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Naval Space Command

SPACE TRACKS

A BULLETIN ON NAVAL SPACE ISSUES AND INITIATIVES March/April 1998

The Critical Link for Information Superiority

. . . SATCOM is the backbone of the 'network centric' battle-space of 2010 . . . page 12

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Building Interoperable C4I for the Fleet ... *page 7*

Reservists Bring Space to Countermine Demos ... *page 9*

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Oceanographic Satellite Launched

A combined military and commercial space team launched the Navy's GeoSat Follow-On (GFO) meteorological-oceanographic satellite at 5:20 a.m. on Feb. 10 from Vandenberg Air Force Base, Calif., atop an Orbital Sciences Corporation Taurus launch vehicle. The Navy's GFO radar altimeter will provide real-time altimetry data to forward-deployed tactical decision makers for the first time. ***Details on page 8.***

Photo courtesy of U.S. Air Force, 30th Space Wing

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Directory of 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 finally, how to exploit those products in the waging of war and peace.

O 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.

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Intelligence Prep of the Battlefield	Disaster Assessment
Mission Rehearsal	Order of Battle Disposition
Amphibious Support	Change Detection
Supplement MC&G Products	Broad Area Coverage
Combat Search and Rescue	Bathymetry Predictions

Product requests may be submitted via message to: COMNAVSPACECOM DAHLGREN VA//N312, via facsimile to DSN 249-6167 or (540) 653-6167, or via email to msi@manta.nosc.mil.

O 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.

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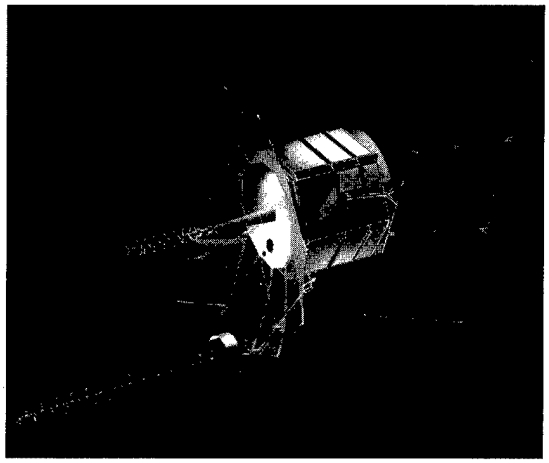
UHF Satellite Marks 20 Years of Operation



Twenty years ago, on Feb. 9, 1978, the first spacecraft in a new constellation of UHF tactical communications satellites was launched. Designed to operate for five years, it is still in use today as one of the world's oldest functioning satellites orbiting the Earth.

FLTSAT-1 was the first of eight spacecraft launched to comprise the space segment of the Fleet Satellite Communications (FLTSATCOM) system conceived by the Navy in the early 1970s. As envisioned by the Navy, the Fleet Satellite Communications system would provide communications support to the fleet worldwide by means of at least four satellites placed in geosynchronous orbit around the Earth's equator. Only the near-polar regions of the globe would be beyond the reach of the FLTSATCOM system.

The satellites would also contain a special transmitter/receiver package, called AFSATCOM, that would provide communications for Air Force long-range bombers.

Navy, which provided initial requirements and funding for the system, was designated the overall program manager. The Air Force was assigned to develop the satellites, provide for their launch and on-orbit control, and to develop airborne terminals. The Army would be responsible for ground terminals, as would the Navy for shipboard terminals.

The FLTSAT spacecraft, built by TRW Space and Technology Group, each weigh a little over a ton. The satellites are solar powered, measuring over 43 feet long from tip to tip of their fully extended solar panels.

The payload module of the early FLTSAT spacecraft contained three antenna systems and transponders for 23 UHF channels. The last two FLTSATs were modified to carry an EHF communications package that supported a maximum of 30 voice channels, as well.

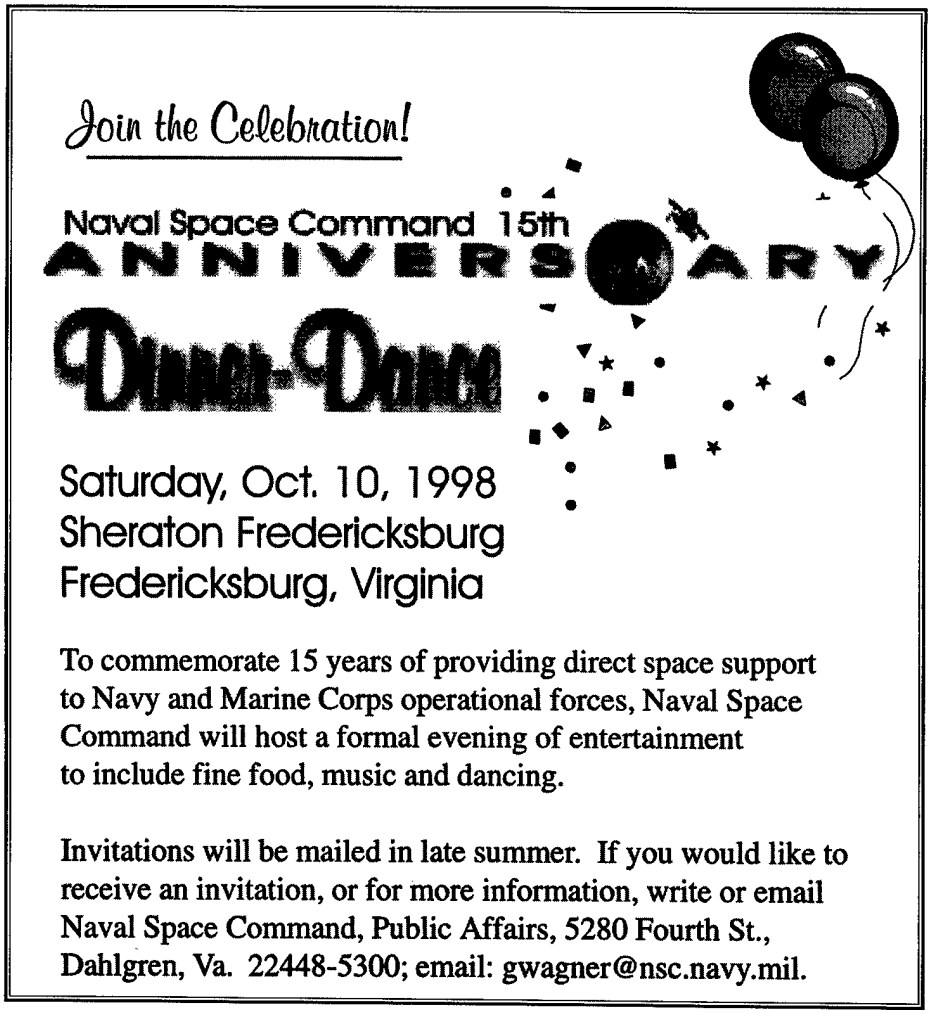
All eight FLTSATs placed in orbit were launched by Atlas-Centaur boosters from Cape Canaveral, Fla., from 1978 to 1989. FLTSAT-1 was initially positioned over the Pacific Ocean to provide tactical communications from southeast Asia to the west coast of the United States. Today, the satellite is positioned over the Indian Ocean.

Naval Space Command assumed on-orbit control of the FLTSAT spacecraft in 1997. The satellites are being flown by the Naval Satellite Operations Center, a component of NAVSPACECOM, based at Point Mugu, Calif., using new connections to the Air Force's satellite control network. Currently, four FLTSAT spacecraft are still operational.

The Navy has procured a new constellation of satellites to replace the aging FLTSATs. The UHF Follow-On (UFO), being built by Hughes Space and Communications Co., features higher power transmitters designed to improve service dependability.

Beginning with UFO-4, the spacecraft in this system also contain an EHF communications package. Six UFO spacecraft are currently operational on orbit. The Navy has ordered a total of 10 satellites.

NAVSPACECOM is operational manager for the UFO system. Air Force Space Command's 3rd Satellite Operations Squadron currently exercises satellite control of the UFO system. That responsibility will transition to NAVSOC after the last UFO spacecraft is operational on orbit.



Exercise Kernel Blitz Tests Exploitation of Imagery for Littoral Warfare

Global Broadcasting System Facilitates Rapid Transmission of Hyperspectral Imagery

By Cmdr. William J. Overman, III
and the SITAC Staff

Hyperspectral imagery products were collected, processed, exploited and fused with other sources of intelligence information in support of Exercise Kernel Blitz 97, conducted at Camp Pendleton, Calif., last summer.

The Hyperspectral MASINT Support to Military Operations (HYMSMO) program was selected by the Navy's Tactical Exploitation of National Capabilities (TENCAP) office to provide tactical intelligence products to both the offensive and defensive amphibious force commanders for the exercise, held in June 1997. This exercise support, and other related hyperspectral collection activity, was named Littoral Radiance II.

The primary objective was to provide intelligence preparation of the battlefield at "Red Beach," Camp Pendleton. Red Beach had an array of typical coastal defense obstacles employed on it. Included in the obstacles were land-based and maritime mines.

Hyperspectral sensors collect and record data in hundreds of spectral bands. The increased number of sensor bands provides higher spectral resolution and more opportunities to detect subtle spectral differences in signatures that are too narrow to be differentiated on multispectral imagery. The significant increase in data to be analyzed has resulted in the development of a totally different method of analysis from that traditionally used for multispectral imagery.

The Hyperspectral Digital Imagery Collection Experiment (HYDICE) airborne sensor, which spans the visible through short-wave infrared spectrum, was installed in a Convair 580 and used to conduct mapping operations, collecting hyperspectral imagery data of both littoral water near-shore and adjacent land areas.

Phases of Operation

There were five functional phases associated with the Kernel Blitz hyperspectral imagery exploitation and intelligence production effort. The first phase involved the execution of airborne collection operations with the HYDICE sensor. During the over-flights, spectro-radiometric measurements of calibration panels were obtained. The raw hyperspectral data, stored on high-capacity Ampex tapes on the aircraft, was then hand-carried to the Spectral Information Technology Application Center (SITAC) in Fairfax, Va. SITAC initiated the radiometric conversion of the data sets to an 8-mm Exabyte tape format that could be read by the exploitation team. This labor-intensive process required approximately 24 to 48 hours to facilitate. Meanwhile, the spectro-radiometric data of the calibration panels was processed and transmitted to SITAC by Meade Technology Laboratories, which was responsible, along with the Army Topographic Engineering Center, for collecting ground truth data. Only the calibration data was sent electronically to all entities of the exploitation team.

Once the radiometrically-corrected hyperspectral data sets were produced, they were copied and transmitted by the Global Broadcast System (GBS) T-3 land-line, and hand-delivered to all exploitation participants. In addition, quick-look images of the scenes were provided, along with the calibration data, mission logs and any relevant contextual information.

Upon receipt of the hyperspectral data, the Naval Research Laboratory's (NRL) Stennis Space Center, Miss., facility provided an update to its multisensor baseline map, which included hyperspectral imagery data that was obtained during the Kernel Blitz background collection in February 1997.

Once the radiometrically-corrected data sets were received by exploitation team members from Applied Signal and Imagery Technology, Inc. (ASIT) and NRL in Washington, D.C., they produced first-phase hyperspectral products, with the assistance and oversight of HYMSMO staff, in collaboration with the Marine Corps Imagery Support Unit (MCISU). HYMSMO was responsible for focusing exploitation products on satisfying essential elements of information (EEIs) associated with littoral warfare.

Both ASIT and NRL-DC have the capability to demonstrate the rapid exploitation of hyperspectral imagery data sets to produce terrain categorization charts or spectral surveillance and reconnaissance products. These products were coordinated with the MCISU and 1st Topographic Platoon staff and were then transformed into graphic overlays that could be superimposed on the multisensor baseline map provided by NRL-Stennis.

MCISU transmitted its first-phase tactical intelligence products to the Joint Intelligence Center Pacific (JICPAC). These classified products were handled by JICPAC staff, who were responsible for performing secondary exploitation of all-source intelligence information and produced finished intelligence for dissemination to the U.S. Pacific Fleet's 3rd Fleet flagship, USS *Coronado*.

Operational intelligence personnel onboard *Coronado* used the JICPAC products to brief the amphibious force commander. The products generated

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with the HYDICE hyperspectral data supported both offensive and defensive scenarios.

An important adjunct to the hyperspectral exploitation teams was the availability of a GBS tactical receive site. GBS is comprised of a Sun SPARC-based computer workstation running Solaris and the GBS software suite. The key element of the system is a satellite receiver system that provides secure, high-speed digital data, audio, and video receive capability.

GBS Key to Data Exploitation

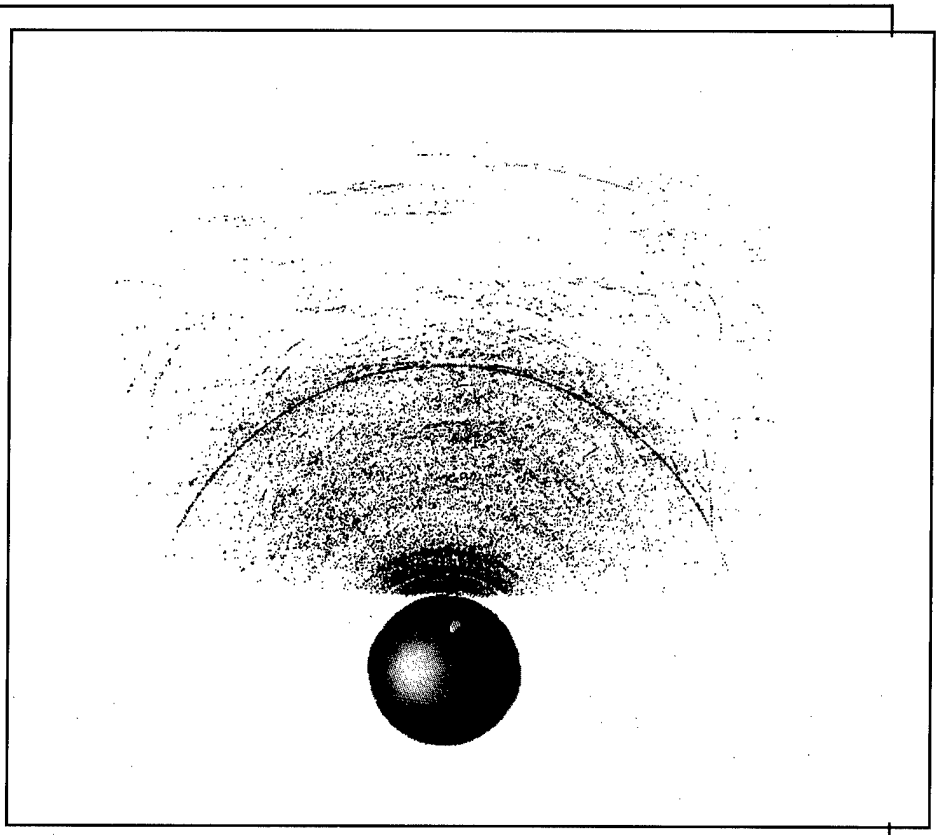
GBS proved to be extremely valuable by facilitating the rapid transmission of over 50 HYDICE major frames (approximately 200 megabytes per frame) from the Pentagon to the lst Topographic Platoon in a matter of hours. The GBS system produced 8-mm tapes that were in the correct format for immediate use by the exploitation teams.

By the end of the exercise, GBS had supplanted all other means for passing information from the SITAC to Camp Pendleton. This exercise was the first time, other than during "test" transmissions, that hyperspectral data has ever been sent via satellite. Dissemination time for the HYDICE products was cut by over 50 percent from previous exercises.

All exploitation was done blind with no actual knowledge of the site. Each increase in level of information provides more detail, requires more information, and takes longer to determine. Detection and classification are accomplished based on the scene data alone, while discrimination and material identification require supplemental information from spectral libraries.

Over 60 anomalous objects were detected at the TENCAP array. Based on spectral properties, each object was discriminated into one of seven categories: vehicle, fabric, camouflage, other man-made objects, non-made objects (e.g., pile of sand), construction material, or indicators of activity. Wherever possible, the material of each object was identified, and that information was provided to force commanders.

Author Cmdr. William J. Overman, III, is a special projects officer for Naval Reserve SPAWAR 0366.



A Constant Vigil

An image of the range capability of the Naval Space Command's space surveillance network, or "Fence," is depicted here. The Fence consists of a series of three transmitters and six receivers that lie along a great circle that stretches across the southern U.S. from Georgia to California. This image is a composite of known observations from the main transmitter for a time span ranging from 2 hours to several weeks.

The points closest to the Earth are from observations taken over a two-hour time span, while the points far from the Earth are from observations taken over a six-week time span. The observer is looking south, perpendicular to the Fence from a point in space slightly off of the North pole. The east cost is to the left and the west cost is to the right.

The strong band in the middle of the image is the semi-synchronous altitude, about 23,000 kilometers, which is the region where the Global Positioning System (GPS) satellites orbit. As can be seen, the maximum altitude visible by the Fence is twice this distance, or more than 45,000 kilometers.

The Fence is actually capable of seeing past the geosynchronous altitudes. The altitude limit seen in this image is a product of the present satellite population. If there were more satellites at higher altitudes, the Fence would see them as it routinely sees the Moon.

The Fence has a longitudinal width that goes from Africa (< 15 degrees west longitude) to beyond Hawaii (> 165 degrees west longitude). It is capable of this wide longitudinal coverage because of its high-altitude capability. On a typical day, the Fence will see more the 160,000 observations, most of which lie in near-Earth orbits. This image was processed by Edward D. Lydick, II, a physicist in Naval Space Command's Software and Analysis Branch.

Programs Focus on Improving Information Flow in Joint Military Operations

By Richard L. Buko

Critiques of U.S. military actions in Operation Desert Storm and more recent contingencies highlighted deficiencies in command and control, communications and intelligence (C3I) information flow. These shortcomings have included a lack of interoperability and standardization between the services and the lack of sufficient capacity at Defense Satellite Communications System (DSCS) ground entry points to meet the needs of a Joint Task Force.

In an effort to address these deficiencies, the Joint Staff implemented the Standard Tactical Entry Point (STEP) program. This initiative focused on upgrading the Digital Communications Satellite Subsystems (DCSS) of ground entry stations, hereafter called STEP sites, to standardize and improve access to strategic networks through the Defense Information Systems Network (DISN) for tactical warfighters in all services.

An integral part of improved access to warfighting command and control is the standardized pre-positioning of Joint Voice and Data Services (JVDS) at each designated ground entry station (STEP site). Aspects of JVDS incorporated within the STEP concept include the following:

- The Defense Switch Network (DSN) and Defense Red Switch Network (DRSN) constitute a DoD-owned network of unclassified and secure voice communications systems for tactical and strategic interface to theater and national command authorities.

- The Non-secure Internet Protocol Router Network (NIPRNET) and Secure Internet Protocol Router Network (SIPRNET) provide a worldwide network of unclassified and classified IP routers that support multiple applications such as e-mail, the Defense Message System (DMS) or the Global Command and Control System (GCCS). NIPRNET and SIPRNET IP services are collectively referred to as the Integrated Tactical-to-Strategic Data Network (ITSDN).

- The Joint Worldwide Intelligence Communications System (JWICS) provides a worldwide network of routers as the sensitive compartmented information (SCI) component of the Defense Information Systems Network (DISN). It is a secure, high-speed multimedia network for communications that can provide either high-definition imagery or video teleconferencing.

- Video Teleconference (VTC) will provide a standardized network for joint force teleconferencing, which will incorporate service-unique VTC systems, such as the Navy's Video Information Exchange Subsystem (VIXS).

STEP sites will also provide tactical voice interface through Tri-Tac switch systems. The Switch Multiplexer Unit (SMU) ashore will link joint warfighters and provide a shore interface to DSN/DRSN for deployed tactical circuit switches.

In the past, only two Navy command and control flagships — USS *Mount Whitney* and USS *Blue Ridge* — were capable of communicating with ground mobile forces or Tri-Tac switches ashore. This capability is being expanded with a RF modification to the Navy's AN/WSC-6(V)4 satellite communications terminals common to all large-deck ships. The terminals will be upgraded to provide dual-carrier capability to support a joint task force commander (CJTF), naval force (NAVFOR) or Marine force (MARFOR) component commander, or unit commander in a joint mission.

The modification will first be installed on Fleet flagships to support a CJTF or NAVFOR mission, and amphibious flagships to support NAVFOR, MARFOR, or Joint Force Air Control Center (JFACC) missions. The modification will also provide a tactical interface ashore for embarked Marines or special operations personnel.

Interoperable Comms for JTF

Access through the STEP site may be to other joint forces ashore or as a link between an amphibious task force commander aboard ship and Marine forces deployed ashore. The dual-carrier modification will also be installed on aircraft carriers to provide tactical phone interface through STEP sites to a shore component.

As an original concept, STEP provides the primary components of a Joint Task Force supporting a unified commander in chief with interoperable, essential, and integrated tactical-to-strategic C4I services globally. Interoperability includes communications among tactical ground mobile forces and SHF-capable naval forces supporting a joint task force commander or mission.

The requirement for a Navy SHF-capable force has grown from Fleet flagships to include aircraft carriers and amphibious landing and assault ships. In the near future, the requirement embraces unit-level ships — cruisers, destroyers, combat support ships and amphibious dock ships — as well as submarines. In response, JCS enacted a program change to upgrade specific STEP sites to support the Navy's terminal growth.

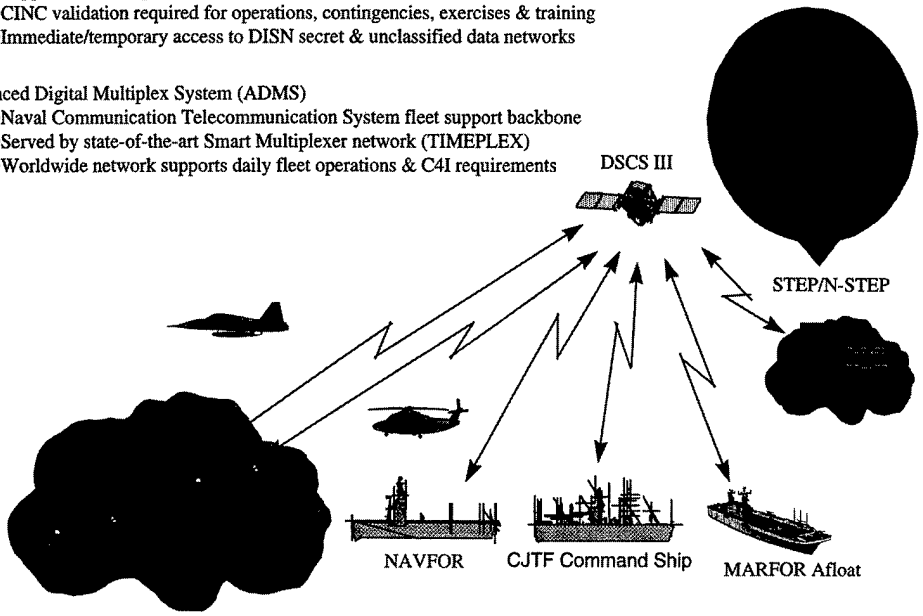
The STEP sites being modified to support present and future Navy requirements — which amounts to more than 155 ships and submarines — are commonly referred to as Navy STEP (N-STEP) sites. The sites'

Naval Space Command 15th Anniversary

Joint Interoperability Through STEP/N-STEP

•Joint Voice and Data Networks (JVDN)/Integrated Tactical-Strategic Data Network (ITSDN)
- •Supports JTF components (CJTF HQ, AFFOR, ARFOR, NAVFOR, ARFOR, JSOTF)
- •CINC validation required for operations, contingencies, exercises & training
- •Immediate/temporary access to DISN secret & unclassified data networks

•Advanced Digital Multiplex System (ADMS)
- •Naval Communication Telecommunication System fleet support backbone
- •Served by state-of-the-art Smart Multiplexer network (TIMEPLEX)
- •Worldwide network supports daily fleet operations & C4I requirements



terminals are being modified to handle the added user requirements as part of the Heavy Terminal/Medium Terminal upgrade being sponsored through the Joint Staff and the Defense Information Security Agency (DISA).

The N-STEP sites will be provided a Navy-supplied smart multiplexer (TIMEPLEX) to support naval ship interface to DISN services. C4I services for SHF ships in routine day-to-day operations are not directly supported by JVDS/ITSDN and must be obtained through the Navy's Automated Digital Multiplexer System (ADMS) TIMEPLEX Network. ADMS in its present form will require upgrading to support the growth in SHF-capable units and bandwidth requirements through fiscal year 2003.

The STEP/N-STEP program is funded to upgrade 15 sites worldwide. Of the 15 sites, 10 are designated for upgrades to support N-STEP as either a single or dual N-STEP site configuration

Each STEP site is a joint asset under the operational control of the Joint Chiefs of Staff. STEP access is managed by DISA and, in the case of Navy day-to-day operations, is coordinated with the Fleet CINC and numbered fleet commander for ship access.

Access to ITSDN services is restricted to unified CINC-validated and approved missions, such as a joint task force contingency, humanitarian mission, or disaster response. Navy day-to-day missions are not supported by JVDS/ITSDN, although the multiplexer, cryptographic and modem assets supplied to the STEP program by the Navy to support naval components of a joint task force can be utilized on a not-to-interfere basis.

'Teleport' for Deployed Access

Other joint efforts to improve warfighter access to strategic DISN are being coordinated under the DISN Deployed Strategy. This strategy integrates commercial satellite communications (C-band and Ku-band), Global Broadcast System (GBS), UHF SATCOM, Milstar medium- and low-data-rate EHF, MSS, and Global Fiber with STEP to form a seamless multi-frequency transport system — a teleport — for deployed access to DISN.

Support for this concept is already taking shape by the collocation of two GBS injection stations at Navy satellite communications facilities at Northwest, Va., and Wahiawa, Hawaii. DISA also expects to collocate its commercial ground entry stations with STEP sites to take advantage of the existing built-in terrestrial architecture provided through the DISN.

DISN provides the terrestrial transport from STEP to backbone switches, routers or hubs for those tactical circuits arriving at STEP via DSCS. As tactical circuits enter the STEP, they are passed through the collocated DSCS Integrated Data Network Exchange (IDNX) system of multiplexers that serves as the worldwide transmission backbone multiplexer for DISN.

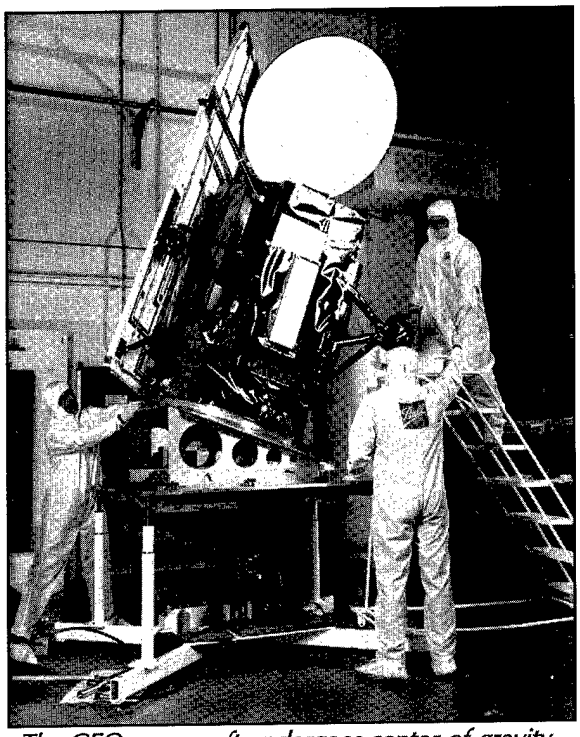
Tactical circuits may terminate directly into DISN, such as through JVDS/ITSDN, or they may ride the DISN network to reach a distant end provider. Such is the case of the ADMS network of smart networking multiplexers that supports SHF and commercial satellite communications, and is the prime shore interface supporting Navy IT-21 worldwide.

The primary N-STEP sites for SHF-capable ships are the Navy satellite communications facilities at Navy Computer and Telecommunications Area Master Stations (NCTAMS) at Northwest, Va., Wahiawa, Hawaii, and Cappuccino, Italy, as well as the Navy Computer and Telecommunications Station (NCTS) in Bahrain. All IP router-based services, weather, VTC, IDSN, secure voice, and message systems, to name a few, are acquired through the NCTAMS or associated Network Operations Center (NOC).

There will be a need for gradual use of non-Navy manned N-STEP sites to support the proliferation of SHf-capable ships in the next five years. Reachback connectivity from these sites to area NCTAMS and associated NOCs will be necessary in order to support the expansion of force and C4I requirements.

Author Richard L. Buko is a senior engineer with SEMCOR, Inc., in Chesapeake, Va., supporting Naval Space Command's SATCOM Plans and Policy Branch.

Oceanographic Satellite Will Help Scientists Track El Nino



The GFO spacecraft undergoes center-of-gravity tests at Ball Aerospace facilities. (Ball Aerospace Photo)

The Navy is forward deployed to meet our nation's interest. The data from [the GeoSat Follow-On spacecraft] will help keep our warfighters safe and ensure their effectiveness," commented Rear Admiral Kenneth Barbor, commander for theNaval Meteorology and Oceanography Command, following the launch of the satellite on Feb. 10.

"We need to understand the oceans and the atmosphere to help the warfighters do their job, and this satellite will allow us to characterize the oceans with a high degree of fidelity," he added.

The GeoSat Follow-On (GFO) spacecraft will support Navy, NOAA, NASA, and university ocean science and ocean monitoring. Additionally, the GFO radar altimeter will assist meteorologists in mapping the progression of El Niño. The Navy's previous GeoSat altimeter was the only satellite to capture the sea level changes associated with the 1987 El Niño.

All GFO payload data will be provided on an encrypted, continuously operating tactical downlink to AN/SMQ-11 tactical terminals on board Navy ships and facilities. The Naval Meteorology and Oceanography Command's Naval Oceanographic Office at the Stennis Space Center near Bay St. Louis, Miss., will process GFO data at their Payload Operations Center.

The San Diego-based Space and Naval Warfare Systems Command Meteorological and Oceanographic Systems program office is responsible for the acquisition and launch of GFO. Ball Aerospace & Technologies Corp. is the prime contractor for GFO.

Naval Space Command's Naval Satellite Operations Center (NAVSOC) will operate GFO. The Naval Satellite Operations Center operates assigned spacecraft and provides on-orbit support for naval communications satellites from its headquarters at Point Mugu, Calif.

The GFO ground segment will include two NAVSOC remote tracking sites at Prospect Harbor, Maine, and Point Mugu. Satellite payload and engineering data will be relayed to NAVSOC's Satellite Operations Center at its Point Mugu headquarters, with payload data sent directly to the Payload Operations Center at Stennis.

NAVSOC's Satellite Operations Center will provide all system and satellite operations with remote commanding via the Maine and California sites.

A GFO fact sheet is available on the World Wide Web at http://www.spawar.navy.mil/corporate/spawarpao/newsreleases/gfo_fact_sheet.html.

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Satellite Operations Upgraded

Rear Admiral Patrick D. Moneymaker, commander for Naval Space Command (center), performed ribbon cutting honors at the Naval Satellite Operations Center in Point Mugu, Calif., on Nov. 24. The informal ceremony celebrated the completion of a redesign of the command's computer and control centers. The newly configured control facility will enhance NAVSOC's ability to provide satellite telemetry support. Pictured with the admiral is Capt. M. M. Herbert, NAVSOC commanding officer.

Naval Space Command 15th Anniversary

Naval Reservists Lend Space Expertise to Countermine Technology Demonstrations

Navy and Marine Corps reservists will participate in the second Joint Countermine (JCM) Advanced Concepts Technology Demonstration (ACTD) scheduled for April and May.

The focus of the exercise, which will be conducted in Newfoundland, is to demonstrate the capability to conduct seamless amphibious mine countermeasure operations from sea to land.

Reservists participating in the second JCM ACTD will build on the groundwork laid by Navy and Marine Corps Reserve forces during the first demonstration held in August and September 1997.

A team of 15 hand-picked Navy and Marine Corps reservists representing disciplines in science and technology applications, space systems operations and products, intelligence, and airspace management augmented the system evaluation team at the first JCM ACTD.

The demonstration was conducted as part of Joint Task Force Exercise 97-3 at Fort Bragg and Camp Lejeune, N.C., and aboard Navy ships at sea.

Reservists were assigned to JCM ACTD to augment the team evaluating the performance and overall military utility of nine novel system prototypes (and supporting communications) devoted to detection, classification and neutralization of mines from shallow water to land during amphibious assault operations.

Navy Capt. Donald N. Thackery served as the reserve support manager for the project, and Navy Capt. John Hobday served as officer-in-charge of the reserve detachment. Both officers were attached to Naval Reserve ONR HQ 106.

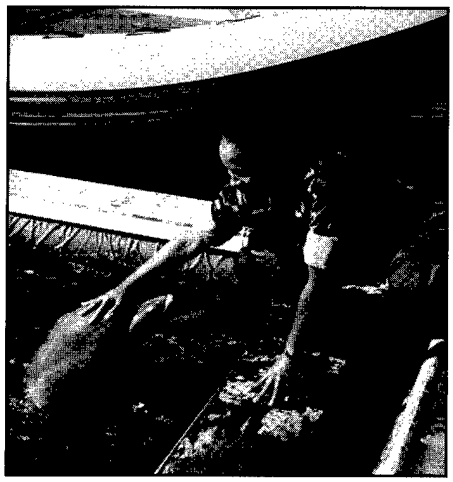
Demo I was the culmination of nearly two years of reserve support to JCM ACTD. Reservists provided over 270 man-days of support to the project in fiscal year 1997 alone.

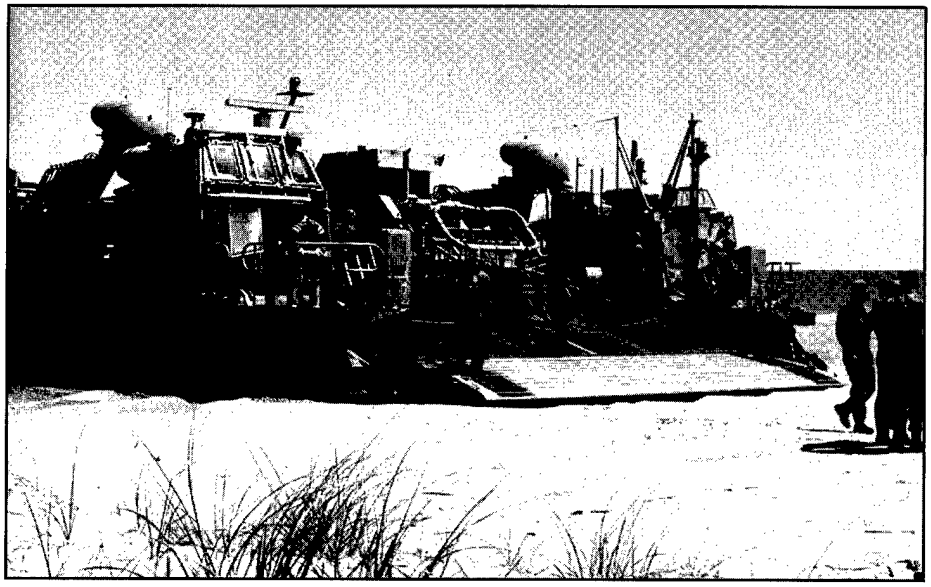
Most reservists were assigned to sites around Camp Lejeune to monitor particular novel systems and to record Marine Corps operator impressions of the military utility of the systems under evaluation.

Others were assigned to the Atlantic Intelligence Center at Norfolk where they monitored the development and dissemination of the Littoral Remote Sensing (LRS) remote surveillance and reconnaissance products to support expeditionary operations. The goal of LRS is to develop, demonstrate and transition new collection techniques and exploitation algorithms for covert detection of littoral region defenses and natural hazards.

A third group of reservists was aboard the command and control ship USS *Mount Whitney* (LCC 21), flagship for Commander Second Fleet, for coordination with the Second Fleet air staff regarding joint countermine activities.

In addition to LRS, other system prototype tests supported by the Navy and Marine Corps Reserve team included the airborne blue-green laser imager for minefield reconnaissance, autonomous vehicles for explosives neutralization, teleoperated mine rakes and explosives nets, ground-penetrating man-portable mine detectors, and seismic and acoustic off-route clearance devices.





YN3 Saundria Cardwood visits with Katrina (top photo), an Atlantic Bottle-nosed Dolphin assigned to a Navy shallow-water countermine detachment. Cardwood works with Naval Reserve ONR HQ S&T 106. An LCAC offloads an amphibious minefield clearance prototype system (bottom photo) during the Joint Countermine demonstration at Camp Lejeune last fall.

For his role in JCM ACTD Demo I, Capt. Thackery received a Meritorious Service Medal from the Secretary of the Navy. His award cited Capt. Thackery's efforts to plan, coordinate and execute reserve support for Demo I from elements of the Naval Reserve Science and Technology Program, the Naval Space Reserve Program, the Naval Reserve Intelligence Program, and the Marine Corps Reserve.

Celebrating 15 Years of Support to the Naval Warfighter

Naval Space Command Established to Focus Operational Use of Space

On Oct. 1, 1983, the Navy provided its most public indication of its intention to emphasize the operational aspects of space support to fleet operations. The highly publicized establishment of Naval Space Command, under the leadership of a recently-promoted, distinguished astronaut, had been crafted by Navy Secretary John Lehman to send a message that the Navy intended to remain a serious player in space activities.

When Commodore Richard Truly took command of Naval Space Command, he had been away from the Navy for almost two decades. But he had also been on the leading edge of manned U.S. efforts in space and had significant credibility as a spokesman and advocate for Navy space interests.

Naval Space Command began with 72 military and civilian personnel. The initial organization chart for the command indicated responsibility for the activities of the Navy Astronautics Group (which controlled the TRANSIT satellite navigation system) and the Naval Space Surveillance Center (the U.S. CONUS-based space-tracking radar system).

Then-Commodore Richard H. Truly (left) and Chief of Naval Operations Admiral James D. Watkins celebrate the commissioning of Naval Space Command in ceremonies at Dahlgren, Va. Former Congressman Don Fuqua (D-Fla.), then-chairman of the House Science and Technology Committee, also took part in the festivities.

Final Node of Space Triangle

It was anticipated at the time that Naval Space Command would form the final node of a triangle that included: (a) Naval Space Command, to collect and validate requirements for satellite support for fleet operations; (b) Navy Space Systems Division (OP-943), to craft and sponsor programs; and (c) Naval Electronics Systems Command (PME-106), to execute the programs and deliver space systems.

During the mid-1980s, Naval Space Command began to organize itself and to formulate its approach to Navy space activities. A Naval Space Master Plan was drafted to serve as a road map for future activities. A Naval Reserve Unit was commissioned on Oct. 1, 1984, and a Marine Corps Reserve Augmentation Unit was established as part of Naval Space Command in 1987.

As organizational capabilities matured, Naval Space Command assumed operational management of Navy UHF satellite communications and was designated operational commander of the Navy Relocatable Over-the-Horizon Radar (ROTHR). Naval Space Command was given responsibility for ROTHR because the system, although not a Space system, was viewed as a component of a wide-area surveillance "system-of-systems" which included ROTHR and satellite reconnaissance systems.

Naval Space Command also assumed responsibility for the Navy SLOW WALKER program, which involved placing Navy operators at Air Force Defense Support Program (infrared warning satellite) ground stations.

From its inception, Naval Space Command accepted responsibility for training Navy and Marine Corps personnel concerning the potential contributions of satellite systems to their missions. These missionary activities included creation of a variety of teaching tools, including:

- Senior Officers Space Awareness Wargame
- Space Tactical Awareness Briefing
- Space Threat Briefing
- Space Cell at Naval War College Wargame
- Joint Space Intelligence Operations Course
- Sponsoring a Space Chair at the Naval Academy and Naval War College
- Creation of Space Support Teams to work with fleet staffs
- Production of the video "Spaceflight: The Application of Orbital Mechanics."

Naval Space Command 15th Anniversary

By 1989, Naval Space Command had grown to encompass the following subordinate activities and responsibilities:

O Navy Astronautics Group, Point Mugu, Calif. (which controlled Navy satellites such as TRANSIT and GEOSAT).

O Naval Space Surveillance Center, Dahlgren, Va. (which operated a radar system for tracking satellites).

O Fleet Surveillance Support Command, Chesapeake, Va. (which was preparing to control Navy ROTHR sites).

O Naval Space Command Reserve Unit, Naval Reserve NAVSPACECOM 0166.

O Marine Corps Reserve Augmentation Unit.

O Naval Space Command Detachment, Colorado Springs, Colo., an O-6 level liaison office at U.S. Space Command headquarters.

O Naval Space Command Detachment ECHO (which provided Navy personnel for SLOW WALKER operations at DSP ground stations).

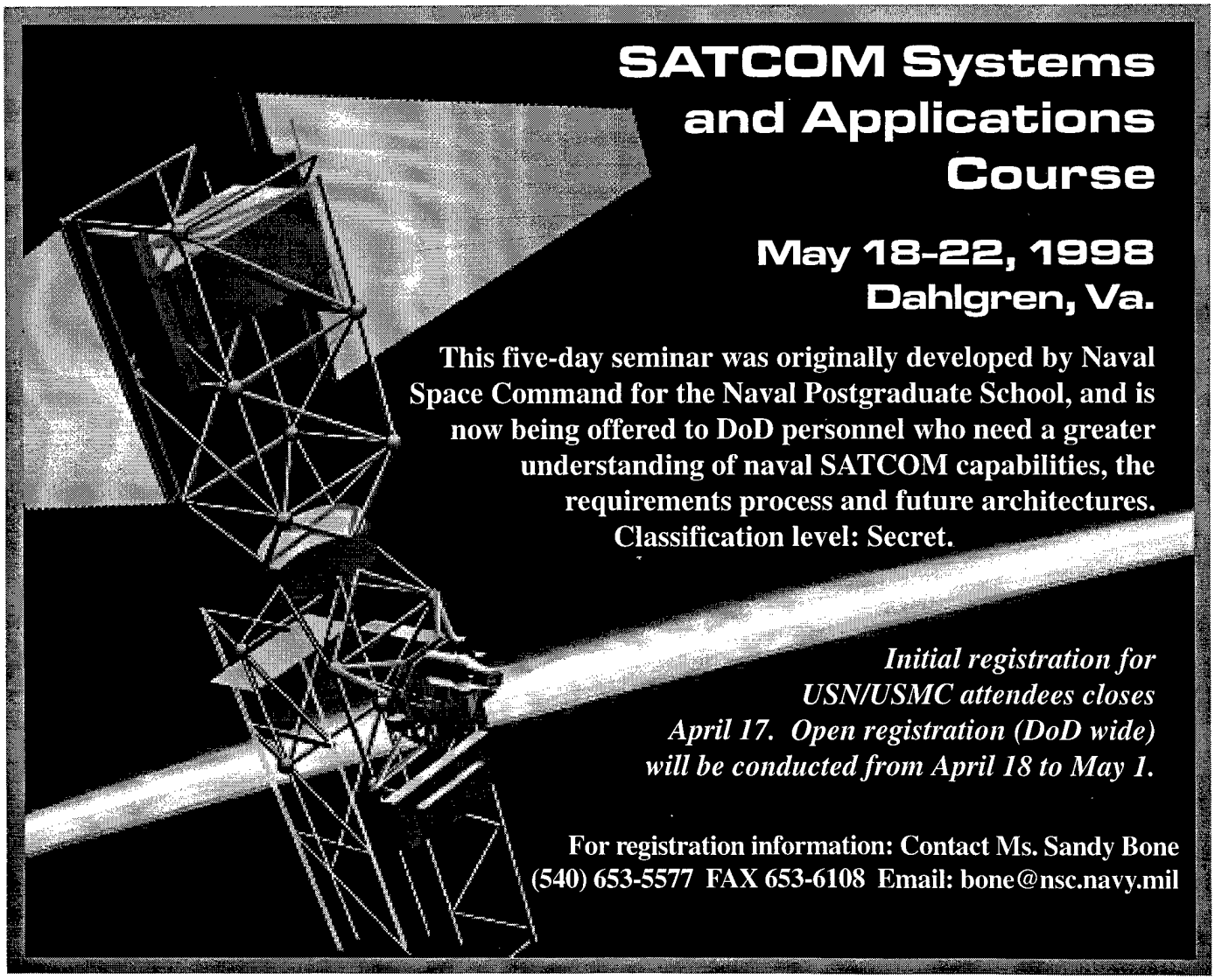
O Navy TENCAP (Tactical Exploitation of National Capabilities) Detachment, Dahlgren, Va.

In January 1990, the Navy Astronautics Group at Point Mugu was renamed the Naval Satellite Operations Center (NAVSOC), a title more descriptive of its true responsibilities. At the time of this name change, NAVSOC had control of TRANSIT navigation satellites and a number of experimental or special-purpose satellites such as GEOSAT (which was collecting information on ocean topography for the submarine ballistic missile community, in support of the TRIDENT program).

This summary was extracted from a report prepared by the Center for Naval Analysis, titled "From the Sea to the Stars, A History of U.S. Navy Space and Space-Related Activities."

"We can no longer measure sea power by shipboard capabilities alone. We increasingly need the unimpeded use of space to ensure the security and well-being of our nation..."

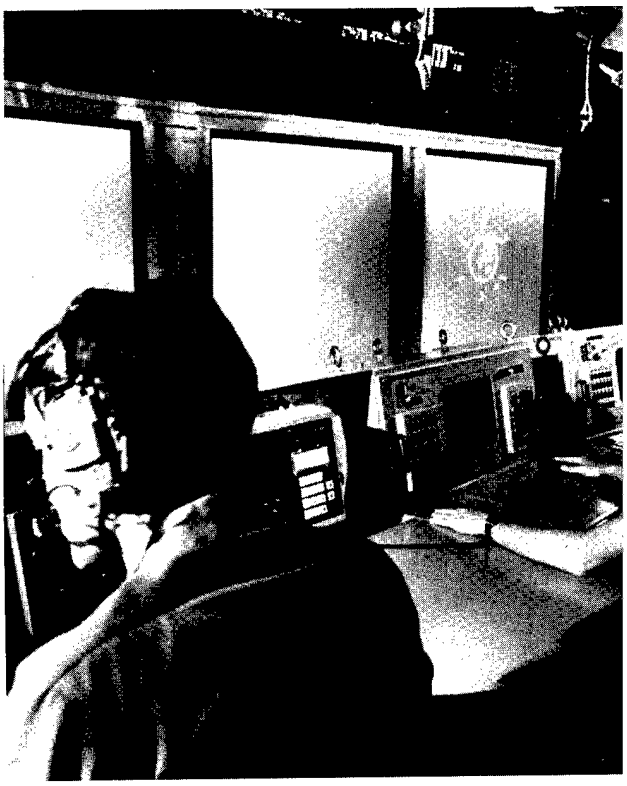
Admiral James D. Watkins
Naval Space Command Commissioning
October 1, 1983



Increased SATCOM resources are needed to ensure naval forces can maintain information superiority in future conflicts

The Critical Link

By Cmdr. Austin W. Boyd, Jr.



Navy is on the threshold of a key period of decision-making that will determine our future ability to meet national objectives and win the next war.

During the period 1998-2000, key funding and programmatic decisions will be made with regard to "information superiority" for naval forces that will have an extensive impact on the warfighting capability of Navy and Marine Corps. During the biannual budget deliberations of 1998 and 2000 (POM 00, POM 02), and the summer mid-cycle budget review of 1999 (PR-01), Navy will chart the course for funding of the C4I systems that will be the legacy of the 2010 warfighter.

Without proper attention to the burgeoning SATCOM and information technology needs of 2010, it is possible that naval forces will not be able to win the battles of the next war. No other military department is as closely wedded to the need for SATCOM for information transfer as is Navy. Proactive space support is needed today to be a dominant military force in 2010.

Joint and naval doctrine has shifted rapidly in the past five years. The naval strategy, "Forward...From the Sea" has refocused naval priorities on winning the naval engagement in littoral battles. The joint service plan, "Joint Vision 2010," calls for a new focus on information superiority as the underpinning of a strategy that combines "dominant maneuver," "full dimensional protection," "precision engagement," and "focused logistics" to win the war. In both doctrines, SATCOM is key to the information connectivity for joint maritime warfighters.

Unfortunately, cold war-era decisions have given us a legacy of military satellite communications that all begin to reach end of life between 2003-2007. The replenishment of these systems represents a $40-65 billion bill that will require strong service support and "ironclad" arguments to fund basic needs in a period of severe fiscal turbulence.

Space and terminal systems must be fielded between 2003-2010 to keep naval forces "wired in" to the joint battle picture. Without SATCOM, and without near-term budget support, naval forces will have a marginal presence in the joint task force, and could lose the tactical advantage in the next war. The importance of the next two years' decision-making cannot be overstated.

Naval forces will be called on to continue support of joint and combined operations (e.g., Bosnia), crisis response (e.g., Liberia), regional conflict (e.g., Iraq), and forward presence (e.g., Taiwan) missions. Without SATCOM, naval forces cannot meet the burgeoning demands of the "information grid" that tie together the "sensor grid" of sensor systems (radar, space, acoustic) and the "shooter grid" (ships, aircraft, ground armor, submarines, soldiers).

The Battlespace of 2010

A "network-centric" battlespace with many shooters tied to many sensors over SATCOM-based networks will be the standard in the battlespace of 2010. In essence, our military systems will be linked in the same way that the Internet links users together. We will soon "feel the pinch" in Navy if the size of the communication "pipe" (e.g., SATCOM) does not grow to meet the demand.

The goal should be to create a robust backbone of information systems, providing some of each SATCOM medium to every naval platform. A fault-tolerant SATCOM architecture will provide the nec-

Naval Space Command | 5th Fleet

Over-the-horizon weapons control, real-time battle damage assessment and tactical ballistic missile detection account for some of the increased demand for information and data in shipboard Combat Information Centers (left). This demand can only be satisfied through the medium of satellite communications.

essary bandwidth for a network-centric Navy, and will prevent the loss of one or two systems from disrupting naval warfighting capability.

Naval needs for SATCOM have been on a meteoric rise as the power of microprocessors has enabled new and more capable weapon systems and C2 systems. In Desert Storm, naval communications over UHF SATCOM were overloaded by attempts to transmit the Air Tasking Order (ATO). Naval commanders were forced to fly the ATO to sea each day from joint headquarters.

A rapid improvement has been made in naval SATCOM connectivity, yet the increase in SATCOM still fails to keep pace with the planned weapon systems that will be the mainstay of tomorrow's warfighting. As an example, today's aircraft carrier has two megabits per second (Mbps) of SATCOM data throughput provided by UHF, SHF and commercial SATCOM (Challenge Athena III, INMARSAT). This is a big improvement from only 9.6 Kbps of UHF in Desert Storm, but is still a long way from the need for up to 10 Mbps in 2003-2005.

The burgeoning requirement for more than 1,000 Global Command and Control System (GCCS) terminals on an aircraft carrier, as well as voice, video, and quality of life communication systems, will drive the current bandwidth allocations to saturation before the end of the decade. As we field more processing systems — such as more than 1,000 terminals with access to GCCS on one ship — the demands upon the limited SATCOM pipes will increase.

The AOL Model

A good model for this demand is the lesson learned by America On Line, where that Internet provider crashed temporarily amid demands for Internet access from millions of subscribers in 1997.

Demands for SATCOM will skyrocket, with a need for 20-80 Mbps by 2010, depending upon the level of participation by Navy in unmanned aerial vehicle (UAV) and precision guided munitions (PGM) programs.

Many readers will scoff at the proposed need for 80 Mbps to an aircraft carrier in 13 years. Admittedly, that is a hard number to swallow. Yet, consider that today's processor systems — the computer on your desk — are further away from 2010 technologically-speaking than they are from the Apple II-E of 1981. Who in 1981 would have predicted 300+ MHz clock speeds and disk drives of hundreds of gigabits?

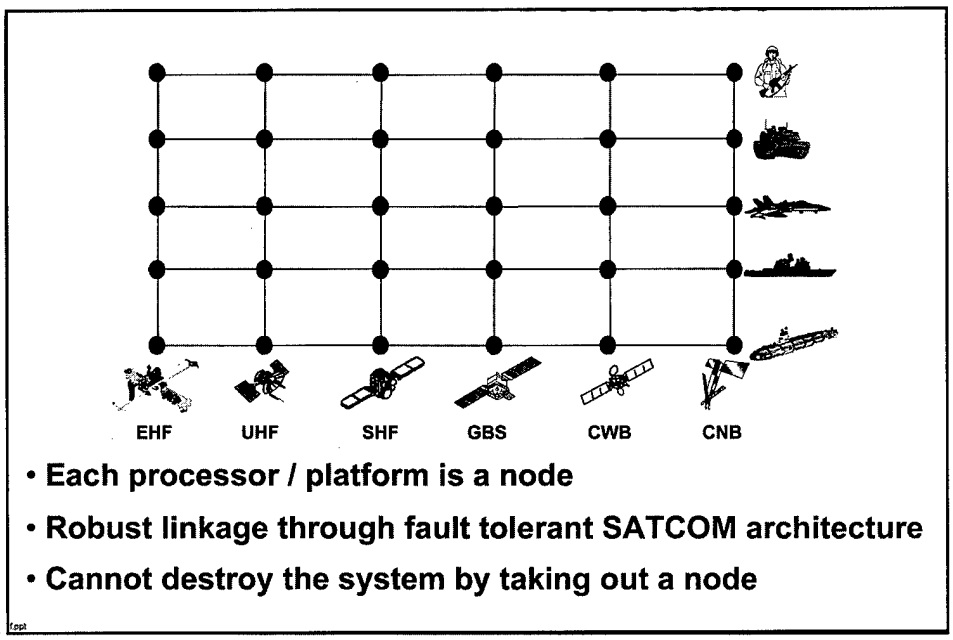
Some may recall that, in 1981, many industry observers predicted that computer growth would stall because of the cost and rarity of computer memory. Yet computer growth did not stall. As the processing capability of computers grows, so will the data demand on naval warships and aircraft, fed by the medium of satellite communications.

Much of the processing demand will originate at the CINC, who will expect to maintain the tactical operations center awareness he has ashore when he is deployed afloat. Joint planners will seek to reduce the strike planning cycle from days to hours, then to minutes, requiring full collaboration by all participants, rapidly sharing wideband files with dynamic updates.

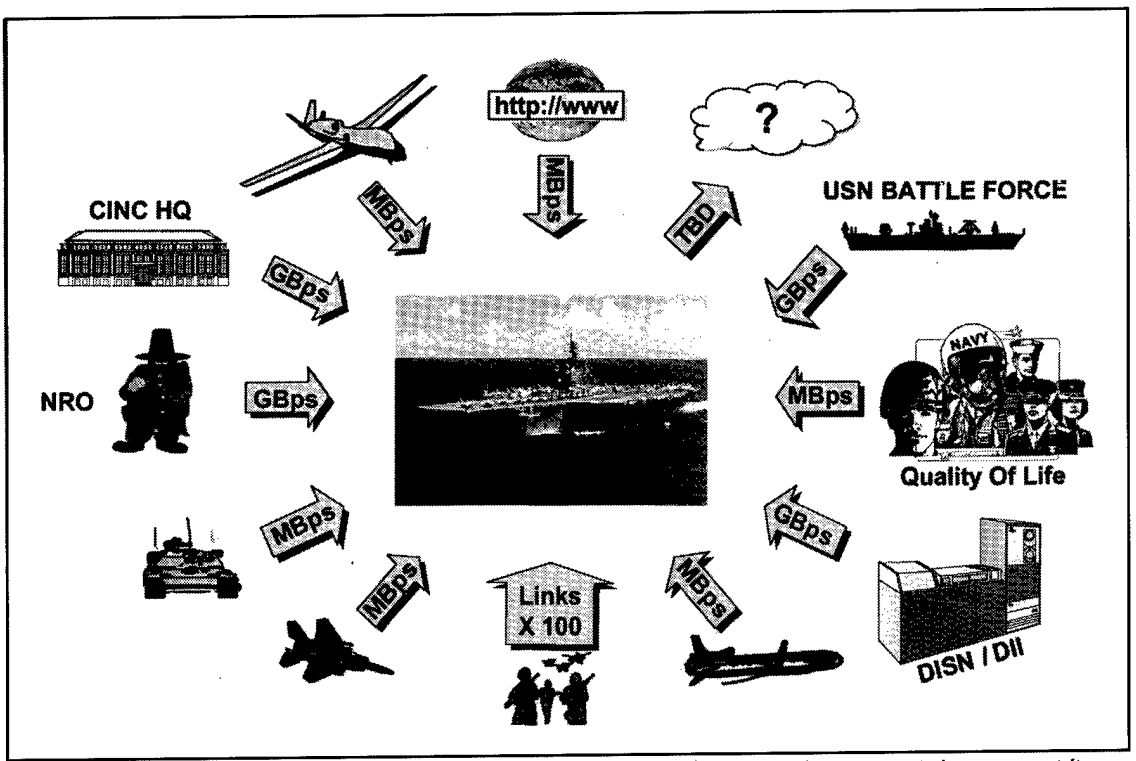
The Army will field a digitized division in 1999, and will lead the way into a fully digitized battlespace by 2005-2007. Every platform will need communications to participate in the total battlespace awareness that will be brought about by this digital revolution.

Over-the-horizon targeting and weapons control for precision-guided munitions will require extensive SATCOM connectivity to accurately target and employ a few high-precision weapons. For example, emerging concepts for Tomahawk missiles will require up to 10 Mbps links per mis-

*(Please see **Link** on page 14)*



Satellite communications is the backbone of the naval battle cube — the information grid — that ties together sensor systems and weapons systems in a "network centric" battlespace.



DoD's "Joint Vision 2010" calls for a new focus on information superiority, and SATCOM is key to providing adequate connectivity for joint maritime warfighters.

Link

(Continued from page 13)

sile for real-time bomb damage assessment from video links on board the missile.

Cooperative Engagement Capability (CEC) on Aegis cruisers will require several megabits per second per ship to link many shooters together over the horizon for tactical ballistic missile detection and defense. UAVs, through the Global Hawk and Dark Star, will require links of up to 274 Mbps per aircraft for imagery transfer.

Air Force and Navy will field SATCOM on the Joint Strike Fighter (JSF) to link all tactical aircraft, and the demand will increase for quality-of-life programs afloat, such as Internet and e-mail access, video teletraining, television, telemedicine, telemaintenance, and telephone connectivity.

Bombs, Barracks and Bits

As the CINCs and terrestrially-based forces of the Army and Air Force experience rapid growth in processing systems supported by fiber and heavy-terminal SATCOM capabilities, the naval warfighter will need to keep pace to maintain joint service interoperability. Winning the next war will depend on Navy's ability to remain connected to the information grid and employ the new high-data-rate weapon systems that are coming to the battlespace in the next decade.

During the next two years, important budget decisions must be made to fund SATCOM systems — both spacecraft and terminals — to keep pace with the accelerating information demand. Key decisions will be made by the Joint Space Management Board in the next year that will determine the makeup of satellite constellations through 2015. The joint battle will hinge on information superiority in 2010.

Navy must make tough decisions about fully funding C4I systems now to be ready to join Army and Air Force in the C4I-intensive battlespace of tomorrow. Today's strategic decisions to fund tomorrow's C4I systems will determine the naval role in future warfare. Tough trades need to be made today between bombs, barracks, and bits.

We cannot, dare not, underestimate tomorrow's need for more bits and more communications access — more C4I — the lifeblood of the joint maritime warrior in 2010. Without a more capable SATCOM infrastructure, the Navy will not be able to meet tomorrow's national objectives. National security is extricably tied to Navy's information superiority through the medium of satellite communications.

Author Cmdr. Austin Boyd is the director of Naval Space Command's Plans Division in Dahlgren, Va.

Naval Space Command 15th Anniversary

SPACE BILLETS

The following is a partial listing of officer billets with space missions, whose incumbents are scheduled to transfer between October 1998 and June 1999. For specific billet information and actual availability dates, contact your detailer.

Billets With Subspecialty Code XX75 (Space Systems - General)

	ACTIVITY	TITLE	BDES	BGRD	BSUB1	BSUB2	AVAIL
NAVSOC PT MUGU	STF PLN/DIV OFFICER	1700	LT	0075S			9810
OSD	SA FOR SPACE POLICY	1000	CAPT	0075P			9811
NWARCOL NPT	ADV C&S INST/OPS PROF	1300	CDR	0075R			9902
DOD SPACE ARCH	STAFF ANALYST	1000	CDR	0075R			9902
OPNAV N2K2	ASST AGENCY COORD	1000	LT	0075S			9903
OPNAV N631	HD, NAVY SATCOM BRANCH	1050	CAPT	0075P			9906
CINCUSNAVEUR	STF COMM/DCOS	1000	CAPT	0075R			9906
USSPACECOM	CHIEF REQS 5100	1050	CAPT	0075S			9906
NAVSOC PT MUGU	CO SHR ACTIVITY	1000	CAPT	0075R			9906

Billets With Subspecialty Code XX76 (Space Systems - Operations)

	ACTIVITY	TITLE	BDES	BGRD	BSUB1	BSUB2	AVAIL
COMNAVSPACECOM	FLAG LT	1000	LT	0076S			9810
CNSC DT COL	AF LIAISON OFF	1000	LCDR	0076P			9810
CINCUSNAVEUR	INTEL SUPP	1630	CDR	0061P	0076S		9811
COM6THFLT	OPS INTEL ANAL	1630	LT	0076S			9811
NAVSPACECOM	OPS INTEL/ASCC DIV OFF	1050	LCDR	0076S			9811
NAVSPACECOM	OPS INTEL/ASCC	1000	LTJG	0076S			9811
NAVSPACECOM	OPS INTEL/NSST	1050	LT	0076S			9811
NAVSPACECOM	OPS INTEL/NSST	1630	LT	0076S			9811
USSPAC CB OPST	SPACE CTL	1000	LTJG	0076S			9811
USSPACECOM	CH OPS READ	1050	CDR	0076P			9811
NAVSPACECOM	OPSINTEL/ASCC	1700	LT	0076S			9811
USSPACECOM	COMM-COMP 6421	1700	LT	0076P			9811
USSPACECOM	MRP/IPL OFF	1050	LCDR	0076P			9812
USNELDODOF ACO	NATL SYS LIAIS	1050	LCDR	0076B			9812
DOD SP ARCH	SPACE REQ OFF	1050	CDR	0076P			9812
SPAWAR SPTECH	SPACERQMT ANAL	1610	LT	0076P			9812
SPAWAR SPTECH	SPACE PJ TECH	1610	LCDR	0076P			9901
SPAWAR SPTECH	SPACERQMT ANAL	1000	LCDR	0076P			9901
USSPACECOM	TST OPS OFF	1000	CDR	0076P			9901
OPNAV N60C	COMM PLN&OPS	1000	LCDR	0089R	0076S		9901
USSPACECOM	INT TNG STF	1050	LCDR	0076S			9901
USNELDODOF PAC	NATL SYS LIAISON	1050	LCDR	0076B			9901
USNELMDODPRJOF	NTL SYS CUST REP	1050	LT	0076B			9902
DEFINTEL AGEN	IO/COLL MGT	1630	LCDR	0076S			9903
USSPACECOM	SPACE OPS	1050	CDR	0076S			9904
USSPAC CB OPST	CMD DIR	1050	CAPT	0076Q			9904
CNSC COL SPGS	OIC SHR ACTIVITY	1050	CAPT	0076R			9904
NAVSPACECOM	OPINTEL/ASCC	1050	LT	0076S			9904
USSPACECOM	DEP IG	1000	CDR	0076P			9905
USSPAC CB OPST	SPEC ANAL	1050	LT	0076S			9905
NAVSPACECOM	OPS INTEL/ASCC	1700	LT	0076S			9905
NSGA SGROVE	CO SHR ACTIVITY	1610	CAPT	0076P			9906

Billets With Subspecialty Code XX77 (Space Systems - Engineering)

	ACTIVITY	TITLE	BDES	BGRD	BSUB1	BSUB2	AVAIL
SPAWAR SPTECH	DEP DES PJ MGR	1510	CAPT	0077P			9810
SPAWAR SPTECH	DPJ SUP	1512	LCDR	0077P			9810
SPAWAR SPTECH	SPACE PJ TECH	1050	LT	0077B			9810
NAVSOC PT MUGU	ELX ENG/SAT MGR	1000	LT	0077S			9810
NAVSPACECOM	NSST	1700	LCDR	0077P			9811
DOD SP ARCH	CHIEF CAPAB DIV	1510	CAPT	0077P			9812
SPAWAR SPTECH	HD, ADVANCED CONCEPT	1610	LCDR	0077P			9901
SPAWAR PMOSDGO	DPJ SUP/ASST PT	1050	LT	0077B			9903
SPAWAR SPTECH	HD, MEASURE DIV	1000	LCDR	0077P			9903
SPAWAR SPTECH	MAJ P J MGR SEL	1510	CAPT	0077P			9905
SPAWAR SPTECH	SPACE ACQ	1440	LT	0055B	0077S		9906
SPAWAR SPTECH	DEP SPEC SYS MGR	1000	CDR	0077P			9906

NAVSPACECOM Enlisted Billets at Dahlgren, Virginia

Following is the allowance for enlisted personnel at Naval Space Command, located on board the Naval Surface Warfare Center Dahlgren Division in Dahlgren, Va. Dahlgren is located approximately 50 minutes from Washington, D.C., and three hours away from Norfolk, Va. The base is also home to the Aegis Training 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 Lt.Cmdr. Jane Hoffman at DSN 249-5152 (email address: jhoffman@ nsc.navy.mil) or the Command Master Chief, ETCM Alan Kinder. Master Chief Kinder can be reached at DSN 249-6115 or commercial (540) 653-6115 (email address: akinder@ nsc.navy.mil). If you are interested in receiving orders to Naval Space Command, contact your detailer.

CTA:	E7:1		E5:2	E4:1
CTR:		E6:1	E5:2	
CTT:		E6:2		
DP:			E5:1	
DS:		E6:1	E5:1	
EA:	E7:1			
ET:	E7:1	E6:1	E5:3	E4:2
EW:	E7:1		E5:2	E4:2
IS:	E7:1	E6:2	E5:4	E4:3
NC:	E7:1			
OS:	E7:3	E6:5	E5:3	E4:13
RM:	E7:2	E6:3	E5:8	E4:1
SK:			E5:1	
YN:		E6:1	E5:2*	

*One YN2 billet is TAR.

Naval Space Support Team Deploys to Southwest Asia

As additional U.S. Navy forces steamed for the Persian Gulf in early February in response to Iraq's obstruction of United Nations inspection teams, Naval Space Command responded to direct requests for support from Commander Fifth Fleet (C5F), deployed in Bahrain.

Lt.Cmdr. Julia Petritsch, NAVSPACECOM's Pacific Fleet Space Support Team Leader, deployed immediately to Bahrain. She carried with her a suite of Theater Space Operations Cell (TSOC) equipment that could be used to generate space information products, exploit imagery and provide email connectivity.

Lt.Cmdr. Petritsch also arrived in Bahrain with hard-copy multi-spectral imagery of southwest Asia produced by NAVSPACECOM's Remote Earth Sensing Information Center at Dahlgren, Va.

While stationed at C5F headquarters, Lt.Cmdr. Petritsch worked to identify opportunities to provide space tactical awareness training for ships operating in the Persian Gulf — USS *Independence*, USS *George Washington* and USS *Nimitz* and their associated battle groups, along with USS *Guam* with the 26th Marine Expeditionary Unit embarked.

International Support Group Addresses Communications Issues

Naval Space Command hosted the Permanent Support Coordination Group (PSCG) on Dec. 10.

Based in Washington, D.C., PSCG is a working group of the AUSCANNZUKUS Naval C3 Organization. Made up of the five navies of Australia, Canada, New Zealand, United Kingdom and the United States, the organization was established in 1960 to help align naval communications policies and limit barriers to interoperability.

Members of a multinational working group on command, control and communications met at Naval Space Command recently to discuss naval communications issues in a coalition environment.

PSCG meets monthly to identify and discuss issues facing the navies of the member nations operating within a coalition environment. Current issues include information management, HF interoperability, combat ID, networking at sea, SATCOM, battle group e-mail, video teleconferencing, and indications and warning.

During their visit to Naval Space Command, the group was briefed on military SATCOM current operations and the mission and capabilities of the command's Naval Space Operations Center.

Space Liaison Officer Supports Joint Task Force

Officers from Naval Space Command have deployed on a rotational basis to provide on-site support to the Commander, Joint Task Force-Southwest Asia (JTF-SWA) as part of a project initiated last year by U.S. Space Command.

Space support team members from U.S. Space Command, Air Force Space Command, Army Space Command and Naval Space Command share 120-day rotations as the JTF-SWA space liaison officer, representing U.S. Space Command on the task force staff.

To date, Naval Space Command members who have served as space liaison officer have included Lt.Cmdr. Mark Rodgers and Navy Lt. Larry Watkins.

Lt. Watkins, who served as space liaison officer from August through December 1997, reports, "We are in theater to provide the JTF-SWA staff with direct access to space products."

This support includes helping them obtain and exploit national and foreign space-based systems as part of their daily routine operations, especially in the areas of weather, navigation, communications and surveillance.

"We also provide training on the capabilities of space-based systems and offer advice on the tactical application of space products and services," adds Watkins.

The space liaison officers advise the JTF-SWA staff on issues related to theater missile defense (TMD) architecture, system operations and configuration, and furthermore, help test and evaluate TMD systems and procedures through a robust exercise program.

Specific responsibilities related to TMD encompass a wide range of activity. The space liaison officer plans, coordinates and executes all aspects of

monthly exercises, and conducts training or revises procedures as necessary to enhance TMD.

The space liaison officer also tests reporting procedures for Central Command's Missile Warning Center, as well as the reliability of missile warning data provided through the Theater Event System (TES).

The U.S. Space Command representative works to integrate Patriot Air Defense Operations Centers, deployed batteries, and Carrier Battle Group assets — in particular, Aegis cruiser and destroyer capa-bilities — into the overall TMD architecture.

Finally, the space liaison officer provides tar-geting data and assists the Air Operations Center (AOC) in planning for counterforce/attack operations.

Watkins observes, "Space support to JTF-SWA is extremely useful for both the Joint Task Force and U.S. Space Command. The space liaison brings a variety of products, systems, and services to the theater and takes operational experience and warfighter inputs back to the space community."

While the primary focus of the joint task force is to produce the daily air tasking order for Operation Southern Watch, Watkins concludes, "There is still room for space initiatives such as exploitation of Global Positioning System navigation data and commercial and national imagery."

SPACE TRAINING

ISIOC (Interservice Space Intelligence Operations Course)
The ISIOC is offered to military and civilian personnel (04 and below) at the SI/TK level, in all the armed services who work as space system operators. This course is also excellent for those involved in command and control warfare (C2W) activities. Classes remaining for FY98 are:

11-22 MAY 98 (Mobile Training Team, Dahlgren, Va.)
15-26 JUN 98 — 17-28 AUG 98
20-31 JUL 98 — 14-25 SEP 98

ISIOSC (Interservice Space Intelligence Operations Senior Course)
A condensed version of ISIOC, the ISIOSC is offered for senior officers, O-5 and above, also at the SI/TK level. Classes remaining for FY98 are:

2-5 JUN 98 — 1-4 SEP 98

ISFC (Interservice Space Fundamentals Course)
The ISFC is offered to Army, Air Force, Navy and Marine Corps officers, enlisted personnel, and civilian employees entering nonoperator 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. Classes remaining for FY98 are:

4-15 MAY 98 — 17-28 AUG 98
1-12 JUN 98 — 14-25 SEP 98
27 JUL - 7 AUG 98

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

Chugach Awarded 'Fence' Maintenance Contract

A letter contract to operate and maintain Naval Space Command's network of space surveillance field stations has been awarded to Chugach Telecommunications and Computers, Inc. (CTC), of Anchorage, Alaska.

CTC is a subsidiary of the Chugach Alaska Corporation established in 1971 under the Alaska Native Settlement Claims Act. The company, which is certified in the Small Business Administration's business development plan, provides program management and information systems services to government and private companies. In addition to its Anchorage headquarters, Chugach maintains offices in Hawaii, Washington, California, Tennessee, Virginia and the District of Columbia.

The Navy selected CTC to manage the NAVSPACECOM field stations after determining not to exercise future options on a contract with Rick Montoya Services, Inc., which had managed the space surveillance sites since 1995.

Over 100 employees work at nine different locations in eight states to operate the space surveillance network around the clock. In operation since 1961, the network is the nation's only unalerted sensor dedicated to tracking space objects.

Navy-Industry Partnership Refines Imaging Technology

The Naval Research Laboratory is developing the Navy Earth Map Observer (NEMO) imaging satellite program, in partnership with the Space Technology Development Corp. of Arlington, Va.

The NEMO program agreement is a unique partnership between government — principally NRL — and industry. The program leverages the best Navy-developed satellite, remote sensing and processing technologies from NRL's Naval Center for Space Technology and Remote Sensing Division, with off-the-shelf components, technology and business acumen from industry. The

*(Please see **NEMO** on page 18)*

NEMO

(Continued from page 17)

resultant dual-use research and development program will satisfy both government and industry's needs for Earth image data from space. The technology developed by NRL will transition to industry, while government and industry will share program cost.

The program will demonstrate and refine a new imaging technology from space, hyperspectral imaging (HSI), that will augment and enhance the traditional remote sensing techniques used today. These images will assist the Navy's future research efforts in defining and modeling the global littoral ocean.

The NEMO images are invaluable to commercial enterprise for assessment of geology, agriculture, and the natural environment. Image data products from this system will be processed in real time by NRL's onboard parallel processor, a "super computer" in space, using NRL's patented ORASIS spectral recognition algorithm.

Sodium Sulfur Batteries Tested on Space Shuttle

An experiment developed by the Naval Research Laboratory recently flew aboard space shuttle *Columbia's* mission STS-87. The Sodium Sulfur Battery Experiment was designed, built and tested at NRL's Naval Center for Space Technology under the sponsorship and request of the Air Force Phillips Laboratory in Albuquerque, N.M.

Sodium sulfur cells use molten sulfur and sodium electrodes with a solid ceramic electrolyte which conducts sodium ions. To operate, the cells must be heated to 350 degrees Celsius (662 degrees Fahrenheit) to melt the sodium and sulfur and to increase the mobility of sodium ions through the electrolyte.

Scientists are testing the sodium sulfur battery cells' performance for possible future use in powering satellites. The cells have three times greater energy than the specific energy of nickel hydrogren batteries that are currently used to power satellites.

Teacher Workshop Focuses on 'Teaching Tomorrow's Astronauts'

"Good teachers are always looking to the future and trying to prepare a child for years down the road. There's no profession that touches the future like a teacher; a child's memory of a teacher lasts forever."

Dr. Jerry Brown, director of education for the U.S. Space Foundation, opened a day-long workshop for area teachers with those observations. Sponsored by Naval Space Command at Dahlgren and hosted by Washington District Elementary School in Oak Grove, the workshop included lectures on relative size and distance, biological effects of space flight and the Search for Extraterrestrial Intelligence (SETI) initiative.

Capping the day with a session on "teaching tomorrow's astronauts," Dr. Brown emphasized, "Change is coming to your kids so fast, that if you don't look to the future as a teacher, your students won't be prepared for what's coming."

As one example, Dr. Brown cited continuing advances in scramjet technology and the development of exotic hydrogen-based fuels, which will enable us to build a hypersonic airplane that can travel through space.

"You will see the last of fossil fuels at the end of your lifetime," he predicted. "Your children will travel anywhere in the world in 46 minutes in an aerospace plane."

Dr. Jerry Brown, director of education for the U.S. Space Foundation, during the teacher workshop.

Dr. Brown emphasized the need for teachers to bring "real science" to their students to counter the science fiction portrayed on TV. "Star Trek is not what space travel is all about," he said.

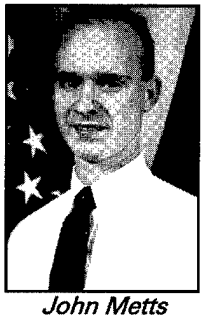
Science is rapidly transforming work and leisure. Job applicants to AT&T are now handed a laptop computer, cited Dr. Brown. "Can your students fill out a job application on a computer?"

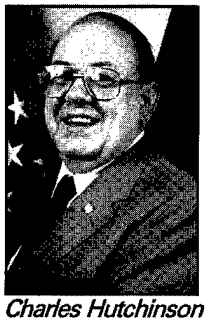
And, as satellite navigation receivers are added to new automobiles, he added, "our kids will have to understand latitude and longitude."

Over 30 elementary school teachers from West-moreland County attended the workshop. Naval Space Command sponsored the event as part of its adopt-a-school partnership with Washington District Elementary School, now in its fifth year.

Naval Space Command 15th


DP1 Tucker


John Metts


Charles Hutchinson


CTR1 Otis


IS2 Taylor

Annual Awards Honor Military, Civilian Employees

Naval Space Command recently named its top sailor and civilian employees for 1997.

Petty Officer 1st Class Denise J. W. Tucker from Fleet Surveillance Support Command in Chesapeake, Va., is the NAVSPACECOM Shore Sailor of the Year.

A data processing technician, Tucker was commended for her management of a complete upgrade of the command's local area network. The project in-volved extensive research and preparation of more than 100 separate hardware and software orders that totaled more than $275,000.

In addition, her award recognized her management of the command's minor property accounts, and her volunteer work as president of the command's morale, welfare and recreation committee for 1997.

Originally from Camden, N.J., Tucker enlisted in 1987 under the delayed entry program and began active duty one year later. Her Navy assignments have included tours with Space and Naval Warfare Systems Command in Washington, D.C., supporting the Worldwide Military Command and Control System, and with SEAL Team Eight in Norfolk, Va., as ADP department head before transferring to Fleet Surveillance Support Command in May 1996.

John P. Metts, III, an aerospace engineer in the Analysis and Software Branch, is Naval Space Command's Civilian of the Year. Metts' award recognized his work to provide technical support for the command's mission system database.

The mission system is a complex suite of software and hardware that enables the command to analyze thousands of satellite observations daily and calculate orbit predictions. The operational database that supports the mission system consists of 131 tables of data, 175 software routines to access the tables, and 68 database forms for users to access and modify data.

In the past year, Metts served as the team leader responsible for the development, maintenance, access and upgrade of the database. In addition to mastering database tools and integration issues, he also had to contend with software upgrades and record numbers of satellite observations by NAVSPACECOM and other Space Surveillance Network sensors worldwide.

Originally from Columbus, Miss., Metts first came to work for the Naval Space Surveillance Center at Dahlgren in 1991, following his graduation from Mississippi State University with a bachelor's degree in aerospace engineering. He initially worked with computational algorithms and the development of software for surveillance data reduction.

Charles E. Hutchinson is Naval Space Command's Watchstander of the Year.

Hutchinson is a supervisory space control analyst in the command's Naval Space Operations Center. His work involves maintaining watch operations in support of the Fleet, collecting and analyzing orbital information, and processing space events.

His award cited his efforts to characterize the orbits of a number of space objects. In one instance, he discovered two new objects associated with a foreign spacecraft. In another, he was able to calculate the orbit of a small camera that had separated from a Russian *Progress* resupply vehicle to the *Mir* space station.

Hutchinson originally joined the Naval Space Surveillance Center in 1966.

The command also announced selections of top sailors from the headquarters at Dahlgren, Va. **Petty Officer 1st Class Randy S. Otis** is Headquarters Sailor of the Year.

Otis, a cryptologic technician in intelligence collection, is the leading petty officer for the command's SATCOM Branch at Dahlgren. His award recognized his efforts to develop and maintain a system for tracking extremely-high-frequency (EHF) satellite and terminal outages to minimize down time and increase operational readiness for multiple deployed battle groups.

As the primary scheduling petty officer for the EHF communications package on Fleet Satellite FLTSAT-7, he helped resolve anomalies and satisfy the SATCOM needs of multiple operational units and research agencies. His efforts earned him the title of Naval Space Command's Sailor of the Quarter for October through December 1997.

Originally from Concord, Calif., Petty Officer Otis enlisted in 1974. He worked briefly as a jet mechanic with Attack Squadron VA-95 at Whidbey Island, Wash., prior to training as a cryptologic technician. He subsequently served with Naval Security Group Detachments at Imperial Beach, Calif., and Rota, Spain, and with Naval Security Group Activity, Winter Harbor, Maine.

He served as a watch supervisor and leading petty officer aboard USS *Truxtun* (CGN 35) prior to his transfer to Dahlgren in 1995.

*(Please see **People of the Year** on page 20)*

People of the Year

(Continued from page 19)

Petty Officer 2nd Class Charles J. Taylor, Jr., is Headquarters Junior Sailor of the Year.

Taylor is an intelligence specialist in the command's Intelligence Branch. His award cited his work as an intelligence watchstander and command briefer. He was commended for his thorough analysis of hundreds of foreign space systems activities and items of geopolitical interest, which ensured the command was well-informed on key theater and tactical issues.

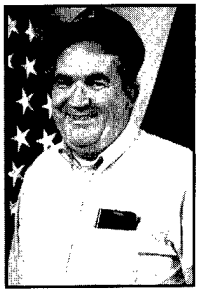
His award also recognized his efforts as the command's master-at-arms and physical training coordinator for his branch, as well as his volunteer work with the Combined Federal Campaign and command self-help projects.

Originally from Lake Charles, La., Taylor joined the Navy in 1989. In his Navy career he has served with the Naval Support Activity in Naples, Italy, and aboard the aircraft carrier USS *America*. He reported to Naval Space Command in 1996.

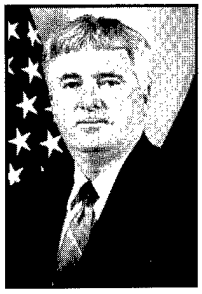
People of the Quarter

CTR2 Munro

B. J. Anderson



Ed Clair



Marshall Groves

Other top performers in the command were recently selected for quarterly awards for October through December 1997.

Petty Officer 2nd Class Lisa A. Munro is Junior Sailor of the Quarter. A watchstander and space warning petty officer in the command's Naval Space Operations Center, she was commended for her work to train other watchstanders and thereby help improve the center's mission readiness.

Among her duties in the NAVSPOC, she maintained customer support files on the command's electronic bulletin board and ensured that satellite vulnerability information was accurately provided to fleet units via the Joint Maritime Command Information System.

Prior to joining Naval Space Command in March 1997, Petty Officer Munro worked two years in Newfoundland, Canada, with the Canadian Triforces on the Personnel Exchange Program.

Originally from Denver, Colo., she enlisted in 1990 and subsequently served with Naval Security Group Activity, Ft. Meade, Md., and the Naval Computer and Telecommunications Area Master Station on the island of Diego Garcia in the Indian Ocean.

Bobbi J. Anderson was named Civilian of the Quarter. As a mail and file assistant in the Management Support Division, she processed over 9,500 pieces of mail into the command and more than 1,000 packages and facsimiles during the quarter, as well as over 2,400 outgoing letters and documents.

She also was responsible for barcoding nearly 200 classified documents, in addition to helping process travel orders and claims and helping prepare visual aids for budget briefings. Anderson has worked at the command since 1985.

Elmer E. (Ed) Clair is Operations Watchstander of the Quarter. He was commended for his role in support of space shuttle missions. As an orbital analyst, Clair has helped track space objects to compute potential close encounters with the space shuttle as it circles the Earth. His work was instrumental in the command being certified recently to provide primary support to NASA for space shuttle missions.

Clair served with the Air Force Reserve as an air evacuation medical technician from 1967 to 1973. He originally joined the Naval Space Surveillance Center in 1985.

Marshall M. Groves of Colonial Beach was named Automated Data Processing (ADP) Watchstander of the Quarter.

His award recognized his efforts to restore data processing operations at Dahlgren when a severed data line caused the disruption of space surveillance observations from six of the command's field stations. He coordinated an effort to switch the field stations to dial-up modem connections during the outage to maintain data processing.

Groves has been employed at Dahlgren since 1973, initially as a store worker in the commissary. He transferred to the Naval Space Surveillance Center in 1985 as a computer operator.

Lt. Thompson Heads JTAGS Detachment

Navy Lt. Teresia J. Thompson assumed command of Naval Space Command's Detachment Echo, based in Chesapeake, Va., on Feb. 10. She relieves Lt.Cmdr. Tina Paco, who headed the detachment since December 1994.

Personnel assigned to NAVSPACECOM's Detachment Echo serve as operators for the Joint Tactical Ground Station (JTAGS), a joint Army-Navy system for providing direct downlink of missile warning information to theater forces. Detachment members deploy to operational JTAGS sites in Korea and Germany.

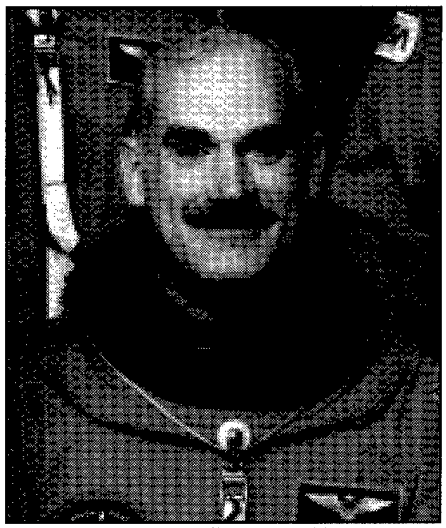
Lt. Thompson

Lt. Thompson reports from NAS Sigonella where she served since October 1995 as officer in charge of U.S. Naval Forces Europe's Emergency Action Message Cell.

Originally from Cincinnati, Ohio, Lt. Thompson was commissioned through the Naval Reserve Officer Training Corps at Miami University in Oxford, Ohio, where she earned a bachelor's degree in history.

She initially served with Fleet Logistics Support Squadron 50 at Cubi Point, Philippines, as legal officer. When the base closed following the eruption of Mt. Pinatubo, she transferred to Fleet Surveillance Support Command in Chesapeake, Va. She served there as assistant administrative officer, legal officer, personnel officer and training officer until she was ordered to Sigonella.

Capt. Kenneth Cockrell



Capt. William Readdy

Navy Reservist Astronauts Earn Distinguished Flying Cross

Two Naval Reservists and former NASA Space Shuttle commanders received Distinguished Flying Crosses (DFC) on Dec. 19. **Capt. Kenneth Cockrell** and **Capt. William Readdy** each accepted the awards for bravery and accomplishment from Secretary of the Navy John H. Dalton.

"We only send our nation's best and brightest into space," said Secretary Dalton, "and Captain Ken Cockrell and Captain Bill Readdy not only represent the best of America, but they also represent the best of our Naval Reserve Force."

It was the second time in history that naval officers in the space program have received the DFC. The first officer was Capt. Steve Oswald.

Capt. Cockrell, a former A-7 Corsair and F/A-18 Hornet pilot, set a mission duration record of 17 days, 15 hours, and 53 minutes in 1996. He is now deputy chief of the Astronaut Office at NASA.

In his latest mission, Capt. Readdy met and docked with the Russian space station *Mir* while exchanging U.S. astronauts.

Space Plans Director is Copernicus Awardee

Cmdr. Austin Boyd, director of Naval Space Command's Space Plans Division, received the 1997 Copernicus Award during the west coast's largest conference and exposition on communications, weapons systems, electronics, intelligence and information systems, held at the San Diego Convention Center on Jan. 14-16.

Cmdr. Boyd

Copernicus Awards recognize individual contributions to naval warfare in the disciplines of C4I, information systems and information warfare. Cmdr. Boyd was among 140 nominees. Selections were made by the Copernicus Award co-sponsors, the Armed Forces Communications and Electronics Association (AFCEA) and the U.S. Naval Institute.

Cmdr. Boyd's nomination highlighted his work as head of the command's Satellite Communications Branch. In that role, he established a solid naval satellite communications architecture and provided critical leadership at the joint level as a principal member of the

*(Please see **Awards** on page 22)*

Awards

(Continued from page 21)

DoD Military SATCOM Architecture Transition Team.

Furthermore, he led the development of concepts of operations, functional requirements, and system operational policy and procedures for Polar Extremely-High-Frequency SATCOM, Global Broadcast Service, and the implementation of Ultra-High-Frequency Demand Assigned Multiple Access (DAMA).

In addition, he developed a graduate-level course on naval MILSATCOM concepts and operations for the Naval Postgraduate School.

Cmdr. Boyd was one of 25 Navy civilians, Sailors and Marines who were selected for the 1997 Copernicus Awards.

AFCEA is the world's foremost professional association in communications, electronics, intelligence, imaging and information systems. The association provides a multi-faceted forum for education, professional development and career opportunities in these fields.

The U.S. Naval Institute, publisher of *Proceedings*, *Naval History* and more than 600 books, is a private, independent, non-profit member society for professionals supported by our sea services and

Navy & Marine Corps Commendation Medals

Lt. Sara Ostrom as the Joint Tactical Ground Station (JTAGS) program officer from January 1996 to December 1997; she managed the development of the naval theater ballistic missile defense architecture. She also qualified and served as a space surveillance officer in the command's Alternate Space Control Center.

Lt. Cliffton Phillips as head of the command's Force Enhancement Section since January 1996; he managed the dissemination of ephemeris data on virtually all objects in the 9,000-item space catalog to over 800 customers throughout DoD. He also executed oversight of the Communications Secuity Management System and maintenance of mission-critical message templates.

Lt. Denise Becker as training division officer and Pacific Fleet Naval Space Support Team member from November 1994 to November 1997; qualifying as a space surveillance officer, she developed a training program for Naval Space Operations Center watchstanders and built the first space event scenario library. As a NSST member, she directly supported exercises Roving Sands, Bright Star and Joint Warrior Interoperability Demonstration 1997.

(Continued on page 23)

Herbert Reynolds is pictured with astronaut candidate Air Force Maj. Rex Walheim (l. to r. top photo). ET1 Haywood Davidson is greeted by astronaut Dr. Michael Foale (bottom photo).

Space Flight Awareness Program Honors Employees

Members of Naval Space Command and the Naval Satellite Operations Center (NAVSOC) have been honored recently for their support of NASA's manned space program.

As a computer specialist in NAVSPACECOM's Analysis/Quality Assurance Branch, **Herbert Reynolds** monitors space objects in orbit. NASA relies on this type of analysis to determine whether the flight path of the Space Shuttle would bring the orbiter too close to any other object.

In recognition of his work, Reynolds was invited to Cape Canaveral, Fla., to the launch of Space Shuttle *Atlantis'* mission STS-86 on Sept. 25 as an honoree of the Space Flight Awareness Program.

More recently, **Petty Officer 1st Class Haywood Davidson, Jr.**, from NAVSOC was a guest of the Space Flight Awareness Program for the Jan. 22 launch of Space Shuttle *Endeavor's* STS-89 mission.

Davidson, an electronics technician, is the Laguna Peak department head at NAVSOC headquarters in Point Mugu, Calif. Laguna Peak is the site of one of the command's satellite tracking and injection stations.

Naval Space Command 15th Anniversary

(Continued from page 22)

Lt.Cmdr. Tina Paco as officer in charge of Naval Space Command Detachment Echo at Chesapeake, Va., from December 1994 to February 1998; she was cited for her leadership in efficiently planning and coordinating the change of homeport for her detachment to Chesapeake, and for her support of Joint Tactical Ground Station (JTAGS) elements in Korea and Germany.

Navy & Marine Corps Achievement Medal

EW2 Bob Baker as the work center supervisor and assistant ADP officer in the operations department aboard USS *Whidbey Island* from February 1992 to February 1997; he was a key player in shipboard installation and testing of the Ram missile, as well as the upgrade for the AN/SLQ-32(V) which greatly enhanced the electronic support capability of the ship.

Special Act Award

Sandra A. Bone received a Special Act Award from Commander Naval Space Command for her efforts in coordinating the Industry Day for Naval Satellite Communications hosted by the command at Dahlgren in October 1997.

Letters of Commendation

CTASR Christina Carney Lt. Michael Finnegan

Letters of Appreciation

Lt.Cmdr. Phil Tinsley
Lt. Jill Roberts
Edna Jenkins
Jonathan Boers
Virginia Stumpf
Richard Pitts III
Maj. Paul Rabe
Lt. Dave Bermingham
Lt. John Jackson
Lt. John Frederiksen
IS2 Charles Taylor
IS2 Larnell Smith
RM2 Carl Smith
Lt.Cmdr. Gerald Hicks
Lt.j.g. Jill Roberts
Alan Bauer
Jayna Stephens
Wanda Sale
Charles Harshman
IS1 Lawrence DelPlato
IS2 John Fritz
IS2 Larnell Smith
OS1 Ricky Fortner
Lt.Cmdr. Sheryl Campbell
Lt.Cmdr. Mark Rodgers
Pieter Traas
Lt. Larry Watkins
Lt. Scott Johnson
Lt. John Prohaska
Wendolyn Brown
Ronald Farmer
Herbert Reynolds
James Powers
Lt.Cmdr. Sonya Smith
Lt. Steven Jacobs
Lt. James Sauers Jr.
IS3 Gary Barile
IS2 Darin Kroft
James Rose
ET2 Booker Nunley
CTM2 Theresa Kraft
Lt. Steven Jacobs
Edward Lydick
David Perrussel
Kimberly Lydick
IS1 Diane Cummings
Cmdr. Terry McCarthy
IS2(SW) Charles Taylor
ISC(AW) Fredric Hyde
Lt.Cmdr. Larry Flint
Cmdr. John Nunley
Buddy Meyers
Lt. John Prohaska

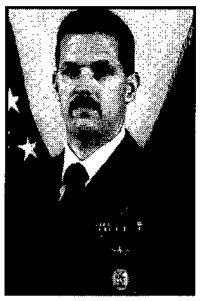
FROM THE MASTER CHIEF

Professional ... Sailor ...?

By ETCM Alan G. Kinder

In writing this article, I have to wonder about the events that have led me here. A short time ago, while waiting for a scheduled PT session to begin, I decided to join a Sailor and a civilian for a little basketball.

As I attempted to block a shot from the civilian, it was with shock that I realized he was a Sailor. The full goatee was more than sufficient to make him difficult to recognize at first.



ETCM Kinder

After recovering my composure, and ensuring he knew why I was so displeased, I began thinking about this event. Is it a single, isolated event and not worth worrying about, or is it a symptom of some deeper problems within the Navy as a whole?

A professional, at least according to Webster's, is one who is "engaged in a specific activity as a means of livelihood." This doesn't mean that a professional can't have other interests. It simply means that professionals devote their efforts to the pursuit of an activity that will provide for their needs.

There are additional definitions which shed some light on this. One that I particularly like, and I feel more accurately describes a professional is, "possessing great skill or experience in a field or activity, one with assured competence in a field."

As I think about the tasks that our Sailors accomplish on a daily basis, both afloat and ashore, I'm amazed at the level of competence displayed. The skills our Sailors have are immense. Their sense of competency approaches, and in some cases far exceeds, expertise.

A final definition is "behaving in such a way as to appear professional." This is where, I think, some of our Sailors fail. They don't act professional in all situations. What element are they missing that leads them to "forget" that they are professional Sailors? I think it comes down to a lack of formal training and consistent leadership.

The Navy at large, and Space Command in particular, is very good at teaching our Sailors what they need to know to do their job from a technical standpoint. But how effectively do we teach our Sailors that they are members of the fighting forces of the United States? How effectively do we train our Sailors, formally, that they are expected to carry the Navy's core values throughout the day, not just when they're at the command?

We in the Chief Petty Officer community are quick to speak of the professionalism with which we serve our country, but how did we get to be "professional?" For most of us, I think, it was learned by watching our leaders. We haven't received a lot of formal training; it was simply instilled in us as the right way to do business.

This doesn't mean that we shouldn't have formal training on this topic. In fact, I think it needs to be done more often. It can be done, and should be done, at the command level. This kind of training is perfect for GNT, or as an addition to your formal in-rate training program.

The second area where we fail as leaders is consistency. When we are inconsistent in our example, we send confusing signals. Being consistent in all aspects of our job is vitally important. We need to be proud of our profession and of our accomplishments as a service. We need to be in front of our Sailors modeling professional behavior at all times.

By the way, I think the vast majority of our Sailors want to do a good job, and want to be considered professionals. It just takes a little effort on our part as their leaders to ensure that they have the chance.

CALENDAR

Meetings & Symposia

Global Air & Space, May 4-6, Arlington, Va. Sponsor: American Institute of Aeronautics and Astronautics (AIAA). Call (800) 739-4424 or (703) 264-7535.

Spring Intelligence Symposium, May 6-7, Langley, Va. Classified: Top Secret SI/TK). Sponsor: Armed Forces Communications & Electronics Assoc. (AFCEA) International. Call (703) 631-6250 for information.

TechNet International '98, June 9-11, Washington, D.C. Sponsor: AFCEA. Call (703) 631-6125 for information.

BMDO Interceptor Technology Conference & Exhibit, Aug. 3-7, Ft. Carson, Colo. Sponsor: AIAA. Call (800) 739-4424 or (703) 264-7535.

Guidance, Navigation & Control Conference & Exhibit, Aug. 10-12, Boston, Mass. Sponsor: AIAA. Call (800) 739-4424 or (703) 264-7535.

MILCOM '98, Oct. 18-21, Bedford, Mass. Sponsor: IEEE. Call (508) 490-1126.

Infotech '98 Conference & Exposition, Oct. 20-22, Dayton, Ohio. Sponsor: AFCEA Dayton-Wright Chapter. Call (703) 631-6200.

Fall Intelligence Symposium, Oct. 28-29, Washington, D.C. Sponsor: AFCEA International. Call (703) 631-6250.

Defense & Space Programs & Technologies Conference & Exhibit, Oct. 28-30, Huntsville, Ala. Sponsor: AIAA. Call (800) 739-4424 or (703) 264-7535.

Courses & Seminars

- Satellite Communications, Tracking and Control, May 11-13 at Washington, D.C.
- Launch Vehicle Selection, Performance & Use, May 18-20, Huntsville, Ala.
- Advanced Earth-to-Orbit Vehicles, May 21-22, Huntsville, Ala.
- Mobile Communication Satellites, June 8-9, Tempe, Ariz.
- Fundamentals of Synthetic Aperture Radar, June 15-16, Washington, D.C.
- Advanced Synthetic Aperture Radar (Processing & Applications), June 17-19 at Washington, D.C.

All courses above are sponsored by the Applied Technology Institute. Call (410) 531-6034; email atiinfo@aol.com. Course outlines are available on the Internet at http://catalog.com/hitekweb/.

- Warfare Using Information, April 27-29, Washington, D.C.
- Multispectral Electronic Warfare, May 4-8, San Diego, Calif.
- Multi-Sensor Data Fusion, Target Tracking and Classification, May 4-8, Washington, D.C.
- Global Positioning System: Principles & Applications, May 11-14, Washington, D.C.
- Satellite Electrical Power Systems, June 1-4, Washington, D.C.
- Information and Command and Control Warfare, June 8-11, Washington, D.C.
- Synthetic Aperture Radar with Remote Sensing Applications, June 15-19, Washington, D.C.

All courses above are sponsored by the Continuing Engineering Education Program of George Washington University. Call (800) 424-9773 or (202) 496-8444; email ceepinfo@ceep.gwu.edu.

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