



Test drive
TRIUMPH-LS

Virtual Roadshow

Test drive TRIUMPH-LS from the comfort of your home or office, 24/7 anywhere in the world.

Log on to any of our TRIUMPH-LS units and take control of the device. It is as real as sitting next to it and test-drive it.

This is another innovation that saves you time.

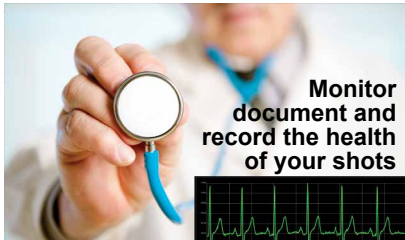


Make more **money** and have **fun** too >>>
Park, RTK, DPOS-It/Reverse-Shift-It

JAVAD

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Some Innovations and features that only we have

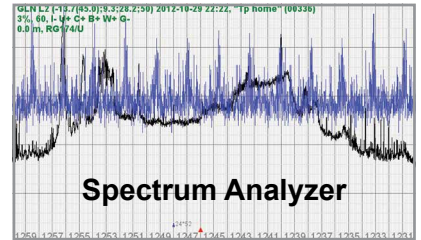


Monitor document and record the health of your shots

Verify, Monitor, record, present and defend your shots. TRIUMPH-LS has six different RTK engines and extensive automatic verification and notification systems to ensure that your shots are 100% reliable. Export results in PDF and HTML formats.



5 Hz BEAST MODE RTK resolves ambiguities up to 5 times faster. This is totally different from up to 100 Hz RTK that is done by extrapolating 1 Hz base data. In 5 Hz BEAST MODE RTK, base transmits correction data 5 times per second.



Spectrum Analyzer

Interference in the GNSS spectrum exists in many places. Monitor and avoid it with the TRIUMPH-LS. It shows the magnitude and characteristics of the interfering signals and their effect on the GNSS signals.



MULTIPATH BUSTERS

Multipath acts like a "ghost" signal and degrades the accuracy of your shots. We isolate multipath effects in both code and carrier phase measurements and remove them.



Make more money and have fun too

You don't need to setup your base over a know point. Mount your base on top of your car; park it near your job site and perform RTK survey. Then DPOS-It or Reverse-Shift-it (fast localization on any known point) to correct the RTK points for base offset.



One Complete Tool

Don't break out the Total Station! Complete the job with the TRIUMPH-LS only. The built in camera of the TRIUMPH-LS performs a variety of photogrammetry tasks. See the example of surveying a tall tower on www.javad.com



180-pound Gorilla Test

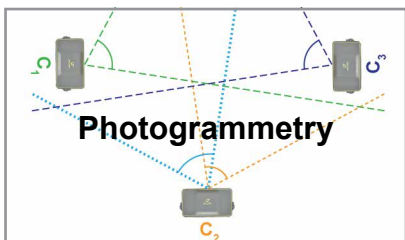
Highly rugged. Gorilla Tested, Surveyor Approved. Gorilla Test = 180 pounds of surveyor driving it into the pavement (Don't Try This at Home!). Also, check out our concrete drop test on www.javad.com



Bottom camera shows Double Bubble on the screen and documents it. Also, you can use these physical bubbles to calibrate the built-in electronic tilt sensors. You don't need to level the rod, tilt sensors and compass automatically compensate for tilts.

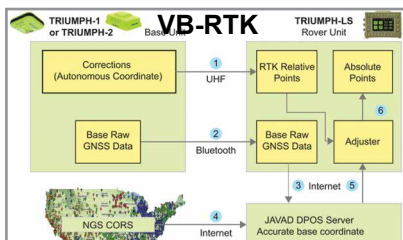


Don't Look! Don't Touch! Survey with Lift&Tilt. Survey starts with you lift the pole (within 5 degrees) and keep it steady for 3 seconds. Survey stops when you tilt it more than 15 degrees. Repeat the process and survey points quickly.

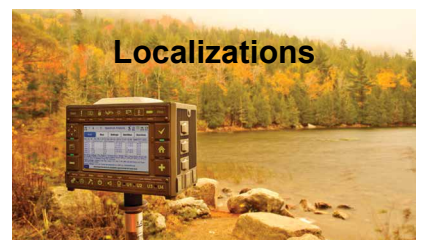


Photogrammetry

You can survey points that you or GNSS signals can't reach. Camera Offset Survey (Photogrammetry in the box) with the internal forward facing camera of the TRIUMPH-LS.



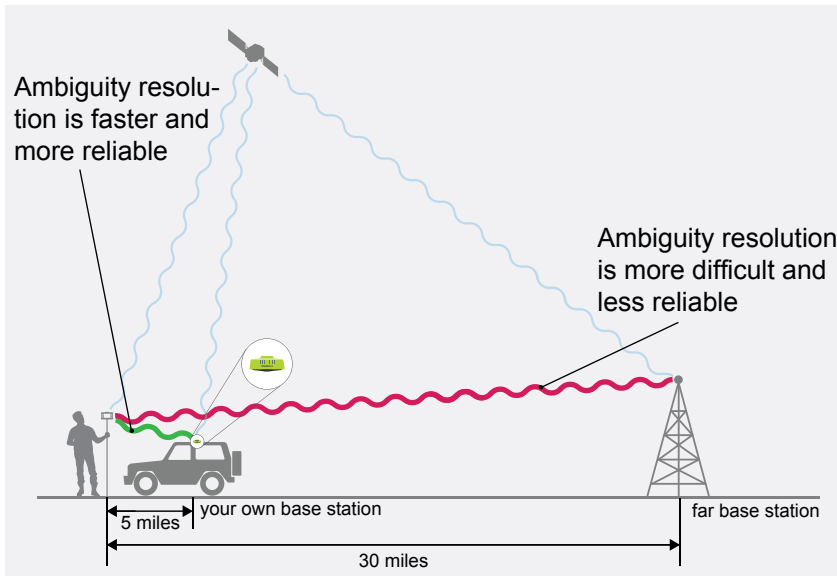
Process data collected at the base with OPUS or DPOS and verify your shots. It basically ties your shots to the well-established NGS and IGS base stations. DPOS does the process automatically.



Localizations

TRIUMPH-LS has the most comprehensive worldwide Coordinate Systems, transformation and localization, including "time dependent" coordinate systems.

Advantages of your own base station and short baselines



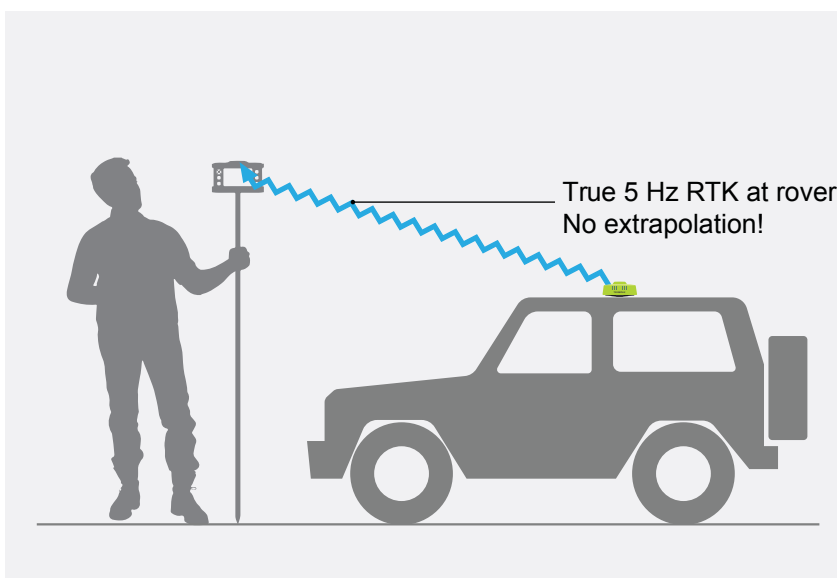
1. Shorter baselines provide significantly better **reliability** because the ambiguities are much easier to resolve and the correct ambiguity solution has an obvious contrast.

2. Shorter baseline has better **accuracy** because most of errors (like atmospheric and tropospheric effects) are common and cancel.

3. Shorter baseline ambiguities are resolved much **faster**. In longer baselines, incorrect ambiguities may pose as being correct in the statistical evaluations and it takes longer to isolate incorrect ambiguities.

4. Shorter baselines make it feasible to work in **difficult** areas (under tree canopy and in urban environments) because ambiguities have better contrast and are easier to resolve.

5. **Beast Mode RTK** is available only via our TRIUMPH-2 and TRIUMPH-1M base station. It makes ambiguity resolution up to 5 times faster because base station transmits base data 5 times per second. 5-Hz Beast Mode RTK is totally different from the up to 100-Hz RTK that is done by extrapolating the same 1-Hz data 100 times per second AFTER the ambiguities are fixed. This extrapolation technique does not improve the ambiguity resolution speed and is mainly used in applications like machine control after the ambiguities are fixed.



6. In addition to savings due to speed and reliability, it saves you RTN and communication charges. A complete system, Base + Rover + Radio + Controller & Controller Software, starts at **\$19,990**. 0% financing available (\$1,537.69 per month for 13 months) to active license US Professional Land Surveyors (PLS). Extended finance terms also available

contact sales@javad.com for details.

1 Equip your car

Mount the TRIUMPH-2 and radio on top of your car or truck. You can use either **UHF or FHSS** (Frequency Hopping Spread Spectrum) radios. You may want to bolt them down in your car for everyday use. FHSS does not need a license but its range is limited to a couple of miles. UHF has a longer range (up to 50 miles with a 35 Watt amplifier) but it needs a license. FHSS is particularly helpful in connection with our Beast Mode RTK which provides corrections from a TRIUMPH-2 near your job site. Use an appropriate long whip UHF/FHSS for longer range transmission.

HPT401BT
1W UHF Radio



TRIUMPH-2
GPS+GLONASS
L1/L2

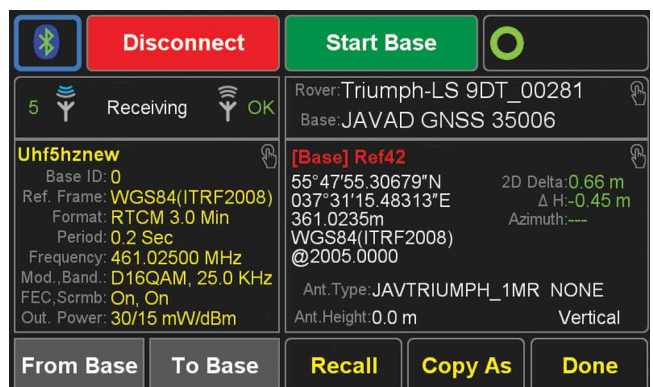
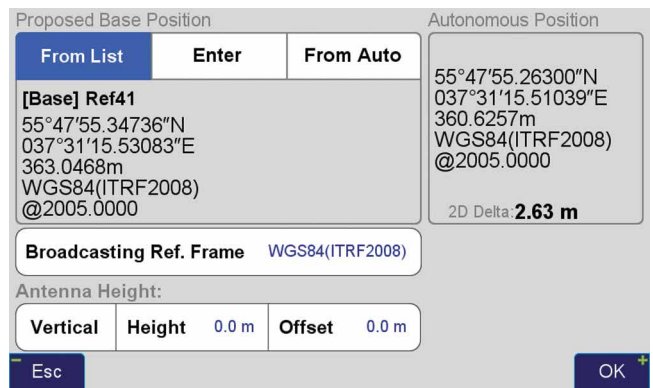


2 Park your car, Start Base

Park your car in an open area near your job site. It may be even in the middle of your site job. Engage all the brakes and ensure the car will not move. The Base/

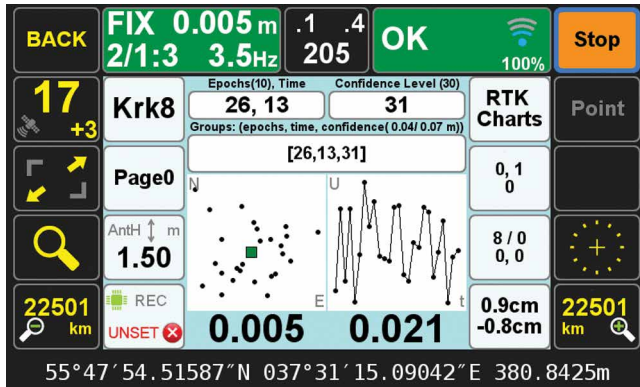
Rover Setup screen makes it easy to configure the base and rover with the same parameters.

Use **“Auto”** for the base coordinate. “Auto” will use an autonomous solution as the base coordinates which may be off by several meters (this will be corrected later). Then click **Start Base**.

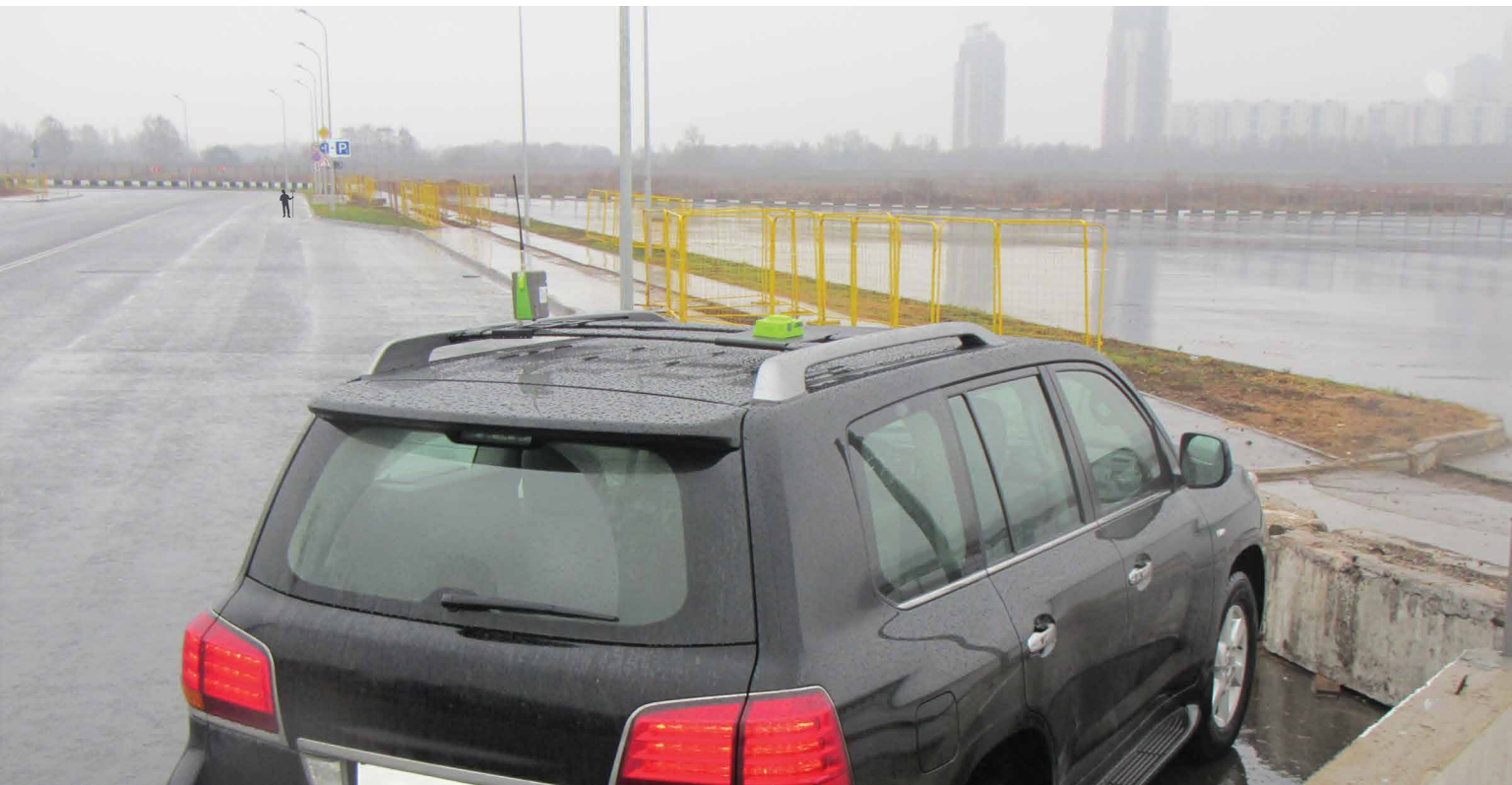
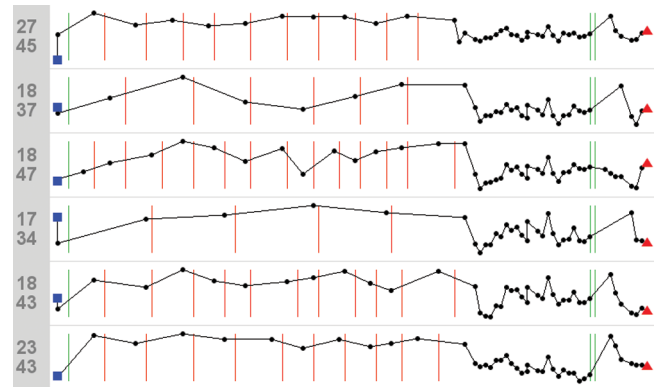
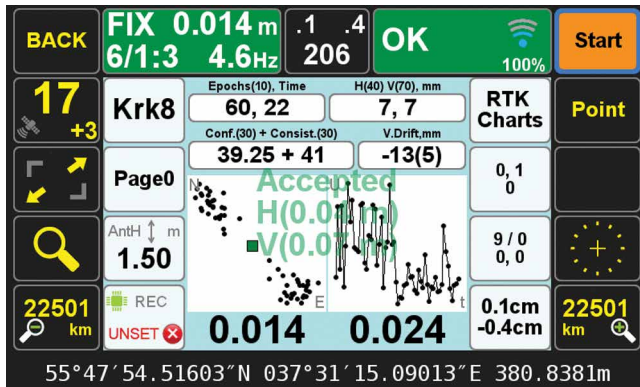


3 RTK Survey

Use your rover to perform your tasks. We have combined UHF and Spread Spectrum Frequency Hopping (FHSS) in the same module in TRIUMPH-LS as an option. The automatic “Verify” feature (Phase-1 and Phase-2) ensures that you will never get a wrong solution.



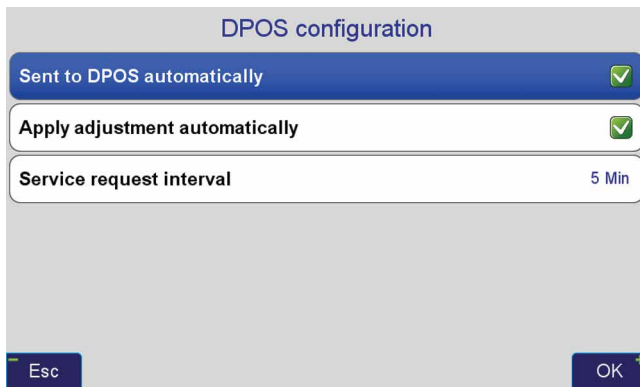
Since your RTK baselines are short, you benefit from all advantages that we discussed earlier BUT all your rover shots are shifted by the offset error of the autonomous base coordinates (up to several meters). “DPOS-It” or “Reverse-Shift-It” to correct for the error from the autonomous position.



4 DPOS-it or Reverse-Shift-it

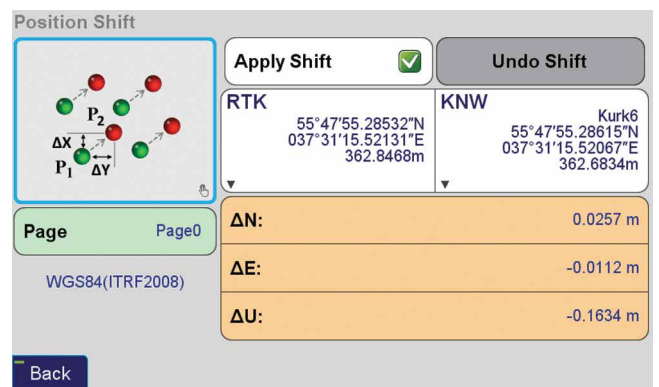
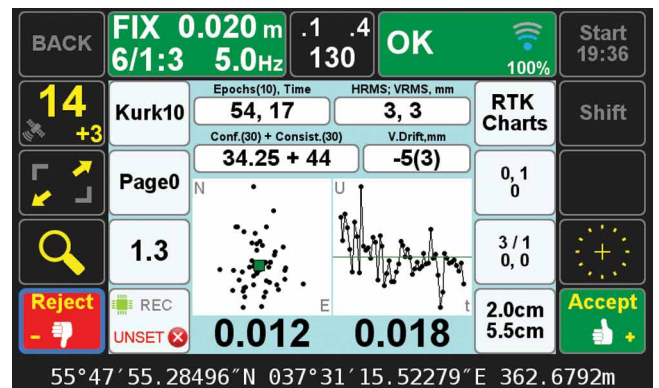
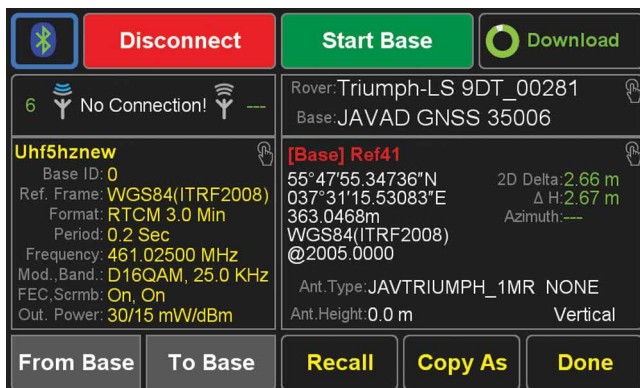
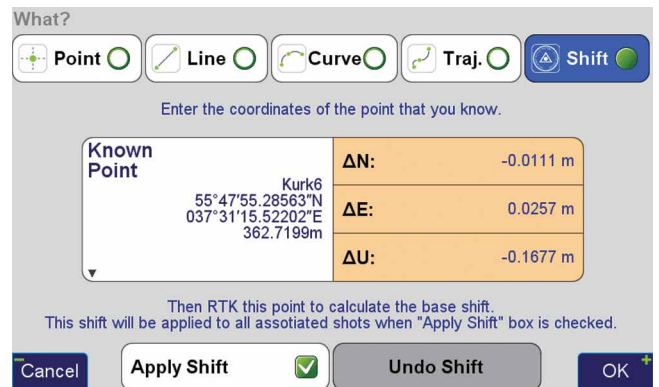
DPOS-it:

Press Stop Base and this will automatically **download** the raw GNSS base data to TRIUMPH-LS and send it to **DPOS** for processing with data from nearby CORS receivers. The TRIUMPH-LS then receives the **correct coordinates** of the base and **shifts** all the rover points accordingly. DPOS, CORS data and J-Field's RTK Verification guarantee your rover solutions.



Reverse-Shift-it:

1) Take the TRIUMPH-LS to a **known point** and select the “**Shift**” function in the Setup Advanced screen. 2) Enter the **known coordinates** of that point. 3) Take a **shot** at that point and a base station shift will be **calculated and applied** to all previous and subsequent points surveyed in this session. You can then also use the newly surveyed points as known point for leap frogging during the project.



REVERSE SHIFT<<it

Setup your base anywhere you want. Put the rover on a known point and click reverse "SHIFT". The base correction will be applied to all past and future points in that session. You can move your base and leap frog using any of the new points that you have surveyed.

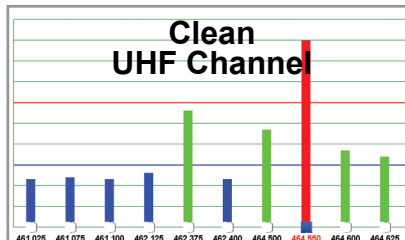


the most advanced GNSS chip with 864 GNSS channels, 24 digital filters and 24 anti-jam filters to protect against out-of-band and in-band jammers. We calibrate GLONASS interchannel biases down to 0.2 mm.

RAMS

Remote Assistance & Monitoring Services

You can monitor and control the activities of your field crews from the comfort of your office via a PC, MAC or iOS/Android device. It is also a great tool for training and receiving support.



Similar to monitoring the GNSS bands, TRIUMPH-LS also monitors and scans all UHF bands and shows interferences in all channels. It assists you to select the cleanest channel.

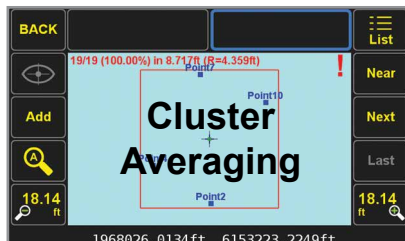


Six RTK engines plus one support engine provide robust RTK performance, even in challenging environments. The six RTK engines combined with their automatic re-set and verification features guarantee that you will never get a wrong solution without notification.



Fully integrated
Over 20 hours of battery life

TRIUMPH-LS is a fully integrated system, all antennas, radios, controller, high resolution sunlight readable display, over 20-hours of sealed internal batteries that make "hot swappable" and "removable" jargons outmoded concepts. 2.5 Kg (5.5 lb) including monopod.



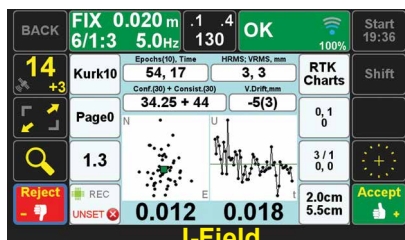
In some instances, you may have a legal requirement to repeat your shots. The TRIUMPH-LS makes this process easy. It finds clusters and averages them. You don't need to make any attempt to manually tie shots together. The cluster margin is user defined.



DPOS is our Data Processing Online Services. It is similar to OPUS but processes GLONASS and more of your observations if available from the nearest CORS sites. It also applies corrections to the base coordinate and all RTK solution as mentioned in VB-RTK.



Visual Stakeout overlays stake points on top of the camera image to easily guide you to the stake point. A nice virtual reality.



TRIUMPH-LS provides horizontal and vertical graphs of every epoch solution along with statistical data. This screen, along with the final solution screen and several other progress screens, can automatically be recorded with each point for documentation and protection.



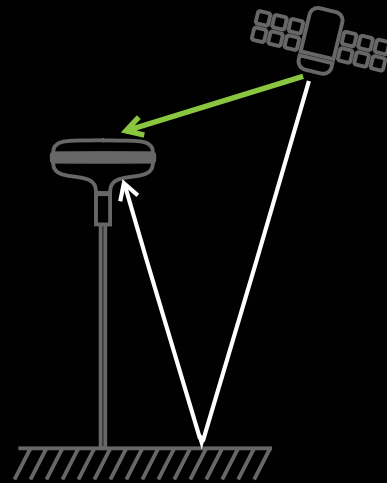
TRIUMPH-LS has the most comprehensive COGO functions (grid, ground and geodetic surfaces) in easy to use graphic-assisted interface.



You can quickly measure angles with the internal forward facing camera of the TRIUMPH-LS.

All these unique features at price of \$12,990

MULTIPATH BUSTERS



Multipath appears like a **ghost signal** that degrades the accuracy of your shots. We **detect and bust** these ghosts by sophisticated signal processing techniques in our **TRIUMPH** chip. We also show the **signature** of these ghosts that we bust. Below are two screen shots from the TRIUMPH-LS.

SAT	EL	AZ	L1	P1	P2	L2C	L5
GPS2	29↑	154	7	7	2	--	--
GPS6	44↑	98	11	9	2	2	-13
GPS12	70↑	282	7	8	-2	-2	--
GPS14	25↓	302	5	8	-4	--	--
GPS17	23↓	58	6	9	-6	-2	--
GPS24	53↓	196	1	4	13	1	-12
GPS25	30↑	282	4	8	7	1	-32
GLN1	10↑	34	1	4	-15	-23	--
GLN8	16↓	344	12	15	17	25	--
GLN9	32↑	316	0	2	-3	-6	--
GLN15	31↓	142	5	5	0	1	--
GLN16	84↑	266	2	2	-11	-18	--
GLN17	39↓	44	-1	-4	-12	-10	--
GLN18	69↑	188	-1	3	-1	-6	--
GAL12	68↑	108	0	-26	0	--	-14
SB127	25↓	160	7	--	--	--	-4
SB128	15↓	130	9	--	--	--	-11
OZ193	13↑	68	-3	-1	--	1	-19
BDU2	16↓	132	-7	--	--	--	-17
BDU5	25↓	154	-4	--	--	--	-7
BDU8	25↓	54	-10	--	--	--	-20
BDU11	75↑	158	-6	--	--	--	-5
BDU12	36↓	60	-6	--	--	--	-14
GPS3	10↓	26	--	--	--	--	--
GPS29	3	229	--	--	--	--	--
GPS32	3	346	--	--	--	--	--
GLN7	3	297	--	--	--	--	--
GLN19	12	210	--	--	--	--	--

In each column the relative amount of multipath ghosts that has been detected and busted from each signal **carrier phase** is shown (in millimeters). In the carrier phase it is up to a **quarter of a cycle** (wavelength).

SAT	EL	L1	P1	P2	L2C	L5
GPS2	29↑	273	281	-76	--	--
GPS6	44↑	55	201	-60	-5	189
GPS12	70↑	183	190	-90	-94	--
GPS14	25↓	281	317	--	--	--
GPS17	23↓	332	364	-74	6	--
GPS24	53↓	117	566	67	-64	124
GPS25	30↑	243	218	-42	-50	-34
GLN1	10↑	305	229	-126	-404	--
GLN8	16↓	26	87	-484	-617	--
GLN9	32↑	359	301	-246	55	--
GLN15	31↓	276	203	-93	-2	--
GLN16	84↑	235	309	-133	-109	--
GLN17	39↓	52	-84	-156	-52	--
GLN18	69↑	190	168	-177	-184	--
GAL12	68↑	680	-121	246	--	32
SB127	25↓	469	--	--	--	319
SB128	15↓	206	--	--	--	322
OZ193	13↑	550	513	--	56	55
BDU2	16↓	299	--	--	--	275
BDU5	25↓	269	--	--	--	230
BDU8	25↓	145	--	--	--	143
BDU11	75↑	362	288	--	--	305
BDU12	36↓	288	--	--	--	200
GPS3	10↓	--	--	--	--	--
GPS29	3	--	--	--	--	--
GPS32	3	--	--	--	--	--
GLN7	3	--	--	--	--	--
GLN19	12	--	--	--	--	--

In each column the relative amount of multipath ghost that has been detected and busted from each signal **Code phase** (range) is shown (in centimeters). In the code phase it is approximately **several meters**.