



Trimble Survey Controller v7.7 Software

THE ADVANCED TOTAL FIELD SOLUTION FROM TRIMBLE

Today's land surveyors demand high productivity, total flexibility, and top quality from their instruments. The Trimble Survey Controller™ software is the most advanced field data capture solution we have ever created to meet those demands. Innovative features like the ability to switch seamlessly between total stations and GPS survey instruments bring a new level of convenience, speed and efficiency to field surveying. High-resolution graphics bring your survey data to life, in real-time. And for ultimate convenience, it works in your language.

The Trimble Survey Controller software is an important component of the Trimble Toolbox of Integrated Surveying™ solutions. Discover the next generation of field survey technology and take control of your instruments, your productivity, and your results.



CONNECTIVITY—IN THE

TRIMBLE INTEGRATED SURVEYING— WE SPEAK YOUR LANGUAGE!

Imagine what your productivity could be if you had a single tool that would:

- control all your survey equipment—GPS conventional and robotic
- make it easier to do every part of a project
- organize each job into a single Job file that can be loaded into a single office software package
- operate in your own language

You could be instantly more productive. Instantly more competitive.

That tool is available today: the Trimble Survey Controller software. It speaks the language of just about every field instrument you use—GPS, conventional and robotic total stations, laser rangefinders—and it's translated into your own language, too!

The Trimble Survey Controller software redefines the concept of universal surveying instruments support. It supports:

- **GPS:** the new Trimble GPS Total Station® 5700 and all other Trimble RTK receivers, including the 4000, 4400, 4600LS, 4700, 4800 and MS750 receivers.
- **Conventional:** Trimble 5600, 3600, 3300 and 600M Families as well as conventional instruments from most major manufacturers.
- **Robotic:** Trimble and Leica robotic total stations.
- **Laser rangefinders:** several leading models.

That's Trimble Integrated Surveying!



Trimble Conventional Total Stations



Trimble Robotic Total Stations



Third-party Conventional and Robotic Total Stations



Third-party Laser Rangefinders

FIELD AND IN THE OFFICE



**Trimble GPS
Total Stations**



Your Office PC



SEAMLESS DATA FLOW AND INTEGRATION IN THE OFFICE

Integration of survey data has never been so easy. The advanced interoperability features of the Trimble Survey Controller software make working with mixed GPS and conventional survey data simple and efficient.

To export data, the Trimble office software supports many native data formats of popular survey, design and GIS packages. An efficient two-way data flow also means that data can be imported easily from survey, design or GIS software to be uploaded to the Trimble Survey Controller software prior to fieldwork.

Terramodel® 3D land design and visualization software has an embedded module that allows you to directly transfer your field data to Terramodel. For AutoCAD Land Development Desktop users with the Autodesk Survey option, the embedded Trimble Link™ module allows direct data transfer between the Trimble Survey Controller software and AutoCAD Land Development Desktop.

THE TRIMBLE TSC1—BUILT TO USE, BUILT TO LAST

The Trimble Survey Controller software runs on the TSC1™ data collector—an advanced handheld computer developed and built by Trimble.

The TSC1 data collector is everything you want your data collector to be:

Powerful. The multitasking operating system runs up to nine survey operations simultaneously. The fast, 5-Hz, low-latency RTK operation provides super-fast responses to movement on the ground. You can store an entire job—over 6,000 topographic survey points—in internal RAM (protected from sand, dust, moisture and humidity), or use PC data cards for additional unlimited storage.

Ergonomic. The large, clear, 48,000-pixel, high-resolution graphical display shows you a detailed job map and large, easy-to-use graphics. You can switch between multitasking operations with one key press. And you can operate the large keys with one hand, even when wearing gloves!

Rugged. The TSC1 data collector is built especially for the tough surveying environment. It is tested to withstand a 1.5-meter (5-foot) drop onto a hard surface.

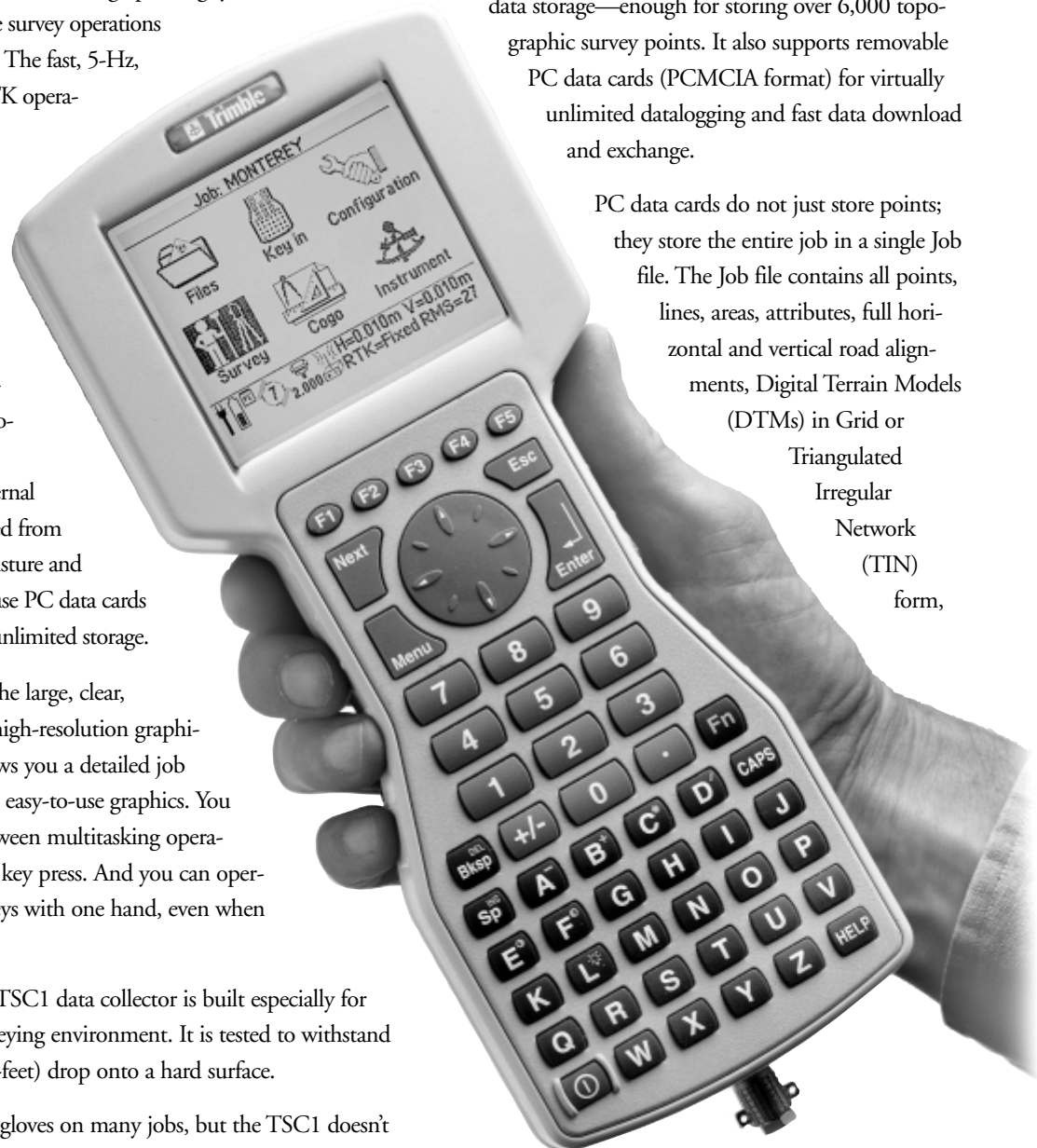
You may need gloves on many jobs, but the TSC1 doesn't care—it's been field proven in the frozen Arctic wastes and the blistering heat of the desert. The LCD display does not "black out" in intense heat or freeze up in extreme cold. It doesn't mind getting wet, either—it works even when the humidity is 100%. It even floats!

Light in weight and power consumption. The complete unit weighs just 800 grams (28 ounces), so it doesn't load you down during a long day. It doesn't load down the battery, either. Using less than 1 Watt, the battery lasts for a full 8-hour work day without recharging.

Data storage flexibility

The TSC1 data collector comes with 2MB of internal data storage—enough for storing over 6,000 topographic survey points. It also supports removable PC data cards (PCMCIA format) for virtually unlimited datalogging and fast data download and exchange.

PC data cards do not just store points; they store the entire job in a single Job file. The Job file contains all points, lines, areas, attributes, full horizontal and vertical road alignments, Digital Terrain Models (DTMs) in Grid or Triangulated Irregular Network (TIN) form,



QA/QC data and calibration data. You can carry the entire survey from one field instrument to the other or back to your office computer for final processing.

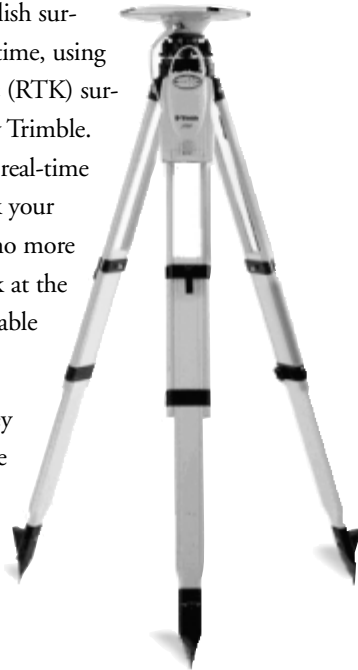
CONTROL

Trimble Survey Controller software makes establishing control for your survey easier than ever, with built-in features that eliminate guesswork, lead you straight through the process, and save you time at every step.

Real-time control points

Now you can establish survey control in real-time, using real-time kinematic (RTK) surveying, invented by Trimble. Doing the work in real-time allows you to check your data in the field—no more postprocessing back at the office before being able to check your data.

The Trimble Survey Controller software provides several ways of checking your data when doing real-time control:



Duplicate points tolerance checking. Later in the survey you can re-survey the control point. This gives you an independent check on your previous measurement and shows that the results are within your specified tolerance.

Mean observations. Trimble Survey Controller software allows you to save multiple observations to the same point name. Then, back in the office, you can take the mean of these observations and get better overall results.

Resection

The Trimble Survey Controller software uses a powerful least-squares algorithm to calculate resections. You get the best answer in the field from combinations of angles and distance measurements to establish points.

Resection			
Point	H.Resid	V.Resid	Use
103	0.003m	0.001m	H,V
101	0.002m	0.000m	H,V
107	0.001m	0.000m	H,V

HA=42°04'38"
VA=86°33'02"
0.000

Add Results Delete

Calibration

You can use Trimble Survey Controller software to apply a calibration before staking out points or computing offset or intersection points.

The solution will adjust the projected (grid) coordinates to fit the local control. And you're in complete control—you can either key in a calibration or let the system calculate it for you.

Site calibration			
Point	H.Resid	V.Resid	Use
SS775	0.004m	0.000m	H,V
SS776	0.005m	0.000m	H,V
Nail B	0.006m	0.000m	H,V
Nail A	0.005m	0.000m	H,V

H=0.007m V=0.009m
1.200 RTK=Fixed RMS=9

Add Delete Results Apply Options

Surveying in grid and ground

The Trimble Survey Controller software allows you to convert your grid coordinates to ground coordinates, making it easier for you to work in some job locations. Distances computed between points will equal those on the ground, so you can check that your data is correct while still in the field.

No projection/no datum	
Site calibration	
Coordinates:	<input checked="" type="radio"/> Ground
Reference elevation:	<input type="checkbox"/> G
Use geoid model:	<input checked="" type="radio"/> No

OK

TOPOGRAPHIC SURVEYS

Trimble Survey Controller software provides a complete set of topographic survey tools, including the ability to switch easily between GPS surveying instruments and total stations.

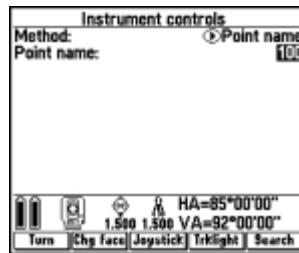
Seamless conventional and RTK surveying

Now you can switch seamlessly between a GPS survey and a robotic survey by having everything you need on one pole: the GPS antenna, prism, radio and the data collector—and all the data in one single Job file! For example, when surveying under a bridge, you can switch from GPS to a conventional survey in the same Job file and continue work without going back to the instrument.

Total Trimble instrument control

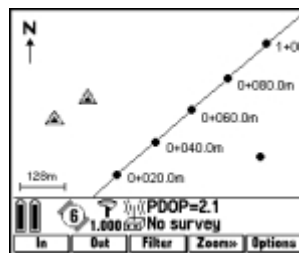
Several new capabilities enhance your control of the instrument and save you time throughout the job.

- When you need to make readings on both faces when performing multiple rounds of observations, **changing face** is as easy as pushing a button.
- The TSC1 data collector can operate the robotic total station remotely through the radio communication supplied with the robotic instrument—ideal for one-person surveying.
- **Enhanced search region** functionality makes searching for the prism quicker and more efficient. Just point the instrument in the direction of the target and it will locate and lock on to the target.
- Now you can set the **tracklight intensity** at any time while connected to the instrument. You can save battery power by only having the tracklight on when you need it, as it is easy to turn on and off while performing robotic or servo-type surveys.



Real-time continuous kinematic surveying

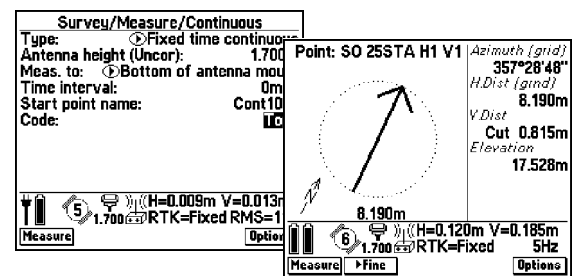
Continuous RTK surveying is surveying on the fly—surveying without stopping. You can plot a continuous line, even a topo map, simply by walking or driving over the ter-



rain and recording a point at a user-defined time or distance; for example: each second or each meter. You can create up to two offsets, horizontal and vertical, with feature codes. This type of surveying is for fast applications—you can pause and restart with one button push, without reinitializing.

Smooth multitasking

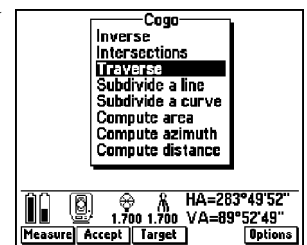
True multitasking capability increases field productivity by allowing you to perform up to nine separate functions at the same time. Unlike other data collectors, you don't have to key your way through several screens to move between tasks;



just run them all at once! For example, you can continuously log topo measurements to the Job file and stake out a route line simultaneously—no need to flag out the line first—cutting the time required on site by up to half.

COGO and in-field calculator

You can calculate inverses and intersections, compute a traverse, calculate distances and azimuths between points, compute areas, create and subdivide lines and curves, and even edit road designs—all in the field! The capability is built-in—you don't need a separate calculator. You can even enter values with different units and the software will output the answers in the correct system units.



Job review

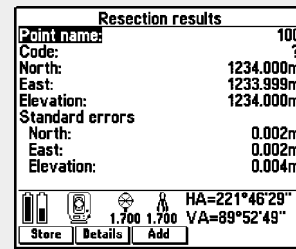
The Review Job feature gives you access to a complete and detailed record of everything that happened in the field—a real electronic field book! It also allows quick and easy editing of data; for example, changing an incorrectly entered antenna height or feature code. When changes are made, they are automatically applied to all affected points.

SURVEYING WITH THE TRIMBLE SURVEY CONTROLLER SOFTWARE

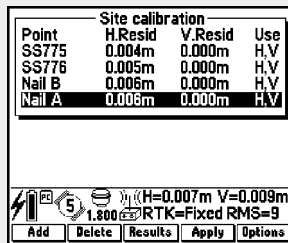
1. Start the survey with GPS using the Survey Style.



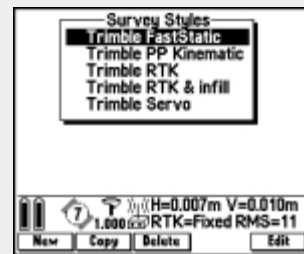
5. Determine the conventional total station position by resection from GPS points already observed.



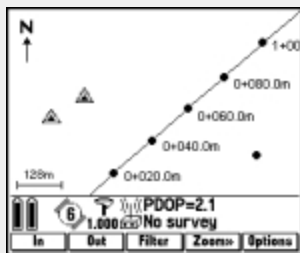
2. Carry out an automatic calibration on known control points.



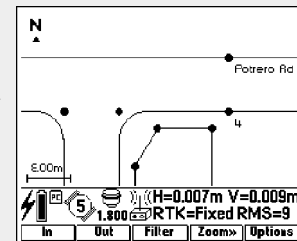
6. Switch back to GPS to pick up some levels by continuous kinematic from a moving vehicle.



3. Survey some features using GPS.



7. Check the in-field map for any missed areas in the survey before leaving the site.



4. Switch to conventional total station to fill in some gaps—without ending the job.



8. Download directly to Trimble Geomatics Office™ software for processing and QA. Users of AutoCAD Land Development Desktop or Terramodel software can import the survey model directly from the survey controller for design.

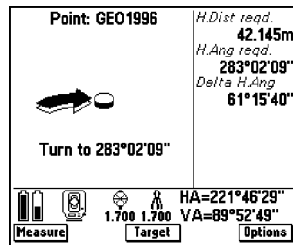


STAKEOUT

The Trimble Survey Controller software gives you unbeatable stakeout capabilities. The graphical stakeout screens get you to each point quickly and easily for all your construction and roading projects.

Graphical stakeout

The powerful graphical and text stakeout screen makes it fast and easy to stake out points, lines, curves, slopes, roads, and surfaces with a total station. You can use either the text on the right of the screen or the graphical display on the left to navigate to the point. The large arrows get you to the stakeout point with ease.



And staking out with a robotic total station has never been easier! When the instrument has locked on to the target, the continuous stakeout tracking in the graphical screen updates your target position in real-time.

Construction offsets

When staking out roads, lines or curves, you have the capability to stake out an offset from your point. You can apply a horizontal offset, or extend a grade from previous elements. This is especially useful in a construction environment. For example, if you are staking out a point where the bulldozer needs to cut, offsetting the stake from the path of the dozer keeps it out of harm's way.

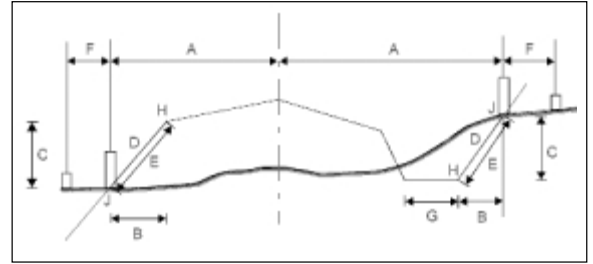


Report position on road/real-time quality control

The ability to put the pole down anywhere on site and see an instantaneous grid position, station, offset and cut/fill report is a great tool for checking stakes in record time. Just put the pole down on the stake and see if it is where it says it is! It's great for making spot checks on points, grades, and earthworks progress.

Catch points

Now you can find and stake the points where the design surface and the existing surface intersect much more easily and accurately. This can be done from an existing ground and design digital terrain models (DTMs) in Trimble Geomatics Office software, or you can do it on site in real-time.



Custom road reports

Record the as-staked position in the field for every point staked with the touch of a button. Just click on the field staked points icon in Trimble Geomatics Office software for instant, as-staked point properties. You can instantly generate quality control reports of as-staked positions, design positions, cut sheet reports, story boards and catch points—all generated from the field data.

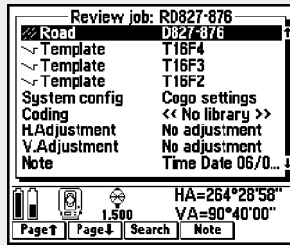


Stake out 3D design surface

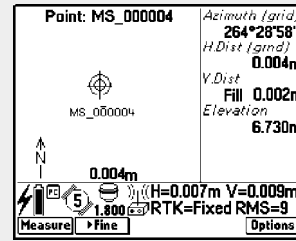
Trimble Survey Controller software gives you the capability to load a TIN or gridded DTM file and stake out the cut/fill values.

STAKING OUT WITH THE TRIMBLE SURVEY CONTROLLER SOFTWARE

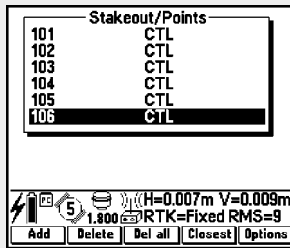
1. Upload design data from the Trimble Geomatics Office software.



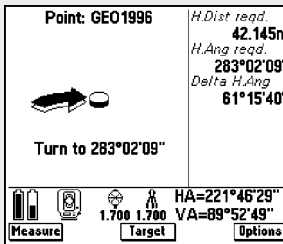
5. Right on target! Hit Measure to record the as-staked position for a QC check.



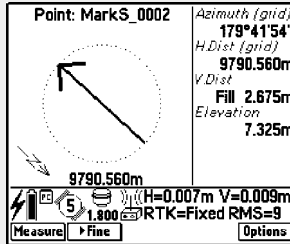
2. Select point to stake out—or automatically select the closest stakeout point.



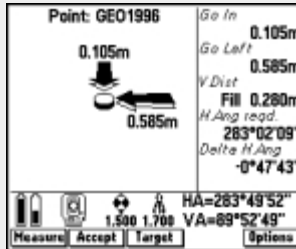
6. Switch to a total station and the large, clear graphical display shows which way to turn to the correct bearing.



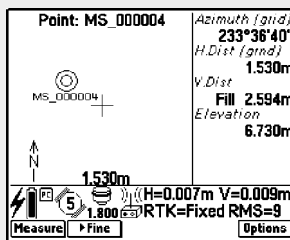
3. Just walk and follow the compass arrow to head for the point—and see it respond in a fraction of a second when you change direction.



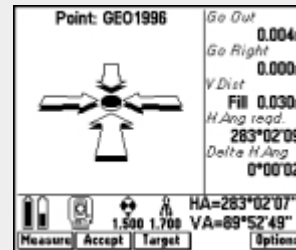
7. Once the rod person is on line, simple graphical displays show how far to go forward or back.



4. See the screen switch to a cross and bullseye when the stakeout point is within a few feet or a couple of meters.



8. Right on the point! Check the as-staked point and move on to the next point, or line, or curve, or road, or even stake out a DTM.

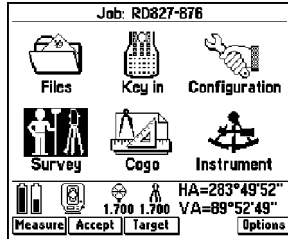


HOWEVER YOU USE IT, IT'S EASY TO USE!

Right from the start and throughout the job, you're never in doubt as to what to do and how to do it. The Trimble Survey Controller software helps you get it done fast—and right!

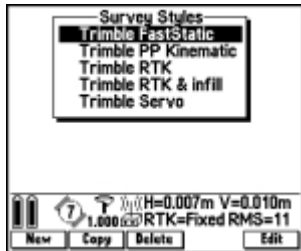
It's easy right from the start

The large, clear graphic display lets you choose your tasks and do your work with easy-to-see and understand graphic symbols. Just select the type of activity you want from the Main menu and start working. The current status of critical system functions and vital Quality Control (QC) data is always displayed.



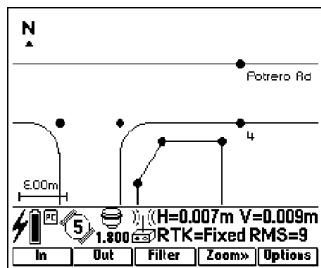
Easy one-time configuration using Survey Styles

Survey Styles enable you to configure all parameters in your Trimble Survey Controller software just once for each type of survey you do and each type of survey equipment you use.



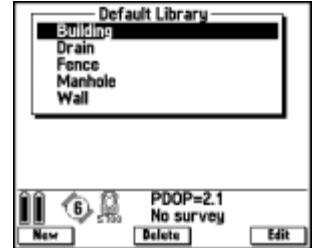
In-field real-time map display

The current job map shows you all the points, lines, curves and roads in the database in real-time. The map automatically pans to the current GPS position. Zoom and Filter functions let you view the data at different scales and choose which feature sets or observation types are displayed. New survey points are plotted as they are collected. You can spot any gaps in the survey while you're still on-site, rather than after the data is downloaded in the office.



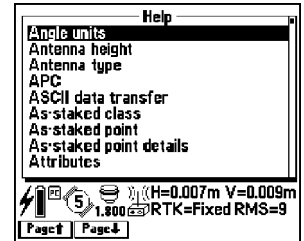
Feature coding and GIS data collection

Powerful survey feature coding capabilities reduce or even eliminate postprocessing and data-editing time and errors in the office. Feature code libraries can be customized so you can continue to use code names that you are familiar with. For high-precision GIS surveys, user-defined Data Dictionaries simplify the most demanding and complex field attribute collection requirements.



Help is just a click away

Have a question or need some guidance? Just press the **HELP** key to instantly display the comprehensive on-line Help index. You get the information you need fast and in your preferred language.



EXTRA CAPABILITIES

With support for radio and cellular communications links, virtual reference station systems, multiple RTK base stations, and upcoming DGPS services around the world, the Trimble Survey Controller software puts you out front—and keeps you there!

Mobile cellular telephone support

Now you can use digital cellular phones or cellular digital packet data (CDPD) modems in lieu of radio modems for the RTK data link between the reference and rover receivers. Direct configuration using the Trimble Survey Controller software makes cellular support quick and easy to set up. Using a cellular link removes the need for licensing.



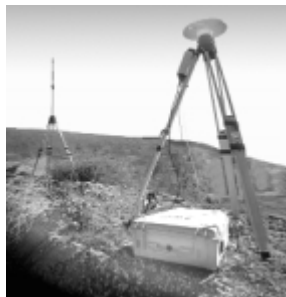
eRTK technology covers a wider area

Trimble's new extended RTK (eRTK™) technology utilizes both GPS L1 and L2 frequencies for extended range and increased coverage.

Trimble eRTK technology gives you a choice of scaleable reference infra-

structures: single base, multibase TDMA, or Virtual Reference Stations (VRS™). **Single-base eRTK** provides up to four times the coverage of conventional RTK, and one base can serve an unlimited number of rovers within the coverage area.

For wider areas, use Trimble **multibase eRTK** technology to take advantage of the precise time synchronization of GPS and operate up to four base stations, all on a single radio frequency in the same area without interfering with each other. This provides a much wider area of RTK coverage than just a single reference station can handle. The receivers can rove around the whole coverage area, switching between reference stations without ever having to change radio frequency. This particularly benefits users who can use only one radio frequency, or operate in areas where a large num-



ber of users are using a limited number of channels in close proximity to each other.¹

Virtual Reference Station (VRS) eRTK. For even wider area coverage, a VRS eRTK network can cover a city, a county or even a country with the high-accuracy, high-performance real-time positioning capability. Multiple roving units can dial into one RTK correction data provider using a two-way communications system such as a cellular modem. All RTK measurements within the VRS network are consistent with each other and with the network stations. Now you can do RTK surveying without needing your own base receiver.

Radio configuration

The software communicates with Trimble and selected third-party radio modems that are connected to the GPS receiver. This allows you to configure the radio in the field quickly and conveniently and eliminates the need to connect the radio to the PC. Changes to the radio frequency and radio mode of operation can be made directly from the Trimble Survey Controller software in the field.²

WAAS, EGNOS and MSAS-ready

The Wide Area Augmentation System (WAAS), European Global Navigation Overlay Service (EGNOS), and Multifunctional Transport Satellite Space-Based Augmentation System (MSAS) are planned, free-access DGPS services for North America, Western Europe and Japan, respectively. The combination of WAAS or EGNOS or MSAS with GPS delivers a more accurate position than standalone GPS, even with selective availability (SA) now turned off.

The software supports the use of these services when connected to a WAAS-ready Trimble GPS receiver.³ You can now start your RTK base station on an unknown point by collecting a sub-meter position rather than an autonomous position, thus eliminating PPM errors. You can use WAAS/EGNOS/MSAS positions to help locate buried control points, establish a base, or do a differential survey.

1 This feature may require certain Trimble GPS and/or radio modem hardware and firmware versions—contact your Trimble dealer or representative for details.

2 Prior to operating a radio modem, users must obtain frequency licenses as required by the country-of-use.

3 Support is dependent on the operational status of these augmentation systems.

CONCLUSION—TRIMBLE SURVEY CONTROLLER

Today's land surveyors and engineers demand productivity, flexibility and quality. The Trimble Survey Controller software is the most advanced field data capture solution ever created to meet those demands. As a significant component of the Trimble Toolbox, it provides:

- **Integrated surveying** with Trimble GPS and conventional and most major optical and robotic surveying instruments and laser rangefinders
- **Seamless data flow** between a variety of instruments in a single Job file with easy export/import to office software systems,
- **Powerful features** that make every job faster, easier, and better, and
- **High-resolution graphical** display for visual feedback for all aspects of your work.

With no add-ons, hidden optional extras or upgrades necessary, the Trimble Survey Controller software is the complete solution. If you want to reap the productivity and competitive benefits gained from being on the cutting edge of technology, the Trimble Survey Controller software is the only solution.

For more information, contact your nearest Trimble Distributor or Trimble Office shown below.

Visitors are always welcome to the Trimble web site at <http://www.trimble.com>

TSC1 DATA CONTROLLER TECHNICAL CHARACTERISTICS

Size: 266 mm x 116 mm x 42 mm (10.5" x 4.6" x 1.65")
75 mm (3") at handgrip

Weight: 800 g (28 oz.) including rechargeable lithium ion battery

Power

Internal: Lithium ion rechargeable battery (supplied) or standard 9-volt alkaline or lithium batteries

External: 10 to 20 VDC supplied to either serial port connector

Power consumption: Less than 1 W

Memory: 2MB available flash data storage; memory extension through user-accessible, industry standard type II PCMCIA card slot

Communications: 2 RS-232 serial ports, up to 38,400 baud

Display: 240 x 200 extended temperature graphics STN LCD display with integral backlight

Keyboard: 54 keys with alphanumeric, function, and softkey entry

Temperature:

Operating: -30°C to +65°C (-22°F to +149°F)

Storage: -30°C to +80°C (-22°F to +176°F)

Humidity: 100%, fully sealed, buoyant

Water resistance: Waterproof against accidental immersion. Wind-driven rain and dust to Mil Spec 810E

Shock: Withstands 1.5-meter drop on hard surface

Certification: FCC class B and CE Mark approval

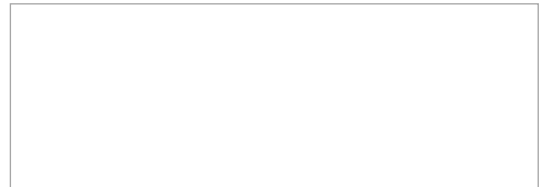
Languages: English, Spanish, German, French, Portuguese, Chinese (Simplified), Japanese and Korean



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Your Local Trimble Office or Representative