

RTK productivity improves when the base station is close to the rover. In technical terms, searching for “integer ambiguity” and having a correct “fixed solution” becomes much more reliable, much faster and more accurate, especially in more difficult areas with foliage, multipath, and obstructed satellites.

RTN and VRS systems provide a “virtual” base station near you, but this does not mean that the “virtual” base station is a “real” base station that eliminates the integer ambiguity problem. The difficulties of obtaining a fixed solution is still related to the nearest actual base station to your location.

There are two problems with depending on your own base station near your rover working area. The following are explanations of both and solutions:

First is the financial investment in an additional receiver. In fact, having a separate base station can be less costly, because it eliminates the need to pay for RTN services and communication costs. JAVAD GNSS offers a complete base/rover system (including J-Field, our state of the art controller software) for around \$20K. In addition, the system includes “Base/Rover Setup” which can be used to painlessly configure the base and rover in about one minute. Another financial benefit is that productivity increases and more points per hour can be gathered: get a fixed solution and collect a point in seconds rather than minutes, particularly in difficult areas. Also, it eliminates the need to re-observe a point.

Second, the user may not have a known point to set the base station on, or lack confidence in the coordinates of the point. JAVAD GNSS has solved this problem reliably and automatically by offering “Verified-Base RTK” (VB-RTK). It is automatic, reliable, faster, less expensive, and it is traceable. Of course, the system can be used with RTN networks, too. It works much better than RTN, because usually the nearest actual “real” base station is many miles away, while a user can set up a base station near the RTK work area, usually less than a mile away.

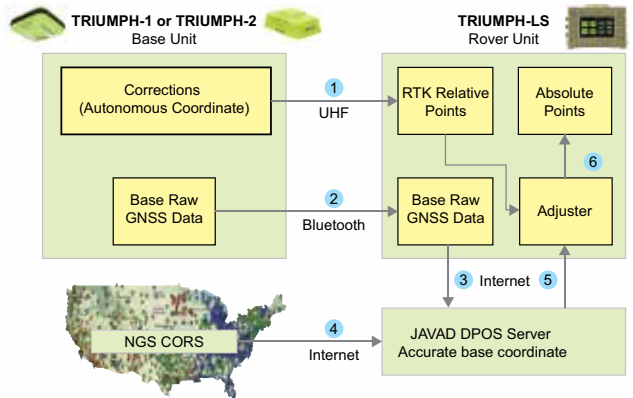
VB-RTK records raw GNSS data at the base station while transmitting corrections to rover. At

the end of work, the user returns to the base and again connects to it with the TRIUMPH-LS rover and stops the base. The rover then downloads the raw data from the base. The base station’s raw data is then sent to our own DPOS (Javad Data Processing Online Service) and processed to NGS CORS data. The results are then returned to the TRIUMPH-LS rover. The coordinates from DPOS are compared against the base coordinates used for all RTK points collected from that particular base session and then (upon the user’s confirmation) the RTK rover points are translated. All these steps are done automatically.

VB-RTK is useful even in situations in which the base was setup on a known point as the processed DPOS results can be compared against the known point coordinates to prove the base was setup on the right monument, that the point had not been damaged, that the coordinates were properly entered, that the instrument height was correct, etc.

VB-RTK also corrects for base antenna height.

As a separate note: Our Auto-Verify RTK system will never give a wrong fix without a clear warning. We are offering **\$10,000** to any US PLS who can prove otherwise and show even one bad fix without a clear warning.



You do **1**, the rest is automatic

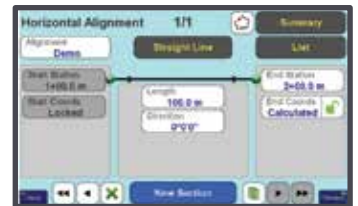
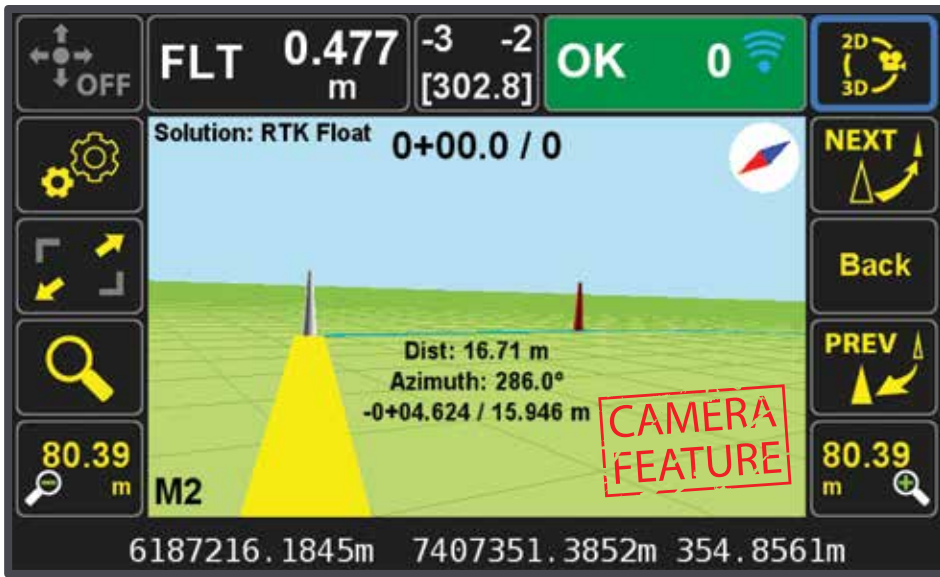
In the issue

▶ **New Photogrammetry**
Get about 2 cm accuracy with TRIUMPH-LS

▶ **Angle Measurement**
Quickly measure angles with TRIUMPH-LS

▶ **Letter from Kelly**





Store and Stake

Introducing GUIDE data collection in the TRIUMPH-LS. Visual Stake-out, navigation, six parallel RTK engines, over 3,000 coordinate conversions, advanced CoGo features, rich attribute tagging on a high resolution, large, bright 800x480 pixel display.

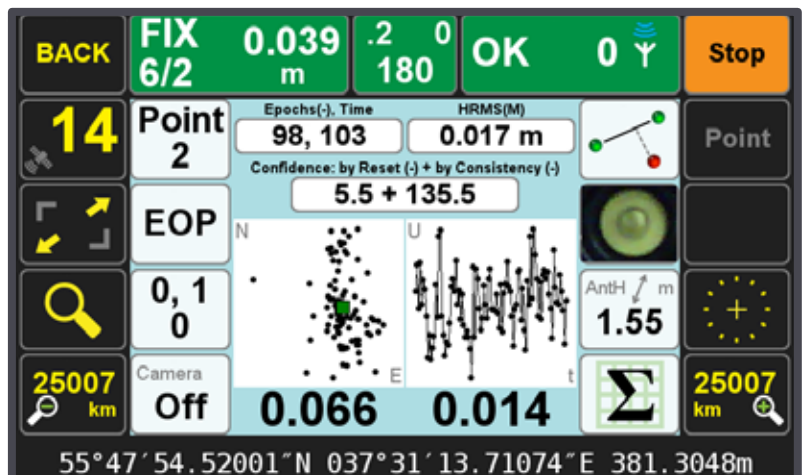
Versatile attribute tagging, feature coding and automatic photo and voice documentation.

The TRIUMPH-LS automatically updates all firmware when connected to a Wi-Fi internet connection.

View and Document your level

The downward camera of TRIUMPH-LS scans and finds the liquid bubble level mounted on the pole. Then focuses on the circular bubble automatically and shows its image on one of the eight white buttons of the Action Screen. You can:

- View the liquid bubble level on the screen.
- Document survey details including the leveling by taking automatic screen shots of the Action Screen, as shown here.
- Calibrate the electronic level of TRIUMPH-LS with the liquid bubble level for use in Lift and Tilt and automatic tilt corrections.



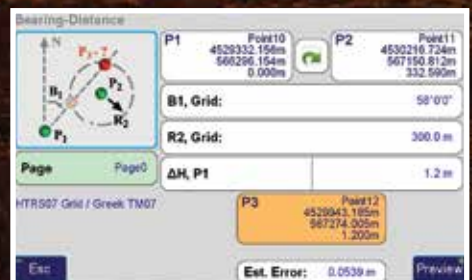
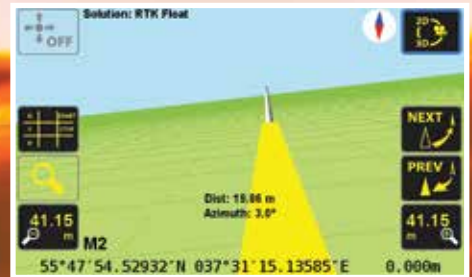
All these camera features are possible only in TRIUMPH-LS where camera, and GNSS antenna are co-located and all other modules integrated.

TRIUMPH-LS

Receiver+Antenna+Radio Modem+Controller+Pole



- 864 Channels for all GNSS signals
- 24 Hours Battery Life
- Interference monitoring of all GNSS and UHF channels
- Visual Stake out
- Lift & Tilt
- 6 parallel RTK engines

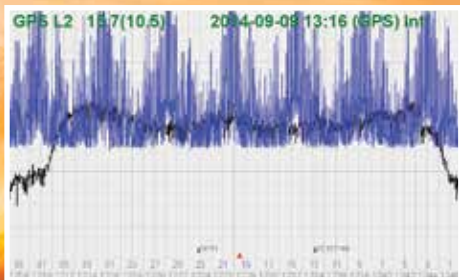


TRIUMPH-NT

Receiver+Radio Modem+Controller+Pole

Similar to TRIUMPH-LS but without integrated GNSS antenna.

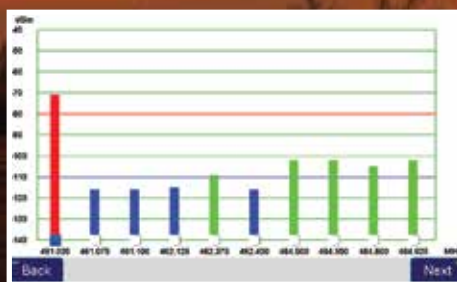
TRIUMPH-NT and GrAnt antenna makes a complete RTK system.



Built-in GNSS Spectrum Analyzer
to detect interference in all GNSS bands.



TRIUMPH-NT + GrAnt



Built-in UHF Scanner

In certain areas, the UHF airwaves may be congested and if your corrections are being broadcast at the same frequency as another surveyor is using, there may be erratic communications.

Built-in UHF Scanner shows condition of each UHF band.

Victor-LS

The Rugged Field Controller



Victor-LS is a rugged field controller. It runs J-Field and can be used with TRIUMPH-1 and TRIUMPH-2.

Base	Geo	55°54'01.30723"N	037°23'50.26652"E	244.461m
	GRID	26021.015m	-6423.657m	244.191m
Rover	Geo	55°47'52.87472"N	037°31'20.76734"E	366.064m
	GRID	14623.098m	1406.924m	365.916m
Dir:	325°38'37"	Dist:13828.612m	ΔH:-121.603m	
FIX:5	Sats:7+5			
HRMS:0.088m	VRMS:0.010m	RMS:0.013m		
HDOP:0.988	VDOP:1.319	PDOP:1.648		
TDOP:1.082	GDOP:1.972			
95% Confidence Ellipse				
σ _x :0.014m	σ _y :0.013m			
σ _z :33°47'16"	σ _h :0.020m			
Esc.				



TRIUMPH-1M + Victor-LS



TRIUMPH-2 + Victor-LS

OMEGA

Rugged GNSS Unit



OMEGA + Victor-LS + GrAnt

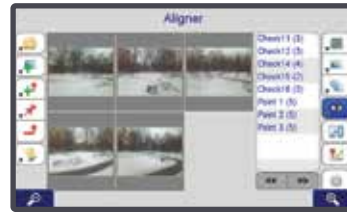
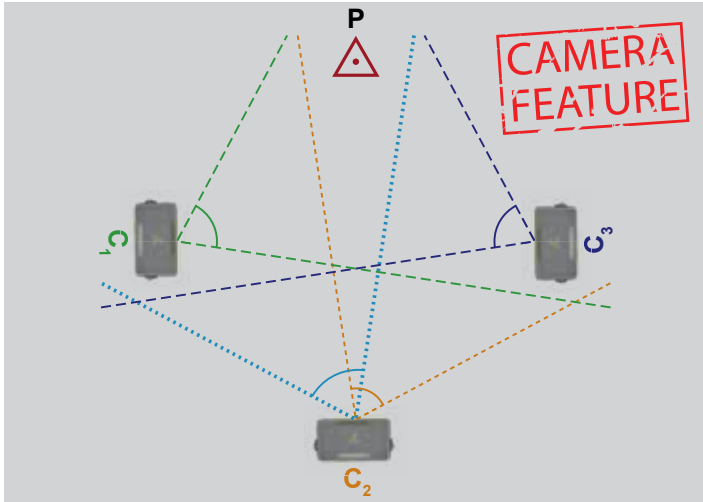
OMEGA is the most advanced GNSS receiver. It does not include integrated antenna and controller. It is suited for applications like **machine control** and in **marine** and **avionics** applications.

Adding GrAnt and Victor-LS makes a complete RTK system.

It is well suited for **monitoring** and **network stations**.

Offset Survey with built in camera

You can survey points with internal TRIUMPH-LS camera with accuracy of about 2 cm. Take pictures from at least three points. Leave a flag on points that you take pictures from, otherwise accuracy will be about 10 cm.

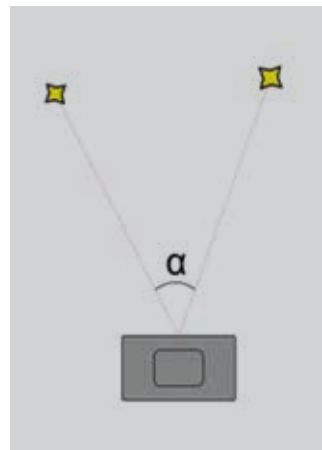


Visual Angle Measurement with Triumph LS

The new Visual Angle Measurement function of the TRIUMPH-LS allows measuring angles between points by using photos taken by the TRIUMPH-LS camera and use in CoGo tasks with the Accuracy of about 10 angular minutes.

To measure an angle:

- just take an image containing both objects of interest and open it in the Measure Angle screen
- select first and second point (using zoom to focus on necessary features)
- The angle between points is immediately displayed on the screen.



From:

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Without question, the Triumph-LS is the most mind-blowing piece of technology that I have ever held in my hands and being able to work with it is the highlight of my 40-year career in land surveying. Intertwined and commensurate with that highlight has also been the incredible honor and privilege in working with Javad Ashjaee, his amazing Moscow-based team of scientists and engineers, as well as some of the brightest surveyors in the United States, all in the shaping of the Triumph-LS and its graphical user interface, J-Field.

There are so many features of the Triumph-LS worth highlighting, it's difficult to know where to start; from the built-in frequency scanners for both UHF interference and GNSS interference, the automated shifting of project coordinates after the base file has

been submitted to DPOS (Javad's own version of OPUS for .jps files) and its adjustment received – all being done by J-Field, or to start by mentioning Visual Stakeout using J-Field's unique and way cool Guide feature. The ability to locate objects using photogrammetric methods is another exciting tool included in J-Field's extensive tool-set.

Being a person that has always gravitated to understanding things visually, J-Field's approach and graphical displays has aided my transition from strictly being an L1 guy for more than a dozen years; (6) ProMark2 Ashtech¹ receivers, to finally get with today's surveying using RTK. Of course, the Triumph-LS's very competitive price point also made this transition possible.



Shown here is just one example of the visual presentation of information given the surveyor. It includes being able to see at a glance the image of the rod bubble beneath the instrument's second camera and the textual display of Triumph-LS's internal pitch and roll values.

If I was limited to saying only one thing about the Triumph-LS that has impressed me the most, I'd have to say that it doesn't have anything to do with technology whatsoever. It has to do with a GNSS manufacturer that has so openly embraced the surveying profession during the development of a specific product, and most notably, professional land surveyors in the United States. As a matter of policy, Javad GNSS users are encouraged to suggest improvements and new features to all Javad GNSS products. And nowhere is that policy reflected more clearly than in J-Field.

The Javad PLS Support Network is an other reflection of Javad GNSS's commitment to supporting the U.S. Professional Land Surveyor and

their use of Javad equipment. Composed of a core group of licensed professional land surveyors scattered across the United States, the so-called 5PLS members stand ready to assist by phone or email. The best method of support is actually using the website's support forum (<https://support.javad.com/index.php>) which serves not only as a portal to quickly getting answers to questions from all of the licensed land surveyors, Javad GNSS geodesists, scientists, engineers and even Javad Ashjaee himself, but also ever increasingly the support forum serves as a reference source and suggestion box.

¹ Ashtech was the first GNSS company that was founded by Javad Ashjaee.