You've come a long way, Survey!

JAVAD

Introducing Three New Revolutionary Products

Please visit WWW.JAVAD.COM for details.

We are introducing

1 **High precision GPS+GLONASS+Galileo Antenna**

2 **Revolutionary, compact, 216-channel GNSS Receiver**

Please see Triumph V.S. videos on www.javad.com

But these are not 3 separate devices!

1

- A high precision all-frequencies GNSS antenna
- 5 quick access program buttons (F1 to F5)

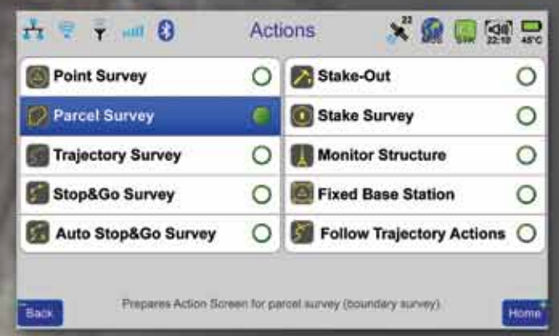
2

- 3 mega pixel camera
- High capacity, removable, rechargeable battery pack

Enter antenna height and specify the type of external antenna, if an external GNSS antenna is connected.

Program the receiver to act as a base station and transmit RTCM messages every second via Ethernet.

Access to program the operation of the receiver for variety of applications.



The selection prepares it's Action screen to do the job accurate, fast and easy.

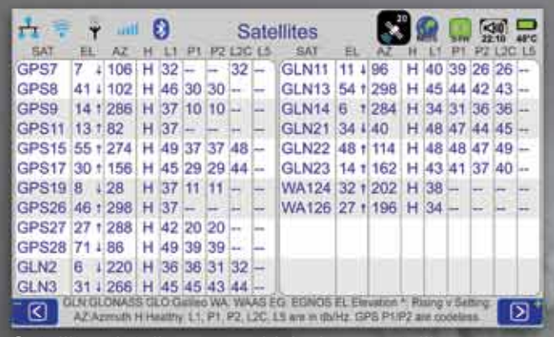
Introducing you Triumph V.S.

Please see Triumph V.S. videos on www.javad.com

External GNSS antenna
External UHF antenna
1PPS/Event
Ext. Freq In/Out

3

- **"Action Screen" makes it a joy to perform all sorts of survey and GIS tasks easily in the field.**



Satellites detail screen, which shows satellites names, azimuth, elevation angles, health status.

Set up all of communication channels of UHF, Bluetooth, LAN, GSM/GPRS, and WiFi.

- **3 connectors for mounting Triumph V.S. on tripods, monopods, poles and machines**
- **High resolution camera in the bottom**
- **2 speakers for audio and voice**
- **In office, you can use legs for putting on the table and better viewing.**

Home page.

3 new revolutionary products!

3 Breakthrough, wide-screen, high-resolution handheld controller

- 3,5-inch display of 800x480 pixels
- Both touch screen and quick action buttons.
- LED's show battery level, charging status and sleep mode

CONGO chooses JAVAD receivers...

We have primarily chosen the Javad Triumph receivers in late 2008 because they were the first (and at that time only) multi-frequency (L1/E1, L2, L5/E5b) and multi-constellation receivers (GPS, Galileo, GLONASS and SBAS) which offered GIOVE tracking support for general users. The Triumph technology offers a huge number of tracking channels, which puts no known restrictions on all-in-view tracking of all supported signals.

An important aspect that distinguishes the Triumph receivers from various other products is the availability of semi-codeless L1 P(Y) pseudorange and phase measurements in parallel to the corresponding L1 C/A code tracking. This appears important because it avoids problems with differential code biases when consistency with GPS clock products is important, e.g. in precise point positioning applications. Besides the legacy GPS signals and the L2C signals of the Block IIR-M satellites the receiver has demonstrated to properly track the new GPS L5 signal (both the PRN1 test signal, and, most recently, the new PRN25 signal of the first Block-IIR satellite; see http://www.gpsworld.com/gnss-system/gps-modernization/news/gps-l5-the-real-stuff-10086). With respect to Galileo, the receiver is ready to track the future Galileo signals due its full support of memory codes (not only the shift register codes used for Galileo). It presently supports tracking of GIOVE E1 Open Service signals (combined E1B/C including CBOC support) and the E5a (combined I/Q) signal. This enables ionosphere-free linear combinations of measurements and provides the basis for the generation of GIOVE orbit and clock information from CONGO data. While E5b and E5 AltBOC tracking is not supported by the present generation of Triumph receivers, E5a is considered to be fully sufficient for precision navigation and has the evident advantage of a common frequency with GPS. Also, many advantages of the AltBOC signal can only partly be materialized when combining the measurements with the lower grade E1 signals. For completeness, we note that the Triumph receivers support a total of four GLONASS signals on L1 and L2 as well as two SBAS signals (on L1 and L5). All of these aforementioned signals and constellations can be tracked concurrently in view of the large number of channels.

Concerning the measurement quality, the Triumph receivers offer a flexible choice of tracking loop bandwidths and smoothing options. These allow the user to optimally adapt the measurement generation to its specific needs (be it high dynamics aircraft or stationary geodetic reference stations). Most notably the receivers offer a superior multipath suppression technique that contributes to an excellent overall User Equipment Error (UEE). As a noteworthy example, the Triumph receivers successfully mitigates the impact of the satellite internal signal reflection of the PRN1 (SVN49) GPS satellite on all L1 and L2 signals. Here the reflected signals exhibit a path delay of only 10m which forms an extremely hard test case and underlines the high quality of the Triumph correlator design and multipass suppression technique. Overall, the Triumph receivers in the CONGO network showed a highly competitive tracking performance across all signals and constellations, which more than justifies their choice for a geodetic reference network.

As a side note, we may add that a Triumph receiver has also recently been proposed to fly as part of a European experiment on the International Space Station (ISS). Besides low noise, high quality measurements, the receiver has demonstrated a superior cold start time-to-first-fix of less than a minute in signal simulator tests under the extreme dynamic conditions of an Earth orbiting platform.

Even though a growing number of manufacturers is now offering alternative multi-constellation GNSS receivers, we believe that the Triumph receivers offer a highly competitive product (at an attractive price) which presently best fits the needs of our network. A highly responsive technical support and development team has furthermore contributed to continuously improve the receivers and to properly meet all user demands.

Regards and best wishes,
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