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SECOND GALILEO TEST SATELLITE REACHES ORBIT

Flight International, 28 Apr. 08

Europe's second test satellite for the Galileo navigation constellation has been placed in orbit by a Russian launch vehicle which lifted off from Kazakhstan yesterday. Launched from the Baikonur facility at 04:16, on board a Soyuz-Fregat vehicle, the Galileo In-Orbit Validation Element satellite, GIOVE-B, features three precision clocks – including one based on a hydrogen maser, which will be the principal timing mechanism for Galileo.

GIOVE-B will be used to demonstrate Galileo technology and also continue work on the constellation's radio frequencies initiated by its predecessor, GIOVE-A, which was launched in December 2005 and its nearing the end of its operational life. "With the successful launch of GIOVE-B we are about to complete the demonstration phase for Galileo," says European Space Agency director general Jean Jacques Dordain.

Four operational satellites, currently under construction, are the next in line to be launched and will be used to validate the space-based and ground-based infrastructure by 2010. Once this stage is completed the developers will proceed with deploying the full constellation which will feature 30 satellites.

GPS DEVICES & SYSTEMS WILL GENERATE REVENUES OF $240 BILLION BY 2013

Business Wire, 28 April 2008

LONDON--satellite technology is becoming increasingly important as it is being embedded in an ever-wider range of mobile consumer devices to enable navigation and Location Based Services. While GPS handsets and in-vehicle navigation systems will remain the most lucrative markets, industrial applications such as network timing, land surveying, and machine control are quickly gaining momentum. By 2013 Global Navigation Satellite System (GNSS) end-user devices and systems will generate yearly revenues of $240 billion.

"The implementation of GPS technology in mobile consumer devices such as handsets and digital cameras, and its indoor use, pose some important challenges," says ABI Research principal analyst Dominique Bonte.

"GPS technology was designed for outdoor use and specific military applications, and its weak signals and long fix times are not well-suited to indoor environments and mobile devices such as digital cameras with their low power consumption and always-on requirements."

Innovative workaround solutions based on the post-processing of the GPS signal are being developed, as is the use of assisted-GPS technology to provide location and satellite data to connected devices for faster fixes and better coverage. For deep indoor environments GPS will have to be complemented with alternative positioning technologies such as Wi-Fi, motion sensors or even TV broadcast signals.

At the same time satellite positioning technology itself is improving with the upgrade of the existing GPS system and the rollout of new GNSS systems. The GPS modernization project is in full swing with three Block IIR-M satellites launched in the last six months and the contract for GPS Block III satellites to be awarded soon.

The funding for the EU's Galileo constellation was finally approved and the second GIOVE-B test satellite was launched on April 27. The Russian GLONASS system has 16 satellites in orbit and should become operational by the end of 2008. These projects will result in more and stronger satellite signals and a higher number of visible satellites being available, which will improve coverage, accuracy, and reliability.

GIOVE-B heads for orbit

GALILEO TAKES NEXT STEP WITH DEMO SATELLITE
TMCNet, 28 April 2008

As impressive as the world's Global Positioning System (GPS) is, there are some things it can't do. For example, whereas your portable GSP car navigation system (Tom-Tom, Garvin, etc.) updates its readings fast enough to assist in automotive travel, the technology isn't sufficiently adept to handle such safety-critical applications as landing aircraft.

Also, GPS is a system developed and deployed by the U.S. military system is designed to provide location signals of the greatest possible accuracy to U.S. military users, while also providing location signals to civilian users.

It's possible to degrade the civilian signals by introducing errors to make them less accurate and thus not very useful to such people as terrorists ("selective availability"). However, on May 1, 2000, the President of the U.S. signed order disabling service availability. Still, the Europeans have always wondered what would happen to the system if a major political disagreement or even a war broke out with the U.S.

These shortcomings and concerns led the European Union (EU), European Space Agency (ESA) and now China to develop Galileo, a new global navigation satellite system that is both an alternative and is complementary to the U.S. GPS and Russian GLONASS satellite networks.

On November 30, 2007, the 27 EU transportation ministers associated with the project reached an agreement that Galileo should be operational by the year 2013. Galileo will provide far more precise measurements to users than can be obtained from either GPS or GLONASS, which worries the U.S., even though the Europeans have agreed to use a particular frequency so that the U.S. will be able to locally interfere with or block the Galileo signals without interfering with their own "military" GPS signals.

Recently, after a year's delay owing to component failure and administrative issues, the Galileo program sent forth a demonstrator spacecraft, Giove-B, which was boosted into Earth orbit by a Russian Soyuz vehicle launched from the Baikonur spaceport in Kazakhstan. This demonstrator satellite will be used to test various technologies (such as the three most stable atomic clocks ever placed in orbit around the earth, based on passive hydrogen maser technology and accurate to within one nanosecond in 24 hours) that will ultimately be installed in the 30 satellites comprising the Galileo network. The 1,000-pound Giove-B satellite is actually the second demonstrator satellite sent into Earth orbit, the first being Giove-A, launched in 2005.

Europe has already spent 1.6 billion euros (US $2.5 billion; £1.3bn) on the project. The project's ministers warn that an additional 3.4 billion euros (US$5.3billion; £2.7bn) recently approved for sat-nav investments will be the limit on expenditure. If Giove-B is a success, the first four operational Galileo satellites will launch in 2010, with all 30 satellites flying by the end of 2013.

ESA'S MOST ADVANCED SATELLITE REACHES ORBIT

ESA News, 27 April 2007

A further step towards the deployment of Europe's Galileo global navigation satellite system was taken tonight, with the successful launch of ESA's second Galileo In-Orbit Validation Element (GIOVE-B) satellite, carrying the most accurate atomic clock ever flown into space.

The GIOVE-B satellite was lofted into a medium altitude orbit around the earth by a Soyuz/Fregat rocket departing from the Baikonur cosmodrome in Kazakhstan by launch operator Starsem. Lift-off occurred at 04:16 local time on 27 April (00:16 Central European Summer Time). The Fregat upper stage performed a series of manoeuvres to reach a circular orbit at an altitude of about 23 200 km, inclined at 56 degrees to the Equator, before safely delivering the satellite into orbit some 3 hours and 45 minutes later. The two solar panels that generate electricity to power the spacecraft deployed correctly and were fully operational by 05:28 CEST.

This 500 kg satellite was built by a European industrial team led by Astrium GmbH, with Thales Alenia Space performing integration and testing in Rome. Two years after the highly successful GIOVE-A mission, this latest satellite will continue the demonstration of critical technologies for the navigation payload of future operational Galileo satellites.

Like its predecessor, GIOVE-B carries two redundant small-size rubidium atomic clocks, each with a stability of 10 nanoseconds per day. But it also features an even more accurate payload: the Passive Hydrogen Maser (PHM), with stability better than 1 nanosecond per day. The first of its kind ever to be launched into space, this is now the most stable clock operating in earth orbit. Two PHMs will be used as primary clocks onboard operational Galileo satellites, with two rubidium clocks serving as back-up.

GIOVE-B also incorporates a radiation-monitoring payload to characterise the space environment at the altitude of the Galileo constellation, as well as a laser retroreflector for high-accuracy laser ranging. Signal generation units will provide representative Galileo signals on three separate frequencies broadcast via an L-band phase array antenna designed to entirely cover the visible earth below the satellite. The satellite is now under the control of Telespazio's spacecraft operations centre in Fucino, Italy, and in-orbit checking-out of the satellite has begun.

In addition to its technology-demonstration mission, GIOVE-B will also take over GIOVE-A's mission to secure the Galileo frequencies, as that first Galileo demonstration satellite launched in December 2005 is now approaching the end of its operational life.

Beyond GIOVE-B, the next step in the Galileo programme will be the launch of four operational satellites, to validate the basic Galileo space and related ground segment, by 2010. Once that In-Orbit Validation (IOV) phase is completed, the remaining satellites will be launched and deployed to reach the Full Operational Capability (FOC), a constellation of 30 identical satellites.

"With the successful launch of GIOVE-B, we are about to complete the demonstration phase for Galileo", said ESA Director General Jean Jacques Dordain in Fucino while congratulating the ESA and industrial teams. "The strong cooperation between ESA and the European Commission has been instrumental in making progress in a difficult environment over the past few years; and, even with that being so, Galileo has already materialised, with two satellites now in orbit, significant headway made on the next four (already in the construction phase) and a fully qualified EGNOS service (*) - all this designed to serve citizens in Europe and all around the globe. ESA will begin shortly the procurement process for the overall constellation beyond IOV under EC responsibility."

Galileo will be Europe's very own global navigation satellite system, providing a highly accurate, guaranteed global positioning service under civil control. It will be interoperable with the US Global Positioning System (GPS) and Russia's GLONASS, the two other global satellite navigation systems. Galileo will deliver real-time positioning accuracy down to the metre range with unrivalled integrity.

Numerous applications are planned for Galileo, including positioning and derived value-added services for transport by road, rail, air and sea, fisheries and agriculture, oil-prospecting, civil protection, building, public works and telecommunications.

SOLAR FLARES MAY AFFECT GNSS

AP, 27 April 2008

The Global Positioning System, which is relied on for everything from navigating cars and airplanes, to transferring money between banks, may be threatened by powerful solar flares, a panel of scientists warned.

"Our increasingly technologically dependent society is becoming increasingly vulnerable to space weather," David L. Johnson, director of the National Weather Service, said at a briefing covered by the Associated Press (AP).

GPS receivers have been used in recent years, for satellite signals in navigating airplanes, ships and automobiles, and in using cell phones, mining, surveying and many other commercial uses, the AP said. Banks use the system to synchronize money transfers, "so space weather can affect all of us, right down to our wallet," Anthea J. Coster, an atmospheric scientist at the Haystack Observatory of the Massachusetts Institute of Technology, told the AP.

The cause for their concern, Johnson said, was an unexpected solar burst on Dec. 6, 2006, that affected almost every GPS receiver on the lighted half of Earth. Some receivers had a reduction in accuracy while others completely lost their ability to determine position, he told the news service. Solar activity rises and falls in 11-year cycles, with the next peak expected in 2011. If that increased level produces more such radio bursts, the GPS system could be seriously affected, the researchers told the AP.

LOCKHEED JOINS NORTHROP GRUMMAN COMPETING FOR GPS OCX PHASE B CONTRACT

PRN, 28 April 2008

RESTON, Va.,--Northrop Grumman Corporation announced, Lockheed Martin has joined its team competing for the U.S. Air Force's Global Positioning System (GPS) Next Generation Control Segment (OCX) Phase B contract.

The OCX modernization effort will provide mission enterprise control support for the nation's existing GPS Block II and future Block III satellites. The current OCX contract for Phase A of the program is valued at $160 million and will provide the Air Force a flexible, scaleable, extensible and service-oriented re-architecture of the current GPS ground system. If selected for Phase B, Northrop

Grumman's Team OCX will deliver and sustain OCX via a block development approach. "Lockheed Martin Information Systems and Global Services is a tremendous addition to Northrop Grumman's experienced and proven team and will greatly enhance our ability to offer the customer an innovative and low-risk OCX solution that modernizes GPS command and control for effects-based operations," said Steve Bergjans, GPS OCX vice president and program manager for Northrop Grumman.

Lockheed Martin will leverage a 30-year GPS service history of proven program performance, which includes successfully integrating and operating all versions of GPS space vehicles and ground system architectures, to support Northrop Grumman's innovative approach for an enduring next generation control segment that will optimize operational effects via net-enabled, shared situational awareness and assured services.

Under an Air Force risk reduction effort, Northrop Grumman has since 2005 supported the study of state-of-the-art capabilities in satellite control segment software and hardware architecture and developed innovative architectures to meet OCX performance requirements.

Lockheed Martin, Gaithersburg, Md., joins a best of industry team that also includes Harris Corporation, Melbourne, Fla.; Integral Systems, Inc., Lanham, Md.; and General Dynamics Advanced Information Systems, Dayton, Ohio; and several key specialty small businesses and vendors such as Infinity Systems Engineering, Colorado Springs, Colo., and Applied Minds, Glendale, Calif. Northrop Grumman leads Team OCX as prime contractor.

Northrop Grumman Corporation is a global defense and technology company whose 120,000 employees provide innovative systems, products, and solutions in information and services, electronics, aerospace and shipbuilding to government and commercial customers worldwide.

GALILEO'S GIOVE-B OPENS NEW ERA OF GNSS SIGNALS

Inside GNSS, April 28, 2008

A new generation of GNSS signals became available as the second Galileo In-Orbit Valideation Element satellite (GIOVE-B) reach orbit, following successful launch on Sunday (April 27) from the Baikonur cosmodrome in Kazakhstan.

Riding a Soyuz/Fregat launcher, the 500-kilogram (1,100-pound) spacecraft lifted off at 12:16 a.m. Central European Summer Time (CEST). The Fregat upper stage performed a series of maneuvers to reach a circular orbit at an altitude of about 23,200 kilometers inclined at 56 degrees to the equator. The two solar panels that generate electricity to power the spacecraft deployed correctly and were fully operational by 5:28 CEST.

The European space Agency (ESA) operational schedule called for Galileo signals at three L-band frequencies to begin transmitting within seven to eight hours after reaching orbit, according to Giuseppe Viriglio, ESA's director of telecommunications and navigation.

These new signals will include Europe’s version of the multiplex binary offset carrier (MBOC) design that the European Union and the United States agreed will be broadcast in common on Galileo’s Open Service and the future GPS civil signal at the L1 frequency. The U.S. version of the MBOC will not be available until the first GPS III satellite is launched, currently projected for 2014.

A European industrial team led by Germany's Astrium GmbH built GIOVE-B, with Thales Alenia Space performing integration and testing in Rome and EADS Astrium UK providing the navigation payload. The satellite is now under the control of Telespazio's spacecraft operations center in Fucino, Italy, which has begun checking out the in-orbit operation of the satellite.

Like its predecessor GIOVE-A, the second Galileo satellite carries two small rubidium atomic clocks, each with a stability of 10 nanoseconds per day. But it also features an even more accurate payload: a passive hydrogen maser (PHM), with stability better than 1 nanosecond per day, the first of its kind ever to be launched into space. On operational Galileo satellites that will begin launching within a few years, two PHMs will serve as primary onboard clocks, with the two rubidium clocks serving as back-up.

GIOVE-B also incorporates a radiation-monitoring payload to characterize the space environment at the altitude of the Galileo constellation, as well as a laser retroreflector to enable high-accuracy orbit determination using laser ranging.

Launch of the new spacecraft was delayed for more than a year following a catastrophic electrical short that occurred during testing in the Thales Alenia Space laboratory in the summer of 2006. A further delay from a December 2007 launch date stemmed from the absence of a suitable Soyuz rocket. These delays, however, gave ESA the opportunity to add the MBOC signal to the navigation payload at the cost of a few million additional euros, according to Paul Verhoef, head of the Galileo Unit in the European Commission's Directorate for Energy and Transportation.

ARIANESPACE PLANS BID TO LAUNCH GALILEO SATELLITES
AFP, April 28, 2008

BAIKONUR, Kazakhstan--The European commercial space-launch consortium Arianespace said Saturday it would make a bid to launch 26 satellites from French Guyana to kickstart the European Union's Galileo satellite navigation programme.

The European Parliament on Wednesday signalled its green light for the deployment of Galileo, seen by space experts as a challenge to the US-administered GPS global positioning system. "Arianespace is going to make an offer that corresponds to the needs of the European Space Agency," its chief executive Jean-Yves Le Gall to reporters, enabling the long-delayed Galileo system to be up and running by 2013.

To meet ESA requirements for two different launch systems, Le Gall said Arianespace would use both Ariane 5 and Soyuz rockets capable of carrying four and two satellites at a time respectively. The first four of 30 operational Galileo satellites are to go into space in the first quarter of 2010, using the Russian-developed Soyuz rocket.

The second of two test launches was scheduled to take place in the early hours of Sunday from the Baikonur cosmodrome in Kazakhstan. The facility is the premier launch centre for Russia's space programme. EU Transport Commissioner Jacques Barrot said the European Commission and the European Space Agency would launch public tenders by the middle of this year, with a view to first contracts being signed before 2009. The 3.4-billion euro (5.4-billion dollar) project would be divided into six segments -- satellites, launchers, computer programmes, ground stations, control stations and system operation.

GALILEO HARDWARE PURCHASE CLEARED
Aviation Week, April 28, 2008

TOULOUSE, France - The European Parliament has overwhelmingly approved a 2 billion euro ($3 billion) funding plan for the Galileo satellite navigation system that will allow construction and deployment of the 30-spacecraft network to be financed entirely with public money.

Pending final formalities that should be complete by June, the parliamentary green light will allow acquisition of the remaining 26 full operating capability satellites to begin at the European Space Agency (ESA), which will perform system procurement on behalf of the EC.

Paul Verhoef, head of the EC's Galileo unit, said the EC recently approved seven so-called ESA novation contracts for the first four in-orbit validation (IOV) satellites. The contracts, which replace the single contractual agreement previously in place, will allow 350 million euros in work still to be done under the 1.3 billion euro IOV program to be contracted.

Thales Alenia Space will supply the system, mission and user terminal segments, worth around 600 million euros; EADS Astrium will furnish the space and ground control segments, valued at the same amount; Arianespace will provide the launches (100 million euros); and an arm of German aerospace center DLR will handle operations (50 million euros).

However, Nicolas de Ledinghen, who heads Thales Alenia's navigation and integrated communications unit, said lower-tier contractors are balking at discussing further work until they are paid some 100 million euros for subcontracts that are virtually complete.

ESA's outgoing director of navigation and communications, Giuseppe Viriglio, says the payment has been delayed by administrative formalities related to the change in the prime contract arrangement. Both Thales and Astrium have offered to put up the money themselves, using unspent IOV funds, until ESA can complete the formalities, and the agency has agreed to the plan. But agency red tape continues to prevent it from being implemented, de Ledinghen says.