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REVOLUTION



Continuing research in unmanned aerial vehicles is revolutionizing the way the Department of Defense can conduct business around the world. Standing in the middle is the Naval Postgraduate School's Center for Interdisciplinary Remotely Piloted Aircraft Studies, helping expand the role of 'pilotless planes' in the military's arsenal.

Alumni@NPS

Spring 1999

Tribute

He was truly one of the few unforgettable persons who has crossed my life. His exceptional intellect, incredible experiences and broad background gave him a unique ability to understand Asia, past and present.

RADM Ralph West
Former NPS Superintendent

to a

Claude was a master at enabling - coaching, teaching, mentoring - his students and his colleagues to exercise their mental powers and develop sophisticated habits of thought.

CAPT Frank Petho
Chairman, National Security Affairs

fallen

The Naval Postgraduate School Foundation has created a special fund to continue Prof. Buss' work. If you would like to help, please send your tax-deductible donation to the Claude Buss Endowment, care of the NPS Foundation, PO Box 8626, Monterey, CA. 93943.

mentor

Professor Claude A. Buss, Senior Lecturer in the Department of National Security Affairs at the Naval Postgraduate School and Professor Emeritus in the Department of History at Stanford University passed away late last year.

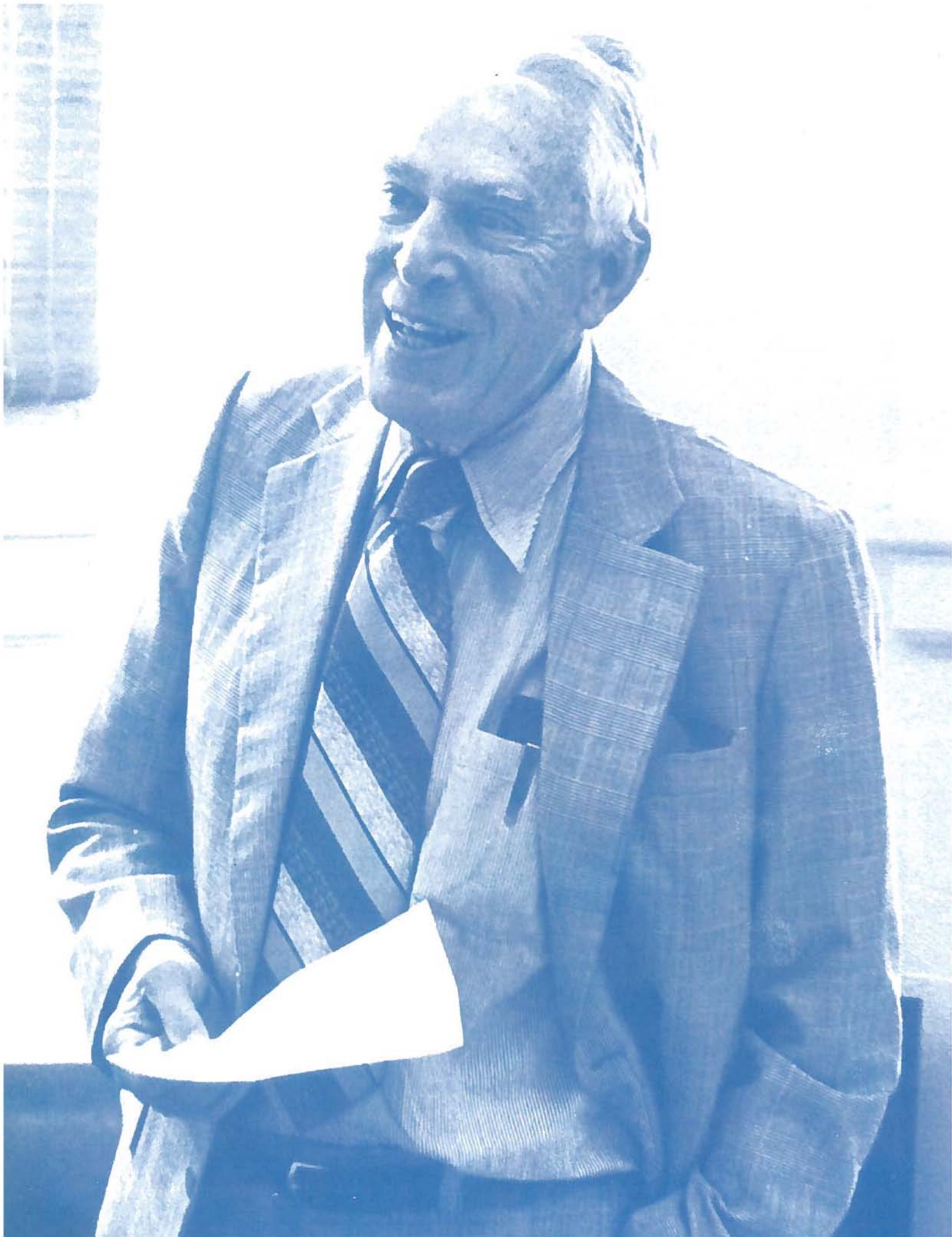
Buss had an extraordinary and enriched life. After earning a doctorate in international relations from the University of Pennsylvania in 1927, he continued his studies in Germany and France. As a tenured faculty member, he taught at the University of California, San Jose State University and Stanford University. He was twice a civilian member of the faculty at the National War College in Washington, D.C.

His government service began in 1929 at the U.S. Embassy in Beijing, and continued intermittently in China, the Philippines, Japan, Korea, India, and Vietnam. After the bombing of Pearl Harbor and as U.S. and Philippine soldiers doggedly fought against the advancing Japanese forces in the early months of 1942, President Roosevelt ordered Gen. Douglas MacArthur and the Resident High Commissioner of the Philippines out of the islands to the safety of Australia. That action made Buss the senior official in Manila when the Japanese armed forces entered the city.

After the war, Buss joined the history faculty at Stanford University and San Jose State University, where he remained until he retired in 1976. He then joined the national security affairs department of NPS.

Felled by a stroke in 1997, Buss fought back and resumed his research and teaching literally until the last week of his life. At the encouragement of several students, he returned to teaching, but given the circumstances, did it from home. For the next few months, students willingly drove the 200-mile round trip to Buss's home in Palo Alto, Calif. once a week for class.

What Buss came to represent to several generations of students through his selfless devotion to their scholarship is appropriately captured in the translation of the Chinese ideogram outside the seminar room which bears his name: "Statesman. Scholar. Mentor."



REVOLUTION

Unmanned Aerial Vehicles are revolutionizing the way the military can conduct business around the world. The Naval Postgraduate School is helping, performing several research initiatives aimed at expanding the capabilities of these unique aircraft. What follows is a snapshot of our research efforts.

Nestled on the outskirts of a small coastal town is the Marina Municipal Airport, the airstrip for the former Fort Ord military installation. The tiny airfield is home to a few privately-owned airplanes, a commercial skydiving business, and some of the most unique aircraft in the world. That's right -- the airport is home to the Naval Postgraduate School's Center for Interdisciplinary Remotely Piloted Aircraft Studies (CIRPAS).

At CIRPAS, we have assembled a collection of Unmanned Aerial Vehicles (UAVs), and are using them to support several research initiatives and Fleet exercises.

The Naval Postgraduate School has had a strong UAV research program for many years. In the past three years, however, our program has rapidly expanded. The UAV program is an example of how NPS uses the interdisciplinary capabilities of students and faculty to examine and better utilize the tools of tomorrow's military.

NPS recently joined with the Naval Research Laboratory in a cooperative agreement designed to foster the ability to effectively develop and use UAVs for Fleet operations. A meeting at NPS in October 1998 familiarized faculty, students, and NRL scientists with current capabilities, studies and future directions. The major components of the current NPS UAV research program are profiled below.

Center for Interdisciplinary Remotely Piloted Aircraft Studies

CIRPAS provides UAV flight services to the research, development, and test and evaluation communities, as well as support for the development of concepts of operations (CONOPS) and operational missions. CIRPAS is located

at Marina Municipal Airport, California, a former military airstrip, and McMillan Airfield, Camp Roberts, Calif. The Camp Roberts facility is approximately 100 miles south of Monterey and provides an isolated geographical location with restricted airspace, allowing CIRPAS to perform experiments without opposing any commercial flight patterns.

Current assets include two Pelican Optionally Piloted Aircraft (OPV) one of which is a surrogate Predator that can be flown with a pilot or controlled by a Predator flight control system. This permits operations over populated areas. The Pelican can also be used to simulate a wide range of UAV configurations/capabilities. CIRPAS also has an Altus, high altitude UAV. Both of these vehicles are operated from a trailer-based ground control station. Satellite communications permit the sensor and flight data to be sent to the payload user at a remote site in near real time and permit the user to provide input to the ongoing flight. A UV-18A Twin Otter is also available for scientific missions, as a UAV chase plane, or a test bed for graduate courses in aerodynamics. In February of 1999, CIRPAS received the first of two Predators from the Tactical Control Station Program.

EA-6B UAV Distributed Geometry In Information Operations

CAPT James Powell, USN, chair of the information warfare academic group, is looking at UAVs from the Information Warfare/Information Operations angle. He believes that the EA-6B plus distributed UAVs or UCAVs (Uninhabited Combat Air Vehicles) should be a large part of the vision for the future of Navy tactical



This Tactical Control System (TCS) Predator UAV arrived at the Naval Postgraduate School's Center for Interdisciplinary Remotely Piloted Aircraft Studies in late February. The Predator is a Medium Altitude Endurance UAV built by General Atomics Aeronautical Systems.

air electronic warfare, whether as the ultimate follow-on, or as an interim replacement for the platform.

Two classified research projects have been recently completed on UAV EA payloads. In addition, LT Tim Barkdahl, USN, a student in the department of operations research, is undertaking a modeling and simulation thesis to show the difference in adding distributed UAVs to the EA-6B mission. Current research is looking at three aspects of this including a methodology to pursue the follow-on.

Modeling and Analyzing UAV Operational Sustainability and Effectiveness

From an operational, mission-oriented viewpoint UAVs are an element and option of the C4ISR system that promises to provide useful, timely, and operationally relevant information economically and effectively, without jeopardizing the lives of pilots and other operators. A variety of issues influence the proper choice of UAV types, and force sizes and operational concepts. The purpose of the present research of Distinguished Professor Donald Gaver and Professor Patricia Jacobs of the department of operations research is to provide initial tools for decision-makers to use to assess the net military value of a particular UAV force when embedded in a total C4ISR system, thus guiding the establishment and management principles for acquiring and using such a force.

UAV Concept of Operations Development

Unmanned aerial vehicles will play an important role in future naval operations, but operational concepts need to be worked out. Professor Alan Washburn, department of operations research, is examining one of the many tasks that UAVs might undertake: Surface Search and Surveillance (SSC).

UAVs will undertake tasks that are dangerous, dirty, and/or dull. SSC is one of the dull kinds. A battle group must keep track of all contacts within several hundred miles of PIM (the group center). Contacts are easy to detect by active means, but must still be overflown to establish identity and intent. A vertical takeoff and landing (VTOL) UAV based on a helicopter platform can make a significant contribution to accomplishing this SSC mission. The UAV's role will be to make repeated flights, each of which visits one or more targets of interest. The utility of the UAV will depend on its sensors, its speed and endurance, its command and control system, its method of prioritizing targets, and on unrelated parameters such as target density and battle group speed. Washburn has developed a Visual Basic simulation of a UAV performing in the SSC role.

Systems Technology Laboratory (STL) Potential for Data Connectivity to the Fleet

CIRPAS's UAVs have communication capabilities on board for passing in-flight telemetry such as kinematics (course, speed altitude, positions, etc.), video, and other data to CIRPAS mobile and fixed ground and tactical control stations where they are typically saved to tape. These data in the past have then been provided to client researchers for use in their particular projects.



UAVs can be a valuable asset to the warrior, and NPS will soon demonstrate that the UAV and target track kinematics data, photos and other digital telemetry data can be provided on a near real-time basis, using existing or commercial equipment at a low cost.

The simplest way to accomplish this task is to have a CIRPAS UAV ground station instruct the UAV to establish a modem-to-laboratory connection by placing a cell (satellite) phone call to the normal STL telephone number. The UAV will then be instructed to pass digital UAV and target track kinematics data to the STL. Lab researchers then convert the digital data into formatted messages which allows automatic insertion of the digital UAV data into the GCCS database for display as tracks on the warriors' GCCS or JMCIS displays. Periodically, the UAV will use a screen grabber to send digital visual and IR spectrum snapshots (one video frame per snapshot) over the modem link to the lab. The researchers then post the snapshots on a STL web page for viewing by warriors over the SIPRNET, an internet protocol used for transferring classified data.

A better way is to have the CIRPAS UAV ground sites send the same digital telemetry information to the STL using high speed modems, or over the Internet to the STL. In this way more data including more snapshots can be sent

to the STL for more near real-time access by the warriors over the SIPRNET.



In addition to the Predator, CIRPAS has several aircraft in its fleet of test vehicles. The Altus (left) was the first production level UAV obtained by NPS; the Twin Otter (above), a piloted aircraft, is used primarily for atmospheric research initiatives; and the Pelican (below) is actually a modified Cessna capable of flying with or without a pilot. With recent modifications, the Pelican now carries the same equipment and capabilities as the Predator.



Thesis students are helping to establish these modem and Internet links on a reliable basis, develop and automate the UAV digital data to the correct format, automatically insert it into the STL GCCS database for transmission to GCCS sites on the SIPRNET, and develop the STL UAV web page where the digital snapshots and other digital telemetry can be posted for viewing by

SIPRNET users, and to then automate this process.

Rapid Prototyping of Avionics Systems for UAVs

The purpose of a Rapid Prototyping System (RPS) is to aid the avionics systems engineering process. By providing a set of integrated tools, engineers can

quickly design, simulate, implement and flight test avionics software. The RPS was developed by Assistant Professor Isaac Kaminer and students who were enrolled in the avionics curriculum at NPS. It utilizes the Realsim Product Family of software tools developed by Integrated Systems, Inc. (ISI) of Sunnyvale, Calif. This software collection, along with the ground station and FROG

unmanned aerial vehicle, allows avionics projects to be developed from initial concept to final flight testing rather quickly. For example, during a recent flight test, code changes were made,

compiled, linked and executed while the aircraft was airborne. This allows the officer students to complete projects from the initial design, to the final testing phase in the limited amount of time available.

Other UAV Studies

- Associate Professor Rick Howard, department of aeronautics and astronautics, has undertaken a wind-tunnel study to design and test a telescope fairing for the Altus UAV based at CIRPAS. Sandia National Laboratories is funding this study, which concerns designing a blister fairing to minimize the resulting steady and high-frequency air loads on the telescope, which requires a fairing with an opening to maintain optical quality. Issues also involve the cavity resonance problem, payload temperature control, and the effect of the fairing on the drag and flying qualities of the UAV.
- Dr. Howard is assisting the Center for Naval Analyses (CNA) in a NAVAIR-sponsored study to identify and assess technologies toward a viable maritime UAV. The study includes vertical takeoff and landing (VTOL) and medium altitude endurance (MAE) options.
- A 1/3-scaled radio-controlled instrumented sailplane is being developed to simulate the flight mechanics of the drop of the NASA Apex 15-meter wingspan sailplane being developed at NASA Dryden Flight Research Center. The Apex is a high-altitude unmanned aircraft to be carried aloft to 100,000 feet by a weather balloon, then dropped and flown through a flight experiment by a remote pilot before landing at Edwards AFB. The data will provide information for designing future high-altitude aircraft for atmo-



This FROG UAV is used to test experimental avionics software packages. Given the short time students have at NPS, the FROG allows immediate testing of this software.

spheric measurements.

- Development of the avionics system definition for a system of networked UCAVs used in a close air support mission is being pursued by Assistant Professor Russ Duren of the department of aeronautics and astronautics. He also is performing feasibility studies and initial system design to incorporate a high-power microwave weapon into a UCAV, and a system-level trade study concerning the use of UCAVs as electronic warfare platforms.
- An autonomous rotorcraft project being pursued by Duren is to develop the avionics hardware and software for a small autonomous helicopter to be used for research in UAVs. He is also developing a dynamic simulation model for the helicopter.
- Assistant Professor Isaac Kaminer is investigating the necessary sensor and algorithmic requirements for the successful autoland of an autonomous aircraft aboard a naval ship using passive sensors only. In particular, the research will focus on the subject of fusing asynchronous, multi-rate, multi-resolution data available from a sensor suite that may include INS, GPS, FLIR, vision, laser and ultrasonic sensors. The research issues being addressed are: 1) extraction of navigation data from vision and laser systems; 2) development of fusion algorithms that explicitly address the multi-spectral, multi-resolution, and multi-rate characteristics of sensor data; and 3) how to properly use the information provided by the fusion algorithms to successfully control the vehicle to the landing site, and land it there in the presence of severe environmental conditions and possible sensor failures (robust sensor-based control).



Under most circumstances, the cockpit of an aircraft is not housed inside a small trailer; however, that is not the case with UAVs. CIRPAS uses this Ground Control Station to fly its selection of UAVs.

A Navy SEAL creeps silently through dense bushes, secretly approaching a structure with American citizens held captive inside. He must see inside this building... How else could he find out how many hostages there are and exactly where they're located? He certainly cannot simply walk up to the building and step inside. He reaches into his belt and opens a small canister to find a two-inch aircraft that can fly quickly into the building, collect data, video, and assess the situation. This may sound futuristic, but vehicles like this are approaching reality, and at the Naval Postgraduate School, researchers are working to help bring such micro air vehicles to life.

Micro-UAVs

Micro-UAVs

Micro-UAVs

Experimental and Numerical Studies of Flapping-Wing Propulsion

Distinguished Professor Max Platzer and Research Assistant Professor Kevin Jones of the department of aeronautics and astronautics are investigating experimentally and numerically the use of flapping wings for the propulsion of micro-air vehicles. Experiments are carried out in the NPS 5' x 5' low-speed wind tunnel using a device which allows for two moving airfoils, each with two degrees of freedom and adjustable phasing between the pitch and plunge motions of the airfoils. The design and construction of such a micro-air vehicle has been completed and wind tunnel tests are currently in progress.

Wireless Power Transmission in Miniature (Micro) Air Vehicles

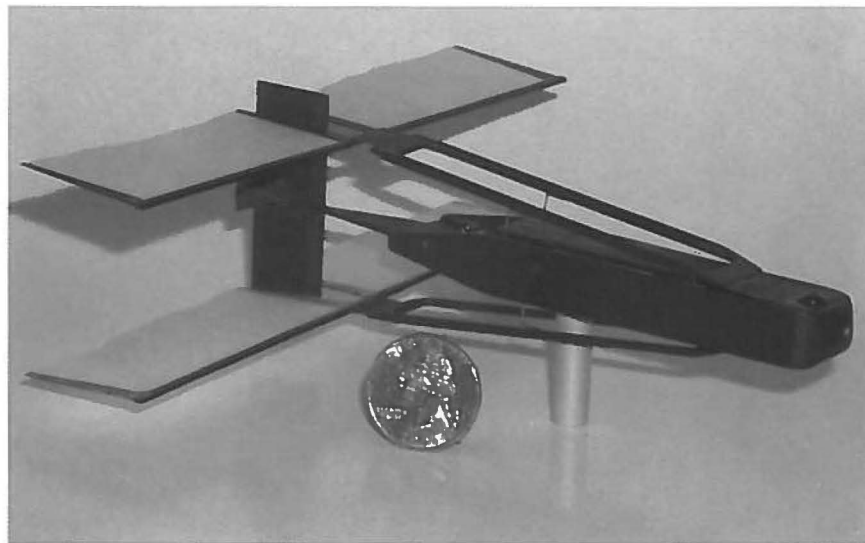
DARPA and several other DoD agencies currently have research programs with the objective of developing a miniature (micro) air vehicle (MAV) that would have both military and civilian applications. The first generation would be only a couple of inches in size, which would allow it to be man-portable and able to fly inside of buildings. A vehicle this small could be used to monitor dangerous environmental hazards (like the inside of a contaminated nuclear facility), and even gather information in hostage situations. Subsequent generations of the vehicle could be made as small as the new technology permits.

The design of such a small vehicle presents some unique engineering challenges. Obviously as the size of the vehicle is reduced,

the weight and power consumption of the systems on board must also be reduced. One possible means of reducing weight is to "beam" microwave energy to the vehicle, which is then converted to a DC signal that drives a motor. This approach is called wireless power transmission (WPT), and it was first demonstrated in 1964. Since WPT eliminates the need for a battery on board, the potential volume and weight savings are significant. Microwave power beaming has a fundamental thrust-to-weight advantage over conventional power sources when the vehicle size is very small (a

couple of inches or less).

Research by Associate Professor David Jenn and student Robert Vitale has demonstrated the WPT concept using a prototype developed at NPS. The prototype is the same size as a conventionally powered UAV under development by Lutronix, Inc. It is approximately 2 inches in diameter, 4.5 inches long and has a rotor diameter of 5 inches. The entire body of the UAV serves as the



Although this aircraft isn't much bigger than a quarter, it does indeed fly. Developed by Professors Max Platzer and Kevin Jones, this 'flapping wing' micro UAV is currently in flight testing experiments.

antenna for reception of the microwave power. The received microwave signal is rectified and then used to power the motor which drives the rotor. Research has also shown that current radar waveforms such as those used by the AN/SPS-65 surface search radar in the NPS Radar Laboratory are capable of powering the UAV.

Other related issues are also being investigated, such as the effects of wall losses and multiple reflections, the mitigation of radiation hazards, and the efficiencies of various ground station configurations.

Making a difference

Influencing change

In February, the Center for Civil-Military Relations (CCMR), based at NPS, sent a team of experts to Indonesia to lead a weeklong seminar. The discussions centered around helping Indonesia prepare for the incorporation of civilian leadership into the hierarchy of their government. The team, led by national security affairs department Professor Mary Callahan, included retired Major Gen. Paul Vallely, Rochelle Dornett, chief-of-staff for Congressman Sam Farr (D – Monterey); LCDR Neil Sheehan, deputy fleet environmental officer, CINCPAC; and Barbara Harvey, visiting fellow from the University of Arizona.

Held in Jakarta at the Center for National Resilience, the seminar was a continuance of programs Callahan has provided to military and civilian leaders in Indonesia during its transition. CCMR conducts similar programs in countries around the world, including Honduras, Croatia, Georgia, Slovakia, and Poland.



The Pembangunan Statue (left) was developed by Pertamina State Oil, and now stands in Jakarta, Indonesia. The flames represent the spirit of the Indonesian people for the development of the country.

.. Around the world

Alumni activity

Much like fellow alumni across the U.S. and around the world, Indonesian alumni have formed a chapter and are making plans to continue the positive influence NPS has imparted to officers and their services. Alumni met in February to discuss plans to create stronger ties between Naval Command and Staff College (Seskoal) in Jakarta and NPS. Discussions focused on exchanging professors, changing technologies, and sending Indonesian officers to earn advanced degrees.

At a less formal second meeting, attendees sang songs, ate lunch and conversed with representatives of Seskoal, including Commandant Sarto and Vice Commandant Said, representatives from the American Embassy, Col. Patton and Lt. Col. Diener, and leaders of the alumni chapter, Rear Adm. Soewarso (Indonesia – Ret.) and Vice Adm. Hamza (Indonesia – Ret.).

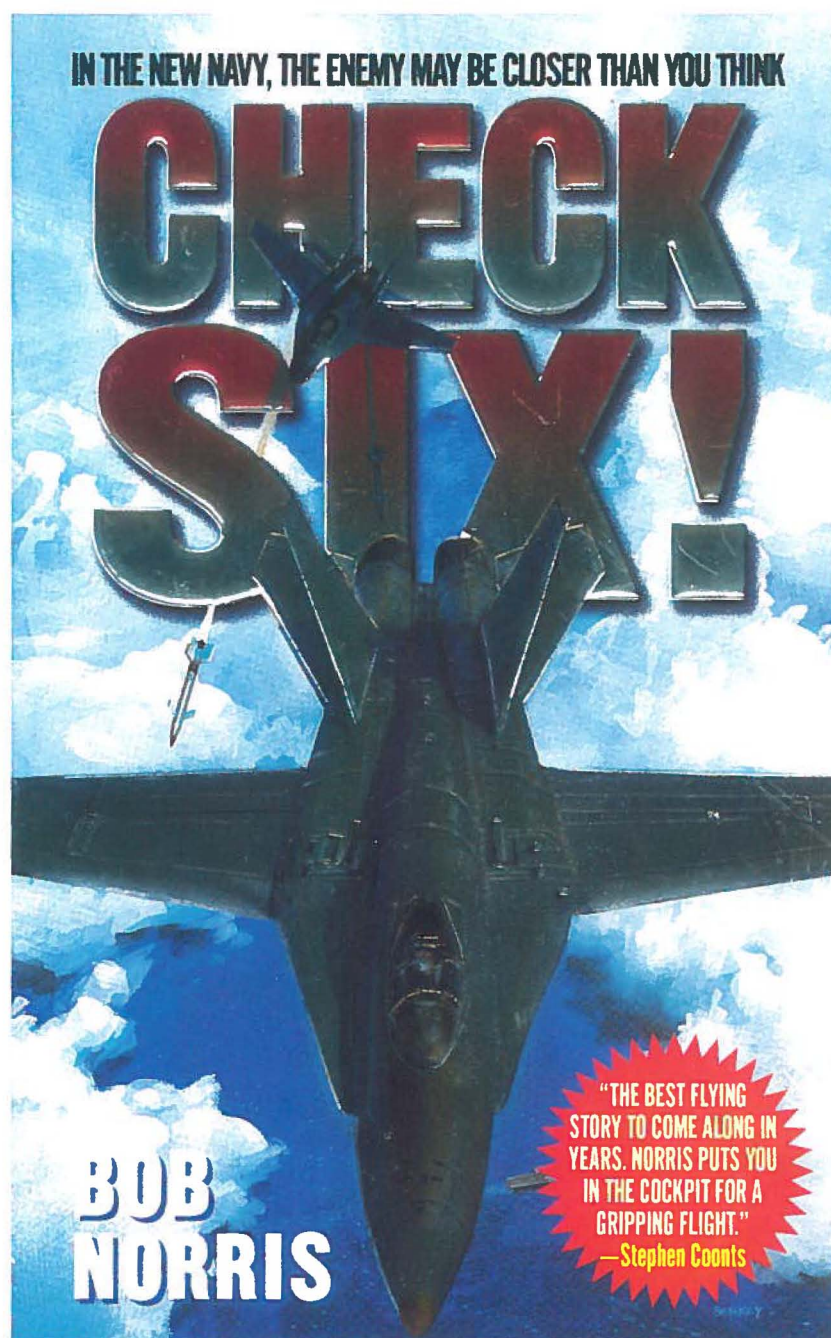
Nearly three times the size of Texas, the Indonesian archipelago spans more than 17,000 islands from east to west and across the equator. A great percentage of world trade passes through its waters between the Indian and Pacific Oceans. It is among the largest populations in the world with over 212 million people – (CIA World Factbook).



A view of Jakarta, the capital of Indonesia. Located on the Island of Java, Jakarta is one of Indonesia's largest cities.

voice

ALUMNI



When a female fighter pilot is killed in a flight-deck launch, veteran reporter Jack Warner smells a rat. Namely, Jim Holmes, a commander whose avowed mission is to keep women from flying the Navy's frontline aircraft, the F/A-18 Hornet. It's a high-level conspiracy for sure, but can Warner nail the brass to the wall in time to save a woman pilot who has just been ordered into combat?

Sound like a great story?? Well, it actually is a new novel titled *Check Six!* authored by Bob Norris, a 1986 graduate of the Naval Postgraduate School. Norris spent twenty years in the Navy as a fighter pilot, commanding the most aggressive planes in the military's arsenal, the F-14, F-15, and F/A-18. When he was set to takeover his own Hornet squadron, an incredible twist of fate changed this pilot's course forever.

"A couple years ago I was diagnosed with a rare neurological disorder that required a craniotomy," he explains. "There were some post-op complications and for several days they kept me constantly awake. Falling back on the POW training we receive as combat pilots, I undertook an 'impossible' task to keep my mind occupied. So I composed the book in my head, sentence by sentence. A few months later, when I could use a keyboard again, I was surprised at how much of the story I retained. It was as vivid as a real memory."

But Norris says there is no need for pity in the world of naval aviation. He admits he does greatly miss flying the world's most powerful aircraft, but a pilot needs to be prepared for any and all possibilities, and he's found satisfaction in his new career.

"Writing is my new passion. When I flew airshows, I was amazed by how many people sincerely wanted to capture the essence of what it feels like to fly high performance fighters. Writing gives me the chance to re-experience some of the thousands of hours I spent in cockpits and share those feelings with others. Please don't get me wrong; I knew when I started in this business that it could

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Above: During a recent visit to Ottawa, NPS Superintendent RADM Robert C. Chaplin was able to make time to meet with several Canadian alumni at a reception in their honor. LCDR Sean Midwood, Canadian Navy (right), organizer of the Canada Alumni Chapter, helped the Admiral set up meetings with Canada's top defense officials.

Below: Washington DC alumni packed the dining room at Fort Myer during our alumni reception there. The Washington DC Alumni Chapter held its first official meeting in early February when they elected chapter officials and developed key goals to pursue in the future. We are continuing to promote chapter development across the nation. If you are interested in joining a chapter in your area, please send an e-mail to alumni@nps.navy.mil.



activities

ALUMNI

Check Six!, continued

end in a flash. The bottom line is that, after all those years, any fighter pilot will tell you that to walk away with the same number of landings as take-offs is as good as it gets."

Check Six! covers what is a controversial topic bound to fill headlines in the nation's top newspapers, women in the military. But can the novel be considered a realistic portrayal of today's Navy?

"Make no mistake, the story is pure fiction," he says. "That being said I think it's important to understand that the small group to whom you refer passionately believe that warfighting must be kept purely male. These aren't two-dimensional bad guys. They make a compelling case, are willing to sacrifice their careers for their cause, and can rationalize just about any action as being for the good of our country. But in the book, just like the real Navy, the majority of officers and sailors are good-hearted people who

faithfully obey orders and do their best to carry them out." And given Norris' view on reality, he wanted to keep his heroine equally as real. "LT Randi Cole is simply a fighter pilot who happens to be a woman. She is willing to play by the same rules as her peers and doesn't want or expect special treatment, just a fair shot. When these two forces interact, things get interesting," he adds.

"I take the reader through the process that gives the lead character a firm grasp of the fundamentals of air combat. It was extremely important to me to make Cole's performance believable. She's not a prodigy or a superwoman, her skills are the product of experience and hard work. As she matures as a fighter pilot, she adds her own innovations."

For more information about *Check Six!* and the author, log on to www.bobnorris.com.

dreams

By CDR Robert Stevenson, USN (ret.)
Class of 1975



Astronaut Mark C. Lee, mission specialist, tests the new Simplified Aid for EVA Rescue (SAFER) system 130 nautical miles above Earth

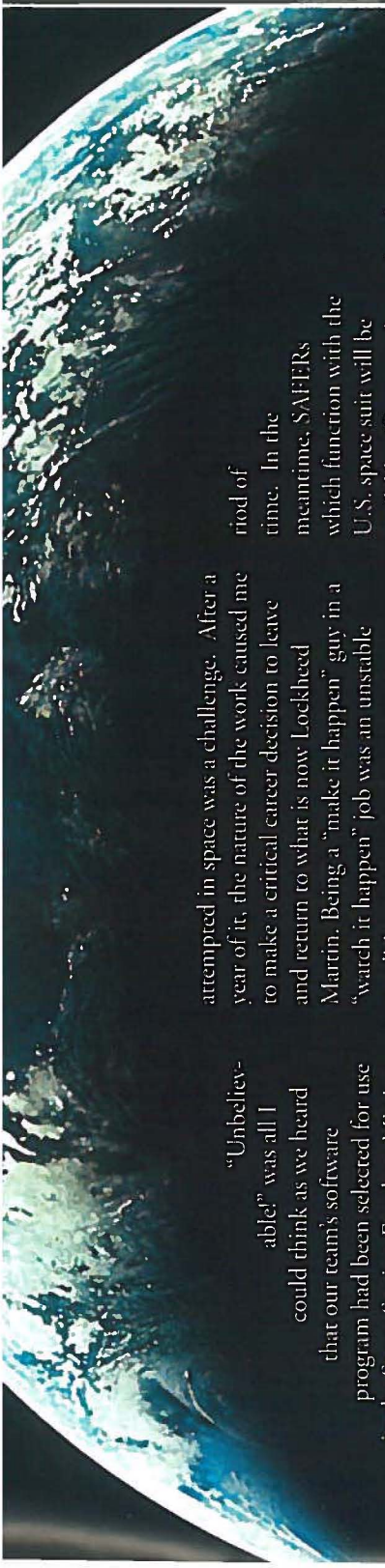
Listening to Sputnik on my neighbor's short wave radio lit the fuse in me the day before my 12th birthday. Watching the Mercury launches and recoveries cultivated my interest. When I had to be at school, there was a transistor radio in my pocket, a wire running inside my sleeve, and an earpiece hidden by my hand as the messages from Mission Control came over the air.

Yes, I was absolutely fascinated with the vast expansion that surrounds our earth. However, reality was here on the ground. You can't work in the space program if you don't have the skills and knowledge. Fortunately, my technical education was provided by the Navy. There was the basic degree in general science paid through a full NROTC scholarship, and later a master's in physics at NPS. Also included were engineering duty officer school plus ten years of on-the-job technical training in aerospace systems. Finally, I had skills to sell to a company working in the space program.

A few special moments in space stood out during my active duty time, and kept the embers glowing: On my destroyer school (since renamed the Surface Warfare Officer School) BOQ room TV, there was Neil Armstrong walking on the moon . . . The last Apollo mission to the moon . . . Initial testing of the space shuttle . . . President Reagan initiating development of a space station.

"No. No. It can't be true," ran through my head as I walked into our missile production control building. But watching the replay of the

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"Unbelievable!" was all I could think as we heard that our team's software program had been selected for use in the Space Station Freedom Mission Control Center. Finally, my dream had come true.

Not so fast! The dream was forced into a temporary suspension when I learned that Space Station Freedom was canceled. "No. No. It can't be true," was back. That thought also kept running through my mind when few people bought anything from my own business for three years. Clearly being a salesperson was not my forte. So it was back to JSC.

Four civilians have hired me since retiring — two men and two women. All knew me personally prior to hiring me. Letters didn't matter. Resumes didn't matter as long as I met the minimum established qualifications for each position. What did matter was finding someone who had a problem to solve where I was the solution. Some people who knew me well could do nothing, because they had no position that needed filling. Other people had positions, but didn't know me and refused to believe my claims. My experience cannot be declared the standard, but it matches

attempted in space was a challenge. After a year of it, the nature of the work caused me to make a critical career decision to leave and return to what is now Lockheed Martin. Being a "make it happen" guy in a "watch it happen" job was an unstable condition.

Most of my recent work has been supporting development of a way for astronauts to "fly" in space by themselves. The first people to "walk" in space remained attached to their vehicle. The first attempt to free the crew from their leash was the Manned Maneuvering Unit (MMU).

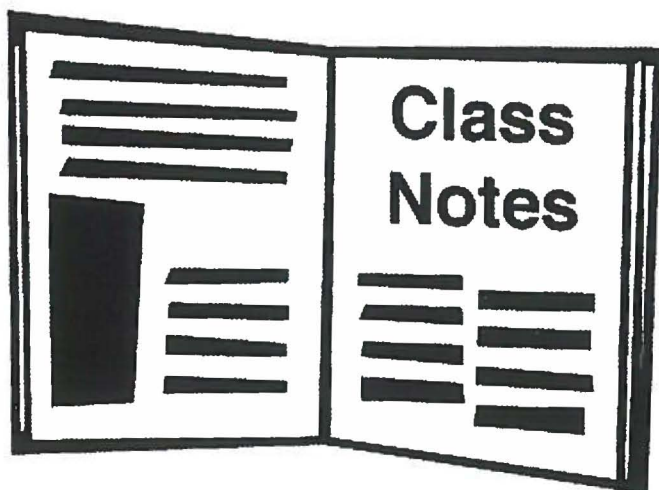
A smaller, cheaper version of the MMU was created to serve as an emergency self-rescue vehicle for a crewmember. The concept was refined into a version used on the Russian space station Mir. The current design is aboard the Unity space station element, and astronauts working from the shuttle to assemble the station will wear them. These have all been called Simplified Aid for Extravehicular Activity Rescue (SAFER), and they were all designed to work with the U.S. space suit.

My project is developing a SAFER to function with a Russian space suit. The U.S. suit has a top and bottom, plus gloves. The Russian one-piece suit has a door on the back to provide entry. The suits make

rod of time. In the meantime, SAFERs which function with the U.S. space suit will be available. Crewmembers using the Orlan-M suit will have to use two personnel safety rethers — a cumbersome and time-consuming process — while translating along the outside of the station until our Russian SAFER is available.

Last year I also participated in developing plans to advance the technology of the Sprint "flying" camera, which had operated well during a shuttle experiment. This astronaut-controlled, shuttle-based, free-flyer contains cameras to give close-up as well as more comprehensive views of the station to assist the crew. The extra views from its cameras will help during assembly of the space station with shuttle- and station-based robotic arms, and they will also help with other extravehicular activity. The crew cannot get to everywhere on and around the station, and other cameras cannot see from angles other than the one in which each is pointed. I was asked to step in, because someone with a systems viewpoint and experience developing flight hardware was needed on the project.

Dreams do come true.



Class of 1965

Retired **VADM William A. Dougherty, Jr.** is now employed as the Director, Government C4I Programs for the Boeing Company in Seattle, Wash.

Retired **VADM Richard A. Miller** continues to serve NPS, currently serving as a trustee for the Naval Postgraduate School Foundation. He is also the watchstander for the Monterey Maritime Museum.

Class of 1966

Retired **CDR Dennis Ferm** is now supporting defense information systems for The Aerospace Corporation in Falls Church, Va.

Retired US Army **LTC Raymond J. Nelson** is now working as a Systems Engineer for Librascope, a subsidiary of Lockheed Martin focused on command, control, communications, computers and intelligence.

Retired **CDR T. Michael Shortal** is now employed as the Vice President of Kastle Systems LLC.

Class of 1969

Retired **LCDR Thomas O. Murray, Jr.** is currently a

college professor at Lynchburg College in the School of Business and Economics.

Class of 1970

Retired **CAPT Keith Ott** is now employed as the Director of General Services for Yolo County in Central Calif.

Class of 1971

Retired **CDR David K. Mansfield** is employed as a Vice President for Nations Bank/Bank of America.

Retired **LCDR Dennis E. Ray** is now a member of the faculty in the computer science department at Old Dominion University.

Class of 1972

Retired **CDR Wayne T. Hildebrand** worked as the program administrator for advanced air-to-air missile development at General Dynamics. Now fully retired, he volunteers for several organizations including the American Legion and the Naval Academy Information Program.

Class of 1973

Retired **CAPT William W. Radican** is still sailing the open seas, serving as the

Chief Officer of the SS INDEPENDENCE, the only American flagged, American crewed ocean going cruise ship.

Class of 1974

Retired **CAPT David O. Rose** is now employed as the Director for Operations Analysis at EDO-Technology Services and Analysis in Falls Church, Va. Currently, his major project is supporting the Navy's Infrastructure Cost Reduction Initiative.

Class of 1975

Retired **LCDR Christopher Crouch** is now the Vice President, Info. Systems, for a marketing research firm entitled Decision Analyst, Inc.

Retired **LCDR George A. Emerson** is now employed with Science Applications International Corporation (SAIC) supporting SPAWAR 051 developing a visualization, collaboration, and information management application.

Retired **LCDR Alan K. Johnson** is now the chair of the department of business administration at Clovis Community College.

Class of 1976

Retired **LCDR Jon L. Barto** is currently a systems engineer with The MITRE Corporation.

Retired **LCDR Jerry D. Thompson** is presently employed as the Director of Operations for Allied Technology Group supporting the US Navy and SPAWAR in government contracting.

Class of 1977

Retired **CAPT Pete Henning** is now working in San Diego as the Director for Government Business Development at Southwest Marine.

Retired **CDR Cole Pierce** is now a pilot with Continental Airlines, as well as a consultant for Boeing Aerospace, Space Station program.

Class of 1979

COL James R. Ward, USA is now serving as the Defense Attache in Riyadh, Saudi Arabia.

Retired **CAPT Ronald A. Wiley** is now working for the Information Technology and Applications Corporation.

Class of 1980

Retired **CDR John H. Bock, III** is now a Senior Vice President and Chief Information Officer for Community Credit Union in Texas.

Retired **LCDR John H. Kobelski** is currently the Director of Operations for Support Systems Associates.

Retired **LTC Wayne Nissen, USA** is now working for the Army's National Ground Intelligence Center as a Middle East analyst.

Retired **LCDR Richard S. Ploss** is now employed as a Principle Engineer for the American Bureau of Shipping.

Class of 1981

Retired **CAPT Frank M. Langley** is now CEO for Broward Alliance, an economic development organization in southern Florida.

Retired **LCDR Martin D. Sullivan** is now employed as a Nuclear & System Safety Engineer for EG&G Services in Dahlgren, VA.

Class of 1982

Retired **CAPT Thomas F. Darcy** is currently the Vice President-European Region for the Northrop Grumman Corporation.

Retired **LCDR John M. Logan** is now employed with TRW Systems and Information Technology Group in Maryland. He is currently working with the FAA in upgrading the air traffic control system.

Hellenic Army **MGEN Ioannis Mastrocostopoulos** was recently promoted to his current rank. He now serves as the Hellenic First Army Chief of Staff.

Reserves **CAPT Pete Smith** is working on global C4I systems for Logicon in San Diego.

Dr. Marc B. Wilson is now

the Chair of Engineering and Aviation Science at University of Maryland Eastern Shore (UMES).

Class of 1983

CAPT Doug Hargrave is currently serving as the Commander of the Defense Contract Management Command in St. Louis.

Retired **LCDR Robert Rutkowski** is now helping to support SPAWAR as a SATCOM systems engineer for ACS Services.

Retired **LCDR Michael J. Shimko** is currently employed as a materials and corrosion engineering

specialist at a Marine Engineering consulting firm.

Retired **LCDR Robert M. Smith** is now employed as the Director of Public Works for the city of Ocoee, FL.

Class of 1984

Retired **CDR Christopher L. Hanson** is now the Vice President for Software Process Improvement Engineering for Citibank's North American Consumer Bank in New York City.

Retired **LTC Paul D. Keller, USA** is now employed as the Risk Manager for the

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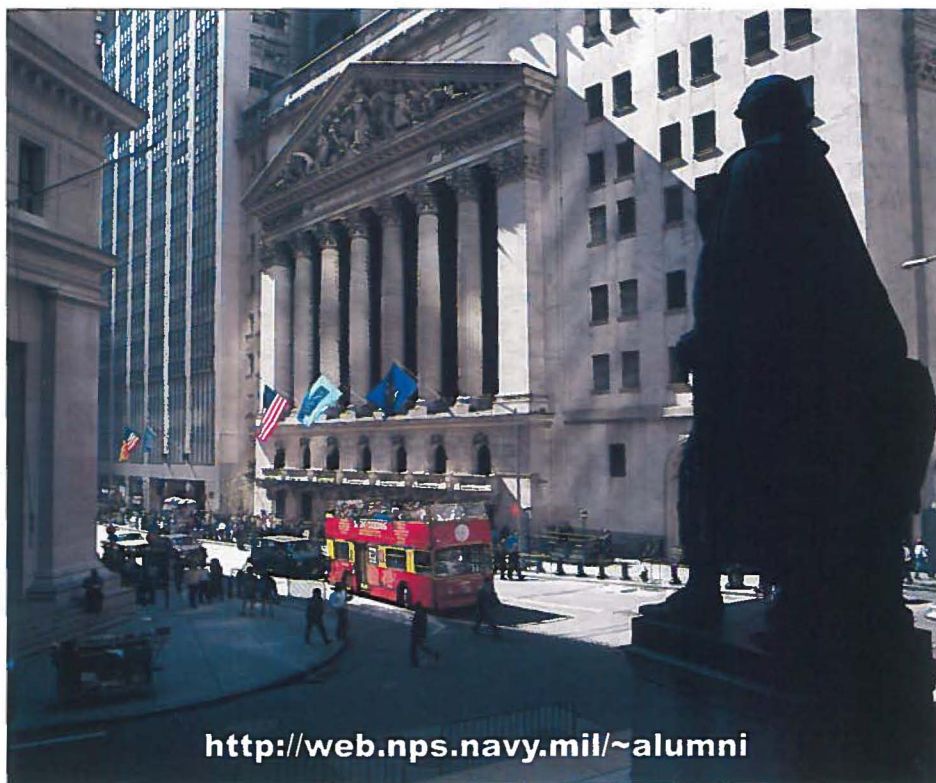
Are you stepping into the civilian sector?

For the section of our alumni population that has separated from active duty, the Alumni Relations Office would like to provide services to aid in the professional development of our Naval Postgraduate School graduates. We have begun to do just that with the development of our Career Services web site.

While the NPS degree is a vital addition to your military career, the education you've received is also valuable in the private sector. Here, those of you who have separated from active duty can research open positions in your field.

NPS Alumni are naturally the best proponents of the top-quality education they have received here. Often, it is NPS alumni themselves who seek to hire fellow graduates, possessing first-hand knowledge of the NPS degree programs. For those of you who have an open position in your organization, and feel an NPS alumnus would be an excellent match, send us a position description, contact information and requirements to alumni@nps.navy.mil and we will place it on the new web site.

The NPS Alumni Career Services have just begun. Please take a look at our site. Together we can build the NPS Alumni Relations Career Services website into your pathway to transition.



<http://web.nps.navy.mil/~alumni>

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CAREER SERVICES

Travel Opportunities

The Naval Postgraduate School Alumni Relations Office, in conjunction with the US Naval Academy Alumni Association and Alumni Holidays International, offers unique vacation opportunities in exotic locations around the world.

Our current offers include trips to Tuscany, Italy from June 29 - July 7 and a cruise on the Danube River from July 24 - August 6. For additional information on these unique vacations of a lifetime, contact Alumni Holidays International at 1-800-323-7373.

Crown Agents Customs Reform Project in Mozambique, Africa.

Retired **LtCOL Frank McBride**, USMC is now employed as a senior systems engineer for the MITRE Corporation in the Battlefield C3 Division.

CAPT Steven C. Rowland is currently assigned to OPNAV as Head, Programming, Budget, and Information Resources Branch (N120).

Class of 1985

Retired **CDR W. Ray Arguello** is now employed as a Environmental Engineer with Ogden Environmental and Energy Services. He recently completed a Master's degree in Hazardous Waste Engineering from the University of New Mexico.

Retired **LCDR Frank J. Frabotta** is now employed supporting SPAWAR on implementing communications systems on new construction ships.

LCOL Karen E. Riecks, USMC is now the Executive Assistant/Human Resources

Director/Network Support Director for the President of Washington Bible College/ Capital Bible Seminary.

Retired **CDR Patrick J. Sharrett** is now working as a space systems trainer and analyst under contract with the US Air Force Space Warfare Center.

BGEN(sel) Mike Vane is currently assigned to the Department of the Army as the Director of Integration, ODCSOPS.

Class of 1986

Retired **LCDR James K. Gruetzner** is presently conducting research in lasers and optics at Sandia National Labs.

Retired **LTC Gary W. Parker**, USA is working for Sterling Software, performing modeling & simulation of large scale information infrastructures.

Class of 1987

US Marine Corps **LCOL Jerome W. Brown, Jr.** is currently assigned to the Marine Corps Warfighting Laboratory in Quantico, VA where he heads the Com-

munications and Information Systems Section.

Retired Canadian Navy **LCDR Gordon H. Fleming** is now employed as the Head of the Sensor Acquisition Group for Computing Devices Canada.

Retired **CDR Tom Wilbur** is employed as a Associate Director for Tetra Tech, Inc., an environmental consulting firm supporting the US Departments of Defense and Energy in various National Environmental Policy Act studies.

Class of 1988

Retired **CDR Linda A. Phipps** is now working in the Joint Warfare Analysis Department at the Johns Hopkins University, Applied Physics Laboratory.

Retired US Marine Corps **MAJ R. R. Rockey** opened his own skydiving business in southern California.

Retired **LCDR David J. Thorn** is now employed as a Senior Specialist, Flight Safety for Lockheed Martin Tactical Aircraft Systems, where he investigates F-16 mishaps.

Class of 1989

US NOAA **CDR Eric S. Davis** is currently serving as a program manager for NOAA's Environmental Services Data and Information Management Program.

Class of 1990

MAJ David D. Clark is currently an aircraft commander of the KC-135 with the Air National Guard, as well as a first officer of the Boeing 767 with United Airlines.

Retired **MAJ John J. Pereira** USAF is now the Technical Assistant to the Director, Office of Satellite Data Processing and Distribution at NOAA/ NESDIS. He is also NOAA's program manager for the NOAA/DOD Shared Processing (satellite) Program.

CDR Valerie Covington Reinert currently holds the Military Fellowship Chair for OPNAV N7 at the Center for Naval Analysis.

MAJ Harold L. Sommer, USAF is currently serving as the GCCS Project Manager for the Joint C4ISR Battle Center in Virginia.

Class of 1991

Canadian Navy **LCDR Ed Chaulk** is currently serving as a technical analyst for the Canadian Forces Maritime Warfare Centre.

US Air Force **MAJ Samuel Liberto** is currently serving as the Chief of Defensive Counter-Information for the Air Force Space Command at Peterson AFB in Colorado.

LTC William G. Reagle, USA is now assigned to the Pentagon, serving as the Systems Integrator for Army Tactical Missile System.

Class of 1992

sible for new Projects on Weapons Systems for new ships in the Brazilian Navy.

LCDR Hesham H. Islam is currently assigned as the Assistant Operations Officer for Carrier Group Two.

Retired US Army **CAPT Tod Jordan** is working for the AmDyne Corporation performing defense system engineering and technical support contract work.

LCDR Bill Nault is now serving as the EA to the Deputy Director for Engineering and Interoperability (D6) at the Defense Information Systems Agency (DISA) in Arlington, VA.

Alex M. Plewniak is working as a Business Manager for west-coast operations for the General Scientific Corp.

Class of 1993

LCDR Michelle Karsch Byman, USNR is currently working as a Management Consultant with the firm KPMG Peat Marwick LLP leading Competitive Sourcing Studies for various government organizations.

US Army **LCOL Ron Byrnes** is currently serving as a computer science professor at the United States Military Academy.

MAJ Jorge A. Esparza, USMC is now serving as the Operations Officer at Marine Wing Support Squadron 172 on Marine Corps Air Stations in Okinawa, Japan.

LCDR Leslie C. Ferguson is now serving as the Executive Officer onboard USS Nashville, (LPD-13) homeported in Norfolk, VA.

LCDR John W. McKinstry is now serving as the

Deputy Director for Operations at the Misawa Cryptologic Operations Center.

LCOL Göran Pettersson of the Swedish Army is now the curricular officer for the Program for Advanced Command Studies at the Swedish National Defence College.

LTC Frederick W. Reichert, Jr., USA is now serving as the Chief, Technology Assisted Learning & Education at the US Army Command & General Staff College.

CDR Ronald B. Robinson is currently assigned as Chief Staff Officer (CSO), at Sea Control Wing, U.S. Atlantic Fleet.

Class of 1994

LCDR Jeffrey P. Brown is now a Future Concepts and Strategy Analyst at the US Strategic Command.

LCDR Larry E. Ninas is now serving as a Program Analyst for the Defense Airborne Reconnaissance Program.

MAJ David S. Pound, USA is currently a student at the US Army Command and General Staff College.

LCDR Paul Soutter is now the Head of Goaling and Market Analysis for the Navy Recruiting Command.

LCDR Thomas A. Tomaiko is now serving as the Maintenance Staff as Fleet HM&E Officer for the Commander-in-Chief, US Atlantic Fleet.

LCDR David A. Welch is now assigned to CNO staff as Navy's Advanced Tactical Data Links Requirements

Officer (CNO N62G).

Class of 1995

CDR Peter Andreasen is presently serving as the Chief, Command and Control Operations Division at the U.S. Pacific Command.

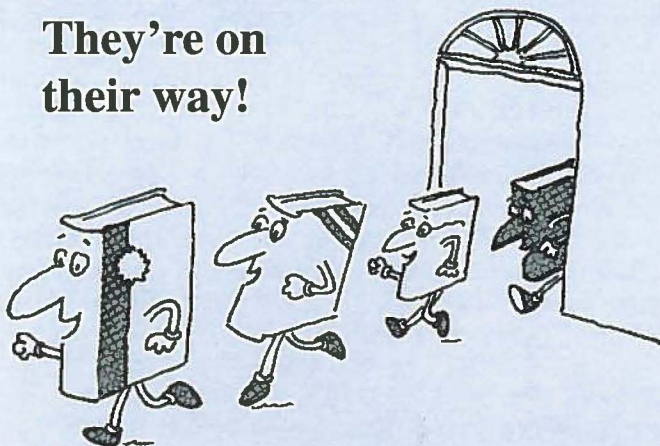
LCDR Robert J. Barton III, USNR is currently a Program Director for Fraunhofer Center for Research in Computer Graphics in Rhode Island.

LT Michael G. McFerren is assigned to teach mathematics at the US Naval Academy and is also the assistant coach of the women's varsity swim team.

LCDR Thomas E. Rogers is now teaching mathematics at the US Naval Academy.

LT Jeffrey Swartz recently retired from active duty and joined the USN Reserves. He is now employed as a senior information systems engineer
continued on back page

They're on their way!



Our 1999 Naval Postgraduate School Alumni Directory project is nearing completion and soon the directories will be shipped.

This comprehensive new volume is a compilation of the most current data available on more than 15,000 Naval Postgraduate School alumni. Information was obtained from questionnaire mailings, telephone verification and/or from alumni records. Now the distribution of this impressive edition will begin.

The directories are scheduled to be released in June. All alumni who reserved a copy of the directory during the verification phase of the project should be receiving their copies two or three weeks after the release. If you have a question on your order, or if you wish to place an order, please contact our publisher directly at the following address:

Customer Service Department
Bernard C. Harris Publishing Co., Inc.
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Norfolk, VA 23503
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Our new directory is an excellent way of reliving your school days and getting reacquainted with former Naval Postgraduate School classmates. To those who returned their questionnaires - many thanks for your cooperation. And, to those who ordered a copy of the directory - enjoy!

with the MITRE Corporation.

Class of 1996

LCDR Mario Mifsud is currently serving as the Admin Officer at Commander, Helicopter Tactical Wing Atlantic.

Class of 1997

MAJ Mike Coleman, USMC is now a Senior Instructor in the computer science department at the US Naval Academy.

LT Peter R. Falk is currently assigned to the Commander, Submarine Force, Atlantic Fleet as the Force Information Systems Officer.

LCDR Chris Halton is currently assigned to OPNAV N6M, the Depart-

ment of the Navy Modeling and Simulation Office.

LT Rudy Hightower, II is now the Intelligence Officer at the Strike-Fighter Wing Pacific in Lemoore, CA.

Class of 1998

LCDR Robert Caldwell is

now stationed in Virginia working with the Joint Strike Fighter Advisory Group at OPNAV Air Warfare.

LCDR Felicia Lucile Cochran is now the Deputy Operation Directorate Head at the Naval Satellite Operations Center. The command has telemetry,

tracking and / or commanding responsibility for 22 on-orbit satellites.

MAJ Matthew D. McEwen, USMC is currently serving as the Aircraft Maintenance Officer for Marine Medium Helicopter Squadron 165, 11th Marine Expeditionary Unit, MCAS Miramar, Calif.

What's Inside

Unmanned Aerial Vehicles are changing the way the military conducts business.

The Naval Postgraduate School's CIRPAS is at the forefront, participating in several innovative research projects in this revolutionary field (page 4).

One of NPS' most distinguished and honored professors passed away in late 1998. We pay tribute to Distinguished Professor Claude Buss and a remarkable career of mentoring hundreds of NPS students through the years (page 2).

See what your fellow alumni are saying, and doing. Check the alumni voice and alumni activities section (page 14).

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