



Lost and Found

Want to know exactly where you stand in the world? The next generation of global navigation satellite technology will help you with pinpoint accuracy.





Of all the recent technologies that have changed the world, few have had more of an impact on our lives than navigation satellites.

Whether it's a lost hiker trying to find his way home or a driver running low on fuel who's in need of a gas station, these eyes in the sky precisely map where we are and where we need to go.

Ironically, the world's Global Navigation Satellite System (GNSS) that makes all this happen was created by the military to steer missiles to their targets. But that's ancient history. "The Cold War has melted. We have better uses for satellites," says Mike Shaw, director of the coordination office for the government's National Space-Based

Positioning, Navigation, and Timing (PNT) agency.

Indeed, satellite navigation may have been the ultimate in Cold War technology, but now that our Global Positioning System (GPS) and Russia's GLObal NAVigation Satellite System (GLONASS) are allies, satellites help people and businesses find out what's where more efficiently than ever before. "They're still essential to the military, but there's a big peace dividend," adds Shaw, whose Washington-based office oversees the U.S. government's GPS network (see www.gps.gov).

Reshaping the World

In a very real sense, the satellites that silently fly 11,000 miles above our heads are reshaping our world. With an atomic clock on board, they broadcast precise time signals to a receiver on the ground. When connected to three satellites, the receiver can calculate its precise location anywhere on the planet within several feet; with four satellites, an accurate altitude reading can be made.

"Hardly a business in the world will remain untouched by this technology," says Javad Ashjaee, CEO of Javad Navigation Systems. Based in San Jose, Ashjaee runs a research facility in Moscow and focuses on high-precision GNSS equipment. He believes the myriad uses of GNSS expand every day: On top of streamlining delivery schedules, managing fleet vehicles, and surveying property lines, satellites also help farmers maximize crop yields by plowing precise furrows. Satellite navigation saves lives every day by helping rescuers find people in trouble, as well as by steering ships and airplanes away from danger. "This is truly a global business these days," adds Ashjaee.

With 2006 sales of \$25 billion, the global satellite navigation market is soaring. Analysts at the marketing research firm of RNCOS expect sales to rise to \$28 billion this year and \$32 billion in 2008. Illustrating the move away from the armed forces, 52% of GPS users are now consumers, 40% commercial, and only 8% military. The reason for this surge in civilian popularity is that as the navigation devices have gotten smaller, lighter, and quicker, they've also gotten cheaper. Eventually, there could be a navigation chip in every vehicle and cellphone, meaning that we will only get lost when we want to.

"Knowing where you are is just the start," says Alan Cameron, editor-in-chief at *GPS World* magazine. "With the right database, the world

The most dynamic and innovative team in the world of GPS, GLONASS and Galileo



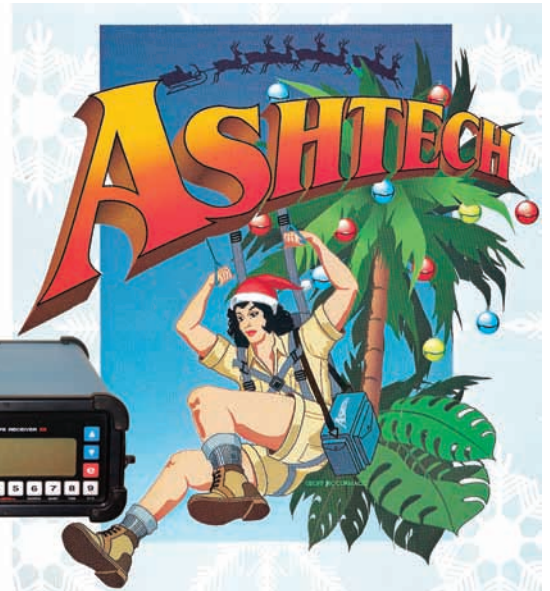
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G N S S

In 2005 we founded JAVAD GNSS to create the next generation of GNSS technology. With the best and most talented team in GNSS, we have great hopes for our future.



In 1998 we founded Javad Positioning Systems and developed new break through technologies. In 2000, JPS became Topcon Positioning Systems and Javad Navigation Systems. Both companies are successfully in operation today with impressive results in their own respective markets.

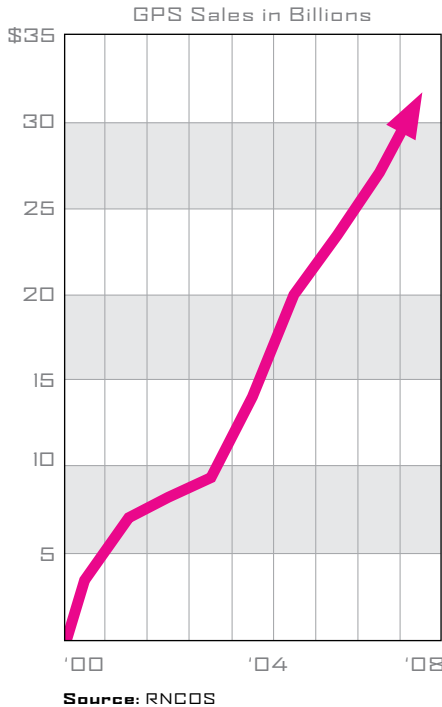
In 1986 we founded Ashtech and directed it to an impressive success with 45% annual growth. We won the Best Technology Award from the US Institute of Navigation two out of three times that it was awarded. We designed and produced the first series of GPS+GLONASS receivers. Ashtech was later renamed to Magellan, Thales Navigation, and recently back to Magellan which is operating successfully today.



Starting in 1981 we were instrumental in creating the first high precision GPS technology at Trimble who currently is the market leader in GPS.

The Whole World in Your Hands

The navigation satellite market is exploding.



is really at your fingertips.” The new science of telematics—which combines wireless communications with GPS and other sensors—makes it possible to show a vehicle’s position in relation to nearby businesses and attractions on an interactive map. It can help a motorist pinpoint the closest ATM or other destination on the car’s navigation screen. Headquartered in Newton, Mass., *GPS World* is one of 33 journals in the Questex Media Group.

Interactive Jams

The latest twist in telematics involves informing drivers not about the nearest cash machine but rather about how crowded the roads are. “People waste a lot of time and

energy when they’re stuck in traffic,” says Christopher Rothey, COO of Traffic.com. “We want to end that.” Based in Wayne, Pa., Traffic.com integrates real-time sensor data, GPS vehicle data, and event and incident data for 83 cities, allowing drivers to steer clear of tie-ups. In addition to services provided in exchange for advertising inventory that supply real-time traffic information for 50 metropolitan areas to more than 200 radio and TV stations, the company operates free services for travelers. The website shows an interactive map of jams, and sends out personalized e-mails and text messages. It also provides a toll-free traffic hotline and voice alerts warning drivers about what arteries to avoid.

The fold-up paper map may not be obsolete, but it is surely an endangered species now that Traffic.com combines its real-time traffic data with historical records to forecast road conditions. “Our TrafficPro TrafficML solution takes this to a new level by predicting where and when the next traffic jam will be,” adds Rothey. “It’s the best way to avoid traffic.”

While navigation gets most of the attention, says PNT’s Shaw, the satellites’ precise atomic clocks are becoming essential for split-second commerce. Accurate to one second in 300,000 years, the clocks are used to synchronize cell-phone communications towers so that every word gets through, and to help power companies avoid blackouts. But it is in international banking where precision timing makes every second count. “If you’re electronically transferring tens of billions of dollars back and forth across the globe,” says Shaw, “a few seconds of interest can add up to a lot of money. It’s essential that everybody’s clock is set to the same time.”

According to *GPS World’s* Cameron, the Earth is about to get a little bit smaller and the cosmos

a little more crowded, thanks to the European Union’s Galileo project. The first of an expected 30 Galileo satellites is now in orbit, but it could take a decade and cost \$4.3 billion before the system is complete. In many respects Galileo mirrors GLONASS and GPS, but to help it pay for itself, the most accurate signals will be scrambled. “It would be a big change for satellite navigation,” adds Cameron. “If it goes forward as currently planned, only those who pay a fee will be able to use the most precise signals, which also add important supplementary information.”

Despite differences, the world’s GNSS networks can seamlessly work together, but it requires specialized devices like the equipment made by Javad Navigation Systems. Look for a new generation of navigation equipment to come in the next few years that will work with any GNSS satellite in the sky, and which will make navigation receivers much faster and more efficient. “We can use whichever satellites—regardless of which country made them—are in the best position to transmit the fastest and most precise data,” says Ashjaee. “We can pick and choose.” —Brian Nadel

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Resources

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