SPACE TRACKS

A NAVAL SPACE COMMAND BULLETIN ON NAVAL SPACE ISSUES AND INITIATIVES APRIL 2002

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Space Support Services

Naval Space Command provides direct space support to Fleet and Fleet Marine Force operational units around the world, whether for routine deployments, exercises, or actions in response to a crisis situation. We take very seriously our duty of ensuring that our Sailors and Marines understand what products are available from space, how to access them, and how to exploit those products in the waging of war and peace.

❍ Operational Status/Exercise Support Summaries

Naval Space Command maintains a home page on the Global Command and Control System (GCCS) accessible to operational U.S. military forces worldwide at http://navspac1.navspace.navy.smil.mil or http://206.36.197.10.

❍ Naval Space Operations Center (540) 653-6500

Call Toll-Free at 1-888-404-6557. Source of space-related operational intelligence. Space reports and analyses are activated on request and are tailored to a deploying unit's operations and geographic area of movement. Tactical assessments of space system capabilities and vulnerabilities to potentially hostile space sensors are also available.

❍ Naval Space Support Teams (540) 653-6160

Naval Space Support Teams provide tailored information and training at all operational levels to include on-site training, exercise support, and staff augmentation.

❍ Remote Earth Sensing Information Center (540) 653-6520

Naval space Command employs imagery from remote Earth sensing satellites to support intelligence, planning, and operations. Our Remote Earth Sensing Information Center (RESIC) — formerly known as the MSI Cell — processes Landsat, SPOT, and Controlled Image Base (CIB) data in support of Fleet and Fleet Marine Force units. Hardcopy and softcopy products, specifically tailored to users' needs, are produced by RESIC and distributed to support forces participating in real-world crisis, operations, and exercises. RESIC products can be produced to support any of the following applications:

- Planning
- Target Area Analysis
- Bathymetry
- Order of Battle Disposition
- Change Detection
- Broad Area Coverage
- Intelligence Prep of the Battlefield
- Mission Rehearsal
- Amphibious Support
- Supplement MC&G Products
- Trafficability

Product requests can be submitted via GENADMIN message to: COMNAVSPACECOM DAHLGREN VA//N313//, via facsimile to DSN 249-6167 or (540) 653-6167, via email to MSI@manta.nosc.mil, or via Naval Space Command's SIPRNET web page.

❍ Internet On-Line Access

Naval Space Command maintains a home page on the World Wide Web at URL http://www.navspace.navy.mil. Comments or requests for information may be forwarded to the Public Affairs Office via email to gwagner@nsc.navy.mil.

SPACE TRACKS

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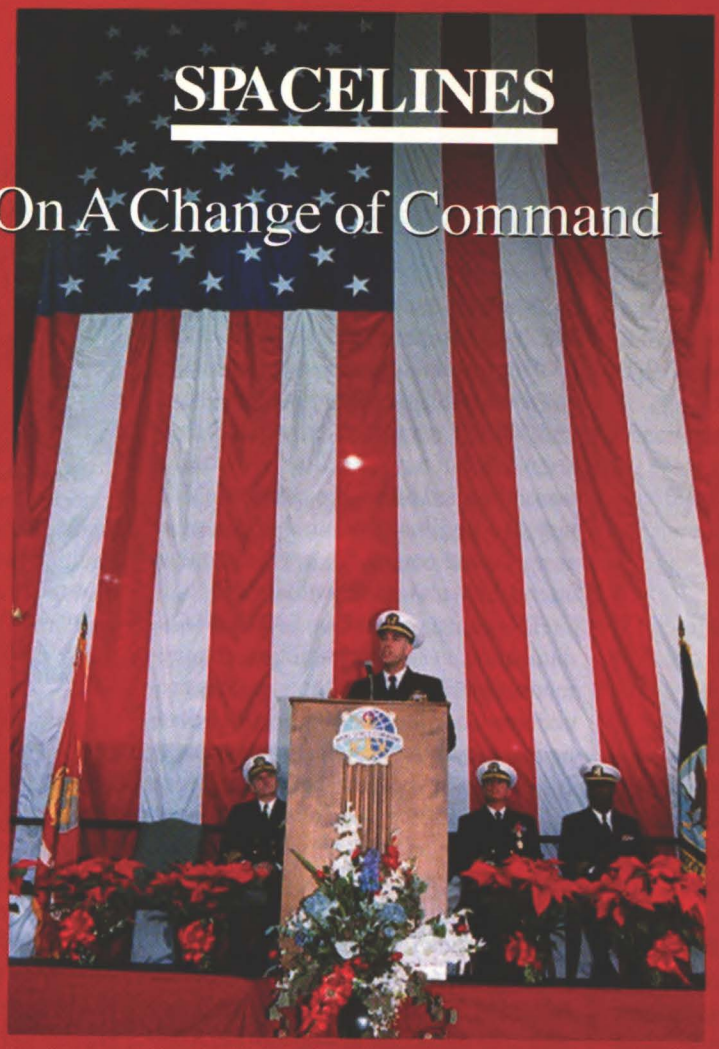
SPACELINES

Reflections On A Change of Command

Our forces are masters of the air, land and sea. We can build a tactical picture encompassing the battlespace spanning the area from sea bottom to outer space. Our leadership has come to expect that our military can tailor the precise force needed in any given circumstance, a force that will remain in constant contact to facilitate operational control. ...



In a melding of every technology we have, our forces are bringing firepower to bear precisely where required to drive a foe from caves. It's a meeting of the most unlikely sort: smart bombs versus desert fighters who might have stepped from the pages of history. It is an environment where brute force would never work, and where only by being smarter than our opponent can we deliver lethality where it will work, without sacrificing our commitment to do no harm to the innocent. ...

Our mission has never been more important than it is today. Achieving military success in this environment means having information that is better than it has ever been. It means that there must be an unbroken capacity to connect the exterior of an Afghan cave to the Oval Office if need be. ...

The role of space has never been more vital. We provide the conduit for the sharing of real-time information that will allow our leaders to make the right decision at every stage of the process.

Selected Remarks by Rear Admiral R. J. Mauldin at Change of Command ceremonies for Naval Space Command on Dec. 10, 2001

SATCOM Course To Be Hosted By Naval Space Command

Naval Space Command will present a course on naval satellite communications on May 7-9 in Dahlgren, Va.

The goal of Naval Space Command's SATCOM course is to help increase the expertise of Fleet and Fleet Marine Force personnel in space-based communication systems that are critical to network centric operations.

Rapid access to bandwidth intensive information services such as email with large attachments, video teleconferencing, telemedicine, file transfer, and web downloading have become core requirements for forces afloat. As end-user applications technology advances, the bandwidth requirements placed on military satellite communication systems continue to increase.

Since there is not enough bandwidth to support those requirements, Naval forces are increasingly relying on commercial SATCOM to augment DOD-owned systems. These courses offer a measure of understanding of the drivers of bandwidth requirements and how military and commercial systems are used to support those needs.

Naval Space Command's SATCOM course includes an operational overview of the full spectrum of SATCOM systems in use and planned for future naval use. The course is targeted toward Fleet and FMF operations officers, communicators, end users and C4I planners at the E-7 level and above, who wish to expand their knowledge of naval satellite communication as applied to naval operations. Military and civilian personnel of the other services and commands are welcome to attend, subject to seat availability.

The course will address SATCOM fundamentals, system capabilities, requirements, operational concepts, access procedures, and future systems in an operational, rather than engineering, context. It includes up-to-date presentations on the current military and commercial systems that are used by naval forces in the joint environment.

Professionally presented by Naval Space Command and Marine Corps subject matter experts, the course covers the full range of the UHF, SHF, and EHF elements of the frequency spectrum. Additionally, governing policy on the management and use of DOD satellite communication systems, including Joint Staff Instruction 6250.01, will be discussed.

For further information, contact Mr. Thomas Sanford at (540) 653-6119, DSN 249-6119, Fax (540) 653-6128, or email sanford@nsc.navy.mil.

Celebrating 40 Years of Space Ops

One of the first commands established by the Navy to provide dedicated space support to the Fleet — the Naval Satellite Operations Center (NAVSOC) — celebrates its 40th anniversary this April.

A two-day schedule of special events to mark the occasion begins on April 24 with a social hour at the officers' club at Point Mugu, Calif.

On April 25, the celebration continues with a golf tournament at the Ojai Soule Park Golf Course, tours of NAVSOC headquarters at Point Mugu, and a dinner-dance at the Spanish Hills Country Club in Camarillo.

For more information on NAVSOC's 40th anniversary activities, visit the web at http://www.navsoc.com or contact Cmdr. James Trump at (805) 989-4200.

Captain Foster Heads NAVSPACE Forward

Navy Captain J. Michael Foster is the new officer in charge for Naval Space Command Forward, based at Peterson Air Force Base in Colorado Springs, Colo.

Capt. Foster reported in June to head the staff of eight military and civilian members that comprise what was formerly designated as NAVSPACECOM Detachment Colorado Springs.

Capt. Foster fills a new OIC position established when the deputy commander billet was relocated to Naval Space Command headquarters at Dahlgren, Va.

Originally from Tullahoma, Tenn., Capt. Foster received his officer's commission through the Aviation Officer's Candidate School in 1976 and was designated a Naval Flight Officer the following year.

His first operational tour was with Fighter Squadron VF-11 and included a

deployment to the Mediterranean in USS *Forrestal*. After three-and-a-half years, he reported to the staff for Fighter Wing One at NAS Oceana, Va.

Capt. Foster

Following a tour with VF-201 at NAS Dallas, Texas, Capt. Foster served in Lithuania as the deputy team chief with the Military to Military Liaison Team. Subsequently, he served as director of plans with the Joint Task Force in Riyadh, Kingdom of Saudi Arabia.

In May 1997, Capt. Foster was assigned to the office of the Deputy CNO for Plans, Policy and Operations as program manager for the Foreign Area Officer Program. After 18 months, he transferred to the office of the Deputy CNO for Resources, Requirements and Assignments as the Navy Y2K representative.

In October 1999, Capt. Foster was assigned to Naval Station Dam Neck Naval Training Center as the chief staff officer.

AFCEA Taps Vice Admiral Browne As New President and CEO

Retired Vice Admiral Herbert A. Browne was named president and chief executive officer for AFCEA International last October.

Vice Admiral Browne comes to AFCEA from GRC International, an AT&T Company, where he served as vice president of intelligence, surveillance and reconnaissance applied technologies. He has more than 10 years of senior level experience in command and control (C2) systems integration in aircraft, command ships and space systems.

In October 2000 Vice Admiral Browne retired from the Navy with 36 years of service. His first assignment as a flag officer was as commander for Naval Space Command from August 1991 to October 1993.

In subsequent tours, Vice Admiral Browne served as deputy commander in chief of the U.S. Pacific Fleet. He later served as commander of the U.S. Third Fleet, where he directed a $25 million renovation of the fleet's command ship, setting a new standard for afloat command and control. He established the Third Fleet as the leader in Navy C2 systems experimentation.

The admiral's combat experience includes combat missions over Vietnam as a naval aviator and commander of the aircraft carrier USS *John F. Kennedy* during its deployment to the Red Sea in support of Operation Desert Storm.

Vice Adm. Browne

His last active-duty assignment was as deputy commander in chief of U.S. Space Command (USSPACECOM) in Colorado Springs, Colo. During his two-year tour with USSPACECOM, he established computer network defense as a new mission area and grew the organization by over 150 employees to work in this area.

Vice Admiral Browne graduated from the Armed Forces Staff College and earned a bachelor's degree in business administration from George Washington University.

Reflecting on the future of AFCEA, Vice Admiral Browne states, "The two biggest challenges facing government, the military and industry today are defeating terrorism and maintaining the defense of our allied nations against traditional threats. AFCEA will play a key role in meeting both of these challenges."

AFCEA is an international non-profit association providing a forum for the professional communications, electronics, intelligence and information systems community. The association is widely recognized for excellence, high ethical standards and the quality of its events. AFCEA serves as an ethical bridge between government requirements and industry's capabilities, representing the top government, industry and military professionals. For more information visit www.afcea.org.

Interservice Space Training

Interservice Space Intelligence Operations Course (ISIOC)
The ISIOC is offered at the SI/TK level to military and civilian personnel (O-4 and below) in all the armed services who work as space system operators.

03 JUN - 14 JUN 02 08 JUL - 19 JUL 02 16 SEP - 27 SEP 02

Interservice Space Intelligence Operations Senior Course (ISIOSC)
A condensed version of ISIOC, the ISIOSC is offered for senior officers, O-5 and above, also at the SI/TK level.

21 MAY - 24 MAY 02

Interservice Space Fundamentals Course (ISFC)
The ISFC is offered to Army, Air Force, Navy and Marine Corps officers, enlisted personnel and civilian employees entering non-operator staff positions who need to be knowledgeable of space operations, activities and environment. This course covers a fundamental presentation of the physical environments of space and the potential effects on manned and unmanned space systems. ISFC is offered at the Secret clearance level.

03 JUN - 14 JUN 02 08 JUL - 19 JUL 02 16 SEP - 27 SEP 02

All courses are conducted at the Air Education and Training Center in Colorado Springs, Colo., unless otherwise noted. To obtain a quota, or for further information, contact Bonnie Watson at (540) 653-5151, DSN 249-5151, or email bdwatso@nsc.navy.mil. The following information is needed to obtain a quota: name, rank/rate, Social Security number, UIC, billet title and phone/FAX.

SPACELINES

Remembering Pioneers In Navy Space Communications and Surveillance

Daniel Martin, head of Naval Space Command's Satellite Communications Operations Branch for the past five years, died on Jan. 3 following a long battle with cancer.

Martin retired from government service in November 2001. At that time, Rear Admiral Richard J. Mauldin, commander for Naval Space Command, presented Martin with the Navy Superior Civilian Service Award — the Navy's second highest honor for civilians — during an informal ceremony at Dahlgren.

Dan Martin

The admiral commended Martin's "dedicated and innovative service" to the command and the Navy at large, which began when he enlisted in June 1964. Martin specialized as a radioman and served at Navy communications stations in the U.S. and around the world, including the Philippines and Italy.

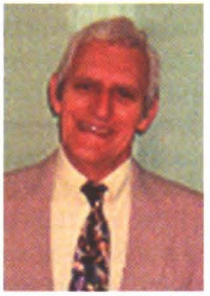
Martin received a commission as a limited duty officer and was serving as a lieutenant when he retired from active duty in the Navy in 1984. The following year, he went to work for the Naval Computer and Telecommunications Command as a government civilian employee, where he continued to support Fleet satellite communications programs.

He joined Naval Space Command in 1995 to head the SATCOM Operations Branch. For the past six years, he was responsible for managing the operation of Navy satellite communications systems.

Martin led a team of military and contractor personnel in providing technical support in joint service operations for a number of satellite systems, and he helped manage contractor support at Regional Satellite Communications Support Centers. He also managed the Navy's INMARSAT B high-speed data and commercial wideband satellite programs.

George Korb, former station manager of the Naval Space Surveillance System's transmitter field station in Jordan Lake, Ala., died on July 6 following an extended illness. He was 69.

Korb was employed at the Jordan Lake field station from January 1959 until his retirement in March 1994. He is survived by his wife, Zora N. Korb, and one sister.



George Korb

Korb, an electrical engineer, had served four years in the Air Force and taught electronics at the Alabama Technical Institute in Montgomery before he joined Bendix Field Engineering Corp. In 1959, he was assigned to a new tracking site Bendix was operating for the Naval Research Laboratory (NRL) at Jordan Lake.

NRL had been tasked to put together a network of ground sites that could detect "quiet" satellites launched by the Soviet Union beginning with Sputnik I in 1957. The antenna field at Jordan Lake — the "transmitter" in the network — radiated electronic signals out beyond the atmosphere into outer space. A satellite passing overhead could be tracked as it deflected some of those signals back to Earth to other ground sites equipped with "receiver" antennas.

In the early years at Jordan Lake, Korb conducted a lot of interesting basic research. As he explained in a *Space Tracks* interview in 1994, "We were just learning about tracking objects in space. In one project, for example, we had to develop a way to distinguish between signals generated by meteorites and those generated by satellites," he said.

Korb's work with the Naval Space Surveillance System was instrumental in upgrading the technical capabilities of the Jordan Lake site. He was promoted to station manager in 1967 and served in that position until his retirement.

COMTHIRDFLT Hosts Navy SATCOM Course

Naval Space Command took its popular "Naval Satellite Communications" course to Naval Air Station North Island in San Diego, Calif., in December. Commander Third Fleet hosted over 60 students from Fleet, shore, and Marine Corps commands who attended the intensive two-day course, which was previously presented on the West Coast at the Anti-Submarine Warfare Training Center in January 2001.

Subject matter experts assigned to Naval Space Command's SATCOM Operations and Plans Branch (N33) presented the course. They introduced the students to satellite basics, including how overt threats and various environmental phenomena can affect space-based communications.

After the satellite basics, students were briefed on specific satellite communications systems within each band of the radio frequency spectrum from ultra-high frequency through extremely high frequency. Discussions included the capabilities and limitations of each system, both government-owned and those leased from commercial providers.

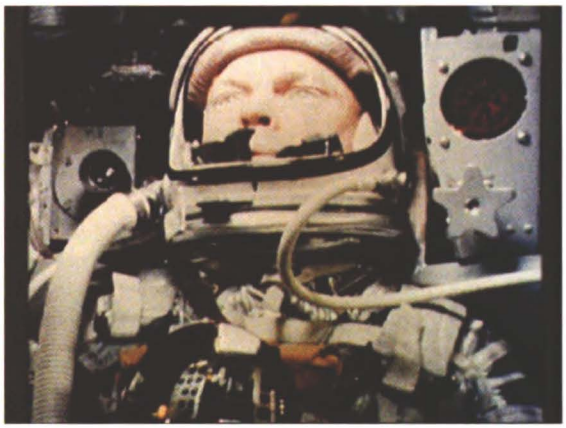
Open discussion and questions were encouraged throughout the course. Additionally, a special period was provided prior to closing to allow students to ask follow-up questions on previously discussed information.

The "Naval Satellite Communications" course began as a Naval Space Command-sponsored one quarter of advanced instruction at the Naval Postgraduate School in Monterey, Calif. In 1998, in an effort to increase the knowledge of fleet communicators and communications planners, the course was revised and offered at Naval Space Command headquarters in Dahlgren, Va., where a three-day version is taught each May.

In 2000, responding to requests from representatives of the Commander's-in-Chief of the Atlantic and Pacific Fleets, the course was condensed to two days and offered on each coast at least once annually. Naval Space Command plans to offer the next three-day course in Dahlgren on May 7-9 this year.

40 Years of Naval Space History

John H. Glenn, Jr., became the first American to orbit the Earth on Feb. 20, 1962. At the time a lieutenant colonel in the Marine Corps, Glenn's space flight in the Mercury *Friendship 7* capsule lasted four hours and 55 minutes. After rounding the Earth three times at a maximum apogee of approximately 162 miles, his capsule landed in the Atlantic Ocean southeast of Bermuda. A Navy destroyer retrieved Glenn and his capsule 21 minutes after his landing.



Glenn was one of the original seven NASA astronauts selected by the agency shortly after it was formed in 1958. Project Mercury was NASA's first manned space program. Its objectives were to orbit a manned spacecraft around the Earth, learn about man's ability to function in space and safely recover astronauts and spacecraft. Ultimately, six of the seven original astronauts were launched into space during the program. NASA Photos

SPACE BILLETS

OFFICERS The following is a list of space subspecialty coded officer billets at Naval Space Command that are vacant or projected to be vacant by September 2002. For additional billet information and actual availability dates, contact your detailer. For Navy-wide space-coded billet availability data, go to http://cno-n6.hq.navy.mil/N64/SIWCC/officer.htm.

BSC	TITLE	BDES	BGRD	BSUB	AVAIL/PRIORITY
00120	CHIEF STAFF OFFICER	1000	CDR	0076R	IMMEDIATE FILL
31230	SPACE SUPPORT TEAM	1630	LT	0076S	IMMEDIATE FILL
31420	OP INTEL ANAL/NEGATION OFF	1000	LCDR	0076S	IMMEDIATE FILL
34090	SPACE CONTROL TRAINER	1000	LT	0076P	IMMEDIATE FILL
73010	OP INTEL GEN/ELECTRONICS	1100	LT	0076S	IMMEDIATE FILL
31130	TENCAP OFFICER	1050	LT	0076P	IMMEDIATE FILL
33090	COMMERCIAL SATCOM	1050	LCDR	0076P	20020501
05230	SHF OFFICER	1100	LCDR	0077P	20020701
34010	TRAINING OFFICER	1050	CDR	0076P	20020801
01300	POM OFFICER	1100	LCDR	0076S	IMMEDIATE FILL
01510	MIL SUPPORT & ADMIN OFF	1100	LCDR	0076S	IMMEDIATE FILL
03100	MILSATCOM OFFICER	1100	LCDR	0076S	IMMEDIATE FILL
32740	FLEET DATA PRODUCTS	1050	LT	0076S	IMMEDIATE FILL
33140	NAVSPOC SYSTEMS OFFICER	1050	LT	0076S	IMMEDIATE FILL
31250	SPACE SUPPORT TEAM	1000	LT	0076S	IMMEDIATE FILL
34115	FLEET ENHANCEMENT TRAINER	1100	LCDR	0076S	IMMEDIATE FILL
04300	DEPUTY DIR INFO SYS DIV	1100	CDR	0076S	20020701
31110	READINESS OFFICER	1100	LT	0076S	20020701
39040	IO OFFICER	1050	LT	0076S	20020901

ENLISTED BILLETS Following is the allowance for enlisted personnel at Naval Space Command, Naval Surface Warfare Center Dahlgren Division, Dahlgren, Va. Dahlgren is located approximately 50 minutes from Washington, D.C., and three hours from Norfolk, Va. The base is also home to the Aegis Training & Readiness Center and the Navy's only active gun testing range. You will also find a small Navy Exchange, commissary, gymnasium, auto and wood hobby shops, year-round pool, library, chapel, theater, and numerous outdoor recreation facilities. If you would like more information about one of the Navy's "best kept secret" duty stations, or would like a welcome aboard package, feel free to contact the Command Master Chief, CMDCM (SS) Alan P. Steiner. Master Chief Steiner can be reached at DSN 249-6115 or commercial (540) 653-6115 (email address: asteiner@ nsc.navy.mil). If you are interested in receiving orders to Naval Space Command, contact your detailer.

CTA:		E7:1	E6:2	E5:2	E4:1
CTR:			E6:1	E5:2	
EA:		E7:1			
ET:		E7:1		E5:1	E4:1
EW:	E8:1			E5:2	E4:2
FC:			E6:1		
IS:		E7:1	E6:2	E5:4	E4:3
NC:		E7:1			
OS:		E7:3	E6:5	E5:3	E4:13
IT:		E7:3	E6:4	E5:9	
SK:				E5:1	
YN:			E6:2	E5:2*	

*One YN2 billet is TAR.

GPS Innovations Incorporated In Missile Testing

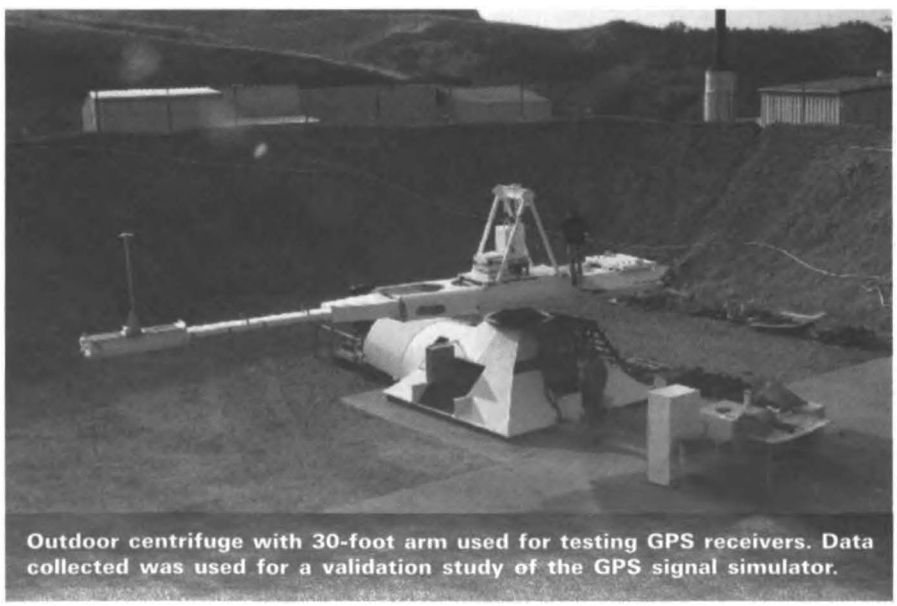
By
Paula K. Khoe
Andrew W. Sutter
James P. Cunningham

Test and training ranges are leveraging the high accuracy positioning capability afforded by the Global Positioning System (GPS) for small missile testing. A tri-service program under the direction of the Office of the Secretary of Defense aims to standardize small missile instrumentation for testing purposes while incorporating cutting-edge technology including new GPS innovations.

The Joint Advanced Missile Instrumentation (JAMI) program will significantly reduce the cost of testing on ranges by enhancing interoperability and improving operational efficiency. Following the avenue mapped by the JAMI program, the range-specific instrumentation packages currently used will be replaced by modular components that can be implemented on any test range.

A primary objective of the JAMI program is to supply GPS sensors that will provide real-time navigation information for range safety applications and data for high-accuracy post-mission analysis. This is no small feat considering flight maneuvers of small missiles such as AMRAAM, RAM, Standard Missile, and Evolved Sea Sparrow may require onboard data collection in high-dynamic environments encompassing supersonic velocities, tens of g of acceleration, and hundreds of g per second jerk, or change-in-acceleration.

To aid in the selection of GPS sensors, the JAMI program office has developed a test program that includes the use of laboratory simulations as well as real-world high-dynamic centrifuge and rocket sled tests and aircraft captive carry and live-fire tests.

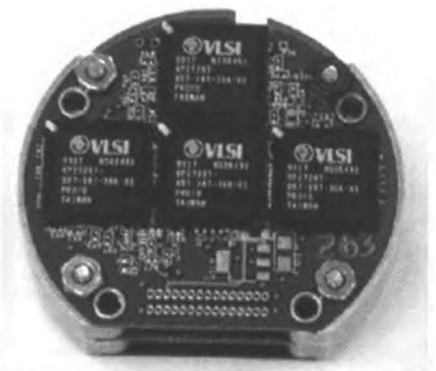


Outdoor centrifuge with 30-foot arm used for testing GPS receivers. Data collected was used for a validation study of the GPS signal simulator.

GPS Sensor Testing

A GPS constellation simulator is a device that replicates in the laboratory the radio frequency signals received by real-world GPS users. The power of the simulator is in its ability to replicate those signals for high-dynamic users, such as small missiles. Using a simulator, testing of different GPS sensors can be done on identical high-dynamic trajectories, allowing direct comparison of the various sensors' performances.

However, before a GPS constellation simulator can be used confidently in the process to rate GPS sensors, especially in high-dynamic environments, validation of the signal generator's output with real-world data needs to be made. With this motivation, the JAMI program performed GPS receiver testing on an outdoor centrifuge. The centrifuge experiments provided the verifiable GPS data in a high-dynamic environment needed for simulator validation.



New technology GPS hybrid translator/receiver may potentially demonstrate high-dynamic tracking capabilties.

During the centrifuge experiments, GPS data was collected from an antenna on the end of the 30-foot centrifuge arm which rotated at a maximum rate of about once per second generating dynamics of approximately 30 g acceleration and 135 g/s jerk. In addition to GPS data, video images of the rotating arm were also collected. Comparison of the arm of position estimates generated using the GPS data

with position estimates derived from the video images showed centimeter-level agreement.

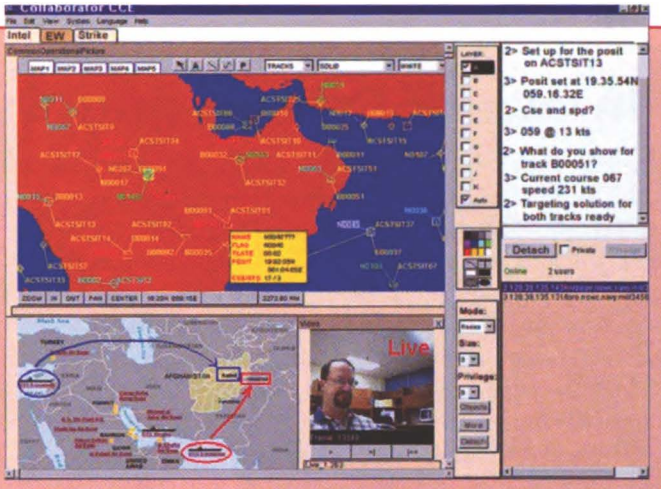
From the centrifuge experiments other results included observation of receiver performance under dynamic loading and the time required for signal acquisition and re-acquisition. Validation of the GPS constellation simulator was made for the full range of dynamic conditions of the centrifuge test. The simulator replicated the centrifuge experiment with great enough precision for GPS positioning to be performed with centimeter-level accuracy.

Using the GPS constellation simulator, replications of various missile flights have been made for the performance evaluation of both inertially aided and unaided GPS receivers, and GPS translators. Overall, translators show greater capability for tracking in high dynamic environments than unaided GPS receivers. However, translators require a significant amount of bandwidth to transmit the GPS signal to the ground processing station.

Limitations in available downlink bandwidth may present the most critical obstacle to using translators in the JAMI program. Further developments in technology, such as the hybrid translator/receiver, may significantly reduce the required downlink bandwidth while maintaining high-dynamic environment tracking capability.

The JAMI initiative to improve, miniaturize and standardize test instrumentation on small missiles has the potential for great cost savings to the test community. A major component of the JAMI program's deliverables is the GPS sensor used for real-time range safety applications and post-mission miss distance evaluation. Much on-going research, testing and development in the JAMI program is directed toward the GPS sensor that will perform dependably in the demanding conditions of missile testing.

The authors are employees of the Space and Ballistic Missile Defense Division of the Naval Surface Warfare Center Dahlgren Division supporting the JAMI program's GPS research and testing.



Navy Collaboration Tool Highlighted In Interoperability Demonstration

A new web-based application designed to provide the warfighter with a common operational picture was praised as an improvement over existing DoD collaboration tools following its successful testing during last summer's Joint Warrior Interoperability Demonstration 2001 (JWID '01).

The Common Collaboration Environment (CCE) tool was developed by the Naval Surface Warfare Center (NSWC) in Dahlgren, Va., specifically for warfighting conditions. The tool provides military users with a collaborative multimedia, compartmentalized, multi-privileged white board and chat using only a web browser.

Warfighters using CCE during JWID '01 reported, "Collaborator seems to provide a more flexible collaboration environment." During the demonstration, CCE provided the capability for imagery and asset pairing for time-critical targeting while maintaining 100 percent availability.

The Defense Information Systems Agency observed that Collaborator is the only DoD collaboration tool that provides the GCCS-M common operational picture with moving hookable tracks.

JWID is an annual, Joint Staff-sponsored demonstration during which government and industry join forces to assess new and emerging technologies that will shape the battlespace of the future. JWID is run on a rotating basis by a different military organization every two years. A "theme" year is followed by an "exploitation" year in which selected demonstrations are refined and receive additional evaluation prior to introducing them into the operational environment. The Air Force led JWID '01, which was an exploitation year.

Held in July, JWID '01 was hosted by NSWC. The Command and Control Laboratory for the center's Theater Warfare Systems Department served as the U.S. Army and U.S. Marine Corps primary site, and as a secondary site for the U.S. Navy for six of the nine JWID '01 demonstrations.

In addition, NSWC inserted five research projects into the JWID demonstration for evaluation by the participants.

The other primary JWID '01 sites in the United States were Hurlburt Field, Fla. (Air Force); SPAWAR San Diego, Calif. (Navy); and the Joint Battle Center in Suffolk, Va. (CinC).

In addition to the various U.S. sites, 17 coalition partners within NATO, Australia and New Zealand established their own JWID sites for their own separate C4ISR demonstrations for a total of 37 JWID sites across the globe.

NAVSEA Dahlgren was connected to the other JWID sites via the Coalition Wide Area Network used to pass data and messages between individual sites and to conduct collaborative planning sessions.

Mobile Imagery Processing System Tested

A team representing Naval Space Command's Remote Earth Sensing Information Center (RESIC) participated in a demonstration last fall of a prototype system designed to exploit hyper-spectral imagery.

The Mobile Processing, Exploitation and Dissemination (MoPED) system was tested at the Expeditionary Warfare Conference (EWC) Blitz '01, held at Coastal Systems Station, Panama City, Fla., in October and November.

The MoPED system is designed to process and distribute hyper-spectral information derived from data acquired near real time from in-theater assets. The system is a joint venture between a number of organizations including Army Space Command (ARSPACE), the Central Measurements and Signatures Intelligence (MASINT) Office, Army Space Program Office, Air Force Space Battle Lab and the Space Warfare Center (SWC).

Finding Concealed Targets

The focus of this year's MoPED demonstration was hyper-spectral information support for identification of potential enemy targets in concealed locations. The RESIC team was invited to participate to observe and evaluate the utility of the MoPED for possible future use by the Navy and Marine Corps. They also had the opportunity to learn the MoPED-unique methods and techniques used for the exploitation of hyper-spectral data collected during the demonstration from both airborne and satellite platforms.

Naval Reservist Cmdr. Chris Houman led the Naval Space Command RESIC team. He is currently activated and assigned to RESIC in support of a year-long hyper-spectral utility study. An intelligence officer, he normally drills in support of the CMO office at the 513th MI Brigade at Fort Gordon, Ga.

Other RESIC team members were Petty Officer 1st Class Bill Clark and Seaman Ivan Locke. Clark is a Naval Reservist assigned to NAVSPACECOM Unit 0266 who, as a civilian, works as the lead image processing analyst in the RESIC.

Locke, a Navy intelligence specialist, is an active-duty production and imagery analyst assigned to RESIC.

The Navy team joined personnel from the Army and Air Force, as well as Boeing Autometric contractors supporting ARSPACE in Colorado Springs, Colo. Each had a unique job, but all shared the same goal: locate the enemy, hiding in very difficult terrain, and get that precious information to the warfighters.

The MoPED system consists of several extremely powerful NT workstations connected by a more powerful UNIX server and backbone. The workstations were located in a tent attached to the back of a specially outfitted Army HMMWV, which maintained the server and backbone. Data were ingested from many different media, from CDROM to ZIP disks, and hyper-spectral analysts used the latest commercial-off-the-shelf image processing software.

The first week started out crisp and clear although as the week progressed, clouds and rain became a factor for the collection of data from airborne sensors. Periodic breaks in the weather dictated when the hyper-spectral sensor could be airborne in hopes of collecting the highest quality data and there were a couple of days the collection aircraft was grounded.

Even with the less desirable data, analysts were able to exploit the imagery. "It was impressive to see the hyper-spectral analysts find the targets under adverse weather conditions," noted Clark. "The techniques they use are powerful, yet simple."

The hyper-spectral analysts of the MoPED repeatedly demonstrated the effectiveness of hyper-spectral data to find extremely well hidden targets. They showed these methods to the RESIC team, who then went on to use those techniques to process data themselves.

The MoPED system consists of several extremely powerful NT workstations located in a tent attached to the back of a specially outfitted Army HMMWV (pictured above).

"Our participation in the MoPED demonstration brought the Navy perspective to what is primarily an Army/Air Force project," expressed Houman. "I am convinced that this is something the Navy needs to investigate because of its great potential for the littoral warfighter. NAVSPACECOM, through the RESIC, could be a key player in this emerging technology," adds Houman.

AFGANISTAN FROM SPACE

This image of the area around Sorubi, Afganistan, is a merge of IKONOS multi-spectral imagery. The scale is 1:6500. Insets highlight a desert facility and a hydroelectric dam in the area. ©2000 Space Imaging, Inc. (All Rights Reserved). Licensed for US DoD/Title 50 & Coalition Forces use only.

Space Reservists Support Time Critical Strike

By Lt.Cmdr. John Manser

Navy reservists from the Naval Space Reserve Program (NSRP) recently participated in a program-wide thrust to support the demonstration of the Navy's Time Critical Strike (TCS) capability.

The goal of TCS is to reduce the targeting cycle time to engage mobile or other time-sensitive targets that challenge our traditional strike warfare process timeline. An example of such a target might be a mobile ballistic missile that requires less than 30 minutes for pre-launch initialization. Achieving the goal of identifying and striking this target prior to launch requires that all elements of the process must be integrated and streamlined.

Fleet Battle Experiment India (FBE-I) and the preparatory Limited Objective Experiments (LOE) 1-3 provided a venue to demonstrate evolving TCS-related technologies. FBE-I was designed to explore methods to operationalize network centric warfare by building and maintaining a C4ISR architecture that provides joint forces with multiple information sources, wide-area connectivity and reach-back capability. FBE-I was conducted as part of the PACOM-sponsored Exercise Kernel Blitz Experimental (KB-X) in June 2001.

The prototype TCS equipment demonstrated during FBE-I included the Naval Fires Network (built on the Tactical Exploitation System-Navy); the Global Command and Control System-Maritime (GCCS-M) intelligence, surveillance and reconnaissance capability; and the Tomahawk precision targeting workstation.

User displays contained geospatial information map displays overlaid with track information, sensor coverage, and real-time, multi-source intelligence data. Other windows were used for sharing information (e.g., chat, email) and for tracking target nominations through engagement and damage assessment.

Precision Targeting Web (PTWeb) and other browser-based tools, collectively called "Ready Room of the Future," were used to derive the 3-D target coordinates needed for current and future precision-guided munitions. The Surveillance Reconnaissance Management Tool was used to optimize the value of theater and national ISR information collection.

The NSRP provided the unique C4ISR expertise needed to operate these prototype TCS systems afloat aboard USS *Coronado*, USS *John C. Stennis*, USS *Lake Champlain* and USS *Bunker Hill*.

Support was also provided ashore at the Naval Warfare Development Command manning the virtual SSGN, with the 1st Marine Expeditionary Force at Camp Pendleton, Calif., and at the Naval Air Warfare Center in China Lake, Calif., with the 18th Airborne Corps.

Cmdr. Lyle C. Brown, initially of NAVSPACECOM 0266, led the 14-month long NSRP support to Time Critical Strike. Cmdr. Brown is currently on extended ADSW as director for Fleet Integration and Support for the Naval Fires Network Program Office (PMS 454).

Cmdr. Brian Hastings, formerly of SPAWAR HQ 0466, led NSRP efforts for LOE 2, and Cmdr. Graham Overman of SPAWAR HQ 0366 led Naval Reserve support for LOE 3 and FBE India.

Fourteen space and intelligence reservists provided a total of 401 man-days in scenario planning, simulation scripting, technology checkout and operations support for FBE-I. Working shoulder-to-shoulder with active-duty counterparts in a simulated conflict environment provided a tremendous training opportunity for all.

NSRP units that participated in the Kernel Blitz experimental exercise demonstrations included SPAWAR HQ 0366 (gaining command SPAWAR Space Field Activity at the National Reconnaissance Office), NAVSPACECOM 0766 and NAVSPACECOM 0266 (gaining command Naval Space Command), N6 SPAEW 0666 (gaining command CNO N6), and SPAWAR HQ 0466 (gaining command SPAWAR HQ). For more information on the Naval Space Reserve Program, see http://nsrp.navspace.navy.mil.

Naval Space Reservists who supported at-sea experiments during the PACOM-sponsored Kernel Blitz exercise last summer are pictured on board a participating warship.

Future joint military operations will benefit greatly from the fielding of enhanced TCS systems and the development of new TCS concepts that occurred during this Fleet Battle Experiment.

Author Lt.Cmdr. John Manser currently serves with NR NAVSPACECOM 0266. He has formerly served on the NSRP headquarters staff as information manager/public affairs officer, and with NR SPAWAR HQ Unit 0366.

Wideband Gapfiller Satellite Enters Critical Design Review

The Wideband Gapfiller Satellite (WGS), scheduled for an initial launch in early 2004, is now in its critical design review.

WGS will provide a quantum leap in performance over the Defense Satellite Communications System (DSCS) spacecraft currently in service by greatly enhancing communications resources for all branches of U.S. armed forces.

While bringing deployed and mobile tactical users robust two-way military X-band and Ka-band communications, WGS will also provide over 10 times the capability of the current generation of DSCS satellites.

Together with DSCS and Global Broadcast System assets, WGS is intended to help satisfy the U.S. military's demand for additional satellite communications resources until the proposed Advanced Wideband System can be built and launched starting in 2008.

A joint-service program funded by the U.S. Air Force and the U.S. Army, the WGS contract awarded in January 2001 was initially valued at $160.3 million for non-recurring engineering and advanced long-lead materiel for three spacecraft. However, the program has options for as many as six Boeing 702 satellites and associated spacecraft and payload ground-control equipment. The procuring agency is the U.S. Air Force Space and Missile Systems Center (SMC).

As WGS prime contractor and overall systems integrator, Boeing Satellite Systems in Los Angeles leads a team of satellite communications industry leaders. Harris Corp. supplies expertise in terminal and payload interfaces as well as the satellite Ka-band antenna subsystem. ITT Industries is integrating the payload control segment. Logicon is leading the effort in system security engineering. SAIC supports the overall WGS systems engineering effort.

WGS successfully completed a series of preliminary design reviews (PDRs) — a key milestone in the program — last fall. PDRs focused on the space and ground segments of the program as well as the overall system. The review invoked a broad range of customer participation, including Air Force, Army, Navy and Department of Defense agency personnel as well as their system engineering and technical assistance support contractors.

The Critical Design Review for WGS will focus on detailed designs and determine readiness to begin production.

Overview on Commercial SATCOM Operations Available

The Commercial Wideband Satellite Program (CWSP) is currently installed on over 25 U.S. Navy ships and is capable of providing over 50 Mbps globally to the Fleet. CWSP combines with the Defense Satellite Communications System (DSCS) system to provide the fleet with 100 Mbps of global connectivity at any given day of the year.

Acquisition of the space segment and shipboard terminals, and leasing of commercial gateways and terrestrial connectivity ashore is done by SPAWAR PMW-176. SPAWAR also installs, tests, troubleshoots and repairs CWSP shipboard equipment.

Naval Space Command provides an operational overview, on-site operational technical advice through its Commercial SATCOM Regional Representatives (CSRRs), and trend analysis. Both SPAWAR and Naval Space Command work with CNO N61, CWSP Resource Sponsor, to maintain the global architecture capability and plan future expansion and upgrades.

While efforts are moving along to put CWSP in the regular Navy pipeline training system, SPAWAR PMW-176 and Naval Space Command have developed a two-day training session to provide operational planners, managers, communications personnel and users of this system with a snapshot of the system today from a global architecture perspective.

Not meant to be a "hands on" "knobology course" (training which is provided during installation and upgrades of the shipboard terminal equipment), the commercial SATCOM overview provides a "quick look," system-level operations training. It covers a short history, management organization, CWSP major components (shipboard, space and ground segments), global architecture, general troubleshooting, reporting procedures and a brief look ahead at future systems on the horizon for the U.S. Navy.

This overview training is offered approximately four times a year as needed or requested. SPAWAR and Naval Space Command have traveled to Norfolk, San Diego, Hawaii, Japan, Italy and other locations over the years to present this overview. Class sizes have varied from 12 to 30 students. It has been accepted with good reviews as pertinent, timely and accurate. The course is currently under revision to expand to other Navy commercial satellite systems such as INMARSAT, Iridium, and TV-DTS.

CWO2 Charles White is Naval Space Command's commercial SATCOM officer. Lonnie Armington, George Hurt and Cynthia Newkirk from N331 at Naval Space Command accomplish research information contributed to the overview. Greg Timme (NSC N331) and Tom Ward (SPAWAR) continually update the course and are the primary instructors.

Those who are interested in receiving this course should coordinate directly with CWO2 White or Timme at Naval Space Command. CWO2 White can be reached at (540) 653-6961 or DSN 249-6961 or email white@nsc.navy.mil. Timme can be reached at (540) 653-5634 or DSN 249-5634 or email gtimme@nsc.navy.mil.

MISSION ACCOMPLISHED:

STS-108 Swaps International Space Station Crews

Endeavour Launch Completes Record Year In Space

The final space shuttle flight of 2001 wrapped up a record-breaking year of manned space missions that completed the first phase of the orbital assembly of the International Space Station.

2001 also marked the 20th anniversary for NASA's Space Shuttle program. In the past two decades, the versatile orbiter fleet carried more than 3 million pounds of cargo and more than 600 passengers into space.

Space Shuttle *Endeavour* Mission STS-108 was launched on Dec. 5. STS-108 was the 12th shuttle flight to visit the International Space Station (ISS) and the first since the installation of the Russian airlock called Pirs on the station.

The space shuttle flight was commanded by Navy Capt. Dom Gorie and piloted by Navy Lt.Cmdr. Mark Kelly and included mission specialists Linda Godwin (Ph.D.) and Dan Tani.

The *Endeavour* crew delivered the Expedition Four crew to the space station: commander Yuri Onufrienko and flight engineers Navy Capt. Daniel Bursch and Air Force Col. Carl Walz. They are slated for a five-month stay aboard the ISS, orbiting 240 miles (386 kilometers) above the Earth.

The fresh ISS expedition team relieved the *Expedition* Three crew — commander Navy Capt. Frank Culbertson and flight engineers Vladimir Dezhurov and Mikhail Tyurin, both Russian cosmonauts — which had manned the space station since August 2001.

While docked with ISS, the *Endeavour* crew conducted one space walk and attached the Raffaello Multi-Purpose Logistics Module to the station so that about 3 tons of equipment and supplies could be unloaded. The crew later returned Raffaello to *Endeavour's* payload bay for the trip home.

Flags for Heroes and Families

During STS-108, NASA honored the victims of the Sept. 11 terrorist attacks by sending nearly 6,000 small U.S. flags into orbit on *Endeavour* as part of the "Flags for Heroes and Families" campaign.

The flags were to be given to survivors and the families of the victims of the attacks in New York City, the Pentagon and United Airlines Flight 93, which crashed in Pennsylvania.

Astronauts Navy Dominic Gorie (b ground top photo Navy Lt.Cmdr. M are in their respe stations during r operations with International Sp Station during M STS-108 in Dec- Astronaut and N Daniel Bursch (b photo) flight eng Expedition Four a Russian Soko

nctional cargo block, or Z ternational Space Station

stronauts and

NASA has named crew three missions scheduled t ternational Space Station in t of 2002.

STS-112 (scheduled for July gust) and STS-114 (Nove ssive assembly work, and t so will exchange space stat n crews. In all, these missio astronauts and cosmona ne first-time flyers.

STS-112, commanded by ffrey S. Ashby, will delive the space station's truss nt to help spacewalkers r station's exterior. Air ela A. Melroy will serve n specialists include Da D.), Piers J. Sellers (Ph.D

Capt. Ashby

Astronauts Navy Capt. Dominic Gorie (background top photo) and Navy Lt.Cmdr. Mark Kelly are in their respective stations during rendezvous operations with the International Space Station during Mission STS-108 in Dec-ember. Astronaut and Navy Capt. Daniel Bursch (bot-tom photo) flight engineer for Expedition Four, is wearing a Russian Sokol suit in the functional cargo block, or Zarya on the International Space Station. NASA Photos

Endeavour Deploys STARSHINE

One day prior to their return to Earth, the *Endeavour* crew deployed the Student-Tracked Atmospheric Research Satellite for Heuristic International Networking Experiment (STARSHINE) satellite.

A number of STARSHINE satellites have been designed and built by the Spacecraft Engineering Department at the Naval Research Laboratory in Washington, D.C., since 1998. The one-meter spheres carry a battery, transmitter/receiver, solar cells and two antennas. The spheres are covered with more than 1,500 mirrors.

Project STARSHINE is an ongoing program to release the beach ball-sized satellites into orbit, where they last for about eight months. During the satellites' mission, sunlight reflecting from their mirrors is visible to the unaided eye during morning and evening twilight hours.

Teams of elementary, middle and high school students visually track the satellites and note the times that they pass between selected pairs of targeted stars. Calculations based on the tracking data will be used to determine atmosphere density at various altitudes.

The payload released in space by *Endeavour* was the third STARSHINE satellite to be placed in orbit.

STS-108 came to an end when Space Shuttle *Endeavour* landed at Kennedy Space Center, Fla., at 11:55 a.m. on Dec. 17.

Astronauts and Cosmonauts Named to Shuttle Flights in 2002

NASA has named crew members to three missions scheduled to visit the International Space Station in the second half of 2002.

STS-112 (scheduled for July), STS-113 (August) and STS-114 (November) will involve assembly work, and the last two also will exchange space station expedition crews. In all, these missions will carry 23 astronauts and cosmonauts, including nine first-time flyers.

STS-112, commanded by Navy Capt. Jeffrey S. Ashby, will deliver a segment of the space station's truss and equipment to help spacewalkers move around the station's exterior. Air Force Col. Pamela A. Melroy will serve as pilot. Mission specialists include David A. Wolf (M.D.), Piers J. Sellers (Ph.D.), Sandra H. Magnus (Ph.D.) and cosmonaut Fyodor N. Yurchikhin from RSC Energia.

Capt. Ashby has flown twice, on STS-93 in 1999 and STS-100 this year. Col. Melroy flew on STS-92 in 2000. Wolf first flew in 1993 on STS-58; in 1997 he traveled to the Russian space station Mir, where he spent 199 days. Sellers, Magnus, and Yurchikhin will be making their first trips into space.

STS-113, commanded by Navy Capt. James D. Wetherbee, also will carry a truss segment, along with additional equipment to assist spacewalkers. STS-113 will be piloted by Marine Lt.Col. Christopher J. Loria. Navy Capt. Michael E. Lopez-Alegria and Navy Cmdr. John B. Herrington will serve as mission specialists.

Capt. Wetherbee, a veteran astronaut, has been in space five times: STS-32 in 1990, STS-52 in 1992, STS-63 in 1995, STS-86 in 1997 and STS-102 in 2001. Lt.Col. Loria and Cmdr. Herrington are first-time flyers, and Capt. Lopez-Alegria will take his third trip to space, having flown on STS-73 in 1995 and STS-92 in 2000.

The Expedition Six space station crew — commanded by Navy Capt. Kenneth D. Bowersox and including Donald A. Thomas (Ph.D.) and cosmonaut Nikolai M. Budarin — will travel to the station aboard STS-113. The Expedition Five crew, made up of Russian Air Force Col. Valeri G. Korzun, Peggy A. Whitson (Ph.D.) and Sergei Y. Treschev, will return to Earth on STS-113.

Please see Astronauts on page 16)

Capt. Ashby

Capt. Wetherbee

Lt.Col. Loria

Lopez-Alegria

Cmdr. Herrington

Capt. Bowersox

Astronauts

(Continued from page 15)

Capt. Bowersox was a member of STS-50 in 1992, STS-61 in 1993, STS-73 in 1995 and STS-82 in 1997. Dr. Thomas previously orbited Earth during STS-65 in 1994, STS-70 in 1995, STS-83 in 1997 and STS-94 in 1997. Budarin returns to space for his third long-duration flight after stays on Mir in 1995 and 1998. Expedition Five's Korzun takes his second long-duration trip to space after a stay at Mir that ended in 1997, while Dr. Whitson and Treschev will make their first trips into space.

STS-114, which had been labeled STS-113 in earlier planning schedules and news releases, will be commanded by Air Force Col. Eileen M. Collins and piloted by Air Force Lt.Col. James M. Kelly. The mission is a space station utilization and logistics flight. The mission includes Soichi Noguchi (NASDA) and Stephen K. Robinson (Ph.D.) as mission specialists. The mission will return Expedition Six to Earth and take Expedition Seven to the station. Expedition Seven is comprised of Russian Air Force Col. Yuri I. Malenchenko, Sergei Moschenko from the Khrunichev Space Center, and Edward T. Lu (Ph.D.).

Col. Collins served as pilot on STS-63 in 1995 and STS-84 in 1997, and commanded the STS-93 mission in 1999. Lt.Col. Kelly flew his first mission aboard STS-102. Dr. Robinson, having flown on STS-85 in 1997 and STS-95 in 1998, also serves as a backup crewmember for Expedition Four. Malenchenko served as commander of Mir 16 and flew on STS-106 in 2000. Moschenko is making his first space flight, while Lu flew aboard STS-84 in 1997 and STS-106 in 2000. Noguchi will be taking his first flight into space.

Further information is available on the Internet:

Crew Biographies
http://www.jsc.nasa.gov/Bios/

International Space Station
http://spaceflight.nasa.gov

Space Shuttle Launch Schedule
http://spaceflight.nasa.gov/shuttle/future/index.html

U.S. CyberService Scholarships Offered

The Naval Postgraduate School is offering full-ride scholarships for information technology specialists who wish to earn a computer science master's degree specializing in cyber defense.

The scholarship program, sponsored by the National Science Foundation (NSF), is open to civilians who will study alongside military officers at the Monterey university.

The scholarships cover tuition and books and provide a $30,000 stipend for living allowances. Recipients of the scholarships agree to serve for two years in the newly established U.S. Cyber Service Corps following completion of their masters' degree.

"These scholarships will be offered as part of the masters program in computer science," notes Cynthia Irvine, director of the Naval Postgraduate School's Center for Information Assurance Studies and Research (CISR). "It is clear that in these times the need for talented individuals with very special skills in information security is greater than ever. Thus, we now need students who want to study a very dynamic field and be part of that unique group serving our country."

Candidates are expected to have an undergraduate degree in computer science or computer engineering. In addition to their course work, students selected for the new program, which was established by NSF under a competitive grant process earlier this year, will participate in full-time, paid summer internships within the federal government.

The NPS Center for Information Assurance Studies and Research is the nation's preeminent educational facility focusing on computer and network security for the military and government.

Candidates for the scholarship program can obtain additional details and application forms from the center's web site at http://cisr.nps.navy.mil/main/programs/scholarship.htm. — *Naval Postgraduate School News Release*

GPS, Other Military Systems Protected By FCC Decision

A decision in February by the Federal Communications Commission authorizing the use of ultra-wideband (UWB) devices above 3.1 GHz and imposing strict technical limits below 3.1 GHz continues to protect critical, spectrum-dependent military systems, including the Global Positioning Satellite (GPS) system.

Deputy Assistant Secretary of Defense for Spectrum and C3 Policy Steven Price said, "The Department supports FCC's reasoned and balanced approach of protecting critical national security systems from frequency interference while allowing commercial deployment of new technologies. DoD appreciates the leadership efforts of the National Telecommunications and Information Administration — the agency with lead responsibility for managing federal government spectrum — ensuring mission-critical operations are not jeopardized. DoD concluded FCC's technical restrictions on UWB devices would be sufficient to protect military systems. Such restrictions were the minimum required to avoid interference with those systems."

DoD intends to monitor regulatory and market developments to ensure national security is maintained and that UWB devices, as deployed, do not jeopardize mission-critical operations supporting public safety, national security and homeland defense. — *DoD News Release*

The Space Advisor

Space systems are key to modern warfare where threats and methods to combat them rapidly evolve. The Space Advisor brings this knowledge to the fight.

By Lt.Cmdr. Zigmond Leszczynski

The unprecedented warfighter reliance on space systems in Desert Storm set new space support requirements for all services. In every conflict since, the military has leveraged space systems to greater degrees of success. Today, naval forces are scoring swift victories in Operation Enduring Freedom with tactics dependent on satellite technologies.

Space systems are now essential for carrier battle group operations. In fact, modern naval forces rely on them to fight and win. This is the future of warfare, and the Navy must increase its space interests to empower people on the tip of the spear.

The Space Advisor (SA) is a new bottom-up initiative that accomplishes this by identifying deployed officers with space systems subspecialties to advise commanders on space matters in the fleet.

The SA officer is an efficacious combination of disciplines, having both a naval warfare specialty and space systems subspecialty. Space Advisors observe and study fleet space systems support processes to suggest improvements and propose solutions for space support needs not yet addressed.

Infrastructure In Place

The main objective of the Space Advisor concept is to accomplish National Command Authority tasking. This is generally achieved by putting precision-guided weapons on target as directed by the Air Tasking Order (ATO). Many space systems are involved in this process, from imagery to navigation and communications. The Space Advisor observes this whole process, from a warrior's perspective, for potential improvements.

To stimulate technological growth, the Space Advisor coordinates with national offices to operationally test advanced space technologies in Fleet exercises. This ensures user feedback and more efficient acquisitions. Concurrently, organic, joint, and combined space tactics are developed to best employ existing as well as emerging systems.

The Space Advisor serves as subject matter expert to the battle group commander. SA expertise includes astrodynamics, satellite payloads, space tactics, and space weather. Astrodynamics is valuable for insight on sensor availability and launch windows. Knowledge of satellite payloads is necessary for analysis of national capabilities, limitations, and daily status.

Space tactics expertise is required to advise on organic, joint, and combined operations. Space weather awareness is important to ascertain the possible impact of solar cycle peaks, magnetic storms, and meteor showers to critical overhead systems.

The cost to establish and maintain the SA program is relatively low. The Space Advisor "Fleet Replacement Squadron" (FRS) infrastructure is already in place as the Naval Postgraduate School (NPS) space systems curriculum. One capstone course is recommended to prepare the Space Advisor for fleet operations. This course addresses the following: duties and responsibilities; lessons learned; applicable collection and communication systems; and advanced space technology programs suitable for carrier battle group integration.

A proposed Space Advisor Tactics Course integrated into the air wing's Inter-deployment Training Cycle (IDTC) Fallon detachment will further reinforce space tactics and advanced space technology insertion. It could also include joint space operations with nearby Nellis Air Force Base. This course would provide valuable warfighter inputs to act as checks and balances for the NPS FRS syllabus to ensure training consistency and validity.

Each battle group should have a Space Advisor. Manpower here is an easier issue than most might think. The number of billets bought is zero. The Space Advisor will be a collateral or additional duty included in a battle group staff, air wing staff, or carrier operations department. An O-4 or above is recommended for required briefings and meetings.

The Naval Postgraduate School space systems curriculum could sustain manning on both coasts by providing five graduates per year. The NPS detailer could monitor these requirements.

Educational payback to the Navy would be enormous. Naval Postgraduate School space systems curriculum graduates with either a space systems engineering (0077P) or space systems operations (0076P) subspecialty would go immediately to sea using their degree and at the same time return to their warfare communities. This plan is complementary to many unrestricted line community requirements, especially aviation's disassociated sea tour.

A Proven Concept

The Space Advisor is an adaptable concept that many graduates could employ during follow-on orders. Their fleet experience and space systems education qualifies them to lead space efforts within their professional community. The Space Advisor concept is a model that can be personalized to fit command-specific needs.

The Space Advisor concept has already improved several space support processes in the Fleet. For example, in the Atlantic Fleet, carrier qualification (CQ)

(Please see Space Advisor on page 19)

Naval Postgraduate School Prepares New Satellite For Launch

The Naval Postgraduate School (NPS) Small Satellite Design Program provides a mechanism for research and instruction in satellite technology and its applications. The program focuses on the design, development, and ultimately, launch and operation of small satellites by officer students at NPS. In addition to the building and flying of complete spacecraft, other space flight experiments are also investigated which may eventually provide a better solution to existing technology for space systems.

The Small Satellite Design Program has been ongoing since the inception of the Space Systems Academic Group in 1982. A number of space flight experiments have flown including the Space Thermo-Acoustic Refrigerator (STAR) as a Shuttle Get Away Special payload, the Ferroelectric Materials in Space (FERRO) experiment as a piggyback payload aboard the DATASAT-X satellite, and a follow-on FERRO experiment aboard the APEX small satellite.

The first NPS spacecraft launched was the Petite Amateur Navy Satellite (PANSAT), a small (57 kg, or 125 pound), digital communications satellite. PANSAT was launched aboard the Shuttle *Discovery* in 1998. The satellite is still orbiting and operating with daily contacts from NPS for telemetry downloads and software uploads.

NPS officer students, faculty, and staff gained a wealth of experience with the PANSAT project in the development of on-orbit operations.

In addition to the educational training, lessons were learned in the space system development cycle which are relevant to the faster, better, cheaper philosophy of spacecraft engineering, as well as the management of a spacecraft development program in an academic environment.

A follow-on small satellite project, NPSAT1, is a logical extension to PANSAT capabilities and lessons learned. NPSAT1 will provide a platform for space flight experiments and address some of the bottlenecks met in the PANSAT project. NPSAT1 moves in the direction of higher capability with coarse, three-axis attitude control; and will be developed in a much shorter period of time.

The long-term vision of the Small Satellite Design Program at NPS is the development of highly capable nanosatellites (1 to 10 kg) or picosatellites (0.1 to 1 kg) developed by officer students providing utility for the scientist, researcher and warfighter.

NPSAT1 Overview

The Naval Postgraduate School is developing NPSAT1 to incorporate commercial standards in a processor architecture that potentially improves reliability of software and decreases development time. The software part of any space system is arguably the least reliable and most prone to cause schedule delays, and thus increases the cost of the program.

Another likely cause for delays and unreliability is the uniqueness of the space flight hardware as a computing platform. Because of this hardware uniqueness, software cannot reliably be tested until hardware becomes available on which to run and debug software drivers, routines, and control algorithms.

One solution is to use current standards that are widely accepted in industry. This affords the use of commercial-off-the-shelf (COTS) products. The goal of the NPSAT1 satellite is to demonstrate a command and data handling subsystem that is compatible with a common desktop PC, along with a POSIX-compliant operating system, namely Linux.

The Linux operating system is a robust, multi-tasking operating system with a rich environment for the software developer. Combining the PC hardware with the Linux operating system software offers the means by which software development carried out on desktop PCs is fully compatible with the target flight hardware. At NPS, this means officer students can work on software algorithms without the need to code at the hardware level.

Other COTS technology is currently available which is directly applicable to space with little or no modification. One such example is ferroelectric (FERRO) memory. FERRO RAM devices are currently available in sufficient densities to allow for their use as a replacement of conventional RAM devices. FERRO RAM offers the inherent property of radiation-tolerance and offers a non-volatile memory storage. NPSAT1 will demonstrate the use of FERRO RAM as part of the spacecraft electrical power subsystem and attitude control subsystem.

Another COTS component that is advantageous for space application is lithium-ion (Li-ion) polymer rechargeable batteries. Li-ion polymer batteries offer the highest energy density (Watt-hours per kilogram) than any of the currently used battery technologies, such as nickel-cadmium, nickel-hydrogen, or nickel-metal hydride.

Li-ion polymer batteries offer energy densities starting from 120 Watt-hours per kilogram and do not exhibit any memory effect. NPSAT1 will attempt to fly the Li-ion polymer battery as part of the electrical power subsystem, which provides a safe battery cell in terms of damage due to overcharging, discharging or handling.

NPSAT1 will support a number of experiment payloads. The Naval Research Laboratory is providing both the Coherent Electromagnetic Radio Tomography (CERTO) experiment as well as a Lang-

Lt. Seiko Okano (right) and electronics engineer Ron Phelps from the Space Systems Academic Group test a MEMS (Micro-Electromechanical System) gyro. NPGS Photo

muir probe to fly on NPSAT1. An NPS experiment to be flown is a configurable processor investigated by Dr. Alan Ross, the Navy TENCAP (Tactical Exploitation of National Capabilities) Chair Professor, Professor Herschel Loomis from the Department of Electrical and Computer Engineering, and Lt. Peter Lashomb.

NPSAT1 will also fly COTS devices as experiments to see how they operate in the space environment, such as a digital camera and some micro-electromechanical systems (MEMS) devices.

The CERTO experiment is a space-based radio beacon that will be used in conjunction with a network of ground receivers to measure the integrated electron density of the ionosphere in the plane of observation.

CERTO will also be used to develop and test tomographic algorithms for reconstruction of ionospheric irregularities; to provide a database for global models of the ionosphere; to characterize the ionosphere for geolocation; and to perform scintillation studies of the ionosphere.

The Langmuir probe is a sensor which will be used to measure ions surrounding the spacecraft as it flies. Data will be correlated between the in-situ measurements from the Langmuir probe and those from the CERTO ground stations.

The configurable processor experiment (CPE) will evaluate on-orbit operation of an NPS design that uses a field-programmable gate array (FPGA) that can be configured for specific processing applications. Ferroelectric RAM memory will be used to store configuration parameters which can be uploaded from the ground to program the FPGA to accommodate different processing requirements.

The fourth NPSAT1 payload is a COTS visual imager (VISIM), or digital camera. The VISIM camera has a 652 x 492 CCD pixel array. Image resolution will be better than 100 meters.

The VISIM payload will be used primarily to generate data that can be used to support on-board processing experiments such as image compression. Additionally, as a community outreach effort, the VISIM can be tasked by elementary and secondary schools to take images of interest, such as their hometown. Through the Internet, students can request images and view them while learning more about space systems in general.

The final experiment to fly onboard NPSAT1 are the MEMS rate sensors. The experiment will operate COTS MEMS rate sensors in a 3-axis sensing configuration. The sensors will be used to assist the attitude control subsystem in the acquisition phase of the mission where the spacecraft is released from the launch vehicle. This initial phase is where tip-off rates will induce the highest rotational rates on the spacecraft.

Following proper orientation of the spacecraft, the rate gyros will be operated intermittently to test their operation in the space environment.

Officer Student Involvement

The main objective, as stated earlier, is the educational training of the officer students at NPS in Space Systems Engineering and Operations. To date, approximately 15 officers have been involved in preliminary design and concept of operations.

Under the guidance of senior lecturer Barry Leonard from the postgraduate school's Department of Aeronautics and Astronautics, NPSAT1 was brought to the forefront of course work as the design project for the Space Systems II course and the Spacecraft Attitude Determination and Control course, during the fall quarter 2000. A former course largely defined the concept of operations (CONOPS) of the spacecraft mission. — *Reprinted with permission from the* NPS Research *newsletter*

Space Advisor

(Continued from page 17)

missions are sometimes flown off the coast of Cape Canaveral. If this coincides with an upcoming satellite or Space Shuttle launch, the associated Military Operating Area (MOA) is restricted for the duration of a launch window for safety.

In one of these instances, the SA obtained Cape Canaveral's tentative launch schedule and potential launch delay information from an unclassified Internet source. Above and beyond daily restrictions published for the MOA, this information enabled carrier Strike Operations to get inside NASA's decision loop and plan contingency operations around anticipated launch windows. That insight provided great scheduling flexibility during a series of STS-99 launch postponements and resulted in early accomplishment of required CQ. Other examples are classified in nature.

Space systems are key to modern warfare where threats and methods to combat them rapidly evolve. The Space Advisor brings this knowledge to the fight.

The Naval Postgraduate School space systems curriculum is proven. Extra costs to establish the Space Advisor concept are negligible. Today, Naval Postgraduate School space systems graduates are serving in battle groups at sea, ready to step up as Space Advisors.

Author Lt.Cmdr. Zigmond "Zig" Leszczynski graduated from the Naval Postgraduate School space systems engineering curriculum with a master's degree in astronautical engineering and a subspecialty in space systems engineering. Seeking to use the Space Systems subspecialty in the Fleet, he researched and developed the Space Advisor concept.

Navy Experiment Uses Low Radio Frequencies For Lunar Surface Studies

The Naval Research Laboratory (NRL) has conducted an experiment to detect radio wave echoes from the Moon with a satellite-borne receiver. The results of this experiment constitute the lowest radio frequency that has ever been used in radio wave echo experiments of the Moon's surface.

On Sept. 13, the High-Frequency Active Auroral Research Program (HAARP) facility, transmitted radio waves to the Moon at a frequency of 8.075 MHz and the radio wave echoes from the lunar surface were detected by the HF radio receiver on board NASA's *Wind* spacecraft. *Wind* was approaching the Moon in order to use the Moon's gravity to swing the spacecraft into a new orbit.

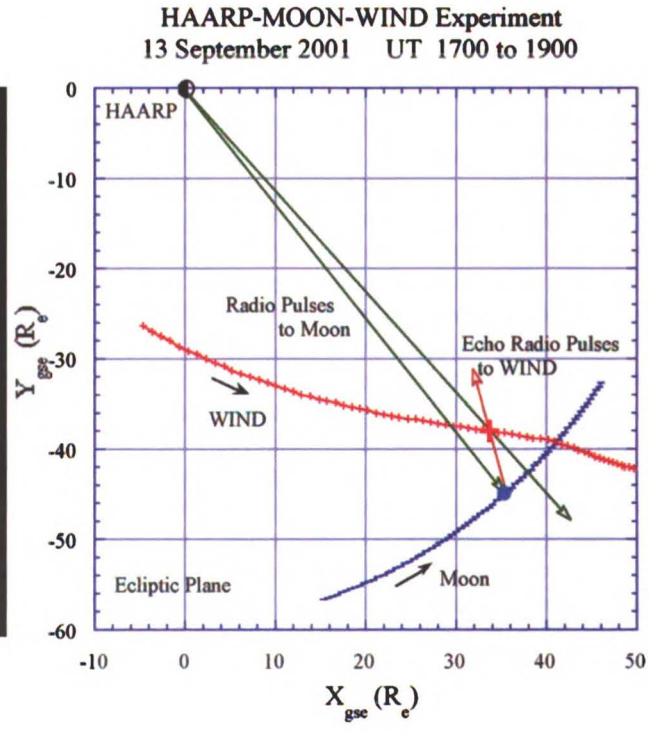
The *Wind* spacecraft was about 40,000 km (25,000 miles) from the Moon's surface at the time of the experiment. HAARP transmitted a series of 1/10-second pulses at high power (960 kilowatts) every 1/2 second for two hours. During the experiment, the HAARP transmission beam rotated to follow the Moon's apparent motion across the sky in order to keep both the *Wind* spacecraft and the Moon within the radio beam. Thus, the *Wind* spacecraft was able to detect both the initial HAARP pulses as they passed by the spacecraft on their way to the Moon, and the reflected echo pulses from the Moon's surface.

NRL principal investigator, Dr. Paul Rodriguez, explains, "The experiment results are significant because they demonstrate that radio frequencies from the low end of the HF band can be used for studies of the lunar surface. Usually, the Earth's ionosphere acts as a radio mask at low frequencies and prevents the signals from passing into outer space. However, in this experiment, the transmissions were done early in the day — at dawn, when the ionospheric masking effect is weak, and with the high powers available from HAARP."

Scientists hypothesize that such low-frequency waves are able to penetrate the lunar surface for several tens of meters below the visible surface, because of relatively low values of electrical conductivity of the lunar interior. "Therefore, we expect that the return echo signal could carry information on the structure of the Moon below several meters," says Rodriguez. "Thus, in future missions for lunar-orbiting satellites, it would be highly advantageous to have HF receiving instruments onboard that could be used to map sub-surface composition changes using the radio echo technique."

The HAARP Operations Center is the large white building and the transmitting antenna array is to the lower right. The Wrangell mountain range is in the background. NRL Photo

The HAARP facility was developed near Gakona, Alaska, under a joint program of the Air Force Research Laboratory (AFRL) and the Office of Naval Research (ONR). The HAARP facility has been in operation for about three years, conducting scientific research in the interactions of high-power radio waves with ionospheric and space plasmas. The facility location at high latitudes allows experiments involving high-energy natural phenomena such as the auroras and geomagnetic storms. In addition, HAARP is used for studies of low frequency communications and long-distance propagation. Future experiments on the reception of echoes from the Moon with Earth-based receiving arrays are also planned. — *Naval Research Laboratory News Release*



The figure illustrates the trajectories of the Moon and *Wind* spacecraft in the ecliptic plane. Their locations at the time of the experiment are shown by the blue dot and red cross respectively. Tick marks on the trajectories are at one-hour intervals. Arrows illustrate the propagation directions of the HAARP radio pulses detected by *Wind*.

Navy Assumes Operational Control of Geosat Follow-On Spacecraft

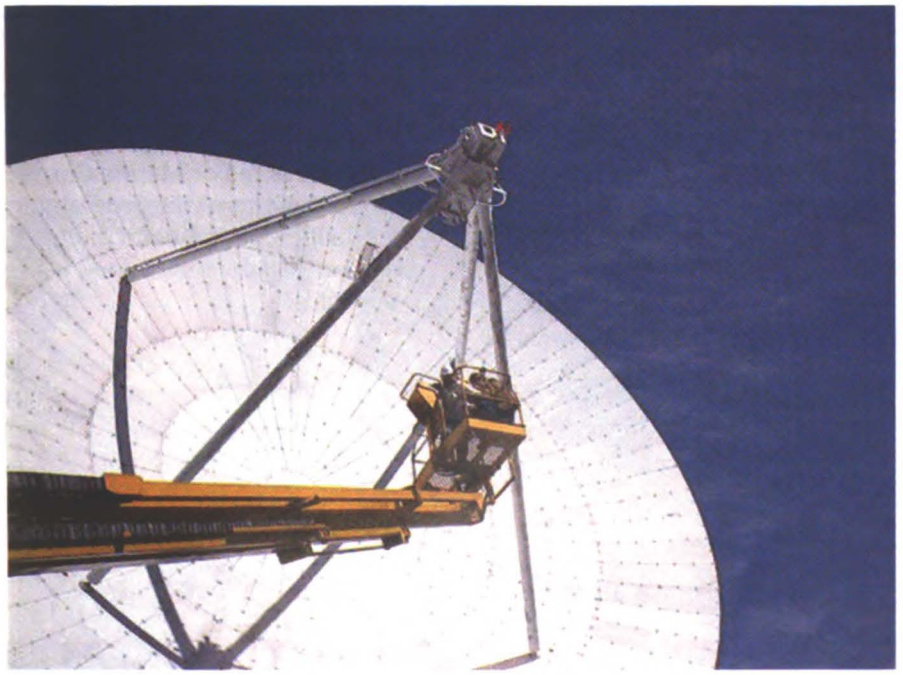
Naval Space Command officially accepted the Geosat Follow-On (GFO) satellite from Space and Naval Warfare Systems Command (SPAWAR) on Feb. 19 and delegated satellite control authority to the Naval Satellite Operations Center (NAVSOC).

GFO was built by Ball Aerospace & Technology, and launched on Feb. 10, 1998. It is a meteorological and oceanographic sensor system that provides data to shore facilities, the civilian scientific community, and ships at sea.

The payload consists of a radar altimeter (RA) and a water vapor radiometer (WVR). The RA measures sea surface height for mesoscale topographical fronts in all weather conditions. The WVR measures the atmospheric path delay used to calculate range corrections for the RA.

The data obtained by GFO is used to determine wave height, wind speed, and the amount of glacier ice. The satellite uses the same 108-degree, 800-kilometer exact repeat orbit that the original Geosat used.

The data collected by GFO is routed to the Naval Oceanograhic Office (NAVOCEANO) payload operations center (POC) at the Stennis Space Center in Bay St. Louis, Miss. There it is processed and fed into oceanographic and weather models used by the Fleet. Ships at sea can download and process the data directly through an on-board AN/SMQ-11 Tactical Terminal.



The Geosat Follow-On spacecraft is shown in a pre-launch test configuration (top photo). NAVSOC's Laguna Peak satellite tracking antenna, one of three ground sites used to provide GFO telemetry and commanding, is shown at bottom.

NAVSOC has operated GFO since launch. Telemetry, tracking and commanding are accomplished through its headquarters at Point Mugu, Calif., and remote sites at Laguna Peak, Calif., Prospect Harbor, Maine, and Finegayan, Guam.

Although SPAWAR accepted the GFO satellite from Ball Aerospace in November 2001, the turnover from SPAWAR to Naval Space Command was delayed until all operational issues were resolved.

Shortly after launch, the Global Positioning System (GPS) receivers on the satellite failed. These receivers were designed to provide both positional information and time tagging for the mission data.

Since then, NAVSOC and Ball Aerospace worked together to develop and field an alternate method of time tagging the data for the orbiting satellite. The positional accuracy requirements are being met through the use of NASA's laser tracking facilities.

Thus a potentially failed mission was salvaged by the dedicated efforts of engineers at NAVSOC and Ball. Upon transfer to Naval Space Command, GFO will be added to NAVSOC's stable of operational satellites.

Originally established in 1962 as the Navy Astronautics Group, NAVSOC was initally created to operate TRANSIT — or Navy Navigation Satellite System — the nation's first operational constellation of spacecraft.

As the command celebrates its 40th anniversary this April, it has realized an expanded satellite control mission that today includes a number of communications satellite systems.

Supporting Joint Task Force-Southwest Asia

SPACE LIAISON OFFICER REPORT

Naval Space Command's Lt.Cmdr. Dennis Ritchey recently completed a 120-day assignment in Saudi Arabia serving as U.S. Space Command's Liaison Officer (LNO) to the Commander, Joint Task Force-Southwest Asia (JTF-SWA), conducting Operation Southern Watch.

The Space LNO position is filled by officers from USSPACECOM, Air Force Space Command, Army Space Command and Naval Space Command on a 120-day rotational basis. Lt.Cmdr. Ritchey served as Space LNO to JTF-SWA from July through November 2001.

The Space Liaison Officer supports the JTF-SWA commander in his mission of enforcing United Nations Security Council resolutions establishing the southern "no-fly" and "no-drive" zones in Iraq, a mission called Operation Southern Watch (OSW). However, the mission evolved to include supporting strike operations in Afghanistan in connection with Operation Enduring Freedom.

Additionally, the Space LNO works jointly with the Space Weapons and Tactics Officer and reports to the director of the Combined Air Operations Center (CAOC). The expertise of the Space LNO is focused on coordinating space force enhancement, space force application, and space force control measures in support of the task force's mission.

Space force enhancement refers to those space systems contributing to the mission of theater ballistic missile defense, navigation, meteorology, communications and intelligence. Specific duties include ensuring end-to-end connectivity of the theater's missile warning voice and data networks, providing navigation accuracy assessments for the Global Positioning System (GPS) to strike and combat search and rescue planners, and working with the weather, communications and intelligence officers in obtaining space products and services.

Space force application applies to measures taken to enhance passive theater missile defense along with ballistic missile intercept systems and procedures.

Space control is the application of all measures to ensure friendly forces' access to space and space-based products and services, while denying the adversary the same. The Space LNO advises the task force and obtains assistance from U.S. Space Command for conducting space surveillance, protection and negation operations to ensure space superiority.

Specific LNO duties include apprising the joint task force of capabilities of friendly space forces as well as the capability of the adversary to exploit space-derived intelligence, services and products.

Serving as the Theater Missile Defense Manager, Lt.Cmdr. Ritchey's efforts were instrumental in expanding the existing theater ballistic missile defense architecture to include all forces deployed in support of Operation Enduring Freedom. Serving as the Space Officer within the Combined Air Operations Center, Lt.Cmdr. Ritchey played a crucial role in the successful execution of over 6,000 combat sorties flown over Afghanistan and southern Iraq by greatly enhancing situational awareness among all levels of the joint task force staff.

Naval Space Command is next scheduled to provide a Space LNO to JTF-SWA in November 2002.

The Main Event

I expect every individual at Naval Space Command, military and civilian alike, to make a strong connection between what they are doing in their individual responsibilities on the job and the needs of the American warfighter. If we are not supporting the warfighter — and I don't mean just the Navy warfighter — then we really have little need to be here. There are many areas in which this connection is obvious. But, I want it to be real and visceral. We aren't here to merely develop requirements or be some marginally value-added organization. We are here to contribute to the pointed end of America's spear. So, take a look around and make the connection between what you're doing and say, we need to keep communications satellites operative so the Air Force B-1 crew flying from Diego Garcia into Afganistan has the ability to reprogram their ordnance load in order to support an Army Special Forces or Marine Corps forward air control team fighting the Taliban or Al Qaeda forces. Remember, the main event is the warfighter.

Rear Adm. J. P. Cryer

Change of Command Remarks by
Rear Admiral J. P. Cryer
Commander NAVSPACECOM

People
SPOTLIGHT

OS1 William Runyon

OS1 Troy Massey

ET3 Sandra Spratling

NAVSPACECOM's People of the Year

Naval Space Command recently named its top sailor and civilian employees for 2001.

OS1 Troy P. Massey was selected as Sailor of the Year for the command's headquarters, and as NAVSPACECOM's Shore Sailor of the Year.

As the leading petty officer in the command's Space Education and Training Division, Massey has been responsible for qualification training for enlisted personnel assigned to watch sections for the Naval Space Operations Center (NAVSPOC) and Alternate Space Control Center (ASCC) functions.

During 2001, he qualified 42 watch officers overall, including 20 in an unprecedented four-month period, resulting in a 56-percent increase in qualifications of ASCC and NAVSPOC personnel for the year.

An operations specialist, Massey himself became the first and only Second Class Petty Officer to qualify and stand the position of ASCC space warning officer and assistant crew commander.

Originally from Powder Springs, Ga., Massey joined the Navy in 1994. Following his recruit training, he attended Operations Specialist "A" School and graduated in the top 15-percent of the class.

He subsequently served on board the cruiser USS *Cape St. George* and deployed to the Mediterranean Sea as part of the USS *Dwight D. Eisenhower* Battle Group. During that six-month deployment, Massey was elected as *Cape St. George's* Blue Jacket of the Quarter for October-December 1995, and later as Bluejacket of the Year for fiscal year 1995 for superior performance as a Combat Information Center watchstander.

Massey later served as identification supervisor for joint air defense exercises during ASCIET 96 and Roving Sands 96. He continued on board *Cape St. George* during a North Atlantic exercise and a second deployment to the Mediterranean prior to his transfer to Naval Space Command in September 1999.

In his off-duty time, Massey has served as vice president of the command's morale and welfare committee. He also coordinated the command's holiday assistance program in 2001.

Massey competed with Sailor of the Year nominees from NAVSPACECOM detachments and component commands to garner Shore Sailor of the Year honors. Other nominees were ET1(SW) Clifford E. Khederian, Naval Satellite Operations Center's Sailor of the Year, and OS1

(Continued on page 24)

Jean Rowe

Bob Graham

Michael Patrick

Tammy Hudson

People of the Year

(Continued from page 23)

ET1 Khederian OS1 Morin IT1 Sims

Additional component command representatives who were part of the Naval Space Command Sailor of the Year competition are pictured here.

Michael A. Morin, Fleet Surveillance Support Command's Sailor of the Year.

As NAVSPACECOM's Shore Sailor of the Year Massey was nominated for competition as the Naval District Washington Shore Sailor of the Year and CINCLANTFLT Sailor of the Year.

In other competition, OS1 William R. Runyan, currently assigned to NAVSPACECOM Detachment Echo, was named as the command's Sea Sailor of the Year for 2001.

Runyan has served as the detachment's travel officer and leading petty officer for the Joint Tactical Ground Station Pacific. In addition to providing technical training and supervision for junior Sailors over the past year, he also volunteered numerous hours to help refurbish living quarters for detachment personnel.

Joining the Navy in 1988, Runyan served in Operation Desert Shield on board the cruiser USS *Jouett*, in Japan on board the forward-deployed aircraft carrier USS *Independence*, and in the Caribbean Sea for drug-interdiction operations on board the ocean surveillance ship USNS *Stalwart*.

Runyan, too, will compete in the CINCLANTFLT Sailor of the Year program.

Also nominated for NAVSPACECOM's Sea Sailor of the Year competition was IT1 Sharon Sims. She represented Naval Satellite Operations Center Detachment Charlie, located in Guam, as that activity's Sailor of the Year. She currently serves as assistant officer in charge of the detachment.

ET3 Sandra L. Spratling is Naval Space Command headquarters' Junior Sailor of the Year. During the year 2001, Spratling served as a computer technician in the Information Systems Division. Her duties have included installing and maintaining over 400 command personal computers, associated software and peripherals. She has also served as network administrator for over 300 users on both classified and unclassified local area networks.

Displaying outstanding technical skill, Spratling contributed directly to a successful desktop upgrade that required an accurate inventory of hundreds of standalone computer systems.

Born in Moscow, Idaho, Spratling joined the Navy in November 1997. She reported to Naval Space Command in May 1999 after completing Electronics Technician "A" School and the JMCIS Maintenance "C" School.

Jean Q. Rowe is the command's Senior Civilian of the Year. As head of the Testing and Information Assurance Section, Rowe directed efforts to detect and defend against cyber-attacks through an upgrade to the intrusion detection systems and through the introduction of new or upgraded anti-virus capabilities at entry points to the command, within the local area networks and at the desktop level.

Rowe was commended for her efforts, which also included support for major projects including the Navy/Marine Corps Intranet and the Naval Space Surveillance System Service Life Extension Program.

Originally from King George, Va., Rowe has more than 35 years of government service. Hired in 1966 as a sensor data analyst with the Naval Space Surveillance System, she advanced from math aide to computer systems architect. She headed NAVSPASUR's Systems Division from 1988 to 1993.

Robert B.Graham is Civilian of the Year. As the command's General Service Security Officer, he was praised for "exceptional performance in the areas of personnel, physical and information security."

In particular, Graham oversaw the update of all background investigations for headquarters personnel and completed comprehensive security assessments for the Fleet Surveillance Support Command and Naval Satellite Operations Center. At NAVSPACECOM headquarters, he was responsible for a hugely successful "Security Awareness Week" program.

Originally from Carroll County, Maryland, Graham has nearly 18 years of government service, including a four-year enlistment in the U.S. Army. He reported to Naval Space Command in 1996 after serving as a police officer with the Naval Surface Warfare Center in Dahlgren.

Michael L. Patrick is Naval Space Command's Operations Watchstander of the Year. Patrick was selected for his award based on his performance as a senior orbital analyst in the Naval Space Operations Center (NAVSPOC). His work entails monitoring and resolving anomalies in satellite position data, as well as satellite breakups.

Patrick resides in Caroline County. He originally joined the Naval Space Surveillance Center at Dahlgren in 1985.

Tammy L. Hudson is the ADP Watchstander of the Year. As a computer operator in the ADP Operations and Maintenance Branch, Hudson was commended for her outstanding support in the operation of the command's Mission Processing System.

"Her response to both routine and non-routine system problems repeatedly prevented a degradation in the command's operational status," reads her award citation.

Hudson was recognized for her efforts, which were significant toward sustaining the operation of the Mission Processing System at a greater than 99-percent availability.

A native of King George, Va., Hudson has been employed with the command since 1989.

EW1 Crow

ISSA Locke

Marilyn Overton

Betty Buck

Robin Groves

People of the Quarter Recognized

Military and civilian members of Naval Space Command were recently recognized for exceptional performance during July through September of this year.

Petty Officer 1st Class Jeremy Crow was named Sailor of the Quarter. His award cites his work as leading petty officer in the Space Expertise and Training Division. He is responsible for planning and maintaining a number of simultaneous training pipelines for officers and enlisted personnel working in the Alternate Space Control Center.

An electronic warfare specialist with surface warfare qualifications, Crow has also made significant contributions to the command's welfare and recreation program. He currently serves as treasurer for the MWR committee.

Seaman Ivan Locke was selected as Junior Sailor of the Quarter. Originally from Smyrna, Tenn., he reported to the command in September 2000 after completing recruit training and intelligence specialist school.

He currently serves as an imagery processing analyst in the Remote Earth Sensing Information Center, where he maintains a database of more than $2.5 million of imagery and a library of more than 12,000 compact disks. Recently, he has also served as an Auxiliary Security Force member.

Marilyn Overton was named Senior Civilian of the Quarter. Her award cites her recent accomplishments as the command's security manager. She ensured the command was trained in force protection conditions and requirements in support of a recent exercise prior to the Sept. 11 terrorist attacks in the United States. As a result, the command was primed and responded efficiently to the attacks.

Overton was commended for her management of numerous challenging personnel security matters and her efforts to protect classified information. Originally from Fredericksburg, Va., Overton has worked with the command four years.

Betty Buck was selected as Civilian of the Quarter. A computer specialist in the Naval Space Operations Center Branch, she was commended for her work as a mission support analyst. She responded to a series of recent communications failures in a tactical space system, working diligently with outsides agencies to resolve the problem.

Her initiative in developing a running log of outages was used by project personnel to track problem incidences and eventually correct the source of the failures.

Robin Groves was named Watchstander of the Quarter in recognition of her performance as a computer operator in the System Operations and Maintenance Group. Her duties include monitoring and coordinating restoration of designated systems, application software and real-time data links.

Her efforts to diagnose and respond to two system anomalies during the award period ensured a greater than 99-percent availability of the command's Mission Processing System.

October-December

Quarterly awards for October through December 2001 were presented to the following personnel.

Petty Officer 1st Class Troy P. Massey was named Sailor of the Quarter. His award recognized his performance as an operations specialist assigned to the Space Training and Education Division.

Massey has coordinated and maintained training for command watchstanders serving as Force Enhancement Petty Officers and Space Surveillance Officers in the command's Naval Space Operations Center. Himself qualified as a

(Continued on page 26)

OS1 Massey

CTA3 Henry

Ron Farmer

Donnie Wise

Elmer Clair

People of the Q

(Continued from page 25)

watchstander, Massey is one blueshirts to serve as a Sp Officer on crew for the Alt Control Center.

Petty Officer 3rd Class Sa was named Junior Sailor of t cryptologic technician in the Security Office, she has mar range of projects, from main bases on personnel acces security clearances to keep ries of classified documents

She has also served as curity manager for the comm provided numerous briefs a

Ronald E. Farmer was se nior Civilian of the Quarter. for his performance as a miss lyst and support officer in the Operations Branch.

Farmer's award recogniz analysis of a breakup of a R lite that was critical to Sp Endeavour's mission STS-1 ply and reboost the International Space Station.

Donny A. Wise was named Civilian of the Quarter. An aerospace engineer assigned to the Information Systems Division, Wise was responsible for leading and effort to design and develop several new database elements and routines that were key components of a software delivery for the command's mission system.

Wise worked closely with data processing experts to outline the requirements for this project, develop new database tables, and produce routines to read and write the data.

Elmer E. Clair; an orbital analyst in the command's Naval Space Operations Center, was selected as Watchstander of the Quarter.

Clair's award cited his outstanding performance in assessing satellite conjunctions, which were key to ensuring the safety of astronauts and cosmonauts on board the Space Shuttle and International Space Station.

Newsgram

roberson@cnet.navy.mil

present their TA appli- e class start date. This lled "After-the-Fact- a formal command let- easons for the late TA

002, the Navy will no te TA requests. Sailors rt their TA processing until the last minute. If gister with the school re able to submit your time.

ation & TA Work-shop is mandatory for Assistance (TA) users. vy TA are encouraged kshop as soon as pos- the second TA docu- ck with your command nd time of the next TA workshop. Don't let your benefits be delayed.

The TA Workshop covers:
- TA policy and restrictions
- How to prepare a TA Application
- Student's responsibilities when using TA
- Processing a TA application
- Accreditation Issues
- Reimbursement & Waiver of Indebtedness Procedures
- Formal Degree Plans
- VA Top-Up

More $$: Veterans Education Benefits Increase. The annual cost of living increase in Educational Assistance Allowance for trainees under the Montgomery GI Bill - Active Duty, Selected Reserves, and the Survivors' and Dependents' Educational Assistance Program has been approved. The new rates were effective Oct. 1, 2001. For complete information on the Survivors' and Dependents' Education Assistance Program visit the VA website at www.gibill.va.gov/education.

one educational goal at a time. This means that a Sailor may request TA for courses that apply to more than one degree goal. The Navy wishes to promote degree completions and, therefore, encourages Sailors to consult with their Navy College advisors for guidance when pursing multiple degree goals.

Continuing Education Units. The Navy will fund courses offered as Continuing Education Units (CEUs) as long as the institution offering the CEUs is accredited by an accrediting body recognized by the Department of Education. Check with the Navy College Office prior to signing up for a CEU course to make certain the institution is approved for TA funds. TA is capped at $125 per CEU. Students are responsible for providing a course completion certificate or grade report to the Navy College Office upon completion of the course.

Late TA. The Navy will NOT authorize requests for TA after the school's late registration period. In the past, the Navy would consider approving TA for stu-

Decorated Service & Special Recognition

Defense Superior Service Medal

Capt. James D. Coulson, for service as chief of the Joint Exercises Branch and deputy chief of the Training and Exercises Division for U.S. Joint Forces Command from December 1997 to August 2001.

Joint Service Achievement Medals

Cmdr. Joseph H. Boener, for service as chief for long-range plans for Joint Task Force-Southwest Asia in support of Operations Southern Watch and Enduring Freedom from July to October 2001.

Lt.Cmdr. Dennis B. Ritchey, for service as Joint Space Support Team Liaison Officer for the Joint Task Force-Southwest Asia in support of Operations Southern Watch and Enduring Freedom from July to November 2001.

Navy & Marine Corps Commendation Medals

Lt. Bradley F. Maas, for service as Satellite Operations Department Head at Naval Satellite Operations Center in Point Mugu, Calif., from July 1998 to June 2001.

EACS(SCW) Rodney A. Gardner, for service as environmental program officer and Logistics Division Chief Petty Officer from January 1999 to January 2002.

Lt. Gary L. McKenna, for service as the Remote Earth Sensing Information Center Officer from November 1998 to January 2002.

Lt.Cmdr. Brian K. Baldauf, for service as meteorology and oceanography officer for the Space Plans Division from June 2000 to December 2001.

OSC(SW) Michael D. Adams, for service as future plans operations officer in Destroyer Squadron 18 from September 2000 to August 2001.

EAC(SCW) Paul A. Long, for service as assistant technical representative of the commanding officer for the U.S. Navy Support Facility at Diego Garcia from August 2000 to August 2001.

NC1 LaRhonda Smith, for prior service as a command counselor with U.S. Naval Hospital at Guantanamo Bay, Cuba, from September 1998 to July 2001.

YN1(SW) Leo S. Godet, for service as flag writer and administrative supervisor for Commander Task Force-Navy and Marine Corps Intranet and Naval Network Operations Command from August 2000 to October 2001.

CTA1 Rachel A. Eisner, for service as Joint Information Processing Center systems manager from March 1999 to February 2002.

EW1(SW) Jeremy A. Crow, for service as space control instructor and leading petty officer in the Space Education and Training Division from February 2001 to February 2002.

Navy & Marine Corps Achievement Medals

IS1 Richard E. Hankins, for service as building petty officer for Naval Space Command Detachment Echo from December 2000 to August 2001.

Lt. Paula A. Labbe, for service as the Reserve intelligence officer assigned to Naval Space Command from March to August 2001.

OS2 Benne J. Clark, for service as Force Enhancement Petty Officer from January 1999 to December 2001.

ET3 Sandra L. Spratling, for service as a computer technician from January to December 2001.

IT1(SW) Annette Y. Chivers, for service as Joint Information Processing Center communications supervisor from November 1998 to December 2001.

OS2 Jenna K. Anthony, for service as Remote Earth Sensing Information Center production technician from December 1998 to December 2001.

CTR1 Anthony McCray, for service as command career counselor from April to September 2001.

OS2(SW) Justin W. Rideout, for service as tactical operations plot watch officer and ship's warfare training team member in USS Carl Vinson (CVN 70) from February 1998 to October 2001.

OS2 Chandra E. Waters for service as a force enhancement petty officer since May 1999.

OS2(SW) Brian V. Kickuth for prior service as a track supervisor on board USS Thach (FFG 43) from August 1999 to September 2001.

Good Conduct Awards

SK2 Michael Farrell (5th)
CTA1 Teresa Faircloth (4th)
NC1 LaRhonda Smith (4th)
IS1 Bryron Zeumalt (3rd)
CTR1 Anthony McCray (3rd)
IT2 John King (2nd)
IS2 Brian Shepos (2nd)
IT2 Gary Cothran (2nd)
OS2 Brian Kickuth (2nd)
ITSN Pamela Nugent (1st)

Letters of Commendation

IS2 Zachariah R. Clark
OS2 Jay L. Howard
ET1 David Grawl
CTA3 Sarah C. Henry
CTR1 Anthony McCray
OS2(SW) Stephan C. Pulver
OS1 Kevin L. Vavra
EW2 Jeffrey A. Parker
Ronald E. Farmer
Donny A. Wise
Jean Q. Rowe
Robert B. Graham
Tammy L. Hudson
CTR2 David R. Leatherman
IS2 Frances L. Thomas

Letters of Appreciation

CTM3 Benjamin Starks
NC1 LaRhonda Smith
CTA1 James Lewis
YN1 Eric Wright

Advancements

IS1 Brian P. Shepos
IT1 Robert Guillory
ET2 Justin D. Jimison
CTM2 Tanya M. Nicastri
IT3 Pamela A. Nugent
CTO3 James L. Nugent
CTA3 Sarah C. Henry
CTO3 Vincent G. Pelatari
CTO3 William D. Barron
CTO3 Jonathan P. Foster
IS3 Jennifer Brandenburg
IS3 Ivan R. Locke

Civilian Length of Service Awards

35 Years

Donald L. Gould

25 Years

Ronald E. Farmer
Beatrice Ball

20 Years

Kathy Jones

Donald Gould

Beatrice Ball

Ronald Farmer

CALENDAR

Meetings & Symposia

2002 Space Control Conference, April 23-25, MIT Lincoln Laboratory, Lexington, Mass. Call (781) 981-7910.

Global Air and Space 2002, April 23-24, Arlington, Va. Sponsored by American Institute of Aeronautics and Astronautics (AIAA). Call (800) 739-4424 or visit www.aiaa.org.

20th AIAA International Communications Satellite Systems Conference and Exhibit, May 12-15, Montreal, Canada. Call (800) 739-4424 or visit www.aiaa.org.

Network Centric Warfare 2002, May 21-22, Arlington, Va. Sponsored by the International Quality and Productivity Center. Call (800) 882-8684 or visit www.iqpc.com.

Courses & Seminars

Military Sensor Networks, May 20-21, San Diego, Calif. Call (310) 563-1223 or visit www.TechnologyTraining.com.

Air and Missile Defense Systems, June 6-7, Washington, D.C. Call (310) 563-1223 or visit Web page at www.TechnologyTraining.com.

Following courses sponsored by the Applied Technology Institute. Call (888) 501-2100 or (410) 531-6034 or visit Web page http://catalog.com/hitekweb/.

❍ Advanced Synthetic Aperture Radar, May 15-16, Laurel, Md.

❍ Digital Satellite Communication Systems, May 6-9, Laurel, Md.

❍ Fundamentals of Orbital and Launch Mechanics, May 20-23, Cape Canaveral, Fla.

❍ Fundamentals of Synthetic Aperture Radar, May 13-14, Laurel, Md.

❍ GPS Technology, May 14-17, Cape Canaveral, Fla.

❍ Satellite Communications Systems Engineering: LEO, MEO, GEO, June 24-26 in Los Angeles, Calif., and Sept. 16-18 in Washington, D.C.

❍ Satellite Design and Technology, June 25-27 in College Park, Md., and Sept. 10-12 in Hampton, Va.

❍ Satellite RF Communications and Onboard Processing, June 4-6, Laurel, Md.

❍ The Space Environment — Implications for Spacecraft Design, June 18-19, Huntsville, Ala.

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