



W E D N E S D A Y

September 21, 2011

# ION GNSS 2011

# Show Daily

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Written in Cooperation With:



## CPGPS Workshop

# A Compass ICD Coming Soon, More Launches Planned

A remarkable workshop on Compass (BeiDou) program produced some long-awaited news on Tuesday: the first official interface control document (ICD v 1.0) for China's GNSS system will be published next month.

Organized by the International Association of Chinese Professionals in Global Positioning Systems (CPGPS), the workshop featured a select group of high-level officials and academic researchers closely involved with Compass.

Dr. Xiancheng Ding, representing the China Satellite Navigation Office, confirmed that the ICD, would be released in 2011 and, in later discussion, specifically in October. It will be available in printed form and, perhaps, through the Compass website.

ICDs, which define the specifications of the GNSS signals in space, are crucial for product designers and system integrators who want building user equipment and applications based on a system such as GPS or Compass.

Titled Compass: Progress, Status, and Future Outlook, the workshop was co-chaired by Dr. Jade Morton, Miami University (Ohio), and Prof. Jingnan Liu, Wuhan University, China. CPGPS organized the gathering as a commemorative event to celebrate the 10th anniversary of the association's founding. Dr. Morton, the ION's Satellite Division's Vice Chair,

currently serves as president of the CPGPS.

Beginning with launches of BeiDou-2 spacecraft in 2007, a "simple navigation constellation" consisting of nine satellites has been established — four inclined geostationary orbit (IGSO) space vehicles (SVs), four geostationary satellites (GEOs), and a middle Earth orbiting (MEO) satellite.



Compass Workshop speakers at the 2011 ION GNSS meeting. The workshop was chaired by Dr. Jade Morton, Miami University (Ohio) and Prof. Jingnan Liu, Wuhan University, pictured 4th and 5th from the left.

As a result of this expanding constellation, tests on the system will be completed this year and initial operation of regional services that can meet the requirements of users in Asia-Pacific area will begin by the end of 2012 — including an expanded message service, Ding said.

Further updates provided by Dr. Ding included the announcement that two more BeiDou satellites will be launched this year and another five will be launched in 2012.

Another notable speaker was Yuanxi Yang, representing the China National Administration of GNSS and Applications. He presented results obtained by his organization incorporating and comparing the performance of GPS and a set of Compass satellites, three GEOs and four IGSOs, broadcasting on three BeiDou channels.

Tests conducted in Shanghai showed stable positioning in along an east-west axis, but unstable accuracy in the north and up components, a product of the GEO and IGSO orbits, according to Yang.

Other results comparing stand-alone and integrated positioning, navigation, and timing using Compass and other GNSS systems were presented by speakers from Tsinghua University and Beihang University.

Yanping Zhao, CEO of Shanghai HauCe Navigation Technology Ltd., a manufacturer of GPS and Compass receivers, described the GNSS market in China and its future prospects.

In 2010, Zhao said, the GNSS navigation market in China accounted for \$7.7 billion, primarily in the form of GPS-based, location-capable 3G smartphones and portable navigation devices (PNDs). By 2015, that figure will reach \$41 billion, including \$24 billion of location-based services, with a project base of 350 million Chinese GNSS users, Zhao said.

## ION GNSS 2011

# Welcome to ION GNSS 2011

*Opening Day features GNSS Updates on USA, Russia, EU, China, and Japan plus a special panel session on LightSquared*

Welcome to the Pacific Northwest and the ION GNSS 2011 — the 24th International Technical Meeting of ION's Satellite Division and the world's largest technical meeting and showcase of GNSS technology, products and services.

Today's must-see events include the GPS Program Update Panel Discussion in the morning, led by The MITRE Corporation's John Betz. It features updates on satellite-based navigation systems by leading experts from the U.S. Air Force GPS Wing (GPS), the Russian Federal Space Agency, (GLONASS), Europe's Galileo Program, China's BeiDou (Compass) Management Office, and Japan's Satellite Applications and Promotion Center (discussing the Quasi-Zenith Satellite System or QZSS.)

Then this afternoon, don't miss the panel discussion "Can LightSquared and GPS Coexist?" led by Thomas Stansell, Stansell Consulting. Panelists include representatives of leading GNSS manufacturers as well as a spokesperson for LightSquared Subsidiary LLC, the wireless broadband company that seeks to build a network of powerful terrestrial base stations transmitting in an RF band next to the GPS (and other GNSSes') L1 frequency.

Today the exhibition area will be open from 10 a.m. to 4 p.m. and then again from 7 p.m. to 9 p.m. for an exhibitor-hosted reception. Be sure to explore the offerings of the nearly 70 companies, organizations, and institutions represented in 76 exhibit booths and 10 island displays.

After your sessions, you will find that Portland is a beautiful city to explore. With its MAX Light Rail transportation system, getting around Portland is easy, cheap, and environmentally friendly. Portland has painstakingly planned its parks and outdoor spaces to take advantage of the Pacific Northwest temperate climate — making exploring Portland fun and healthy.

From its huge microbrewery scene to its trendy restaurants, ION GNSS 2011 attendees will discover plenty of options to satisfy even the finickiest of "foodies."

The annual ION GNSS conference draws worldwide attention and participation, and is recognized as the forum for announcing new policy and technology developments and applications of global navigation satellite systems.

WELCOME, continued on page 3

# Dual Launch of GPS Satellites on the Horizon, CGSIC Attendees Told

To reduce launch costs the Air Force will begin launching GPS satellites two at a time starting with the GPS III satellites, said Col. Bernard Gruber, director of U.S. Air Force's GPS Directorate.

That change, and developments in other GPS programs were detailed to attendees at the 51st meeting of the Civil GPS Service Interface Committee.

Gruber told *Inside GNSS* magazine the Air Force is now working with United Launch Alliance to devise an adapter for the launch vehicle — which could be either a Delta or an Atlas rocket. It has not been decided when the dual launches will begin though it could be as early as the sixth GPS III spacecraft.

The shift should not impact the schedule for the GPS IIIs said Gruber, which are now set to start launching in 2014, though a change to the ground control segment will be necessary. It is not possible to do dual launches with the GPS IIF satellites, Gruber added, because they are configured for direct insertion into a specific orbit.

Those orbits are shifting — at least for three of the satellites in the current constellation of 30 said Lt Col. Jennifer Grant, commanding officer at the Air Force's Second Space Operations Squadron.

CGSIC, continued on page 2



## Random Fixes



### IFEN Offers Workshop on Multi-GNSS Signal Generator, Software Receiver

IFEN (**Island Booth I**) invites ION GNSS 2011 participants to join a workshop on the features and operation of its NavX-NCS Essential signal generator and the new SX-NSR GNSS navigation software receiver.

The session will take place from 9 to 9:45 a.m., Thursday, in the exhibitor demo area adjacent to the ION GNSS exhibition in Hall B.

Live demonstrations of the two IFEN products will cover the features and operation, including multipath generation and detection using the NavX-NC Essential for signal generation and the SX-NSR for signal processing. IFEN presenters include Dr. Günter Heinrichs, head of customer applications, Dr. Robert Wolf, head of navigation products, and Dr. Thomas Pany, senior research engineer.

### Vote for Your Favorite Innovation with Location-Based Mobile Voting App

The 2011 USA Challenge (**Booths 705-707**) offers ION GNSS participants a chance to pick their favorite satellite navigation application from this year's contest using eVotz, a mobile voting platform that won the competition last year.

Elliot Klein of New York developed eVotz to verify voter's identities and location via a secure, mobile platform for location-enabled smartphones or tablets. ION participants inside a virtual "geofence" within and around the convention center may use eVotz to select their favorite — the "People's Choice" — from among the five ideas already judged by a panel of GNSS experts.

Deadline for voting is 11 a.m., Thursday, Sept. 22. Information on how to cast ballots and displays of the five finalists' innovations are available in the USA Challenge exhibit.

Mobile voting will take place using TechnoCom location technology and Intercept Networks, a joint venture between Primary Wave Media and TeleSmart Networks to enhance Intelligent Numbers with cloud-based location services and two-way messaging.

Five finalists will introduce their GNSS application and location-based service ideas in "fast pitch" presentations on Thursday, September 22, at 12:30 p.m. in Rooms A 105-106. A regional partnership of the European Satellite Navigation Competition, the USA Challenge 2011 competition was organized by Inside GNSS magazine and cosponsored by NovAtel, Inc., and the Institute of Navigation.

## Averna's Multi-Channel RF Recorder Makes Magazine's Top 50

Averna (**Booth 204**) is proud to announce that its field-ready multi-channel RP-5100 RF Recorder was named among Test & Measurement's World top 50 products of 2011. TMW's 2011 buyer's guide lists more than 700 vendors, divided into five major categories and 16 subcategories. With a broad range of frequencies supported from 250 kHz to 2.5 GHz, and 20 MHz of recording bandwidth on each channel, the Averna RP-5100 Series supports a wide spectrum of navigation as well as broadcast radio and video protocols.

### CGSIC continued from page 1

Those three older satellites are being moved and paired with younger spacecraft in their orbit slots to give added capability to "terrain challenged" users. The new lineup, devised particularly to aid warfighters in Afghanistan, will assist users worldwide including those in the United States, said Grant.

To protect those U.S. users from jamming the Department of Homeland Security is cooperating with other agencies to create Patriot Watch, a system of systems that will eventually tap a wide variety of government and commercial sources to pin point interference to GPS signals, explained John Merrill, PNT program manager in the U.S. Department of Homeland Security's Geospatial Management Office.

The first element of Patriot Watch, called Minnow, is now being deployed, he said. A program of the Federal Aviation Administration and the Federal Communication Commission, Minnow will spot jamming and other interference sources around airports. As Patriot Watch develops, data could be added from other GPS users, such as FedEx, who have receivers deployed as part of their operations. That data would be stripped of privacy-sensitive identifiers, said Merrill, gathered, standardized by Homeland Security and then used collectively to identify where interference is occurring in near real time.

Time was the subject of an earlier session of the CGSIC — specifically the usefulness of the leap second that keeps digital systems using Coordinated Universal Time or UTC in sync with Universal Time

or UT1 — the time reflecting the Earth's position in the space relative to the sun and other bodies.

Though leap seconds are regularly added to UTC systems, the effort is not worth the confusion it creates, suggested physicist Judah Levine. Levine, who works for National Institute of Standards and Technology, stressed he was giving his own opinion.

A proposal now on the final agenda of the International Telecommunication Union would drop the leap second. The total difference between UTC and UT1 would amount to about one minute over 100 years, said Levine, and would not impact computer systems.



Col. Bernard Gruber, director of U.S. Air Force's GPS Directorate

## NEW PRODUCT ANNOUNCEMENTS

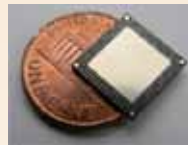


### MAXTENA TO DISPLAY NEW HIGH PERFORMANCE ANTENNA

Maxtena will be displaying its new M1227HCT-A-SMA antenna at **Booth 221**. The new antenna, which is 51 x 30cm and weighs 17g., provides exceptional pattern control, polarization purity and high efficiency in a very compact form through proprietary Helicore® technology.

The antenna, which designed for L1/L2 GPS bands, uses a screw-on design, features an integrated SMA connector and is rated for 50 V/m out of band interference. Particularly useful when doing retrofitting, or for applications requiring minimal integration, the antenna is equipped with an O-ring that makes it waterproof once it is installed on a mating surface.

The antenna has Active LNA circuitry, out-of-band jamming immunity and Ultra low noise figure and power consumption.



### GNSS TECHNOLOGIES INC., UNVEILS NEW CHIP FOR INDOOR 3-D

GNSS Technologies Inc., Japan has unveiled a new chip that provides 3-D positioning information for indoor locations. The IMES chip, on display at **Booth 722**, is 12mmx12mm in size and transmits an L1C/A GPS compatible signal using PRN codes 173-182. Since it is GPS compatible signal only a firmware update is necessary for GPS receivers.

The chip should be particularly useful for indoor and deep 3-D indoor navigation applications where GPS/GNSS signals are not available and can provide 3-D position data along with Floor ID using a single transmitter device. The chip can also be set up to transmit signals from Galileo, Glonass or Compass.



### NAVTECHGPS OFFERS SPECIAL SHOW PRICES ON HARDWARE, SOFTWARE

NavtechGPS is offering special show pricing on SatGen software & LabSat hardware through September 30.

The software enables the simulation of almost any kind of test at a set time and date, anywhere in the world. With a data file created in SatGen software, replayed on a LabSat, it is possible to simulate an aircraft taking off and going into a vertical climb up to 30,000 feet and then performing a high-g turn.

NMEA files containing GGA data can be imported directly into the software. You can also create a route in Google Earth or build a route using simple user commands.

More information is available from NavtechGPS at **Booth 617**.

### NOVATEL LAUNCHES GNSS IONO SCINTILLATION AND TEC MONITOR RECEIVER

NovAtel Inc. (**Island Booth F**) announced at the ION GNSS 2011 today the GPStation-6 GNSS Ionospheric Scintillation and TEC Monitor (GISTM) receiver. This specialty GNSS receiver is integral to ionospheric monitoring and space weather applications. The announcement was made at ION 2011 in Portland, Oregon. The GPStation-6 receiver integrates NovAtel's OEM628 measurement engine with a low phase-noise oven-controlled crystal oscillator (OCXO). It provides high-quality signal tracking, ionospheric scintillation, and TEC measurements for all current and upcoming GPS, GLONASS, Galileo, and Compass satellite signals. Designed as a replacement to the GSV4004B GISTM receiver (no longer commercially available), the GPStation-6 provides backwards compatibility from both a hardware and software perspective; easing the transition effort of existing GSV4004B customers.

**EXHIBITORS — Information for the Show Daily: You may drop off press releases, new product announcements and other information for the Show Daily at the ION Membership Booth 823-825 in the Exhibit Hall or at the Registration Desk in the foyer.**

Submit Your Abstract by October 4, 2011



January 30 - February 1, 2012

Newport Beach Marriott Hotel & Spa

Newport Beach, California



www.ion.org

WELCOME continued from page 1

### ABOUT YOUR HOSTS: THE INSTITUTE OF NAVIGATION SATELLITE DIVISION

#### ION GNSS 2011 Leadership

A complex and technically forward-looking enterprise such as the ION GNSS conference would not be possible without the year-round efforts of the ION elected leadership, staff, and many volunteers. This year's event is led by the following:



**General Chair:**  
**Patricia Doherty**  
*Boston College*

Ms. Patricia Doherty is director of the Institute for Scientific Research at Boston College. As director of the Institute, she oversees the activities of staff members working on a variety of innovative research projects. These projects include space weather studies, ionospheric effects on space-based systems, ionospheric measurement techniques, chemical reactions in space and magnetospheric physics. Patricia's research interests include GNSS as a space weather sensor; ionospheric effects on satellite-based augmentation systems; and promoting research and education in GNSS technology in developing countries. She currently serves on the ION's Executive Committee, is chair of the ION's New England Section and treasurer of the ION Satellite Division.



**Program Chair:**  
**Dr. Dorota Grejner-Brzezinska**  
*The Ohio State University*

Dr. Dorota A. Grejner-Brzezinska is a professor in Geodetic Science, and director of the Satellite Positioning and Inertial Navigation (SPIN) Laboratory at The Ohio State University. Her research interests cover GPS/GNSS algorithms, in particular, high precision positioning and navigation, such as DGPS and RTK, GPS/inertial and other sensor integration for navigation in challenged environments, sensors and algorithms for indoor and personal navigation, signal processing in integrated navigation systems using Kalman filter and non-linear filtering, and precision orbit determination for GNSS/LEO. She is president of the International Association of Geodesy (IAG) Commission 4, Positioning and Applications, and IAG Fellow; she has been serving on the Institute of Navigation (ION) Council for the past eight years, and is an ION Fellow. She has published over 190 peer reviewed journal and proceedings papers, numerous technical reports and five book chapters on GPS and navigation and was the recipient of the ION's 2005 ION Thomas Thurlow Award.

#### Technical Chairs:

Dr. José-Ángel Ávila-Rodríguez, *ESA/ESTEC, The Netherlands*; Dr. John Betz, *The MITRE Corporation*; Neil Gerein, *NowAtel, Inc, Canada*; Dr. Allison Kealy, *University of Melbourne, Australia*; Dr. Paul Kline, *Honeywell Aerospace*; Professor Terry Moore, *University of Nottingham, United Kingdom*; Stephen Rounds, *L-3 Interstate Electronics Corporation*.

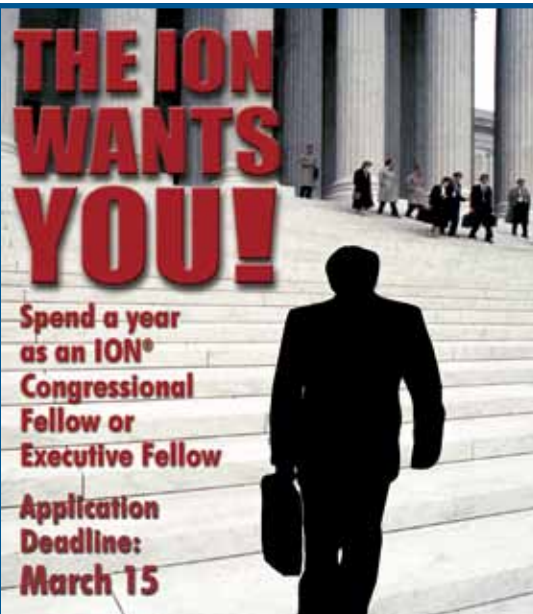
#### Satellite Division Officers:

**Chair:** Dr. John Raquet, *Air Force Institute of Technology*; **Vice Chair:** Dr. Jade Morton, *Miami University (Ohio)*; **Secretary:** Timothy Murphy, *The Boeing Company*; **Treasurer:** Dr. Paul Kline, *Honeywell Aerospace*; **Immediate Past Chair:** Dr. Pratap Misra, *The MITRE Corporation*; **Pacific Technical Advisor:** Dr. Allison Kealy, *University of Melbourne*; **European Technical Advisor:** Dr. Jari Syrjarinne, *Nokia Inc.*; **Galileo Advisor:** Prof. Günter W. Hein, *ESA/ESTEC, The Netherlands*; **Compass Advisor:** Dr. Xiancheng (Hunter) Ding, *Beidou Management Office, China*.

### Visit The ION/ AAAS Government Fellows Booth

Wednesday, Sept. 21  
6:30 p.m. – 7:30 p.m.  
Exhibit Hall Entrance

Help shape policy in Washington, D.C. Meet with, and talk to, former ION government fellows and learn about the many benefits of participating in this program. This may be a perfect fit for you now, or in the future!



#### ION GNSS 2011 Membership Promotion

### MEMBERSHIP SPECIAL FOR YELLOW BADGES AT ION GNSS JOIN OR RENEW AND SPIN THE WHEEL

Now is your chance to JOIN The Institute of Navigation! If you have a **YELLOW** registration badge, that means you registered as a non-member and are eligible for the SPECIAL MEMBERSHIP OFFER.

We want ALL GNSS attendees to enjoy the benefits of ION membership. So, trade in your **YELLOW** badge for a **GREEN** badge by joining The Institute of Navigation during GNSS 2011 for just \$15 (\$35 for outside the U.S.)

It's easy AND fun.

Plus, if you JOIN ION OR RENEW YOUR ION MEMBERSHIP during GNSS 2011, you will get a free spin of the prize wheel located in **Booth 823-825** in the Exhibit Hall.

Two easy ways to JOIN OR RENEW: 1) Go to **Booth 823-825** in the Exhibit Hall and complete the membership/renewal form, or 2) go to the registration desk and complete the membership/renewal form there.

After you join or renew, bring your membership receipt to **Booth 823-825** and spin the prize wheel for a free gift. Everyone wins (unless you land on "Loose Your Turn".) Prizes include Starbucks gift certificates, ION lapel pins, ION Coins, ION ear buds, ION ties and other fun prizes.

This is the best opportunity to join ION at a great price. ♦

### CHECK IT OUT

#### Mobile Conference Site

Access the GNSS program and other conference information on your mobile device. Point your mobile browser to [m.iongnss.org](http://m.iongnss.org).

#### Customize Your Conference Schedule

Once you are registered for the conference, visit the ION web site to build a customized schedule of conference papers you wish to attend. Visit the ION GNSS program at [www.ion.org](http://www.ion.org) for details.

#### Self-Service Business Area

The use of computers, a printer and a copier is being provided by RX Networks on a self-service basis in the ION registration lobby. Internet access is not available on these computers. For Internet access, please use the computers in the Internet Access Center. As a courtesy to others, please limit your time when others are waiting.

#### Technical Paper Copies Online

Registered attendees may download copies of technical papers online for FREE. Papers can be accessed through the ION website [www.ion.org](http://www.ion.org) by clicking on the ION GNSS 2011 icon. You will need to submit your registration ID (located on the back of your conference badge) and your last name. Only papers provided to the ION by the presenting author will be available. If a desired paper is not available, we recommend you contact the author directly.

#### Conference Proceedings

Official conference proceedings are scheduled for distribution in November to all eligible conference participants.

#### ABSTRACTS DUE MARCH 1, 2012

**JNC** GUIDANCE, NAVIGATION & CONTROL  
**2012** JOINT NAVIGATION CONFERENCE  
Co-Sponsored by the Joint Services Data Exchange (JSDE) & The Institute of Navigation (ION)

**June 11-14, 2012**  
**Crowne Plaza Hotel**  
**Colorado Springs, Colorado**  
[www.jointnavigation.org](http://www.jointnavigation.org)

#### REGISTRATION OPEN

8:00 a.m. – 12:15 p.m.  
& 1:45 p.m. – 5:00 p.m.

#### MORNING SESSIONS BEGIN

8:30 a.m. – 12:15 p.m.

#### PANEL DISCUSSION — PROGRAM UPDATES: (GPS, GLONASS, Galileo, COMPASS, QZSS)

Room C123-124

#### EXHIBIT HALL OPEN

10:00 a.m. – 4:00 p.m.

#### EXHIBITOR DEMONSTRATIONS

Exhibit Hall Demo Area, Hall B

#### Spirent Federal Systems

11:00 a.m. – 11:45 a.m.

#### Locata Corporation

12:00 p.m. – 12:45 p.m.

#### Boeing Company

2:00 p.m. – 2:45 p.m.

#### INFORMAL LUNCHEON

Exhibit Hall

12:15 p.m. – 1:15 p.m.

This event is included with any type of registration. Enjoy lunch with colleagues and new acquaintances.

#### FREE TIME IN EXHIBIT HALL

1:15 p.m. – 1:45 p.m.

#### AFTERNOON SESSIONS BEGIN

1:45 p.m. – 5:30 p.m.

#### PANEL DISCUSSION —

PROGRAM UPDATES:  
HIGH INTEGRITY SYSTEMS  
Room C123-124

#### PANEL DISCUSSION —

Can LightSquared & GPS Coexist?  
Room C123-124  
5:30 p.m. – 7:00 p.m.

#### ION/AAAS GOVERNMENT FELLOWS INFORMATION HOUR

Outside Exhibit Hall Entrance

6:30 p.m. – 7:30 p.m.

Hosted by Dr. Clark Cohen, ION Government Fellows Committee chair. Talk to former ION Government Fellows about the many benefits of these ION-sponsored fellowships. Experience government behind the scenes and use your expertise to help shape policy.

#### EXHIBITOR HOSTED RECEPTION

Exhibit Hall

7:00 p.m. – 9:00 p.m.

Join this year's exhibitors as they host a social evening of information and cuisine. All exhibit booths will be open. Take this opportunity to review developments in GNSS technology, talk shop, get the specifics directly from the vendors, and learn about what has been happening in the GNSS marketplace during the past year. This event is included with any type of registration. Spouses and traveling companions 21 and older are welcome.

#### PROGRAM CHANGES

**Session A1:** Paper #4 by Garcia, withdrawn. Replaced with Alternate #1 by Geng.

**Session A2:** Session Chair Dr. Sally Basker, Sally Basker Consulting has been replaced with Dr. David Bevy, Auburn University.

**Session F1:** Alternate #3 by Sun, withdrawn.

**Session A2:** Paper #2 by Li, withdrawn. Replaced with alternate #1 by Duong.

**Session B2:** Paper #8 by Qiao swapped with alternate #2 by Jeon. Alternate #1 by Li, withdrawn.

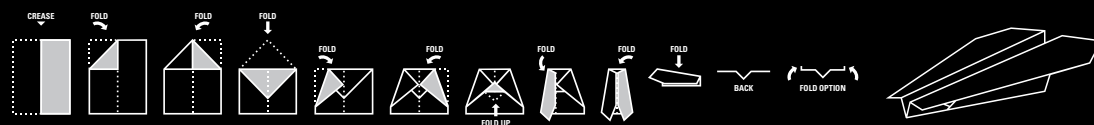
Take it for a test flight.



actual size

### New SPAN-MEMS, small enough for any unmanned air or ground vehicle.

Our new SPAN products combine GNSS technology with a range of MEMS inertial measurement unit options to provide continuously available position, velocity and attitude – even when GNSS signals are blocked by barriers such as trees, canyons or buildings. It's ideal for UAVs or UGVs, tracking and mapping, or anywhere else you'd like to soar over the competition. To help imagine what it is like to hold the power of SPAN-MEMS in your hand, fold this page according to the instructions. Or, to integrate the real card into your own design, call you-know-who. Just remember, MEMS the word. For more info, visit [novatel.com/span-mems](http://novatel.com/span-mems).



Integrate success into your

Integrate success into your

