjustment, standard errors, and best and worst PDOP and RDOP during the measurement session. The results report can be user defined so that only values of immediate interest are shown.



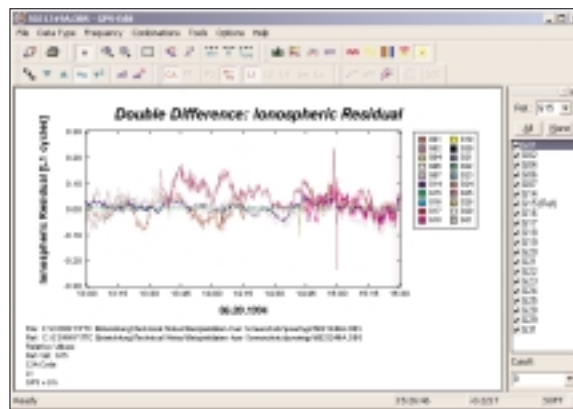
Baseline results report

### Graphical analysis and editing

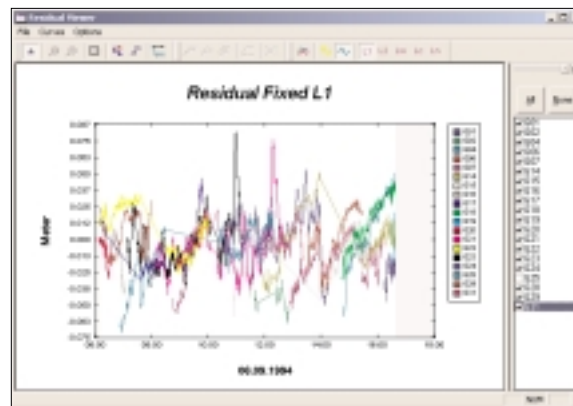
Graphical analysis and editing features give you complete control over the data, as well as provide the in-depth analysis needed in many survey applications. Lines on which multipath interference from buildings or trees is suspected can have sections of bad data disabled so that they are ignored in future processing. You can edit the data satellite-by-satellite. You can also define the satellites used, elevations and observation intervals for each line. The locations of cycle slips are displayed, although the software corrects for these automatically during processing.

### Kinematic data processing

The software supports both kinematic and continuous data. On-the-fly ambiguity resolution is available, which processes kinematic data without any period of static initialization. This is especially useful in applications such as aerial photogrammetry. Trimble Total Control software allows you to interpolate the position at time of exposure for photogrammetric flights. The positions of event markers are interpolated almost instantly, making processing airborne GPS data effortless! Results can be given in a local, national or state plane coordinate system.



Graphical analysis

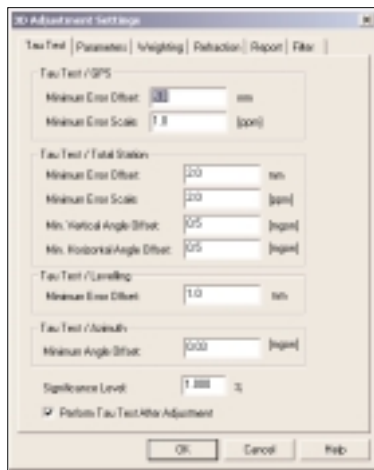


Residual analysis

## NETWORK ADJUSTMENT

Adjusting a network is a critical part of determining the best possible coordinates for each point in your project. With the software's robust least-squares network adjustment engine, adjusting your network is easy as well as geodetically sound.

The complete network can be adjusted by least-squares, and the coordinates transformed to state plane, local or national grid coordinates. The system can accept data from Trimble conventional total stations, digital leveling systems, and static, kinematic or RTK GPS systems. The RTK data can be imported from both the Trimble Survey Controller software and Survey Pro software.



*Adjustment settings screen*

Manual loop closure tests can be carried out on any section of the network. Simply select the route of the loop and the closure is calculated. Individual lines can be selected or ignored. Observations from individual days can be grouped together. Different static, kinematic, and RTK solutions can be included. Automatic statistical tests are carried out. All parameters in the test are user-definable.

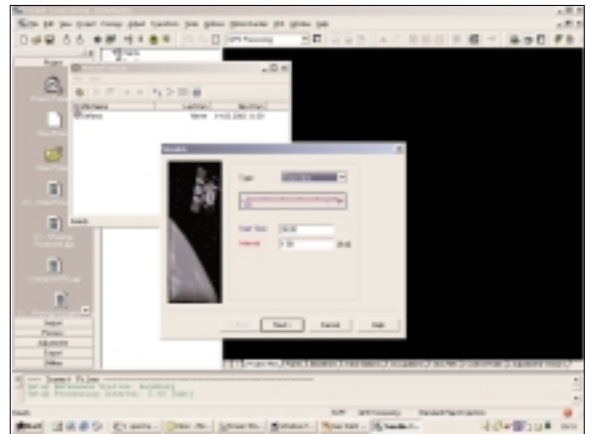
### User-defined output reports

All project reports, including the adjustment reports, are generated in HTML. You can define both the content and format of the HTML reports. Although a wide choice of content is available as standard, a macro language (TCL) allows extensive customization so that you can deliver reports to your clients in almost any format they require.

## CONTINUOUS DEFORMATION MONITORING

The optional Motion Tracker module provides an instantaneous graphical GPS deformation analysis system for dam and landslide monitoring, earthquake prediction, and subsidence analysis.

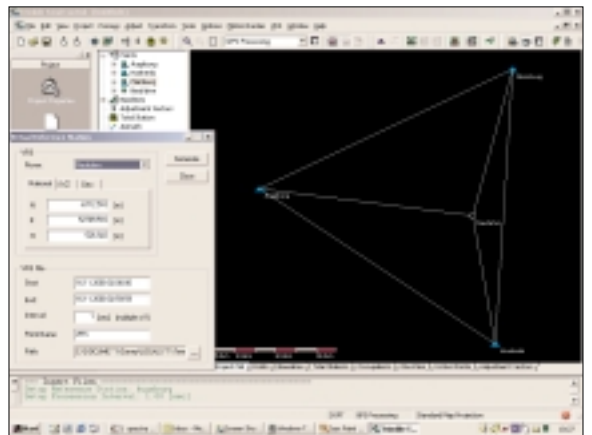
Data is transferred via a modem or radio from a continuously operating GPS network to your computer, which processes the data on a continuous basis. Several projects can be processed on one computer and the processing can be configured to start automatically or at pre-set times. Automatic network adjustment, reliability analysis, and comprehensive reports give you total confidence in your results.



*Motion Tracker display*

## VRS POSTPROCESSING

To complement the Trimble GPSNet real-time Virtual Reference Station Processor, Trimble Total Control software includes an industry-unique feature that enables you to generate "virtual" reference stations in the office. This feature allows you to derive an optimized reference station dataset from surrounding reference stations, reducing the influence of atmospheric and orbital effects for the local data processing of the rover position.



*VRS data display*

## TRANSFORMATIONS AND FINAL DATA OUTPUT

### Transformations

Trimble Total Control software includes a complete transformation package.

- All major geoid models are supported. You also have the ability to graphically sub-grid an existing geoid model to your local area—reducing the size of the geoid file to be used in your controller.
- Basically all datums and projection systems are supported, including US State Plane, Universal Transverse Mercator (UTM), and all major national projections, using Trimble's extensive Geodetic Coordinate Database engine.
- User-defined or new values can be assigned to any datum or projection.
- Calibration parameters can be derived and uploaded to the Trimble Survey Controller software to be used in the field.
- Ground coordinate systems and local sites are supported.

### Full transformation results are available.

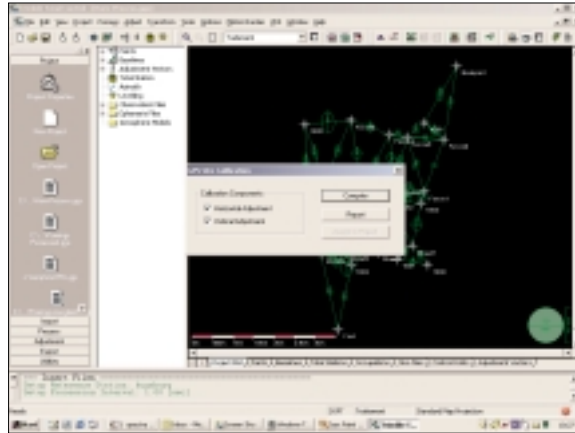
After a network adjustment, the new coordinates and information on the quality of fit to the local control stations are stored automatically and displayed. Any of the stations common to both systems can be removed from the transformation, and the transformation is instantly recalculated. Outliers can be removed quickly and easily.

### Exporting final project data

A list of final coordinates or observations is available in a choice of formats:

- ASCII
- Trimble Data Exchange Format (TDEF)
- Excel spreadsheet
- NGS Bluebook
- DXF
- Geolab

In addition, reports can be custom designed and can include residuals and statistical information.



*GPS site calibration*

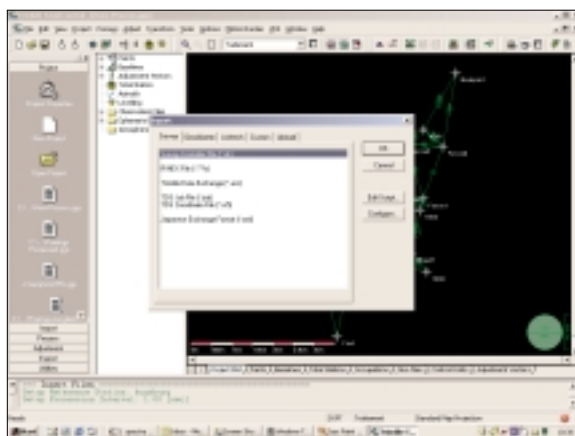
### Sending files to controllers

With Trimble Total Control software, sending relevant files to the TSCe Controller is easy. Using Trimble's integrated Data Transfer communications, you can send the following files:

- Geoid files
- Datum grid files
- Antenna files
- Trimble Survey Controller DC file
- Projection grid files

### Sharing data with other software in the Trimble Office suite

The Trimble Data Exchange Format (TDEF) can be used to transfer data between different Trimble office software. This offers seamless exchange with the Trimble Geomatics Office™ software, another member of Trimble's office software suite. Also, Trimble Total Control software can generate many data formats so that the results can be passed to other mapping system software. All the formats are controlled by simple, user-defined macros.



*Selecting data export formats*

## RECOMMENDED SYSTEM REQUIREMENTS

### Computer

Pentium or compatible  
32 MB RAM  
1 GB hard disk  
CD ROM drive, 3.5" floppy disk drive  
SVGA monitor  
Microsoft compatible mouse

### Operating System

Windows 95, 98, 2000, ME, NT (v4.0 or later), or XP

### Internet Browser

Netscape or Internet Explorer (4.0 or later)

### Printer

Any printer supported by Windows

## CONCLUSION

Trimble Total Control software gives you complete control over the geodetic control and processing of data from virtually any type of survey and any type of instrument. Its powerful features and unique capabilities handle the job quickly and flexibly, providing fully customizable reports to suit your requirements. And its ability to readily accept data from virtually any survey instrument is another example of how Trimble's Integrated Surveying solutions save you work, time, and money.



NORTH AMERICA  
Trimble Engineering and  
Construction Division  
5475 Kellenburger Road  
Dayton, Ohio 45424, U.S.A.  
800-538-7800 (Toll free)  
+1-937-233-8921 Phone  
+1-937-233-9004 Fax  
www.trimble.com

EUROPE  
Trimble GmbH  
Am Prime Parc 11,  
65479 Raunheim,  
GERMANY  
+49-6142-21000 Phone  
+49-6142-2100-550 Fax

ASIA-PACIFIC  
Trimble Navigation  
Australia PTY Limited  
Level 1/123 Gotha Street,  
Fortitude Valley, QLD 4006,  
AUSTRALIA  
+61-7-3216-0044 Phone  
+61-7-3216-0088 Fax



YOUR LOCAL TRIMBLE OFFICE OR REPRESENTATIVE

