JAVAD

We are back...
To lead again...
With Triumph!

The Triumph Chip... with 216 channels!!!

At the heart of our Triumph Technology is our Triumph Chip. In a 17x17 millimeter power-efficient 352-TFBGA chip we have packed impressive amount of state-of-the-art functions using ***0.09 micron (90 nm)*** integrated circuit technology.

The Triumph chip has ***216 (two hundred and sixteen) channels*** for tracking all types of GNSS signals. These 216 channels are grouped in three categories of channels, some with 5 and some with 10 correlators, optimized to track all types of GNSS signals.

The Triumph Chip can track all existing satellite signals as well as all those planned for the future. This includes all ***GPS, GLONASS, Galileo, QZSS, WAAS, EGNOS, and Compass/Beidou signals***.

Additionally these 216 channels are accompanied by the equivalent of ***110,000 regular correlators*** for fast acquisition even when signal strength is very low.

Each channel is optimized to measure the most precise code, carrier and Doppler from each satellite system. The most advanced multipath reduction is also implemented for each channel. Each channel has 3-bit RF input and a tracking resolutions of 5 mm for code measurements and 0.005 mm for phase measurements.

The Triumph Chip also includes a very powerful microprocessor including a ***220 MHz CPU*** with ***Floating Point Unit (FPU)***, ***4 MB*** ***internal RAM*** for on-chip data processing which reduces power consumption and cost.

Harmonics of transmitters like TV and radio stations may fall within the GPS band and block the reception. To defend against such in-band interferences Triumph Chip has ***five adaptive anti jamming filters***, in five ***sophisticated 64-th order*** suppressing multiple interferences different signal bands, capable of by up to 60 dB.

Decoding the bit streams of GPS L5, Galileo, WAAS, EGNOS, and similar systems, which use Viterbi decoding schemes, are very computationally intensive. To facilitate this task we have implemented ***Viterbi decoder and cyclical redundancy check (CRC)*** module in the Triumph Chip hardware. The implemented Viterbi decoder has 3-bit soft decision, decoding depth of 64 and capable of decoding frames of up to 512 bit with a decoding speed of 1 Mb/sec. It can support both stream and block modes. The CRC module has a polynomial length of up to 32.

Triumph Chip also includes 40 flexible programmed RF input pins, three 1-PPS timing signal outputs, three Event inputs, and two embedded PLL-s.

The sophisticated power management implemented on the 90 nm technology reduces the power consumption of the chip to the range of 0.2 to 1 Watt depending on the modules activated.

Our Triumph Chip not only offers impressive and unparalleled performance, it also provides for ***substantial reduction in manufacturing cost***. It enables us to reduce the size and power consumption and offer products at lower cost. This is not a price war, it's a technology war, which we are back to fight for you!

Tracking all GPS, GLONASS, Galileo, Compass, QZSS, WAAS/EGNOS, etc... signals

JAVAD GNSS, 1731 Technology Drive, San Jose, California 95110, USA

Letters From Friends

The following are excerpts from some of many e-mails that we have received in the past few weeks. Such comments and feedbacks add to our enthusiasm and motivation to strive harder to bring the best of GNSS to the professional community. We look forward to receive your comments and suggestions regarding our new products. With your help we can make them even better.

"The innovation Javad brought by using dual constellations was revolutionary, something that took [redacted] and [redacted] years to catch onto. I look forward to seeing your new line in February." *Mike Skands, British Columbia, Canada.*

"Our business has grown rapidly over the past year and we look forward to continuing this with you. We are aware that Javad has always produced exceptional products and is at the forefront of GNSS technology." *Brad Stephenson, Australia.*

"I'm an original customer from 1998-1999 who purchased the Odyssey and Regency DD receivers with Pinnacle PP. We still use one of our Odysseys, and have SN #001 for one of the CDU1 detachable faces. Watching this unfold for sometime during 2007, and VERY excited with future of JAVAD GNSS products in the marketplace. Simply put, wishing you the BEST, and Happy New Year!!" *Geoffrey Tinker, PLS, Waterloo, Iowa.*

"I am very happy that Javad GNSS is finally independent and authorized to sell in all markets. CONGRATULATION!" *Zoran Nedeljkovic, General Manager, Atlas Navigation Systems, Belgrade, Serbia.*

"At long last. The survey world is thrilled to have you back." *John Nicholson, President, Midwest A&E.*

"Infotop ltd. has been using Javad GPS products since 1999 ... and we are looking forward to seeing your new generation of precision positioning products." *Veronica Claudia Jianu, General Manager, Infotop SRL, Romania.*

"We are very glad to hear about your successful ending with Topcon and we are very enthusiastic about your new start in February 2008. We want to join your efforts to put Javad again in the right position in Romania. As a fan of Javad products and trusting in your future strategies, we ask your permission to join in the worldwide Javad team and become your distributor for Romania and Moldova." *Laurentiu Neghina, Bucharest, Romania.*

"We are eager to see the upcoming release of your new products and hope to be able to expand our involvement with you in a number of new projects. We are confident that your equipment will allow us to make a significant impact in the mining industry, particularly in fleet management and machine guidance, where we plan to integrate your products with our own over the coming months." *Peter Johnson, General Manager, Maptek Australia.*

"I recall our correspondence nine years ago when JPS was seeking distributors and we started our collaboration in Greece! Since then, a lot had happened and our company has managed to climb to the top of the GNSS market in Greece. We are interested in collaborating with you again." *Christos Vagias, Managing Director, Greece.*

"News of the new products is eagerly awaited, not just by us but also by our loyal customers, both OEM and end users. Have a great holiday and roll on 2008 – and the new products!!" *Colin Beatty and the team at CBi Ltd. England.*

Thank you all very much!

I Have Been Waiting for This...

I envied Steve Jobs' enthusiasm when he announced: "I have been waiting for this chance for the past two years." It was at Mac World 2007, where he introduced the Apple iPhone, after returning to Apple and rejuvenating the company.

Like many, I also admire Steve for how he turned Apple around. The closest that our paths crossed was when one of Apple's VPs of the John Scully era became president of Ashtech, and did to Ashtech what Scully did to Apple. Steve left Apple at the same time I left Ashtech.

And now it is my turn: I have been waiting for this chance for the past seven years!

Triumph technology! We've provided technical details in the previous pages, and we'll have more details on our website and in future publications. Several patents are pending on our Triumph Technology.

And there's more to come! Please check out future issues of this magazine and our website www.javad.com, for the latest products, features and support that we offer worldwide. We plan to accept orders in March and ship products in April.

Along with Triumph Technology comes Triumph Support. Because of our reputation, for the past seven years we have received many requests to support the products of other companies. In addition to our highly-talented local support we are also enhancing our web-based support. Previously, we were providing support and answering technical questions in less than 48 working hours. Now we have re-structured our organization to provide support in less than 24 working hours. In addition to myself, a team of 50 engineers and technical staff monitor all support issues. We do this not only to provide support to our customers but to learn about issues and improve our products. The average GPS/GLONASS experience of the members of our team is more than 20 years. In addition, our team has designed 7 generations of GNSS technology. Compare this with any other company in the world.

Triumph Technology is not just about our hardware. You can soon see for yourself by downloading demo versions of Giodis (our geodetic software), Justin (our GIS and survey software), and Tracy (our field software which runs on our new Victor handheld).

A straightforward word about Triumph pricing: it is true that the boards that we sold with price tags of more than $5,000 did not cost us more than $500 to manufacture. But manufacturing is only a small part of the entire process. The pricing reflects the huge overhead in engineering and developing technology, in addition to the fact that the GNSS precision market size is far less than other markets like cell phones or MP3 players. For example, it cost several million dollars just to develop the Triumph chip. When you pay several hundred dollars for a Microsoft product or more than twenty thousand dollars for a design software package, it is no secret that the cost of manufacturing the CD is less than ten dollars.

That being said, next month we are going to offer Triumph technology at Triumph prices! Stay tuned for more pleasant surprises.

As a final note, a little background on the name "Triumph": there are seven major structures in Moscow from the Stalin era. They are called the seven "vysotkas" and include Moscow State University and the Ministry of Foreign Affairs. In the year 2000, the City of Moscow approved a competition to build a larger and more modern version of those structures and dedicate it to the victorious memories of Russian heroes. It was given the name "Triumph Palace." We have purchased and located our Moscow research center in this building and thought it appropriate to name our technology after the building where our innovations were conceived, and to dedicate it to our victorious engineers who worked so hard to make this happen.

Until the next issue, regards,

Javad

Javad Ashjaee

www.javad.com

OEM Boards... Galileo Free for One Year

We offer 6 OEM boards to cover the entire spectrum of precision applications and budgets. Each board is based on our Triumph Technology implemented in our Triumph Chip. For the first time in the GNSS history we offer up to 100 Hz RTK.

Each board includes the true Galileo option. We offer a FREE Galileo option for one year.

The on-board power supply on every OEM board accepts any voltage from +4.5 to +40 volts and delivers clean filtered voltage where needed. This eliminates the risk of power contamination (ripples) that can be created when clean power is generated elsewhere and delivered to the board via cables.

The CAN interfaces in each board are complete with all associated hardware and firmware, not just the CAN bus. The same is true with all the serial RS232/RS422 ports in our boards.

Each board also comes with large amount of flash for data storage. Each board also includes drivers for four LEDs, ON/OFF and function button controllers. Simply stated, additional functions are not need to incorporate any of our OEM boards.

In addition to timing strobes and event markers, each OEM boards also include the option of complete IRIG timing system.

We have been able to achieve tremendous advances in technology while reducing costs substantially. In the table below, we have summarized our features and included two other examples in the market to allow you make a comparison. Simple features like 1-PPS and serial ports are not included in the table below but are present in all of our boards. In the table below, G2 means GPS+Galileo, G3 means GPS+Galileo+GLONASS, and the trailing T means triple frequency.

Features/Boards	TR-G2	TR-G3	TR-G2T	TR-G3T	TRE-G2T	TRE-G3T	Competition		
GPS L1	16	16	16	16	16	16	14	14	
GPS L2/L2C	--	--	16	16	16	16	14	14	
GPS L5	--	--	16	16	16	16	--	6	
Galileo E1	16	16	16	16	16	16	--	--	
Galileo E5A			16	16	16	16	--	--	
GLONASS L1	--	16	--	16		16	12	12	
GLONASS L2	--	--	--	16		16	12	12	
SBAS	4	4	4	4	4	4	2	2	
Fast acquisition channels	110K	110K	110K	110K	110K	110K	--	--	
Ethernet	--	--	--	--	Yes	Yes	--	--	
Complete CAN	Yes	Yes	Yes	Yes	Yes	Yes	--	--	
Button/LED support	Yes	Yes	Yes	Yes	Yes	Yes	--	--	
IRIG timing system	Yes	Yes	Yes	Yes	Yes	Yes	--	--	
On-board Flash (MB)	128	128	128	256	4,000	4,000	--	--	
4.5-to-40V Power supply	Yes	Yes	Yes	Yes	Yes	Yes	--	--	
Hardware Viterbi	Yes	Yes	Yes	Yes	Yes	Yes	--	--	
Size (mm)	40x55	57x66	57x66	57x88	100x80	100x80	100x60	125x85	
Base Price	$600	$1,200	$1,800	$2,400	$1,800	$2,400			

QUATTRO... The Four-in-One board

The Quattro-G2T is a 100x160 mm Euro-Card board that accepts inputs from up to four antennas. It is the equivalent of four receivers which operate synchronously with a common oscillator and central processor to coordinate all communications and other activities of the four integrated receivers. Each of the four receivers tracks 14 each of GPS L1, L2 and L5 plus optional 14 each of Galileo E1 and E5A. The QUATTRO-G2T has all the features and options of our OEM boards.

Triumph Pricing

The innovations in our Triumph Technology and the state-of-the-art integration in our Triumph Chip enables us to offer Triumph Pricing. We will provide more details by March 2007.

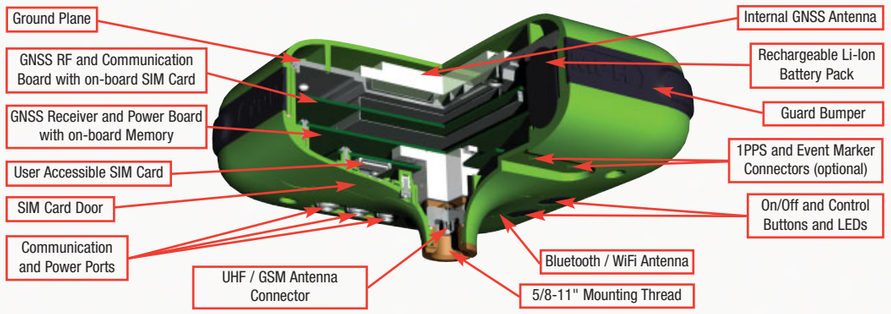
100 Hz RTK

TRIUMPH-1... The RTK package

Based on the Triumph Chip, Triumph-1 is a fully integrated package ready for your demanding jobs, offering precise and automatic performance beyond anything that you have experienced so far.

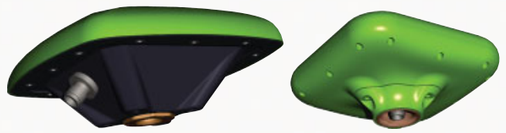
An elegant, rugged, light (1 kg, 16x16 cm), and hermetically sealed box accommodates all GNSS and Modem electronics, antennas, and up to 20 hours of rechargeable batteries and its sophisticated power management system. The close proximity of our batteries with the electronic section helps the batteries to absorb heat and function better in cold weathers. The batteries can be charged with any power supply from 4.5 volts to 40 volts, which includes car, ship and airplane batteries.

All GNSS, UHF, GSM, Blue Tooth, and WiFi antennas are conveniently hidden and protected. An external antenna can also be connected to bypass the internal GNSS antenna. There are two SIM cards inside the box, one of them can be easily reached and changed via a small sealed door.



Antennas

Triumph-1 also accepts external antennas. In addition to choke ring and avionics antenna, we have also designed two new high performance antenna in small sizes. GrAnt (left below) has the option of integrated IMU (three accelerometers and three gyros). TrAnt (right below) has smaller size and has three different mounting mechanisms. Both antennas have GPS, GLONASS and Galileo options.



The RTK Caddy

We have come a long way since the days of several pieces of equipment in a backpack and lots of cables to connect everything to perform RTK jobs.

The existing systems still have the limitation that the pole should be constantly held by one hand.

We took the hint from golfers and offer the option of attaching the pole to a modified golf caddy which can also hold our Victor handheld controller and other field items and be easily wheeled around. Try it once and you get hooked.

Of course Triumph-1 is very light (about 1kg) and can be handled easily with standard poles.

Galileo free for one year

TRIUMPH-4X... The Cluster RTK

Conventional RTK uses one base and one rover yielding only one baseline with no checks and balances. Surveyors appreciate the power of networks, where many points and repeated measurements along with network adjustment remove outliers and give more accurate results.

To improve the reliability of RTK, some users employ data from more than one base. Multiple bases are rare and not conveniently available.

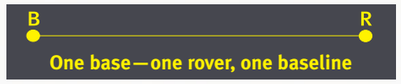
In a giant step forward along with introducing Triumph-4X, we also introduce Cluster RTK, or 4x4 RTK, where sixteen baselines are processed in every single RTK measurement.

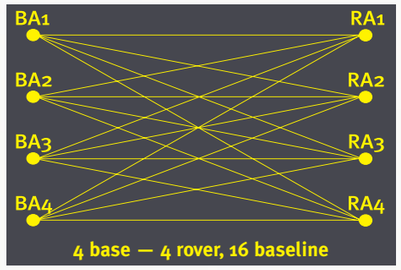
For the first time in the history of GNSS, the power of survey techniques and network adjustments comes to RTK but without the burdens and complications. The operation is similar to conventional RTK. Surveyors and geodesists can now trust RTK measurements while improving accuracy, reliability and availability.

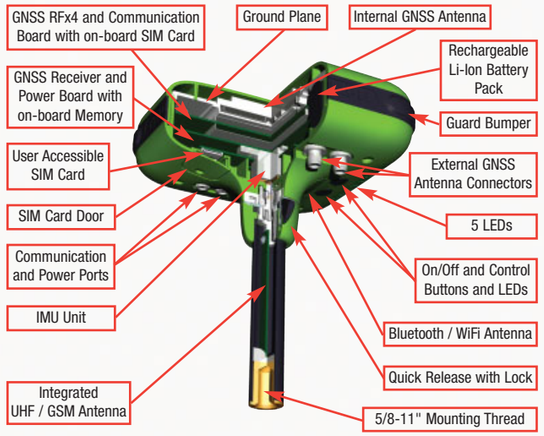
Now when we say 20 Hz RTK, we mean measuring 16 baselines of 8 points and performing equivalent of geodetic network adjustment on 16 baselines, removing outliers and providing reliable geodetic quality RTK solutions 20 times per second!

4x4 cluster RTK does not need a truck load of expensive equipment, multiple field operators, and complicated procedures. It is even simpler than conventional 1x1 RTK because you even do not need to level your pole!

4X4 ALL WILL DRIVE RTK!







Triumph-4x is equivalent of 4 independent Triumph-1 receivers packaged in the same small box. Furthermore, these 4 independent receivers are operating synchronously using the same local oscillator. A central processor coordinates internal activities of these four receivers as well as communications and data transmission with outside. ***And all is done with a single Triumph Chip inside. This is why it is neither heavy nor expensive.***

One Triumph-4X base and one rover results in a 16-baseline RTK system. While systematic and correlated errors can be removed in single RTK systems, the uncorrelated errors degrade the RTK accuracy. In Triumph 4x4 systems the uncorrelated (random) errors are reduced significantly. This improved accuracy and reliability is especially important in critical applications like machine control.

The RTK Umbrella

To make handling of the three additional antennas easy we have designed the RTK Umbrella. The receiver is mounted in the center and three small antennas on three folding arms. It is easy to store, transport and use in the field. The RTK Caddy is especially helpful when roving with Triumph-4X.

The receiver also includes an IMU consisting of three accelerometers and three gyros. Combining a four-GNSS-receiver system with an IMU provides an extremely powerful tool in providing positioning solutions in most severe and adverse conditions.

In Triumph-4X you do not need to level the pole. The four-antenna system and the IMU will determine the inclination and adjust the calculated position accordingly.

In areas under canopy and foliage you get much better chance because at least one of the 16 baselines may provide a solution. Triumph-4X can also be used in a more general configuration to determine orientation or mounted in different sections of moving platforms in machine control applications.

Triumph-4X has integrated Inertial Measurement Unit

Software

Justin

A powerful office GIS software to process GPS&GLONASS data.

- Automatic project management from Import to Report via Scenario.
- Interactive mode for static data processing.
- Dynamic base and rover data processing.
- Single epoch solution for Javad receiver data.
- Stop & Go surveying.
- All user data is kept in the project.
- Support of topology for all layers (net, vector, solution, fiducial, stop&go). Each layer can have preset styles according to accuracy, solution mode, PDOP, etc.
- Export of maps to dxf.
- Ability to open vector map (ArcGIS, MapInfo), raster images with geo-referencing in the cartographic window.
- Change map projection, scale, labeling.
- Register raster imagery.
- Auto geo-referencing for aerial photography images with event data (mosaic).
- Graphic module for fundamental analysis of GNSS data (preset combinations and user macros).
- Google Earth viewer.
- Multilingual interface.

Giodis

Full-featured office post-processing software.

- New high-precision post-processing engine:
  - Solves wide range of practical surveying tasks using advanced scientific approach.
  - Un-differenced GPS data vector and network processing based on multi-site and multi-session algorithms.
  - Direct estimation of ionosphere, troposphere, and satellite/receiver clocks.
  - Global meteodata to improve processing.
  - Uses ITRF control points to make processing more robust.
- Network adjustment:
  - Free and constrained network adjustment of vectors and multi-site subnets.
  - Using both local and ITRF control points.
- Extended coordinate systems database:
  - Easily searchable and extendable predefined database with over 3000 global, national, and local coordinate system definitions, including transformation parameters and geoids.
- Points Data Catalogs:
  - Storage of points, coordinates and attributes.
  - Can be encrypted to protect business data.
- Internet Download Manager:
  - Unattended and explicit downloading of IGS and CORS data for over 7000 worldly distributed stations.
- Online data exchange between field controllers and the office.
- Background maps:
  - Detailed background maps covering the entire United States from the national level down to detailed street networks (TIGER data).
  - World maps of any location on Earth with common geographic features.
- Modern user interface:
  - Uploading and processing data with minimal interaction.
  - Advanced user can manage internal data flow by explicit request.
  - High-quality visualization, reporting, and printing.

Victor

We complement our receivers with Victor, an ultra-rugged Windows Mobile controller with an ample amount of processing power and memory for most field applications.

Tracy

A comprehensive field software for Windows Mobile OS to control our receivers, automate GNSS post processing surveying tasks (Static, Fast Static, Stop&Go, Data Acquisition), and to perform RTK survey and stakeout tasks with the following features:

- Always provides information on receiver while surveying.
- Data logging to receiver and controller.
- Increased productivity and reliability with automatic occupation time control.
- Stop&Go data collection.
- Point offsets.
- In-field post-processing to estimate observation data quality.
- Data acquisition with feature codes.
- Base and rover receiver configuration and control.
- Works with corrections via radio and Internet.
- Support for survey and stakeout projects.
- National and local coordinate system and geoid support. Horizontal and vertical localizations.
- Built in COGO routines.

And soon all major third party software