SURVEY PRO WITH TSX TECHNICAL NOTES

Survey Pro™ software from TDS is the data collection solution of choice for most North American surveyors[1]. And with the addition of the Trimble® TSX (Trimble Systems Extension) module, Survey Pro offers unique and powerful support for Trimble GPS and optical sensors.

Survey Pro offers a complete set of capabilities for all survey projects—it's fast, reliable and easy to use, so you and your crew can work more productively in the field.

Survey Pro is designed to support optical and GPS sensors by all leading manufacturers. Additionally, with the Trimble Systems Extension (TSX) module, Survey Pro leverages the unique capabilities and features of Trimble sensors providing a powerful solution when used with the Trimble® S6 Total Station and Trimble® R8 GPS System.

Run Survey Pro on any of Trimble's rugged, field-proven platforms, such as the Trimble® TSC2™, Trimble® Recon™, or Trimble® CU Controller. These controllers were designed to support Survey Pro, so they optimally support all its functions. Using any of these industry leading controllers, you can quickly and easily access all of Survey Pro's powerful capabilities.

Survey Pro is an important component of the Trimble® Integrated Surveying™ solution. Experience the convenience and efficiency of using one field software running on one controller to collect GPS or conventional data. When you are finished in the field, easily upload collected GPS or optical data from the controller into your Trimble office software for processing.

SURVEY PRO FIELD SOFTWARE: ALL THE TOOLS YOU NEED TO DO THE JOB RIGHT

Seamless Optical and GPS Surveying

Configure your systems for seamless operation between GPS and optical surveying. Using the Survey Pro Instrument Manager, uniquely identify your GPS and optical instruments, allowing you to quickly switch between systems depending upon job requirements. Use the Survey Pro Smart Targets manager to define and recall targets as equipment resources change – and maintain data consistency between systems using the same job file.

Standard Surveying Tasks Made Simple

Survey Pro gives you comprehensive tools to collect, edit, and organize your survey data, simplifying standard survey tasks. Whatever type of surveying you do, you can do it with Survey Pro.

Survey Pro survey functions are designed to simplify complex survey functions and help you get survey jobs done faster and easier.

1 Business News Publishing Company, "Surveying and Mapping Industry Study," 1995-2003. Includes TDS software sold by dealers and TDS partner companies.

Trimble®

TSX (TRIMBLE SYSTEMS EXTENSION): UNIQUE ADVANTAGES FOR TRIMBLE SYSTEM USERS

The Trimble Systems Extension module offers customers with Trimble systems access to unique functions.

Trimble GPS Systems

TSX makes the Survey Pro software even more powerful when used with a Trimble GPS system. TSX provides access to the Trimble geodetic engine which provides additional functionality such as access to a wide range of coordinate systems, multipoint GPS localization or "site calibration", and data transfer between Trimble field and office systems:

Functionality	TSX Unique Advantage
Mapping plane calibration (localization)	Calibration using a universal Trimble controller geodetic engine. Any number of control points. Translation, scale, and rotation.
Geoid model calibrations	Any number of control points. Inclined plane adjustment combined with geoid model.
GPS and conventional raw data converted to a .dc file	Using Trimble Geomatics Office™ software you can import TDS Survey Pro RTK vectors when collected using TSX.
Trimble Coordinate System Database (.csd) file. (zones and projections, datum transformations, ellipsoids)	Supports all worldwide coordinate systems in the .csd file, e.g., U.S. State Plane NAD 27 and 83 and many other published worldwide systems.
COGO functionality	Full range of TDS COGO functionality.

Trimble Optical Systems

Survey Pro with TSX provides full support for the new Trimble S6 Total Station in addition to performance enhancements to the Trimble optical families. This includes:

Functionality	Unique Advantage
GeoLock	Using a patented Trimble technique, Survey Pro provides a GPS augmented target search option at the rod for enhanced "super search" capability.
Trimble Direct Connect	Provides the following enhancements when used with Trimble 5600-series robotic total station: Access menu features more quickly from the instrument. Provides support for remote radio connections without having to connect to the instrument, resulting in faster system setup.
Smart Target Active Prism Definitions	Provides "Smart Target" definitions for Trimble active and passive prisms. When two smart target definitions are configured with active settings, this automatically triggers Survey Pro for a Face 2 repetition shot, without having to manually take the shot from the instrument.

TRIMBLE INTEGRATED SURVEYING SOLUTION

Survey Pro with TSX running on a Trimble controller empowers surveyors in the field with the original Trimble Integrated Surveying solution:

- Survey Pro with TSX interfaces with all your survey equipment: GPS and optical.
- Survey Pro with TSX supports the Trimble IS Rover, which integrates GPS and optical surveying techniques.
- Access software functions quickly through an easy-to-use touch screen interface with active, real time-map and base map display, multiple data output types, and full Microsoft® Windows® CE.NET or Pocket PC functionality.
- Quickly access frequently used functions via the"quick pick list" without exiting the current feature.
- Survey Pro with TSX provides Bluetooth® and 802.11b wireless communications; it also supports removable Secure Digital and CompactFlash storage media slots for cable-free operation and wireless data transfer.
- Use an IP-capable cellular modem and communicate via cellular and IP networks; access the Internet from the field and extend your options.
- Use fewer keystrokes via shortcuts between frequently used functions for faster job completion.
- Uniquely define instrument and target types for quicker setups and transition between sensors.
- Consolidate your field data into job files that easily transfer between systems in the field or to the office computer.
- View the software in color on state-of-the-art rugged field controllers.

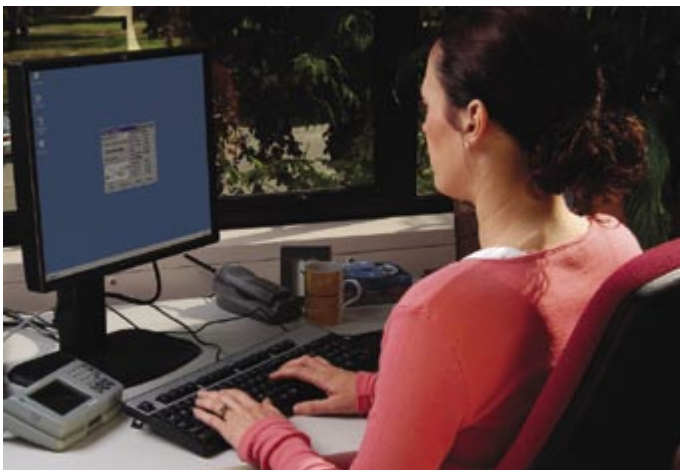
Survey Pro with TSX boosts your productivity, helping you complete more jobs, more efficiently.

Survey Pro provides all these extra Trimble advantages via the familiar and popular Survey Pro interface.

Survey Pro with TSX communicates with almost any instrument you use, including:

- Trimble R8/5800 and Trimble R7/5700 GPS systems
- The Trimble S6 Total Station
- Trimble optical families including the 5600, 5500, 3600, 3300, and 600M
- Trimble precison DiNi® digital levels
- Trimble controllers
- Laser rangefinders—several leading models
- Third-party GPS and optical total stations

Survey Pro stores all data collected in the field for the entire job on the controller for maximum convenience: all survey observations, points, lines, arcs, areas, attributes, road definitions, and localization data. Carry the entire survey from one field instrument to the other, or back to your office computer for final analysis.



Transfer Survey Pro Job files seamlessly to the office from the controller.

SURVEY PRO DATA COLLECTION FUNCTIONS

Surveying

Control Points and Coordinate Files

Survey Pro provides the necessary survey functions for you to establish control points for your survey. Survey Pro can import coordinate files from almost any office software package. Survey Pro supports coordinate file types such as comma delimited text and .csv files, LandXML, and standard Survey Pro job, coordinate, and GPS files. Share control point files with multiple crews by transferring files wirelessly in the field to individual crew members.

Instrument Setup, Traverse and Sideshots

Survey Pro makes it easy to set up the instrument and backsight and start collecting traverse and sideshot data. Survey Pro provides you with multiple instrument setup options from single point station setup to a single backsight to repetition shots and resection from unknown instrument setup point. Results are conveniently displayed in the field and stored within the job file, and Survey Pro prompts you to move the instrument to the next setup point.

The Auto Collect function makes conducting continuous topographic survey even faster when working in robotic mode, and when working with an instrument that has Direct Reflex (DR), use the Corner Angle and Corner Plane function to remotely measure hard to reach building corners or other remote angles and surfaces.

Site Localization

Prior to conducting a GPS survey, perform a site localization before staking out points and lines, to a DTM surface or computing offset lines and points. The site localization adjusts projected grid coordinates to fit the local control. Survey Pro gives you the flexibility to key in the site localization details or configure the software to solve it for you.

Save time when performing a real-time kinematic (RTK) GPS survey by configuring the receiver to store data for postprocessing and continuous, real-time data collection in one step.

Leveling

The Survey Pro Leveling module enables you to perform a level loop, a two-peg test using a Trimble precision level, or single-person trigonometric leveling when using a robotic total station.

Stakeout

Survey Pro provides stakeout tools to complete your stakeout tasks more efficiently. Using an active map view and interactive dialog, Survey Pro navigates you to the points you need to stake, when you need to stake them. Points are checked off as they are staked, preventing you from duplicate observations and making your time spent in the field more productive.

When performing stakeout, you can store cut sheet information. This observed information is stored in the raw data file and then utilized with office software, such as Trimble Geomatics Office, where it can be extracted in the form of a cut sheet report.

Stakeout DTM surfaces and use the data collected to compute volumes in the field. View the resultant DTM being staked in the field to determine where additional points might be needed. Survey Pro displays cut / fill information for any location on the DTM surface in real-time.

Quickly view DTM surfaces, edit surface points and breaklines, and compute live cut/fill volumes.

Feature Codes

Attribute collection: You can define features like "utility pole" and "water line" on your PC, then transfer attributes to your data collector. Survey Pro prompts you to choose features as you survey, saving time in the field.

COGO, Inverse, and Curves

The Survey Pro software provides powerful Coordinate Geometry (COGO), Inverse and Curve functions.

Survey Pro offers a full suite of COGO functions, enabling you to easily perform calculations between a known and new point, compute offset station, lines and alignments and points.

Survey Pro inverse functions allow you to quickly inverse to points, lines, polylines, and alignments, making it easy to verify point locations and offsets from existing as-staked features or linework created on the controller.

The Survey Pro Curve menu contains powerful curve functions that design and compute all aspects of a horizontal curve (including parabolic and spiral curves), display curve components, and assist in curve layout in the field.

Adjust

Survey Pro enables you to perform data adjustments in the field. Survey Pro adjustment routines allow you to adjust your data and review the results, prior to making any changes to the data that you have collected, enabling you to check your data prior to leaving the field.

Perform an angle or compass rule adjustment on a closed or open traverse. You can also translate, scale and rotate functions on groups of points.

Road Layout

Survey Pro uses road alignment defined in the Survey Pro job file or directly from a LandXML file. Key in and modify road layout information, then stake the road in the field. The road staking capabilities enable you to stake any part of the road or slope stake the road. Survey Pro makes defining a simple or complex road quick and easy by providing easy to follow menus that take you though the road definition and editing process.

Road Stakeout

Once your road has been uploaded or keyed in, Survey Pro provides a comprehensive set of road stakeout tools and graphical views, depending upon which element of the road you are staking out. Quickly edit and view the road definition in the field using the road editor. Template information defines the offsets that need to be staked, so they do not have to be manually entered in the field. Points can also be staked out to a predefined subgrade offset, depending upon the phase of the job you are working on.

Slope Staking

Simply define a direction to use for the slope to extend, and define the desired slope to stake. Survey Pro displays all shots on a vertical real-time map display so you can see the profile, and quickly locate and stake the catch point.

Slope staking routines provide a step-by-step method of defining and visually locating the main alignment, template definition, and stake subsequent stations. Then, view results and make edits in real time.

ADVANCED CAPABILITIES BOOST PRODUCTIVITY

Survey Pro is continually being improved with capabilities that make your job easier, help you work more productively, and help get the job done right. These enhanced capabilities include:

- Instrument Manager—Pre-configured settings allow you to communicate automatically with different instruments. The Survey Pro Instrument Manager makes it easy to pre-configure settings for total stations, GPS receivers, levels and other instruments. Simply enter your settings and choose your instrument—Survey Pro is immediately ready to work with it. And once settings are entered it's easy to switch back and forth between instruments. You can also copy your instrument profile to other data collectors so your crews arrive on the job, ready to work.

Use Instrument Manager to pre-configure settings for total stations, GPS systems, levels, and other instruments. Just activate the instrument you want to use, and Survey Pro is ready to work with it.

- Smart Targets—Configure target definitions to include rod height, prism offset and save the configuration. You can quickly recall and use any preconfigured target when necessary. Reflectorless operations are also supported.
- GeoLock™ technology—Fast, accurate remote aiming has now been enhanced with the ability to initiate a "super search" when the target is lost. Using a Trimble patented technique called GeoLock, Survey Pro can now perform a GPS assisted search for the target when the instrument loses lock. The instrument will turn to the prism, search and lock even if the instrument is pointing 180° away from the rod. GeoLock is exclusive to TSX.

A GeoLock button and a GPS satellite status icon have been added to the Remote Control screen, allowing simple access to setup, configuration and use of GeoLock during robotic surveying.

- GPS Start Survey Wizard—Make GPS connections easier. The Start Survey Wizard on Survey Pro GPS takes you through a streamlined GPS setup procedure. It's intuitive, and it helps ensure reliable GPS connections. You can start an RTK receiver and configure postprocessing data collection in one step. You can also store RTK raw data and postprocess raw data simultaneously. You can also bypass the Wizard if you want to continue making your GPS connections the way you're used to.
- IP Modem Support—Survey Pro supports IP modems for internet connections to remote GPS bases for long range RTK surveying.
- Cellular RTK Surveying – Survey Pro has support for a wide range of cell phone handsets to be used for cellular RTK survey communications, including the Trimble R8 with internal GSM module.
- Quick Pick List—Create shortcuts for common routines in the field. Use Survey Pro to create a Quick Pick List with shortcuts for the functions and routines you use most frequently.

Quick Pick lists let you create shortcuts for the functions and routines you use frequently.

- Basemaps—Reference maps help you identify staking points. Basemaps let you use a drawing or graphic as a reference background for a map, making it easier to identify landmarks and staking points. You can import Basemaps in both GeoTIFF and DXF file formats.

Basemaps let you import a drawing or image, such as an aerial photo of the survey site. Use the basemaps as an extra reference to assist when staking points or identifying landmarks.

- Import and export points, lines, and alignments—Survey Pro allows you to work with LandXML files on your controller, eliminating repetitive or manual input. You can import and export points, alignments, polylines and parcels. Point, line, alignment groups and feature attributes can also be imported from a LandXML file.

CONCLUSION

Survey Pro is designed by professionals who understand your business. And Survey Pro with TSX is continually being enhanced thanks to input from surveyors in the field. Trimble understands how even a small change to an existing function can help you be more productive, or make your job easier.

Survey Pro with TSX contains features and functions to make your workflow faster and more efficient.

Survey Pro Configurations

- SURVEY PRO TS shares all Survey Pro functions, works with the Trimble S6 Total Station and optical families in addition to many third-party brands of robotic total stations.

- SURVEY PRO IS is the ultimate field software. It integrates Survey Pro robotics and GPS support, enabling you to use the same job files with both GPS receivers and total stations.

- TSX (TRIMBLE SYSTEMS EXTENSION) contains unique features for use with Trimble GPS and optical systems: Trimble geodetics used in selected coordinate systems, GPS site calibrations, ground coordinates, and data transfer between field and office systems. The Trimble Systems Extension is provided as standard with every Survey Pro TS and IS system.

- SURVEY PRO LEVELING provides support for Trimble precision levels and single-person trigonometric leveling when used with a Trimble robotic total station. Survey Pro Leveling is provided separately as an add-on to any Survey Pro TS or IS system.

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