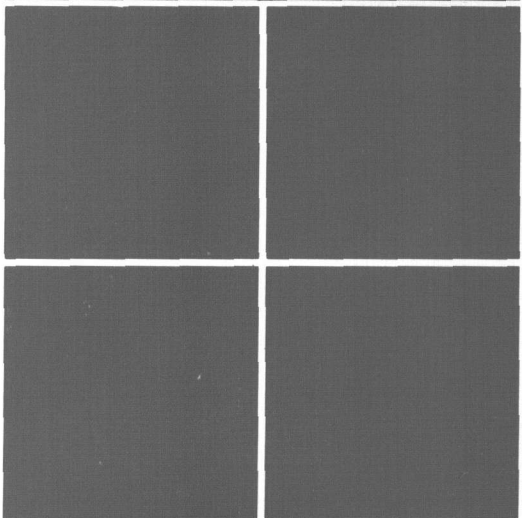
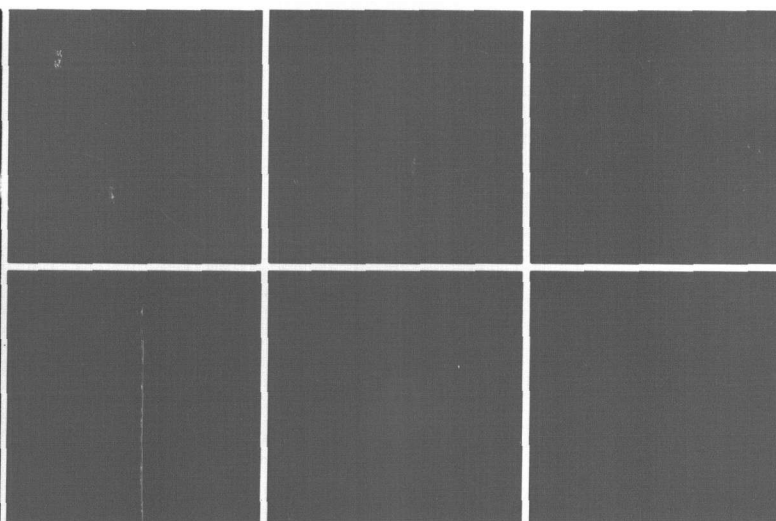
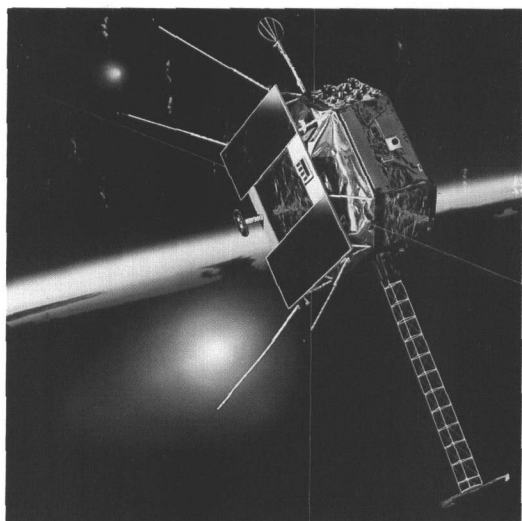


# Naval Research Laboratory

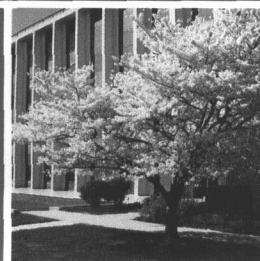
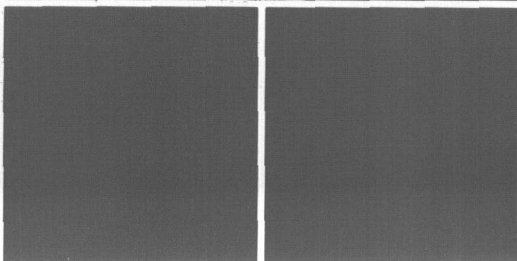
Washington, DC 20375-5000  
NRL Publication 180-4830 May 1991



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# 1991 Fact Book



# Report Documentation Page

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The NRL Fact Book is prepared as a reference source for information about the Naval Research Laboratory (NRL). Fiscal information is current as of 1 November 1990. Personnel and organization changes are current as of 23 November 1990. To provide additional information, a point of contact is listed for each activity.

NRL has a continuing need for physical scientists, mathematicians, engineers, and support personnel. Vacancies are filled without regard to age, race, creed, sex, or national origin. Information concerning current vacancies is furnished on request. Address all such inquiries to:

Civilian Personnel Office (Code 3810)  
Naval Research Laboratory  
Washington, DC 20375-5000

### FIGURE CAPTIONS

*Top left-hand corner:* Artist's conception of the Combined Release and Radiation Effects Satellite (CRRES) in orbit. NRL's Low Altitude Satellite Study of Ionospheric Irregularities (LASSII) flies aboard the spacecraft to study the effects of natural and man-made ionospheric perturbations on radio communications. Photo furnished by Ball Aerospace Systems Group.

*Lower left-hand corner:* Control room of the Technical Information Division's video studio

*Lower right-hand corner:* Spring at NRL

REVIEWED AND APPROVED

A handwritten signature in black ink, reading "Paul G. Gaffney II" with a stylized flourish at the end.

CAPT Paul G. Gaffney II, USN  
Commanding Officer

April 1991

**1991**

**Fact Book**

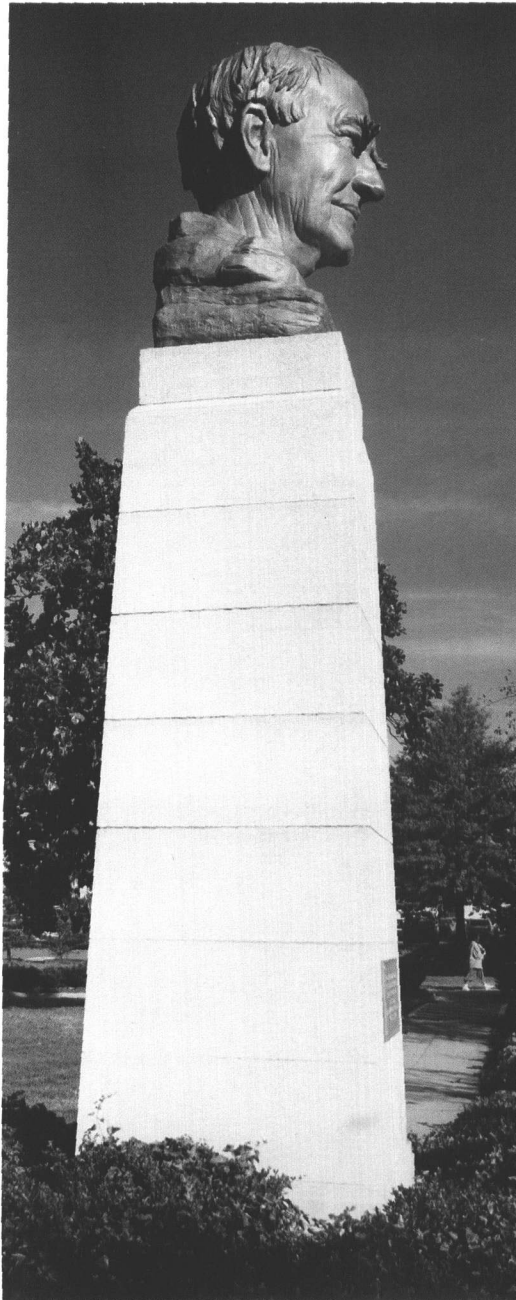
		NAVAL RESEARCH LABORATORY WASHINGTON, DC 20375-5000		

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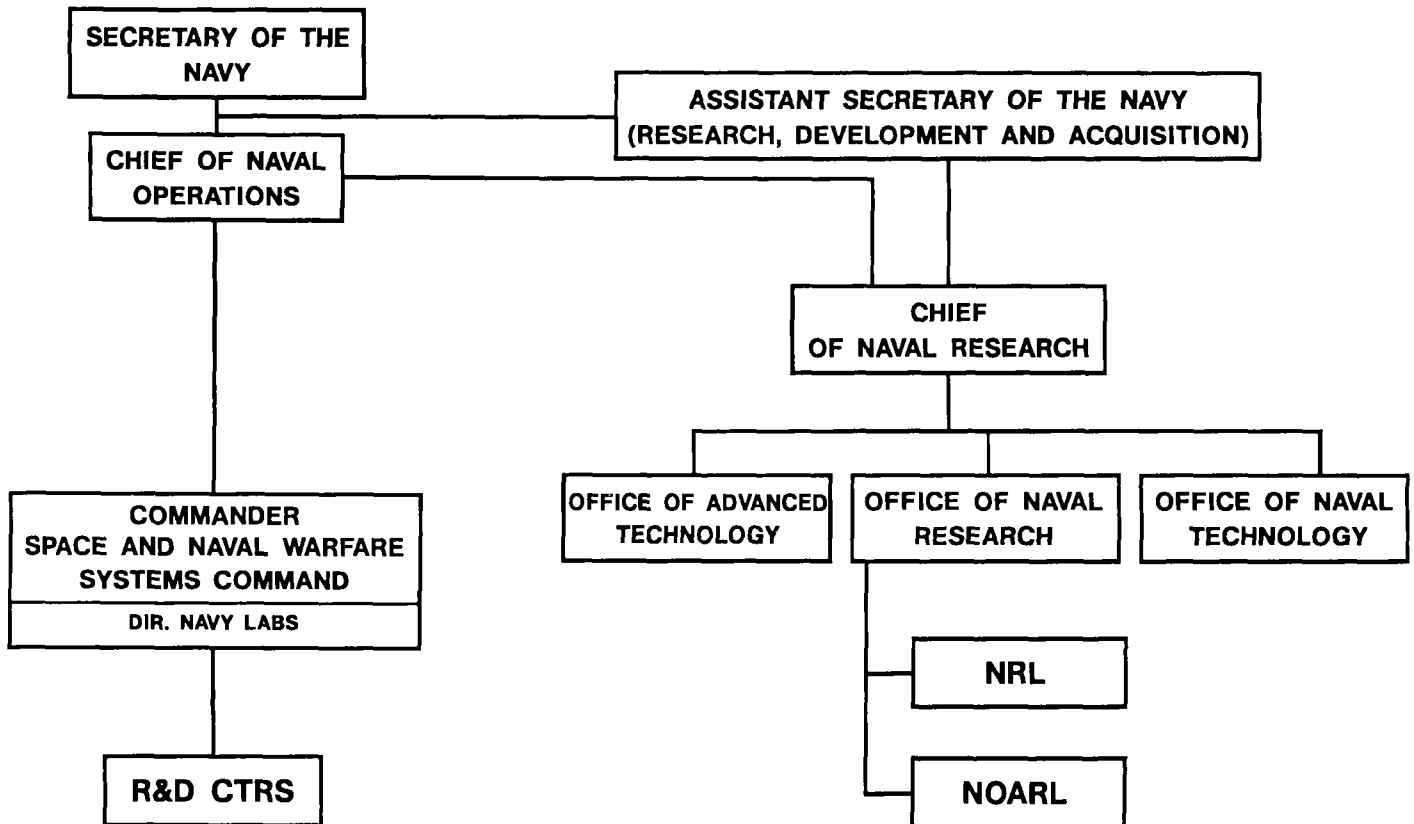


## **MISSION STATEMENT**

**To conduct a broadly based multidisciplinary program of scientific research and advanced technological development directed toward new and improved materials, equipment, techniques, systems, and related operational procedures for the Navy.**

### **RESPONSIBLE FOR NAVY-WIDE LEADERSHIP IN:**

- **The performance of primary in-house research for the physical and engineering sciences;**
- **The conduct of a broadly-based exploratory and advanced development program in response to identified and anticipated Navy needs;**
- **The development of space systems for the Navy.**





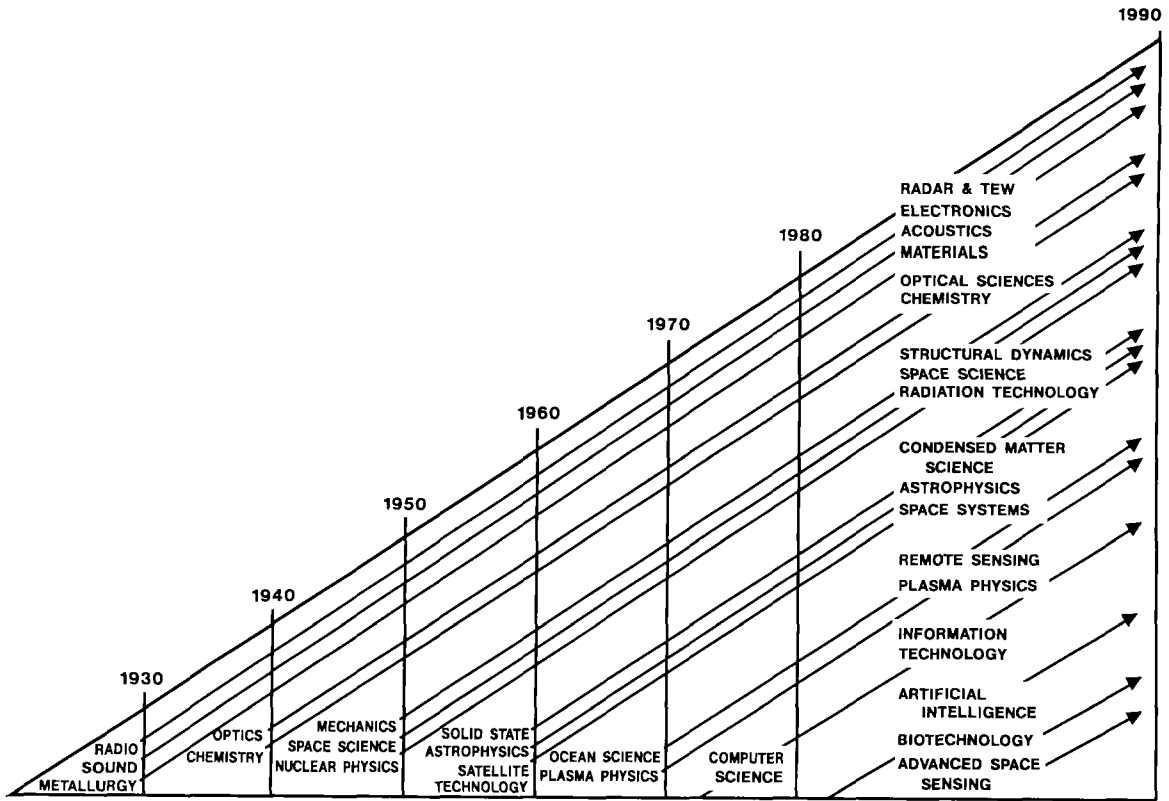
## **The Naval Research Laboratory in the Department of the Navy**

The Naval Research Laboratory (NRL) is the principal in-house research laboratory under the command of the Chief of Naval Research (CNR). As the corporate research laboratory of the Navy, NRL is an important component in the Office of the Chief of Naval Research's effort to meet its scientific research responsibilities.

For its basic research effort, the Laboratory receives guidance from the CNR that establishes the level of effort and trend direction. The Laboratory then develops a comprehensive research proposal package that is submitted to the CNR for consideration for Navy basic research support. The total Navy basic research program ultimately is evaluated by Congress.

In addition to internal critical review and the evaluation by the CNR and others, the research at NRL is published in refereed journals and/or reported at national and international scientific conferences. There is an aggressive policy of scientific interaction whereby scientists from around the world visit NRL and are visited by NRL scientists. In this way, NRL research is subject not only to management review but also to peer evaluation.

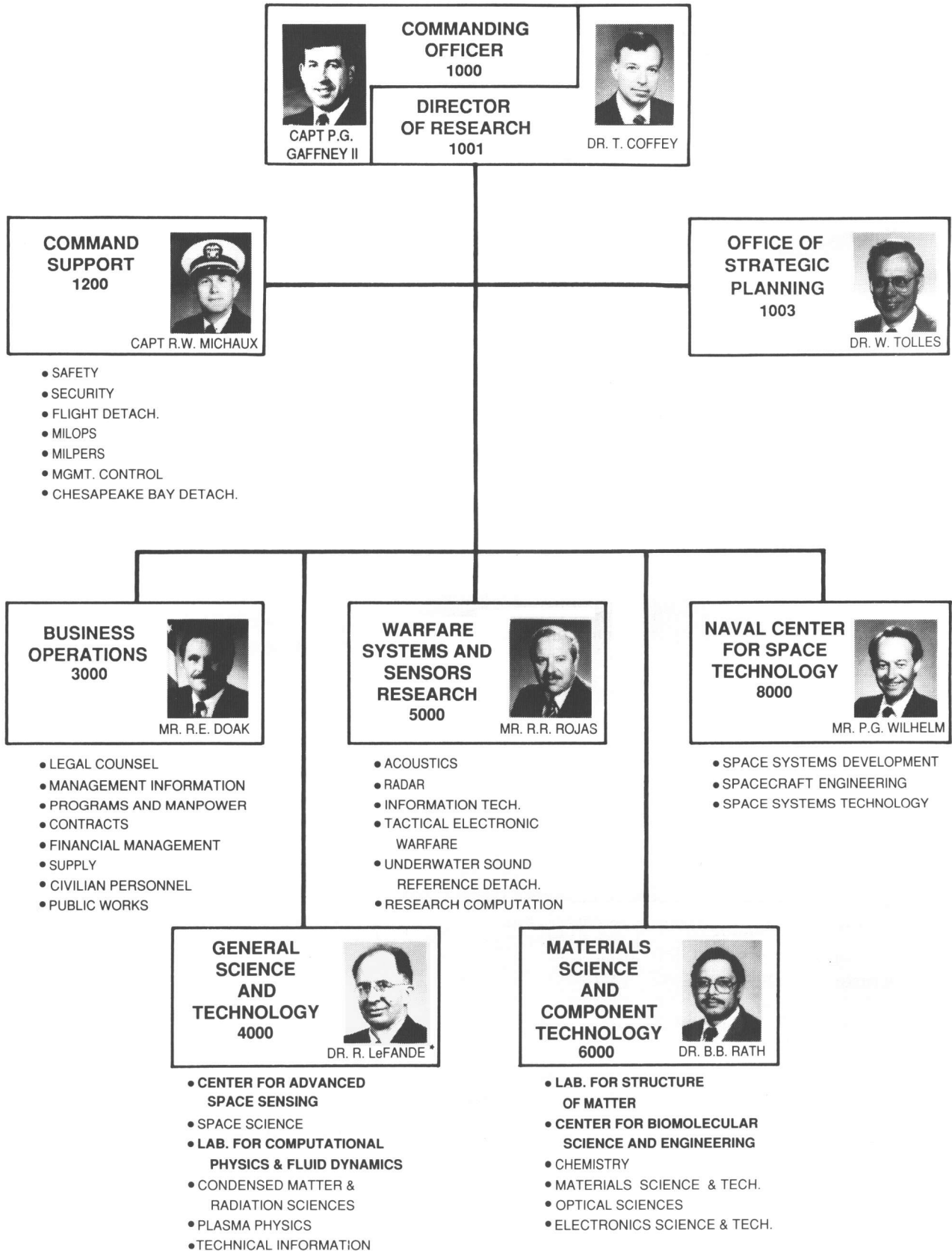
NRL is an important link in the Navy R&D chain. Through NRL, the Navy has direct ties with sources of fundamental ideas in the academic community throughout the world and provides an effective coupling point to the R&D chain for the Office of Naval Research (ONR) Research Programs Department.



## NRL PROGRAM EVOLUTION

The Naval Research Laboratory was officially established on July 2, 1923, as the Naval Experimental and Research Laboratory. In the following six decades, research efforts have expanded as shown above from the two original areas of radio and underwater sound to 16 broad areas of scientific endeavor encompassing many diverse fields.

# NRL FUNCTIONAL ORGANIZATION



\*ACTING

## CURRENT RESEARCH

The following areas represent broad fields of NRL research. Under each, more specific topics that are being investigated for the benefit of the Navy and other sponsoring organizations are listed. Some details of this work are given in the *NRL Review*, published annually. More specific details are published in reports on individual projects provided to sponsors and/or presented as papers for professional societies or their journals.

### **Advanced Radio, Optical, and IR Sensors**

- Advanced optical sensors
- EO/MET sensors
- Satellite meteorology
- Precise space tracking
- Radio/Infrared astronomy
- Infrared sensors and phenomenology
- Middle atmosphere research
- Image processing
- VLBI/Astrometry

### **Computer Science and Artificial Intelligence**

- Standard computer hardware, development environments, operating systems, and run-time support software
- Methods of specifying, developing, documenting, and maintaining software
- Techniques for naval needs
- Expert systems for resource allocation, signal identification, operational planning, and target classification
- Algorithms and utilization of massively parallel computing systems
- Visualization of scientific processes
- High-speed networking
- Machine learning

### **Device Technology**

- Integrated optics
- Radiation-hardened electronics
- Microelectronics
- MM wave technology
- Hydrogen masers for GPS
- Aperture synthesis

### **Directed Energy Technology**

- High-energy lasers
- Chemical lasers
- Laser propagation
- High-power microwave sources
- Charged-particle devices
- Pulse power
- DE effects

### **Electronic Warfare**

- Decoys (RF and IR)
- Repeaters/Jammers, EO/IR active countermeasures
- EW/C<sup>3</sup>CM system concepts
- Simulation

### **Enhanced Maintainability, Reliability, and Survivability Technology**

- Coatings
- Lubricants and greases
- Water additives and cleaners
- Fire safety
- Laser hardening
- Satellite survivability

### **Environmental Effects on Naval Systems**

- Meteorological effects on electro-optical system performance
- Air quality in confined spaces
- Electromagnetic background in space
- Solar and geomagnetic activity
- Magnetospheric and space plasma effects
- Nonlinear science
- Ionospheric behavior

### **Imaging Research/Systems**

- Remotely sensed signatures analysis
- Real-time signal and image processing algorithms/systems
- Image data compression methodology
- Image fusion
- Automatic target recognition
- Scene/Sensor noise characterization
- Image enhancement/noise reduction
- Scene classification techniques
- Radar and laser imaging systems studies
- Coherent/Incoherent imaging sensor exploitation

### **Information Technology**

- Antijam communication links
- Network architectures

Battle management information systems  
Arctic communication links  
Communication/Information security  
Voice processing

### **Materials**

Superconductivity  
Biomolecular engineering  
Materials processing  
Advanced alloy systems  
Rapid solidification technology  
High-temperature materials  
Laser fabrication and processing  
Ceramics and composite materials  
Thin films and coatings  
Metamorphic materials/Smart structures

### **Space Systems and Technology**

Advanced space systems  
Space sensing applications  
Satellite communications  
Spacecraft design, engineering,  
and integration  
Satellite ground station design  
Navigation systems

### **Surveillance and Sensor Technology**

Point defense technology  
Imaging radars  
Target classification/identification  
Underwater acoustics, including propagation,  
noise, and reverberation  
Airborne geophysical studies  
Fiber-optic sensor technology  
Shallow water environmental acoustics and  
sensor systems  
Undersea surveillance system performance  
modellings, unifying the environment,  
acoustics, and signal processing  
Sonar transducers  
Electromagnetic sensors—gamma ray to  
RF wavelengths  
SQUID for magnetic field detection  
Low observables technology  
Ultra-wideband technology  
VHSIC/MIMIC applications

### **Undersea Technology**

Autonomous vehicles  
Bathymetric technology  
Anechoic coatings

# Major Capabilities and Facilities

(Listed alphabetically by organizational unit)

## Acoustics Division

Large tank instrumented for investigating acoustic echo and radiation characteristics of targets  
Tank 30 ft in diameter by 22 ft in depth, automated with computer control and analysis for detailed studies of acoustic fields, transducers, and other underwater devices

Multichannel programmable digital data processing system: a system of DEC computers, high-speed array processors, and peripherals for up to 256 channels; designed for acoustic surveillance array processing

Connection-machine facility: an experimental facility that exploits the natural computational parallelism inherent in data-intensive research problems

Large acoustic pool facility, incorporating near-field conformal scanners and acoustic arrays for structural acoustics studies of underwater targets

Towed acoustic array with 64 hydrophone channels

Airborne geophysical suite

## Center for Advanced Space Sensing

Stratified tow channel

Wind-wave tunnel channel (33.5m)  
30.5m wind-wave tank for studying the dynamics of wind-waves and their interaction with long waves; Uses micro-Doppler spectrometry and photometric techniques

Millimeter-wave Atmospheric Sounder (MAS)

MAS facility

MAS Spacelab instrument

Digital Image Processing Laboratory (DIPL)

SAR processing facility

SARCOM system

SCI processing facility

MWO optical interferometer site

Green Bank interferometer

Washington VLBI correlator

WVMS NDSC instrument

IRIS system and processor

IR test facility

SSM/I processing facility

STEMS-II boat

Ocean tower/platform/ship radars

L,S,C,X,K, and W band

Ocean tower/lab/platform/ship radiometers  
6,10,14,19,22,35,37,85,90,140,220 GHz

Lidar field system

Aerosol and field measurement facility

Aerostat and blimp instrument system

NRL RP-3A aircraft sensors

Airborne Lidar

MMW imagers (35,90,140,220 GHz)

DMSP SSM/I simulator

LFMR SST simulator

PRT-5 IR radiometer

Imaging real-aperture radar (RAR)  
X,C bands

Precision altimeters

X-band, 95 GHz, Lidar

Rotating scatterometer

Tri-frequency-agile radar (TRIFAR)

X-band interferometer

Millimeter-wave (95 GHz) radar

AXBT

Flight-level meteorological sensors

Navigation systems

INS, GPS

Shipboard sensor systems

Surface Met/Ocean obs

Lidar

CTD

Thermistor chains

Acoustic Doppler velocity profilers

## Center for Bio/Molecular Science and Engineering

Langmuir-Blodgett film facility

Electron microscope facility

Class 100 clean room/organo/Bio preparation facility

UV stepper for submicron patterning

Fiber-optic biosensor facility

Tubule fabrication facility

Immunosensor development facility

Deep UV excimer laser projection exposure system

Evans & Sutherland interactive graphic system

## Chemistry Division

Nanometer-scale surface analytical facility

Langmuir-Blodgett film facility

Chemical diagnostic facility

Surface diagnostic facility

Tribology facility

Paint and coating facility

Mechanical and chemical characterization of polymers facility  
Surface cleaning facility  
Alternate and petroleum-derived fuels facility  
Combustion research facilities  
High-temperature chemistry facility  
Fire research facilities  
Navy Technology Center for Safety and Survivability for fire extinguishment research

#### **Civilian Personnel Division**

Supervisor/manager executive development  
Employment inquiries  
Science, engineering, and computer courses  
Administrative support  
Mechanical and technical trades training  
Long-term and special programs  
Computer learning center  
Instructional television via tape, microwave, and satellite as well as computer-based training

#### **Command Support Division**

Security  
Workplace monitoring for occupational hazard abatement and sight and hearing conservation  
Safety service  
Fire inspection and protection  
Health physics  
Operational support, using four research-configured P-3 Orion aircraft  
Radar experimental test site, which includes a variety of radars; ancillary equipment for test and evaluation of equipment, concepts, and techniques; and overwater ranges  
Tactical electronic warfare test site  
Communications facilities for transmission to and from land, sea, and air  
Hypervelocity gun for ballistics research  
Ship-motion simulator with 12-ton payload capacity  
Boat services

#### **Condensed Matter and Radiation Sciences Division**

Hypervelocity gun ranges  
3-MV tandem Van de Graaff accelerator  
200-kV ion-implantation facility  
60-MeV electron linear accelerator  
Synchrotron radiation beam lines (at Brookhaven)  
Synchronized laser facility  
Microwave test facility (with the Plasma

Physics Division)  
Pulsed laser deposition facility  
Bomen infrared spectrometer facility  
HYPRES superconducting oscilloscope system

#### **Contracting Division**

Advance acquisition planning  
Acquisition strategies  
Acquisition training  
Contract negotiations  
Contractual execution  
Contract administration  
Acquisition policy interpretations & implementation  
Defense acquisition regulation council representation

#### **Electronics Science and Technology Division**

Nano- and micro-electronics processing facility  
Electron-beam nanowriter  
Electron microscopes and electro-optical analytical devices  
Crystal-growing facilities including bulk growth, molecular beam epitaxy, and organo-metallic chemical vapor deposition  
Optical and electrical characterization of materials  
Electronic testing and analysis facilities

#### **Financial Management Division**

Accounting  
Budget formulation and execution  
Funds administration  
Vendor and travel payments  
Financial systems development  
Payroll  
Asset management and accounting

#### **Information Technology Division**

Extensive computer facilities  
Microwave space research facility  
HF modem and channel simulation  
Brandywine antenna range  
Pommonkey test range  
Signal analysis laboratory  
Artificial intelligence computer network  
Distributed simulation and prototyping test bed  
Information security test-bed  
HCI laboratory

#### **Laboratory for Computational Physics and Fluid Dynamics**

Hardware: Two VAX 11/780s plus peripherals, one IRIS 4D graphics

workstation, terminals and local area network. An APTEC IOC 24 and 6 NUMERIX array processors, TEKTRONIX 4128 and METHEUS 3610 high-speed graphics processor stations, and a 4693DX wax printer. CONVEX C210 minisupercomputer with 256 megabytes of memory  
A dozen SUN and MACINTOSH II workstations  
All computers and workstations have network connections to NICENET allowing access to the NRL Cray X-MP/216, the Connection Machine, and many other computer resources both internal and external to NRL

#### **Laboratory for Structure of Matter**

Siemens area detector system  
Two X-ray diffractometers  
Zymark robotics  
Evans and Sutherland computer graphics display system  
Silicon graphics IRIS workstation  
Protein and peptide chromatography

#### **Materials Science and Technology Division**

Ultrasonic gas atomizer  
Hot isostatic press  
Cold isostatic press  
Consumable arc electrode melter for reactive metals  
High-energy, dispersive X-ray analytical system  
Electron microprobe SEM and STEM systems  
Quantitative metallography  
Computer-controlled multiaxial loading and SCC measurement systems  
Computer-interactive, nonlinear, multimode fracture measurement system  
Computer-aided, experimental stress analysis  
Crystallite orientation distribution function (CODF)  
Elevated temperature and structural characterization laboratory  
Impression creep and mechanical property evaluation  
Automated physical constant measurement system  
Nondestructive evaluation laboratory  
Closed-loop, low- and high-cycle fatigue systems  
Metallic film deposition systems  
Magnetometry  
Mossbauer spectroscopy  
Cryogenic facilities

High-field magnets  
Marine corrosion facility

#### **Naval Center for Space Technology**

CAD/CAM facility  
RF anechoic chambers  
Thermal-vacuum chambers  
Reverberation chamber  
Shock and vibration test facility  
Clean-room facilities  
Satellite tracking, command, and control facilities  
Spacecraft fabrication and assembly facility  
Propellant handling facility  
Time and frequency control labs

#### **Optical Sciences Division**

Electron-beam, electron-beam sustained, X-ray, and UV preionized laser devices with spectroscopic and other diagnostic equipment  
Short-pulse excitation apparatus for kinetic mechanisms investigations  
Optical warfare laboratory  
IR laser facility for optical characterization of semiconductors  
Mobile, high-precision optical tracker  
Facilities for synthesis and characterization of optical glass compositions and for the fabrication of optical fibers  
Hybrid optical/digital image processing facility  
Silica and fluoride fiber-optic fabrication facilities  
Facilities for fabricating and testing integrated optical devices  
Optical probes laboratory to study viscoelastic, structural, and transport properties of molecular systems  
Computer IR/EO technology/systems simulation center  
High-energy pulsed chemical laser laboratory  
100-J UV laser research facility  
Field-qualified EO/IR measurements devices  
Focal plane array evaluation facility

#### **Plasma Physics Division**

PAWN, 1-MJ compact inductive storage facility  
Gamble II high-voltage pulsed power generators  
PHAROS III, three-beam neodymium-glass laser and target facility  
1000-J NRL CO<sub>2</sub> laser  
Dense Z-pinch facility  
High-power relativistic klystron and

gyrotron facilities  
Modified betatron accelerator  
Charged particle beam (CPB) propagation range  
Super IBEX 5 MV, 100 kA, 40 ns CPB generator  
Maxibeam 3 MV, 60 kA, 300 ns CPB generator

### **Public Works Division**

Military construction  
Operation of utilities  
Scientific program support  
OCNR facilities support  
Facility engineering  
Full range of facility contracting, including construction, architect/engineering services, facilities support, and base operating services  
Transportation  
Environmental  
Planning  
Maintenance and repair of buildings, grounds, utilities, and communication and alarm systems  
Shops for machining, sheet metal, welding, castings, and plating

### **Radar Division**

Radar cross-section measurement system  
Radar research and development test beds (at CBD)  
IFF ground station  
Airborne APS-137 radar with SAR processing  
Recording and control system for airborne adaptive array research  
Noncooperative target recognition facility  
Antenna measurement laboratory  
Computer-aided engineering (CAE) facility

### **Research Computation Division**

Central Computing Facility (CCF): Cray X-MP/216 computer (two CPUs with sixteen million words of memory) running COS  
VAX 8350(1) and 785s(4), configured as a VMS VAXcluster, front ends the Cray. Provides a variety of services including programming languages, math libraries, electronic mail, bulletin board, database management, document preparation, graphics, and telecommunications processing.  
Consultant's Desk, staffed by the RCD to assist CCF users on weekdays 9 a.m. to 5 p.m.

Customer Service Counter (CSC), staffed by CCF operators who register users, service the magnetic tape library, distribute reference material and printer output, etc.

NICENET, the NRL Integrated Communications Environment Network, connects most NRL buildings for computer communications, video services, and gateways to networks and computer systems worldwide (e.g. Internet, DDN/MILNET, SURANET/NSFNET, USAN, SPAN)  
Satellite dishes, two "Cs" and two "Kus," provide video and data reception for NICENET; including news, weather, seminars, and training programs  
Microwave antennae (2), receive ITV from the University of Maryland and George Washington University  
IRIS 4D/GT, graphics workstation with Matrix camera, color printer, and NTSC video output  
RCD training facility, serves the CCF user community as a training room for hands-on courses that are taught by User Services

### **Space Science Division**

Waldorf Annex (lower site) that is instrumented for continuous recordings of atmospheric-electricity, micrometeorological, and lightning-flash data and is used for investigations into environmental phenomena  
Instrumented micrometeorological tower on San Nicolas Island, CA  
Ionospheric sensing and propagation analysis  
E.O. Hulburt Center for Space Research  
Development and test facilities for spaceborne instruments to perform astrophysical, solar, high-atmospheric, and space-environment sensing  
Clean-room facilities  
Extensive computer-assisted data manipulation and interpretive capability for space-data imaging and modeling  
Data center for natural backgrounds  
Low temperature laboratory  
Gamma Ray Observatory (OSSE) operations and data analysis center

### **Supply Division**

Acquisition, storage, distribution, and disposal of materials and equipment required by the research directorates

### **Tactical Electronic Warfare Division**

- Mobile infrared signature measurement and simulation facility
- Mobile ESM laboratory
- Hybrid RF/IR missile-seeker simulation facility
- Central target simulation facility for developing, testing, and evaluating EW systems and techniques, using real-time, hardware-in-the-loop models
- RF simulation laboratory and signal simulators
- Radar cross-section measurement facility (at CBD)
- Search radar ECM simulator
- Advanced tactical EW environment simulator
- Electronic warfare coordinating module
- Scale-model analysis facility
- Wind tunnel for performance measurements of low Reynolds number vehicles
- Optical integration laboratory
- Tempest signal-processing laboratory
- Simulated ship-mast facility
- Secure supercomputer facility
- Vehicle development laboratory
- Visualization laboratory

### **Technical Information Division**

- DICOMED (computer graphics system)
- Electronic publishing
- Research library (1,436 current subscriptions, 150,000 monographs and bound journals, and 1,134,437 technical reports (350,000 hard copy, 771,437 microfiche, and 13,000 full text documents on optical disk))
- LS-2000 on-line library catalog
- Microcomputer software support center
- Photographic laboratories
- Writing, editing, publications consultation
- Exhibits
- Graphic design services
- Video recording and productions
- Billboard* and *Labstracts*
- NRL's television network (NTN)
- Auditoriums (Bldgs. 222, 28, and 226)
- Electronic imaging
- Scientific and technical photographers

### **Underwater Sound Reference Detachment (Orlando, FL)**

- 7-acre lake for electroacoustic transmitting, receiving, directivity, and research and development measurements in the frequency range 50 Hz to 500 kHz
- 1.22 x 1.22 x 3.05-m temperature controlled tank for electroacoustic transmitting, receiving, directivity, and research and development measurements in the frequency range 20 kHz to 2 MHz
- 10,000-gal reverberation-suppressed, temperature-controlled pressure vessel simulating ocean depths to 689 meters for making high-power electroacoustic transmitting, receiving, directivity, high-power immittance, insertion loss, echo reduction, and research and development measurements in the frequency range 2 kHz to 1 MHz
- 30,000-gal acoustic measurement pressure vessel that will be outfitted similar to the 10,000-gal pressure vessel. It will, however, simulate ocean depths to 2094 meters, and has a main port that will allow for entry of 1.8-m wide acoustic panels.
- 28-cm diameter, temperature-controlled, standing wave pressure vessel simulating depths to 1379 meters for measuring electroacoustic receiving sensitivity measurements in the frequency range 0.1 to 2000 Hz
- 25-cm diameter vertical and 38-cm diameter horizontal, temperature-controlled, traveling wave pressure vessels simulating ocean depths to 6895 meters for measuring electroacoustic receiving sensitivity in the range 100 to 4000 Hz and 100 to 1750 Hz respectively. Both vessels operate in the standing wave mode in the frequency range 1 to 100 Hz.
- 50-m deep spring with very low ambient noise for transmitting, receiving, directivity, and scattering measurements in the frequency range 5 Hz to 150 kHz
- 15-cm diameter explosive-driven, conical shock tube simulates the most severe open-water shock specified in MIL-S-901D (NAVY)

## Major NRL Sites and Facilities

Station and Location	Acreage			Buildings/ Structures
	Navy Title	Easement	Permit or Lease	
<b>District of Columbia</b>				
NRL	129.23		1.45	127/26
Artificial Intelligence Center, Bolling AFB			5.25	1/0
<b>Virginia</b>				
Midway Research Center, Quantico	162.48			10/1
<b>Maryland</b>				
NRL Flight Support Detachment, NAS Patuxent River*†			—	
Chesapeake Bay Detachment, Chesapeake Beach†	167.90		0.02	85/100
Multiple research site, Tilghman Island†	2.00			3/3
Dock facility, Fishing Creek, Chesapeake Bay			0.02	3/2
NRL Waldorf Annex, Waldorf†	23.94	35.16		20/27
Radio Astronomy Observatory, Maryland Point†	24.30		197.88	10/19
Radio antenna range, USAF Receiver Site, Brandywine†			22.98	
Free Space Antenna Range, Pomomkey†	37.10	28.40		11/14
<b>Florida</b>				
Underwater Sound Reference Detachment, Orlando†	10.75			25/19
USRD, Leesburg Bugg Spring			65.0	4/6
Marine Corrosion Facility, Key West*				
<b>Alabama</b>				
Ex-USS <i>Shadwell</i> (LSD-15), Mobile Bay				Decommissioned 457-ft vessel used for fire research

\*Site or equipment used by NRL under an intraservice (Navy) or interservice agreement.

†See maps, General Information section.

### PROPERTY

#### Land

Owned 621 acres  
Leased 296 acres

#### Acquisition costs:

Real property \$165.6 million  
Major equipment \$241.7 million  
Minor equipment \$83.4 million

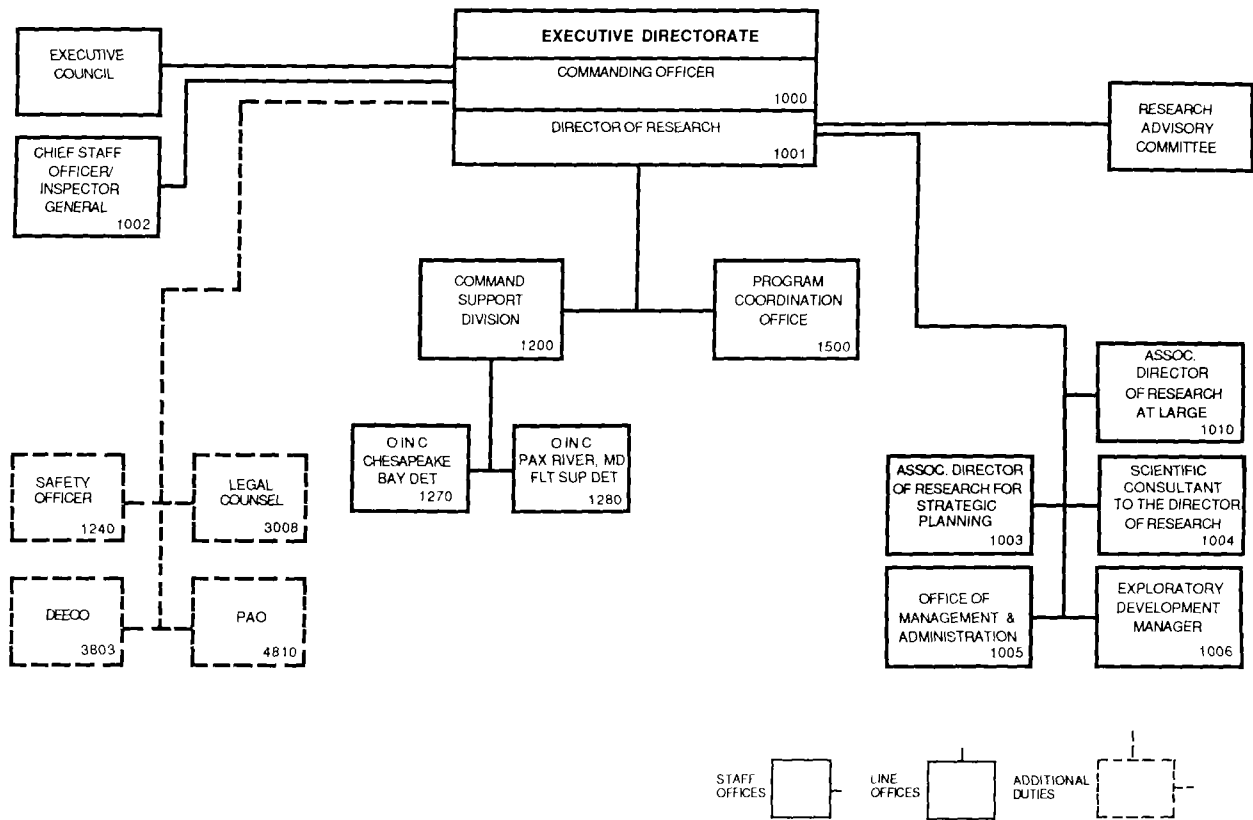
#### Buildings:

RDT&E 2,799,564 ft<sup>2</sup>  
Administrative 196,463 ft<sup>2</sup>  
Other 438,769 ft<sup>2</sup>

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		<b>Executive Directorate</b>		

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### Key Personnel

Name	Title	Code
CAPT P.G. Gaffney II, USN	Commanding Officer	1000
Dr. T. Coffey	Director of Research	1001
CAPT R.W. Michaux, USN	Chief Staff Officer/Inspector General, Head, Command Support Division	1002/1200
Dr. W.M. Tolles	Associate Director of Research for Strategic Planning	1003
Dr. P. Mange	Scientific Consultant to the Director of Research	1004
Mrs. M. Oliver	Head, Office of Management and Administration	1005
Dr. S. Sacks	Exploratory Development Manager	1006
Mr. J. Stone	Safety Officer	1240
LCDR B.K. Jones, USN†	O in C, Chesapeake Bay Detachment	1270
LCDR G.R. Viggiano, USN†	O in C, Flight Support Detachment	1280
Dr. R.T. Swim	Head, Program Coordination Office	1500
Ms. H.J. Halper†	Legal Counsel	3008
Mr. W. Williams	Deputy Equal Employment Opportunity Officer	3803
Mr. J.W. Gately, Jr.†	Public Affairs Officer	4810

†Additional duty

## The Executive Directorate



The Commanding Officer and the Director of Research share executive responsibility for the management of the Naval Research Laboratory. In accordance with Navy requirements, the Commanding Officer is responsible for the overall management of the Laboratory and exercises the usual functions of command including compliance with legal and regulatory requirements, liaison with other military activities, as well as the general supervision of the quality, timeliness, and effectiveness of the technical work and of the support services.

The Commanding Officer delegates line authority and assigns responsibility to the Director of Research for the technical program, its planning, conduct, and staffing; evaluation of the technical competence of personnel; liaison with the scientific community; selection of subordinate technical personnel; exchange of technical information; and the effective execution of the NRL mission.

Within the limits of Navy regulations, the Commanding Officer and the Director of Research share authority and responsibility for the internal management of the Laboratory. The Commanding Officer retains all authority and responsibility specifically assigned to him by higher authority.

The mission of the Laboratory is carried out by three science and technology directorates and the Naval Center for Space Technology, supported by the Business Operations Directorate and the Executive Directorate. In addition, the Laboratory's operating staffs provide assistance in their special fields to the Commanding Officer and to the Director of Research. The operating staffs are listed on the following pages of this publication.

## **Commanding Officer (Code 1000)**

CAPT Paul G. Gaffney II, USN, the former Assistant Chief of Naval Research (ACNR) at the Office of the Chief of Naval Research (OCNR), became the 30th Naval officer to head the Naval Research Laboratory on February 22, 1991.

CAPT Gaffney began his military career as the operations officer aboard the USS *Whippoorwill* in Sasebo, Japan, from 1969 to 1971. In 1971, he began a series of oceanographic assignments, beginning with duty as the Commander Naval Forces Vietnam Staff Oceanographer and Advisor to the Vietnamese Navy Combat Hydrographic Survey Team. He then served as the Oceanographic Services Officer for Fleet Weather Central in Rota, Spain. From 1975 to 1978, he served as the executive assistant and aide to the Oceanographer of the Navy in Washington, D.C.

After graduating from the Naval War College with highest distinction in 1979, CAPT Gaffney became the commanding officer of Oceanographic Unit FOUR embarked on USNS *Chauvenet* and U.S. Director of the AMINDO-Jaya Survey, Republic of Indonesia from 1979 to 1980. In 1980, he was assigned to the Office of Naval Research as acting director of the Arctic and Earth Sciences Division. He was selected and served as the military assistant to the Assistant Secretary of Defense (International Security Affairs) from 1981 to 1983. Following this tour, he reported as executive officer, then commanding officer, of the Naval Oceanography Command Facility, Jacksonville, Florida, until 1986. From 1986 to 1989, CAPT Gaffney was director of the Resources Division for the Oceanographer of the Navy, in the office of the Chief of Naval Operations.

A 1968 graduate of the U.S. Naval Academy, CAPT Gaffney was selected for the Immediate Graduate Education Program. He has received an M.S.E. in ocean engineering from the Catholic University of America (Washington, D.C.) in 1969 and an M.B.A. from Jacksonville University (Florida) in 1986.

CAPT Gaffney has been the recipient of many honors and awards during his career. These include: Defense Superior Service Medal, Legion of Merit, Bronze Star with "V", Meritorious Service Medal, Combat Action Ribbon, Vietnamese Staff Service Medal First Class, and the J. William Middendorf II Prize for Outstanding Tactical/Strategic Research at the Naval War College.

CAPT Gaffney resides in Burke, Virginia, with his wife, Linda, and their daughter, Crista.

## **Director of Research (Code 1001)**

Dr. Timothy Coffey was born in Washington, D.C., on June 27, 1941. He graduated from the Massachusetts Institute of Technology in 1962, with a B.S. degree in electrical engineering, and obtained his M.S. (1963) and Ph.D. (1967), both in physics, from the University of Michigan.

During his graduate career, Dr. Coffey worked as a research assistant at the University of California (1963-64), a research physicist at the Air Force Cambridge Research Laboratories (1964-65), and a teaching fellow and research assistant in physics at the University of Michigan (1965-66). As a scientific consultant for EG&G, Inc. (1966-71), he was involved in investigations in theoretical and mathematical physics.

Dr. Coffey came to the Naval Research Laboratory in 1971, as Head of the Plasma Dynamics Branch, Plasma Physics Division. In this position, he directed research in the simulation of plasma instabilities, the development of multidimensional fluid and magnetohydrodynamic codes, and the development of computer codes for treating chemically reactive flows. In 1975, he was named Superintendent, Plasma Physics Division; he was appointed Associate Director of Research for General Science and Technology on January 1, 1980. On November 28, 1982, he was named Director of Research.

Dr. Coffey is recognized as an authority on the theory of nonlinear oscillations and has played a major role in the national program on high-altitude nuclear effects. The author or co-author of over 70 publications and reports, he has made several fundamental contributions to the theory of electron beam/plasma interaction and to the understanding of plasma processes in the Earth's ionosphere.

Dr. Coffey is a fellow of the American Physical Society and a fellow of the Washington Academy of Sciences. Among Dr. Coffey's recent honors and awards are the Senior Executive Service Performance Award, the Rear Admiral William S. Parsons Award for Scientific and Technical Progress (honorable mention), and the Franklin Institute Delmar S. Fahrney Award. In 1981, he was awarded the Presidential Rank of Meritorious Executive, and in 1988 he received the Distinguished Presidential Rank award.

## Executive Council



The Executive Council consists of executive, management, and administrative personnel. The monthly Executive Council meeting is a scheduled forum that provides the Commanding Officer a personal means to relay new policy or changes to current policy that affects all divisions and allows the other members of the Council to advise the Commanding Officer and Director of Research on matters relating to the administration of the Laboratory. The council also provides an opportunity for information exchange among its members. The Executive Council members include:

- Commanding Officer, chairperson
- Director of Research
- Associate Directors of Research
- Director, Naval Center for Space Technology
- Director, Center for Advanced Space Sensing
- Heads of Divisions
- Head, Laboratory for Structure of Matter
- Head, Center for Bio/Molecular Science & Engineering
- Officer in Charge, Chesapeake Bay Detachment
- Public Affairs Officer
- Deputy Equal Employment Opportunity Officer
- Head, Office of Management and Administration
- Head, Safety Branch
- Head, Management Information Systems Staff
- NRL Counsel

## Research Advisory Committee



The Research Advisory Committee advises the Commanding Officer and the Director of Research on scientific programs and the administration of the Laboratory. The committee assists in planning the long-range scientific program, coordinating the scientific work, reviewing the budget, accepting or modifying problems, considering personnel actions, and initiating such studies as may be necessary or desirable. The membership consists of:

Director of Research, Chairperson  
Commanding Officer  
Associate Directors of Research  
Chief Staff Officer (Observer)

## OFFICE OF STRATEGIC PLANNING Code 1003

The Office of Strategic Planning, formed in December 1987, is headed by the Associate Director of Research for Strategic Planning. He is a member of the NRL Research Advisory Committee (RAC). This office carries out the function of strategic planning for NRL, which involves extensive examinations of the internal resources at NRL and the environments external to NRL (with particular emphasis on requirements within DoD and opportunities within the R&D community). Information examined includes projections for R&D, system engineering, resource requirements, computer and information technology projections, and the integration of these projections within the framework of Navy requirements. The office has responsibility to handle NRL's technology transfer functions; address other issues related to NRL's long-term future; and integrate directorate and division technology needs into an overall laboratory plan by defining the areas to be addressed and the levels of investment that are required.



Dr. W.M. Tolles

Dr. Tolles [REDACTED] He obtained his undergraduate degree in chemistry from the University of Connecticut in 1958, and his Ph.D. in chemistry from the University of California, Berkeley in 1962. Subsequently, he spent one year as a Postdoctoral Fellow at Rice University.

In 1962, he assumed an appointment as Assistant Professor of Chemistry at the Naval Postgraduate School. His research there included electron paramagnetic resonance of energetic materials and radiation-damaged species and quantum mechanical calculations of molecular properties.

He served as a consultant for the Naval Weapons Center, China Lake, between the years of 1965 and 1975, where he did considerable research involving the microwave properties of materials.

During a five-month period in 1975, he performed research at NRL involving the introduction of Coherent Antistokes Raman Spectroscopy (CARS), nonlinear optical spectroscopic methods (including variations on the Raman induced Kerr effect spectroscopy (RIKES)), and related techniques.

In 1977, as a full professor, Dr. Tolles took the position of Dean of Research at the Naval Postgraduate School, and for four years, he also occupied the position of Dean of Science and Engineering.

He arrived at NRL in February 1984 as the Superintendent of the Chemistry Division. In 1987, he was appointed Associate Director of Research for Strategic Planning.

He is a member of the American Chemical Society, the American Physical Society, the American Optical Society, and Sigma Xi.

**Scientific Consultant to the Director of Research  
Code 1004**



Dr. P. Mange

The Scientific Consultant conducts studies and analyses relating to the technical programs being carried out at the Laboratory on behalf of the Director of Research. He represents the Laboratory on external technical boards, advisory panels, or working groups as requested by the Director of Research and is the Laboratory point of contact with the Strategic Defense Initiative Organization.

**Exploratory Development Manager  
Code 1006**



Dr. S. Sacks

On behalf of the Director of Research, the Exploratory Development Manager carries out program management activities related to the Navy 6.2 (exploratory development) efforts. Mission activities include assurance of technical quality and program relevance, orientation of the program to priority needs and transition opportunities, and overall coordination of NRL 6.2 block efforts. The Exploratory Development Manager is the Laboratory point of contact with the Office of Naval Technology.

**Chief Staff Officer/Inspector General  
Code 1200/Code 1002**



CAPT R.W. Michaux, USN

The Chief Staff Officer serves as the Deputy to the Commanding Officer and acts for the Commanding Officer in his absence. The Chief Staff Officer is the Laboratory's Inspector General, and when directed, he investigates, inspects, and/or inquires into matters that affect the operation and efficiency of NRL. These matters include but are not limited to: effectiveness, efficiency, and economy; safety and occupational health; personnel discipline, morale, and welfare; management practices, command relationships, and organizational structure; and fraud and waste. He serves as principal advisor to the Commanding Officer on all inspection matters and audits and is the principal point of contact and liaison with all agencies outside NRL.

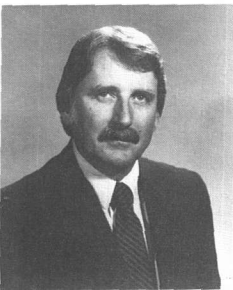
**Deputy Equal Employment Opportunity Officer  
Code 3803**



Mr. W. Williams

The Deputy Equal Employment Opportunity Officer (DEEOO) is the EEO program manager and the advisor to the Commanding Officer on all EEO matters. The DEEOO manages the discrimination complaint process and directs the Laboratory's affirmative action plans and special emphasis programs (Federal Women's, Hispanic Employment, Black Employment, Asian-Pacific Islanders, Individuals with Handicaps, and Disabled Veterans). Duties include reviewing, coordinating, and monitoring implementation of EEO policies and developing local guidance, directives, and implementation procedures for the EEO programs. The DEEOO also advises SES and Merit Pay System employees on setting EEO objectives.

**Public Affairs Officer  
Code 4810**



Mr. J.W. Gately, Jr.

The Public Affairs Officer (PAO) advises the Commanding Officer and Director of Research on public affairs matters, including external and internal relations, and serves as the Commanding Officer's principal assistant in the area of public affairs. To do this, the PAO plans and directs a program of public information dissemination on official NRL activities. The PAO coordinates responses to requests from the news media and the public for unclassified information or materials dealing with the Laboratory, coordinates participation in community relations activities, and directs a program of internal information dissemination within the Laboratory. The PAO is also responsible for coordinating all actions within the Laboratory that respond to requirements of the Freedom of Information Act (FOIA).

# Office of Management and Administration

Code 1005

## Basic Responsibilities

The Office of Management and Administration provides managerial, technical, and administrative support to the Director of Research in his planning and direction of research and development programs in a variety of scientific and engineering disciplines. Specific functions include: performing special studies involving major NRL programs and resource issues; providing administrative support in the areas of personnel, budget, facilities, equipment, and security; reviewing and managing the Director of Research's correspondence; providing management information and analyses for various aspects of the research program effort; coordinating VIP and foreign visits to NRL; managing NRL facilities; providing Laboratory-wide administrative services, including mail handling and messenger service; managing the NRL Directives System; coordinating unsolicited proposals, congressional correspondence, and other external inquiries; maintaining the NRL R&D achievements file; reviewing and interpreting external Navy and DoD directives addressed to NRL; managing the Defense Retail Interservice Support Program (Host-Tenant Agreements); coordinating the IR&D Program; developing guidance for and monitoring the 6.1 (basic research) Program and 6.2 (exploratory development) Program; providing central word processing services to the Directorate; coordinating the NRL-NRC and ONT Postdoctoral Resident Research Associateship Programs, NRL-U.S. Naval Academy Faculty Co-op Program, Navy ASEE Program, and other special Navy programs; interacting with ONR Headquarters and the R&D Centers; and assisting in the development of NRL's Five-year Plan.

## Personnel

Full-time civilian: 60



Mrs. M. Oliver

## Key Personnel

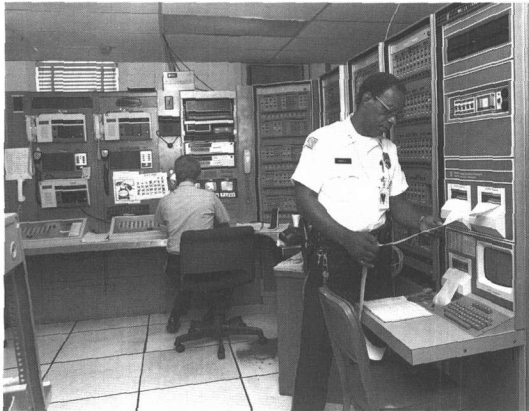
Name	Title	Code
Mrs. M.C. Oliver	Head, Office of Management and Administration	1005
Mrs. L.S. Herrin	Deputy Head	1005.1
Ms. B.J. McDonald	Administrative Officer	1005.2
Mr. E. Rank	NRL Facilities Manager	1005.4
Mr. R.C. Spragg	Head, Management Information Staff	1005.5
Ms. M.E. Barton	Head, Directives Staff	1005.6
Ms. J. Hileman	Head, GLSIP Program	1005.7
Ms. L.T. Warder	Head, Administrative Services Staff	1005.8

**Point of contact:** Ms. B.J. McDonald, Code 1005.2, (202) 767-3634

# Command Support Division

Code 1200

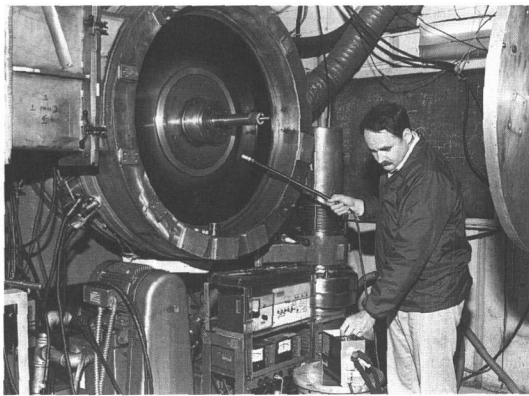
- Military Operations
- Flight Detachment, Chesapeake Bay Detachment
- Personnel and Physical Security
- Safety



Security monitoring



Watercraft at Chesapeake Bay Detachment used to support Navy research projects



Safety evaluation



P-3 airborne research facility



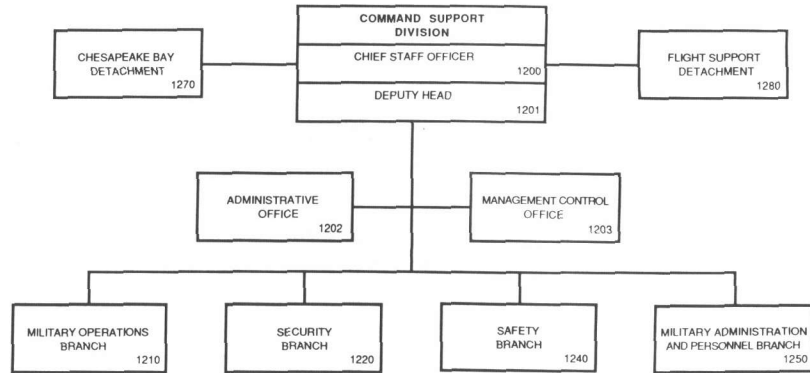
Incoming visitor's reception area



Aerial view of the Chesapeake Bay Detachment



CAPT. R.W. Michaux, USN



## Basic Responsibilities

The Command Support Division is headed by the Chief Staff Officer who is also the Laboratory's Inspector General.

The Division provides a military staff to the Commanding Officer and to the Director of Research for direct research support and assistance in the military aspects of the management of the Laboratory. The staff is the liaison with DoD, Navy commands/activities, and the operating forces of the Navy. It supports NRL research and development operations and coordinates military applications of the scientific work of the Laboratory. Direct research support is provided through operations of four multiengine Laboratory aircraft. In addition, the staff arranges for air, surface, and subsurface services as required by research and development operations and coordinates the Research Reserve Program.

The Division is responsible for physical, personnel, communications, information, industrial and ADP security, and fire protection, as well as safety, occupational health, and health physics. It provides intelligence support and support for international cooperative agreements in technology control. The division staff also coordinates the Laboratory's Management Control Programs and provides liaison and coordination for all audit and inspection teams.

The Chesapeake Bay Detachment is located approximately 40 miles from NRL. Facilities at the site support a variety of optical, electronic, chemistry, and other Navy research projects.

## Personnel

Full-time civilian: 139

Military: 160

## Key Personnel

Name	Title	Code
CAPT R.W. Michaux, USN	Chief Staff Officer	1200
Mr. M.B. Ferguson	Deputy Head	1201
Ms. M.S. Rathbun*	Administrative Officer	1202
Ms. M.S. Rathbun	Management Control Officer	1203
CDR J. Taber, USN	Military Operations Officer	1210
Mr. J.R. Gallagher	Communications/Message Center	1215
Mr. M.B. Ferguson	Head, Security Branch	1220
Ms. M.L. Knight	Head, Classification Management and Control Section	1221
Dr. J. Miller	Head, Special Security Office/Special Activities Office	1225
Mrs. S.A. Cornwell	Head, Personnel and Physical Security Section	1226
Mr. M.B. Ferguson	Head, Safety Branch	1240
CDR T.R. Nadeau, USN	Head, Military Administration and Personnel Branch	1250
LCDR B.K. Jones, USN	O in C, Chesapeake Bay Detachment	1270
LCDR G.R. Viggiano	O in C, Flight Support Detachment	1280

**Point of Contact:** Ms. M.S. Rathbun, Code 1202, (202) 767-3204

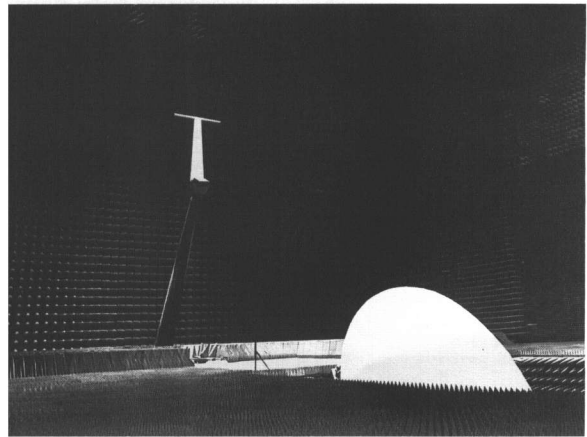
\*Acting

## Program Coordination Office Code 1500

- Technology Assessment
- Technical Program Management
- Low Observables Programs
- Counter Low Observables
- Multidisciplinary Programs
- Modeling of Signatures
- Field Signature Trials
- Low Observables Materials



Vector network analysis of new low observables materials



Infrared signatures



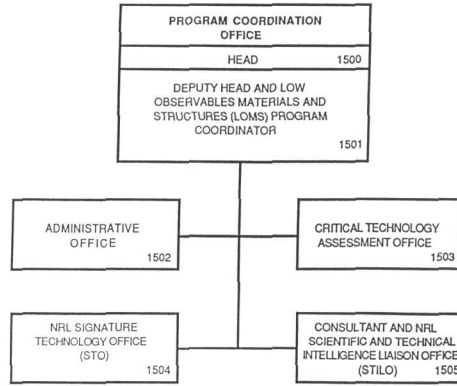
Field signature trials



Administrative office



Dr. R.T. Swim



### Basic Responsibilities

The Program Coordination Office (PCO) coordinates and/or manages specific NRL programs that may be multidisciplinary in nature, that may span both divisions and directorates, and that may also require special security procedures. It is the Laboratory’s focal point within the Navy and DoD for Low Observables programs. The Office conducts or coordinates studies, reviews, and technical assessments in various topical areas. The NRL Signature Technology Office, Scientific and Technical Intelligence Liaison Program, and the Critical Technology Assessment Office are contained within the PCO.

#### Personnel

Full-time civilian: 17

#### Key Personnel

Name	Title	Code
Dr. R.T. Swim	Head, Program Coordination Office	1500
Dr. D.W. Forester	Deputy Head and Low Observables Coordinator	1501
Mrs. D. Ernst	Administrative Officer	1502
Mr. L.M. Winslow	Head, Critical Technology Assessment Office	1503
Dr. D.W. Forester	Head, NRL Signature Technology Office	1504
Mr. H. Bress	Consultant and NRL STILO	1505

**Point of contact:** Dr. R. T. Swim, Code 1500, (202) 767-3314

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		<b>Business Operations Directorate</b>		

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## **Business Operations Directorate**

### **Code 3000**

The Business Operations Directorate provides executive management, policy development, and program administration for business programs needed to support the activities of the scientific directorates. This support is in the areas of legal counsel, manpower management, financial management, civilian personnel management, supply management, contracting, public works, and management information support.

**Associate Director of Research for  
Business Operations  
Code 3000**



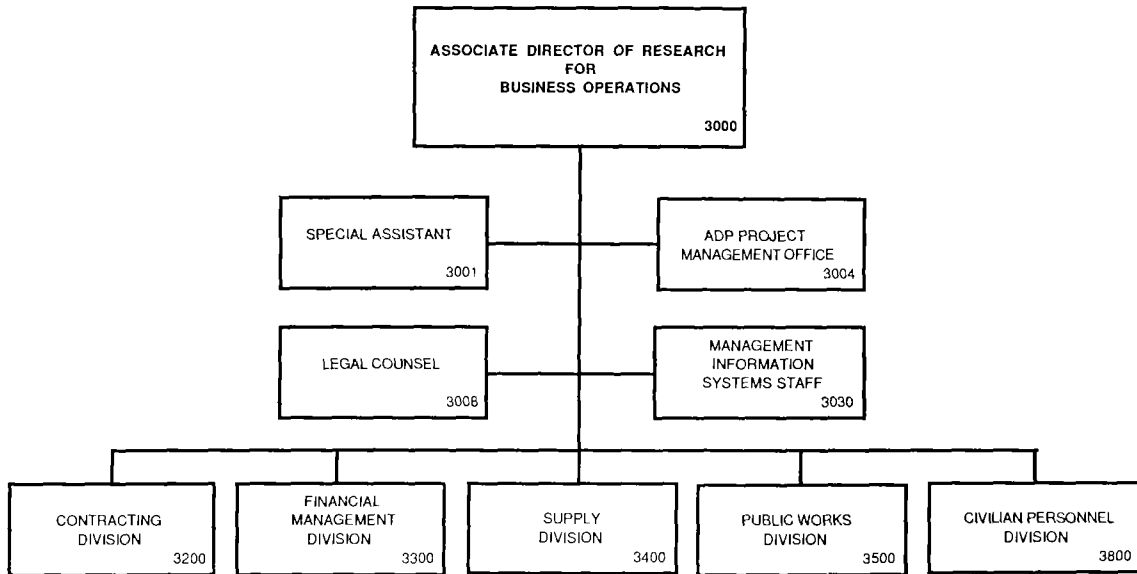
Mr. R.E. Doak

Mr. Robert E. Doak [REDACTED]. He graduated from Benjamin Franklin University with a bachelor's (BCS) degree in accounting in 1964 and a master's (MCS) degree in business administration in 1966. Mr. Doak is a Certified Public Accountant (CPA) licensed by the State of Maryland.

Mr. Doak has twenty-two years of diversified experience with the federal government performing in various line management positions. He has extensive experience in program management, financial management, contract policy and administration; personnel policy and administration; ADP systems development and operations; and the full spectrum of management disciplines associated with the development, production, and operational support of major weapon systems.

From 1967 to 1980, Mr. Doak served in several positions with the Navy's Strategic Systems Projects Office. In these positions he was responsible for the business management operations for the Navy's Fleet Ballistic Missile programs. In 1980, he entered the Senior Executive Service and served as Director of Financial Management with the Bureau of Indian Affairs. From 1981 to 1985, he served as Deputy Director, Plans and Programs, with the Strategic Systems Programs Office. From 1985 to 1989, he served as Deputy Commander with the Space and Naval Warfare Systems Command. In March 1989, Mr. Doak was appointed Associate Director of Research for Business Operations at the Naval Research Laboratory.

Mr. Doak has a consistent record of outstanding performance since entering the Senior Executive Service in 1980. In 1984, he was awarded the Navy Superior Service Award. In 1985 and 1988, he received Navy Rank Awards. In 1986, Mr. Doak received the Presidential Meritorious Executive Rank Award, and in 1988, he received the Presidential Distinguished Executive Rank Award.



### Key Personnel

Name	Title	Code
Mr. R.E. Doak	Associate Director of Research for Business Operations	3000
Vacant	Special Assistant	3001
Ms. B.L. Hildreth	ADP Project Management Officer	3004
Ms. H.J. Halper	Legal Counsel	3008
Mr. R.L. Guest	Head, Management Information Systems Staff	3030
Mr. J. Ely	Head, Contracting Division	3200
Mr. D.T. Green	Comptroller	3300
CDR W.E. Ralls, Jr., SC, USN	Supply Officer	3400
Mr. D.K. Woodington	Public Works Officer	3500
Mrs. B.A. Duffield	Head, Civilian Personnel Division	3800

**Point of contact:** Ms. G.L. Spisak, Code 3000A, (202) 404-7462

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# Management Information Systems Staff

Code 3030

## Basic Responsibilities

The Management Information Systems Staff has dual responsibilities: conducting administrative data processing for the Laboratory, and designing, implementing, and controlling the Laboratory Management Information System (MIS) and its databases. The Staff Head participates directly with the Commanding Officer, the Director of Research, and the Associate Director for Business Operations in all policy matters pertaining to MIS and business data processing.

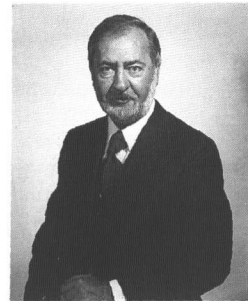
## Personnel

Full-time civilian: 20

## Key Personnel

Name	Title	Code
Mr. R.L. Guest	Head, Mgt. Info. Sys. Staff	3030
Vacant	Head, Systems Development Section	3035
Mr. W.L. Gollaher	Head, Applications Systems Support	3036
Ms. D. Martin	Head, Operations Section	3037

**Point of contact:** Ms. P. Thompson, Code 3030, (202) 767-2030



Mr. R.L. Guest

## Contracting Division Code 3200

- Advance Acquisition Planning
- Acquisition Strategies
- Acquisition Training
- Contract Negotiations

- Contractual Execution
- Contract Administration
- Acquisition Policy Interpretation & Implementation



Administrative assistant begins training the receptionist on procedures for incoming purchase requests



Branch Head and Deputy discuss procurement planning information



Policy staff works on the local area network for production of contract awards



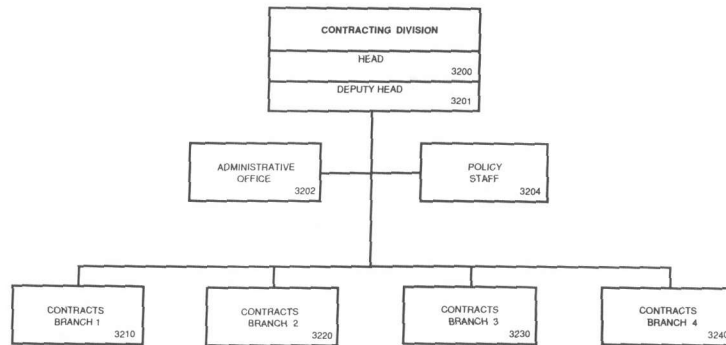
Contract specialist negotiates contract award in support of the Space Program



Deputy Division Head holds regular branch head meetings to discuss changing DoD regulations



Mr. J. Ely



### Basic Responsibilities

The Contracting Division is responsible for the acquisition of major research and development, materials, services, and facilities where the value is in excess of \$25,000. It also maintains liaison with the ONR Procurement Directorate on procurement matters involving NRL. Specific functions include: providing consultant and advisory services to NRL division personnel on acquisition strategy, contractual adequacy of specifications, and potential sources; reviewing procurement requests for accuracy and completeness; initiating and processing solicitations for procurement; awarding contracts; performing contract administration and post-award monitoring of contract terms and conditions, delivery, contract changes, patents, etc., and taking corrective actions as required; providing acquisition-related training to division personnel; and interpreting and implementing acquisition-related Federal Department of Defense and Navy regulations.

### Personnel

Full-time civilian: 64

#### Key Personnel

Name	Title	Code
Mr. J. Ely	Head, Contracting Division	3200
Ms. M. Carpenter	Deputy Head	3201
Mrs. J. Price	Administrative Officer	3202
Mrs. D. Lockamy	Head, Policy Staff	3204
Mr. J. Waldenfels	Contracts Branch # 1	3210
Mr. A. Guida	Contracts Branch # 2	3220
Mrs. J. Talts	Contracts Branch # 3	3230
Mr. E. Tunney	Contracts Branch # 4	3240

**Point of Contact:** Mrs. J. Price, Code 3202, (202) 767-3749

# Financial Management Division

Code 3300

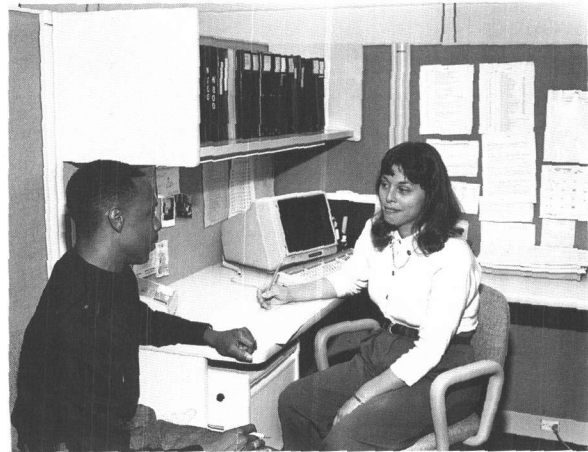
- General Accounting
- Cost Accounting
- Systems Accounting
- Disbursing
- Budget



The Accounting Branch is divided into several sections that perform services essential to the Laboratory including vendor payments, payroll, payment information, and ledger accounting.



The Disbursing Branch is the most visible portion of the Financial Management Division. Its role in the Laboratory's operation includes disbursing checks, processing travel orders, and auditing.



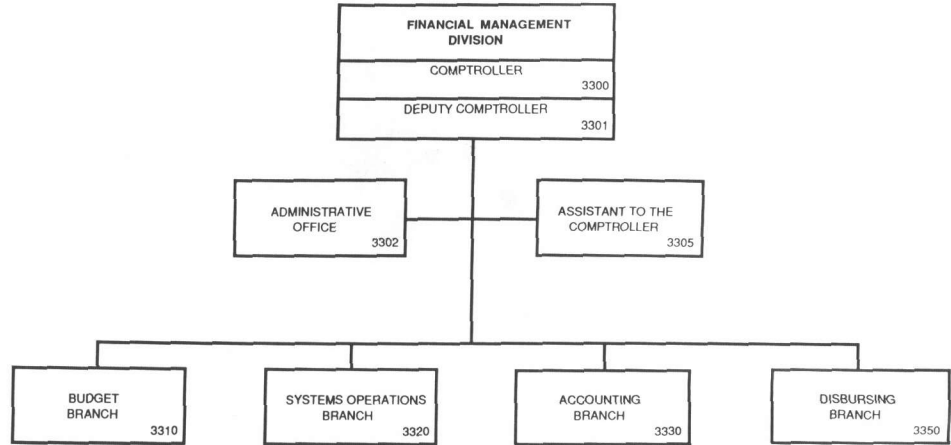
The Budget Branch provides guidance and instructions for budget preparation and funds administration. This branch also develops guidelines and criteria for statistical data at NRL and prepares progress reports and special statistical data as required.



The Payroll Section of the Accounting Branch provides customer services, processes payroll, and interacts with all divisions, branches, and personnel within the Naval Research Laboratory.



Mr. D.T. Green



### Basic Responsibilities

The Comptroller is the financial adviser to the Commanding Officer, the Director of Research, and other officials of the Laboratory, and he administers the financial program of the Laboratory.

The Financial Management Division provides services to the Laboratory in budget formulation and funds administration, program and budget analysis, accounting and reporting, and disbursing.

### Personnel

Full-time civilian: 104

### Key Personnel

Name	Title	Code
Mr. D.T. Green	Comptroller	3300
Vacant	Deputy Comptroller	3301
Mrs. A.J. Downs	Administrative Officer	3302
Mr. E.S. York	Assistant to the Comptroller	3305
Ms. D. Rippey	Head, Budget Branch	3310
Mr. M. Mills	Head, Systems Operations Branch	3320
Mr. J. Thomas	Head, Accounting Branch	3330
Mrs. T. Sherman	Head, Disbursing Branch	3350

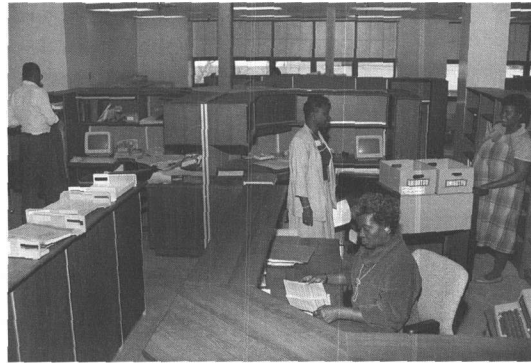
**Point of contact:** Mrs. A.J. Downs, Code 3302, (202) 767-2950

## Supply Division Code 3400

- Administrative Services
- Customer Liaison
- Automated Inventory Management System
- Purchasing
- Receipt Control
- Material
- Technical



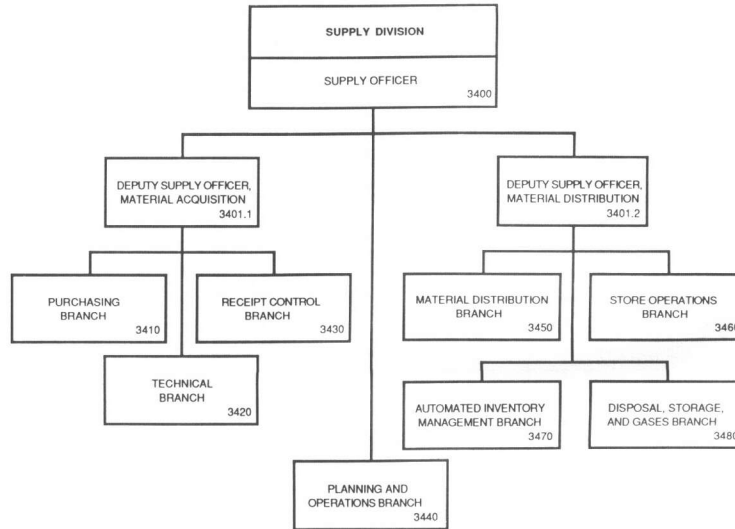
Interior of Supply Stores 33 and 99, Bldg. A-52, featuring glass display cases and modern storage systems to better service NRL customers



Supply technicians and inventory management specialists are gathering information for customers



An inspector verifies the contents of a package



### Basic Responsibilities

The Supply Division provides the Laboratory and its field activities with contracting, supply management, and logistics services. Specific functions include: procuring required equipment, material, and services; receiving, inspecting, storing, and delivering material and equipment; packing, shipping, and traffic management; surveying and disposing of excess and unusable property; operating various supply issue stores and performing stock inventories; providing technical and counseling services for the research directorates in the development of specifications for a complete procurement package; and obtaining and providing guidance in the performance stages of contractual services.

### Personnel

Full-time civilian: 155

Military: 2

### Key Personnel

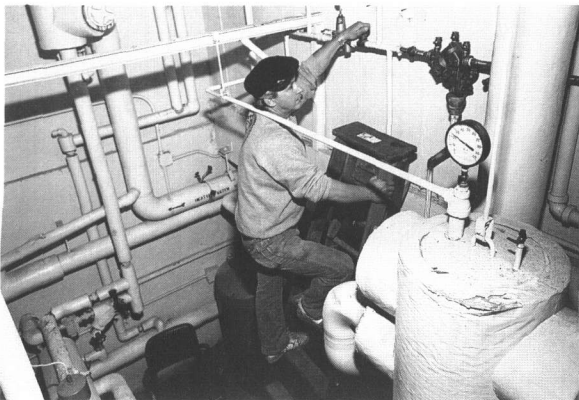
Name	Title	Code
CDR W.E. Ralls, Jr., SC, USN	Supply Officer	3400
Ms. C. Hartman*	Deputy Supply Officer Material Acquisition	3401.1
Mr. S. Kinney	Deputy Supply Officer Material Distribution	3401.2
Ms. J. Bowie	Head, Purchasing Branch	3410
Mr. G Smith	Head, Technical Branch	3420
Mr. J.J. Dupcavitch	Head, Receipt Control Branch	3430
Mrs. C. Hartman	Head, Planning and Operations Branch	3440
Mr. E. Denning	Head, Material Distribution Branch	3450
Mrs. E.I. Woodland	Head, Store Operations Branch	3460
Mrs. L. Shaw	Head, Automated Inventory Management Branch	3470
Mr. J. Cestone	Head, Disposal, Storage, and Gases Branch	3480

Point of contact: Mrs. M. Shorb, Code 3402, (202) 767-3478

\*Acting

## Public Works Division Code 3500

- Engineering
- Maintenance and Utilities
- Maintenance Control
- Contract Administration
- Administration
- Programming
- Facilities Support Contracts



Cyclic maintenance team at work



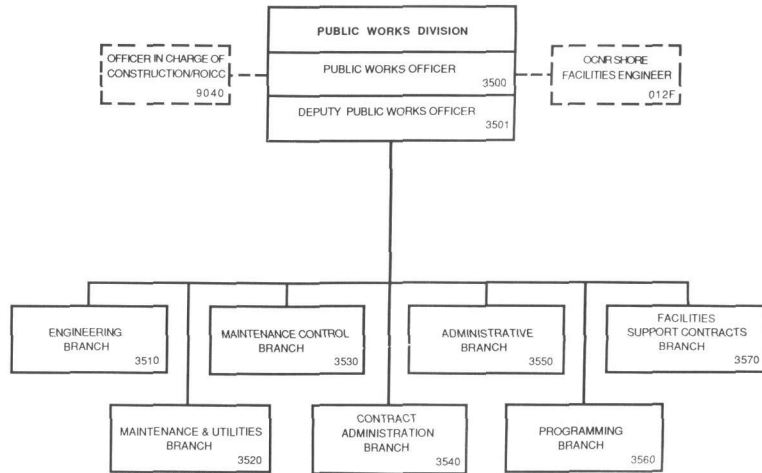
Asbestos removal work in progress



Working shops job



Mr. D.K. Woodington



### Basic Responsibilities

The Public Works Division is responsible for the physical plant of NRL and subordinate field sites. This includes: Military construction, engineering, construction, facility support services, planning, environmental, maintenance/repair/operation of all infrastructure systems, transportation, and vertical transport equipment.

The Division provides engineering and technical assistance to the research divisions in the installation and operation of critical research equipment in support of the research mission.

The Division is responsible for compliance with all environmental regulations and approval authorities required by the command. The Division also supports the Office of the Chief of Naval Research for all facilities operations and acquisition.

### Personnel

Full-time civilian: 312

Military: 2

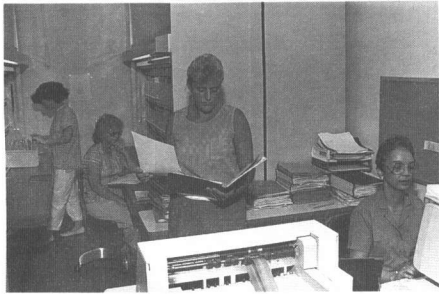
### Key Personnel

Name	Title	Code
Mr. D.K. Woodington	Public Works Officer/ OCNR Shore Facilities Engineer	3500 OCNR-012F
Mr. J. Botkin	Head, Engineering Branch	3510
Mr. C.B. Conner	Head, Maintenance and Utilities Branch	3520
Mr. S. Harrison	Head, Maintenance Control Branch	3530
CDR R. Mello, CEC, USN	Head, Contracts Branch Officer in Charge of Construction/ROICC	3540/9040
Mrs. A. Coats	Head, Administrative Branch	3550
Vacant	Head, Programming Branch	3560
LCDR K. Roman, CEC, USN	Head, Facilities Support Contracts Branch	3570

**Point of contact:** Mrs. A. Coats, Code 3550, (202) 767-2168

## Civilian Personnel Division Code 3800

- Personnel Operations
- Employee Development
- Employee Relations
- Equal Employment Opportunity
- Programs and Manpower



Personnel actions, records, and reports



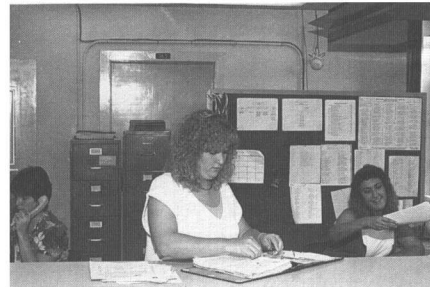
Training—computer software course



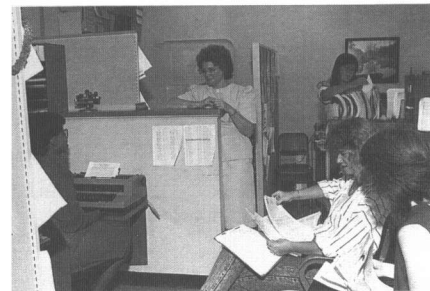
Employee Relations staff



EEO staff



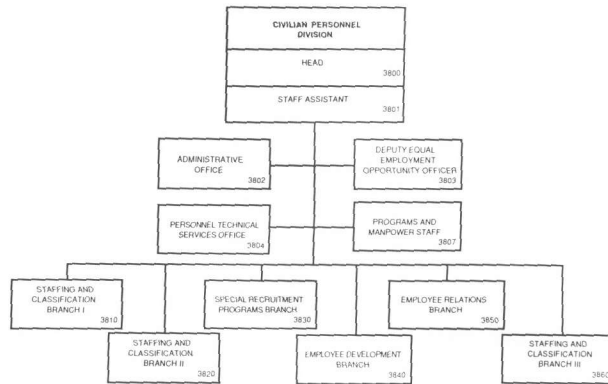
Personnel reception area



Staff of the Special Recruitment Branch



Mrs. B.A. Duffield



## Director of Civilian Personnel

The Director of Civilian Personnel (OCNR Code 0124) of the Consolidated Civilian Personnel Office (Headquarters, ONR, NRL, and Naval Oceanographic & Atmospheric Research Laboratory) is Mr. D.J. Blome. His office is located at the Office of the Chief of Naval Research in Arlington, Virginia. The on-site NRL division head is Mrs. B.A. Duffield.

### Basic Responsibilities

The Civilian Personnel Division administers the Laboratory's personnel program, which includes selection, development, promotion, utilization, appropriate recognition, and employee counseling and services for all civilian personnel.

### Personnel

Full-time civilian: 68

### Key Personnel

Name	Title	Code
Mr. D.J. Blome	Director of Civilian Personnel	OCNR Code 0124
Mrs. B.A. Duffield	Head, Civilian Personnel Division	3800
Mr. D. Schenk	Staff Assistant Officer	3801
Mrs. P.L. Hetzler	Administrative Officer	3802
Mr. W. Williams	Deputy Equal Employment Opportunity Officer	3803
Mrs. N. Talley	Individuals with Handicap Program Manager and Hispanic Employment Program Manager	3803.1
Ms. P. Throckmorton	Federal Women's Program Manager and Black Employment Program Manager	3803.2
Mr. W. Jones	Manager, Complaints Processing	3803.3
Ms. L. Stump	Personnel Technical Services Officer	3804
Mrs. J. Sykes	Head, Programs and Manpower Staff	3807
Mrs. S. Dyer	Head, Staffing and Classification Branch I	3810
Mrs. C. Lowell	Head, Staffing and Classification Branch II	3820
Mrs. C. Downing	Head, Special Recruitment Programs Branch	3830
Mr. A.H. Sass	Head, Employee Development Branch	3840
Ms. J. Hupp	Head, Employee Relations Branch	3850
Ms. D. Erwin	Head, Staffing and Classification Branch III	3860

**Point of contact:** Mrs. P. L. Hetzler, Code 3802, (202) 767-3421

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		<b>General Science and Technology Directorate</b>		

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**General Science  
and  
Technology Directorate  
Code 4000**

The Navy's operational effectiveness depends on its ability to keep pace with rapidly developing technologies. The directorate contributes to this requirement by conducting research in advanced space sensing, reactive flow physics, and computational physics; astrophysics; atmospheric, ionospheric, space, and plasma sciences; fundamental properties of materials; radiation; and pulsed power technologies. Areas of particular emphasis include solar physics, wide-spectrum astronomy, fluid mechanics and hydrodynamics, modeling of atmospheric and ionospheric processes, nuclear weapons effect simulations, high-energy density storage devices, interactions of various types of radiation with matter, survivability of materials and components, and directed energy devices. The directorate provides administrative and technical services to support the Laboratory's mission through the operation of the Technical Information Division.

## Associate Director of Research for General Science and Technology

Code 4000



Dr. R. LeFande

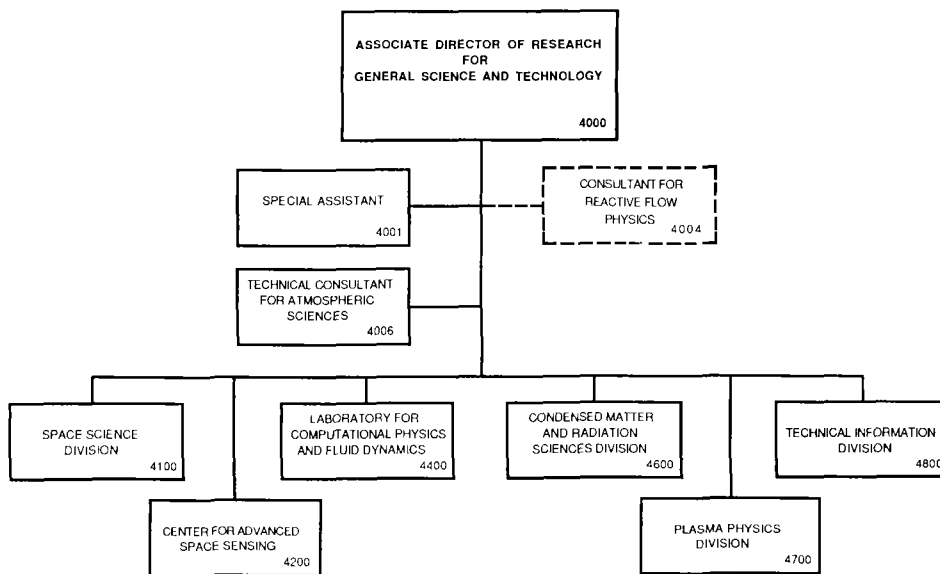
Dr. LeFande [REDACTED]. He attended the Brooklyn Technical High School and obtained his undergraduate degree in physics from the University of Rhode Island in 1962. After a brief tour as a telephone equipment engineer with the Western Electric Company in New York City, he returned to academic pursuits, earning a Master's degree in physics from the Rutgers University in 1965.

In July of 1965, Dr. LeFande joined the Naval Research Laboratory as a research physicist in the Satellite Communications Branch. He worked on a variety of projects related to the design of waveforms for Naval applications, calibration of antennas, and path losses by methods borrowed from radio astronomy, and on the design and acquisition of satellite communication terminals for shipboard and submarine use. By drawing on this work for a thesis topic, he obtained his Ph.D from the University of Maryland in 1973 in the areas of astronomy and astrophysics.

In 1976, Dr. LeFande became Head of the Special Communications Branch where he nurtured and encouraged an NRL team of scientists and engineers in the development of satellite communications terminals that are now being deployed in the Fleet, and in establishing the scientific understanding and practical design principles that contributed to the selection of waveforms for MILSTAR and other systems.

From 1979 to 1981, Dr. LeFande was Technical Director and System Engineer of the Special Communication Project of the Naval Electronic Systems Command. He oversaw several research and acquisition programs related to submarine communications, which covered the spectrum from extremely low frequencies through optics and included the maintenance and operation of a world-wide network of radio transmitter facilities. After termination of the project and a brief tour as Deputy Director, Research and Technology Group, Dr. LeFande returned to NRL as Superintendent of the Aerospace Systems Division. Here he guided a diverse program of basic applied research in Wide Area Surveillance Systems, Space Warfare, and in related areas of physical science, materials and device technology. From 1983 to 1990, Dr. LeFande served as Associate Deputy Assistant Secretary of the Navy (C<sup>3</sup>I and Space), providing technical and philosophical advice to eight assistant and deputy assistant secretaries. In this capacity, he took a keen interest in the issues of acquisition management reform and of the appropriate roles and missions of the Laboratory and the other centers in the acquisition process. During this tour, Dr. LeFande was selected as a Legis Fellow and served on the staff of Representative Byron for six months in 1989, working on a variety of issues and legislation related to Armed Services, Science and Technology, Foreign Affairs, and other matters.

Dr. LeFande returned to the Laboratory in October 1990 where he served on the staff of the Director of Research until he was designated Acting Associate Director of Research in February 1991.



### Key Personnel

Name	Title	Code
Dr. R. LeFande*	Associate Director of Research for General Science and Technology	4000
Mrs. B.J. Turner	Special Assistant	4001
Dr. E.S. Oran†	Consultant for Reactive Flow Physics	4004
Dr. L.H. Ruhnke	Technical Consultant for Atmospheric Sciences	4006
Dr. H. Gursky	Superintendent, Space Science Division	4100
Dr. K. Johnston	Director, Center for Advanced Space Sensing	4200
Dr. J.P. Boris	Chief Scientist and Director, Laboratory for Computational Physics and Fluid Dynamics	4400
Dr. D.J. Nagel	Superintendent, Condensed Matter and Radiation Sciences Division	4600
Dr. S. Ossakow	Superintendent, Plasma Physics Division	4700
Mr. P. Imhof	Head, Technical Information Division	4800

**Point of contact:** Ms. N.H. Sell, Code 4000A, (202) 767-3324

†Additional duty

\*Acting

# Space Science Division

Code 4100

## Research Activity Areas

### Space Astronomy

- Remote sensing of the ionosphere
- Middle atmospheric investigations
- Global modeling
- Upper atmospheric physics
- X-ray observation, analysis and theory of space astronomical sources
- Ultraviolet astronomy
- Gamma-ray astrophysics, solar-flare gamma-rays, space cosmic ray partial environment

Radiation detectors based on superconductivity, which promise energy resolution 10 to 100 times better than existing detectors, are being investigated in this specially-instrumented cryostat.



Scientists test a detector assembly for NRL's Oriented Scintillation Spectrometer Experiment that will be launched on NASA's Gamma Ray Observatory mission in 1991. Its 5-10 year mission: to investigate 50 keV to 10 MeV nuclear radiation from solar flares, neutron stars, supernovae, and black holes.

### Solar Physics

- Solar ultraviolet and visible light spectroscopy and photometry from rockets, satellites, and the Space Shuttle

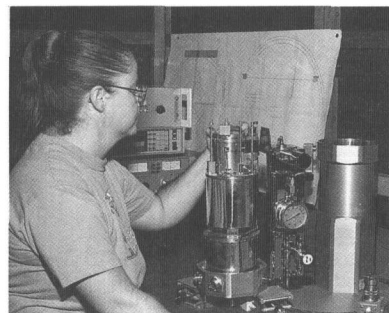
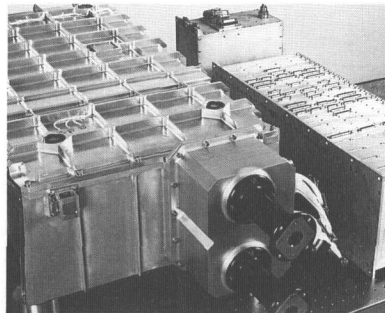
### Solar-Terrestrial Relationships

- Solar X-ray/EUV plasma diagnostics; coronal effects at Earth

### Ionospheric Effects

- Ionospheric propagation/modelling; prediction and assessment systems

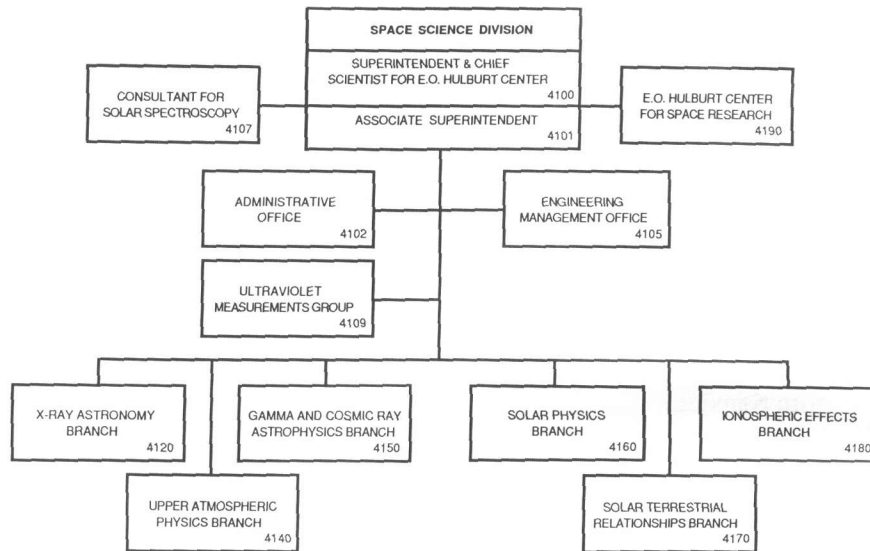
The Remote Atmospheric and Ionospheric Detection System, an array of eight optical instruments, will fly aboard a NOAA Tiros satellite to measure airglow from the upper atmosphere and ionosphere.



The Solar Ultraviolet Spectral Irradiance Monitor will fly on the Upper Atmospheric Research Satellite (scheduled launch date: September 1991) to measure the total solar irradiance in the wavelength region of 200 to 400 nm.



Dr. H. Gursky



### Basic Responsibilities

The Space Science Division conducts research in the fields of astronomy and astrophysics, solar-terrestrial physics, and atmospheric science. Satellites, rockets, and ground-based facilities are used to obtain information on radiation from the sun and celestial sources, and to study the behavior of the ionosphere and high atmosphere. Research results are of importance to radio communications, to use of the space environment, to weather prediction, and to the fundamental understanding of natural radiation and geophysical phenomena. The Superintendent also acts as Chief Scientist of the E.O. Hulburt Center for Space Research, created to provide research opportunities in space science to appointees from universities.

### Personnel

Full-time civilian: 119

#### Key Personnel

Name	Title	Code
Dr. H. Gursky	Superintendent/Chief Scientist, E.O. Hulburt Center for Space Research†	4100
Dr. R.G. Groshans	Associate Superintendent	4101
Mrs. C.J. Marks	Administrative Officer	4102
Mr. J. Vrancik	Engineering Management Officer	4105
Dr. R. Tousey	Consultant (Emeritus), Solar Spectroscopy	4107
Dr. G. Carruthers	Head, Ultraviolet Measurements Group	4109
Mr. G.G. Fritz	Head, X-Ray Astronomy Branch	4120
Dr. R.R. Meier	Head, Upper Atmospheric Physics Branch	4140
Dr. J.D. Kurfess	Head, Gamma and Cosmic Ray Astrophysics Branch	4150
Dr. G.E. Brueckner	Head, Solar Physics Branch	4160
Dr. G.A. Doschek	Head, Solar Terrestrial Relationships Branch	4170
Dr. J.M. Goodman	Head, Ionospheric Effects Branch	4180
Dr. H. Friedman	Chief Scientist (Emeritus), E.O. Hulburt Center for Space Research	4190

**Point of contact:** Mrs. C.J. Marks, Code 4102, (202) 767-3631

†Additional duty

# Center for Advanced Space Sensing Code 4200

## Research Activity Areas

### Remote Sensing

Sensors  
Radio  
Microwave  
SAR RAR, passive microwave  
IR  
CCD arrays, spectrometer  
Optical interferometers  
Areas  
Marine ocean boundary layer  
Polar ice  
Ionosphere  
Space environment

### Astrometry

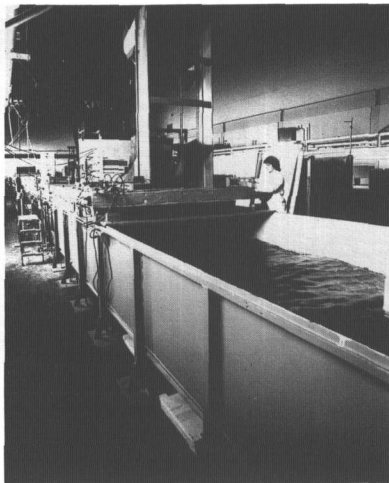
Radio interferometry  
Optical interferometry  
Reference frames

### Radio Science

Astronomy  
Astrophysics  
Interferometry

### Physics of Atmospheric/Ocean Interaction

Mesoscale, fine-structure, micro-structure

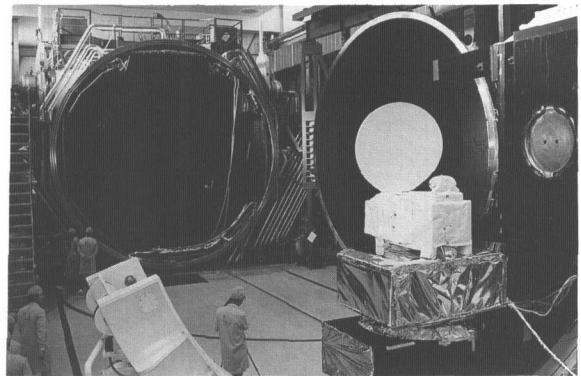


The NRL wind-wave facility is used to investigate the dynamics of the wind disturbed air-water interface. The primary sensors are microwave and millimeter-wave scatterometers.

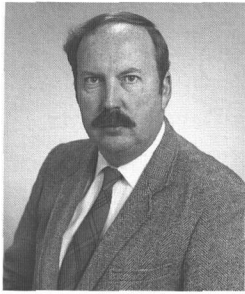
Mixed layer and thermocline applications  
Sea-truth towed instrumentation techniques  
Turbulent jets and wakes  
Nonlinear and breaking ocean waves  
Stratified flows  
Turbulence modeling  
Boundary layer hydrodynamics  
Marine hydrodynamics  
Computational hydrodynamics

### Imaging Research/System

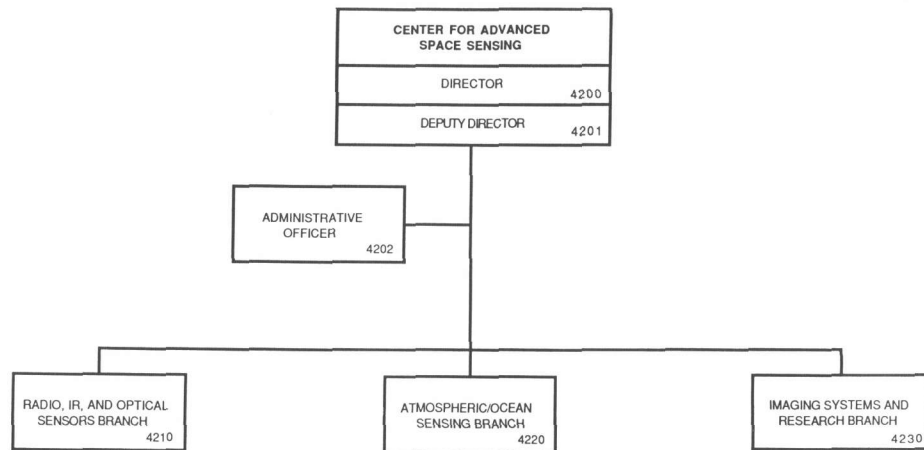
Remotely sensed signatures analysis  
Real-time signal and image processing algorithms/systems  
Image data compression methodology  
Image fusion  
Automatic target recognition  
Scene/Sensor noise characterization  
Image enhancement/noise reduction  
Scene classification techniques  
Radar and laser imaging systems studies  
Coherent/Incoherent imaging sensor exploitation



The Millimeter-wave Atmospheric Sounder (MAS), designed and fabricated by Code 4200, is a shuttle-based radiometer designed to measure important constituents of the middle atmosphere (15-100 km) by limb-scanning millimeter-wave spectroscopy. MAS is an international effort involving components in Germany and Switzerland as well as the U.S. MAS will be launched as part of NASA's ATLAS series of spacelab shuttle flights. The launch date of ATLAS 1 is March 1992, with successive launches at roughly yearly intervals.



Dr. K.J. Johnston



### Basic Responsibilities

The Center for Advanced Space Sensing conducts a program of basic research, science, and applications aimed at the development of new concepts for sensors and imaging systems for objects and targets on the earth and in the near-earth environment, as well as in deep space. The research, both theoretical and experimental, deals with discovering and understanding the basic physical principles and mechanisms that give rise to the background environmental emission and targets of interest and to absorption and emission mechanisms of the intervening medium. The accomplishment of this research requires the development of sensor systems technology. The development effort includes active and passive sensor systems to be used for the study and analysis of the physical characteristics of phenomena that give rise to naturally occurring background radiation, such as that due to the earth's atmosphere and oceans, as well as man made or induced phenomena such as ship/submarine hydrodynamic effects. The research includes theory, laboratory, and field experiments leading to ground based, airborne or space systems for use in such areas as remote sensing, astrometry, astrophysics, surveillance, nonacoustic ASW, and improved meteorological support systems for the operational Navy. Special emphasis is given to developing space-based platforms and exploiting existing space systems.

### Personnel

Full-time civilian: 100

#### Key Personnel

Name	Title	Code
Dr. K.J. Johnston	Director	4200
Dr. V.E. Noble	Deputy Director	4201
Vacant	Administrative Officer	4202
Dr. P.R. Schwartz	Head, Radio/IR/Optical Sensors Branch	4210
Mr. E.E. Rudd	Head, Atmospheric/Ocean Sensing Branch	4220
Dr. S.A. Mango	Head, Imaging Systems and Research Branch	4230

**Point of contact:** Dr. K.J. Johnston, Code 4200, (202) 767-2351

# Laboratory for Computational Physics and Fluid Dynamics

Code 4400

## Research Activity Areas

### Reactive Flows

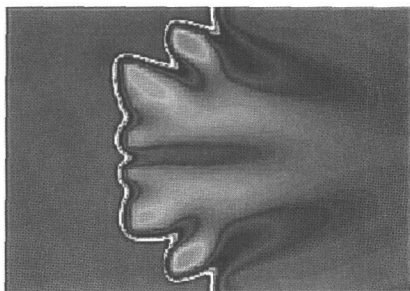
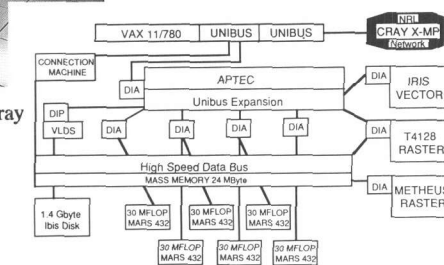
- Fluid dynamics in combustion
- Turbulence in compressible flows
- Multiphase flows
- Molecular dynamics of energetic materials
- Theoretical quantum chemistry
- Turbulent jets and wakes
- Turbulence modeling
- Computational hydrodynamics

### Computational Physics Developments

- Laser plasma interactions
- Inertial confinement fusion
- Solar physics modeling
- Dynamical gridding algorithms
- Advanced graphical and parallel processing systems
- Electromagnetic scattering

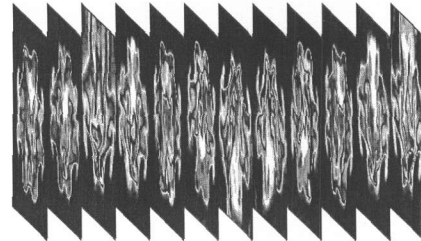


Working at the LCP Graphical Array Processing System (GAPS)



Two-dimensional simulation of an unstable premixed hydrogen-air flame with full chemistry, diffusion, and conduction models. Lean  $H_2$ -air flames can propagate in an unstable mode, which results in cellular structure, shown above. The study of very lean flames has important safety considerations.

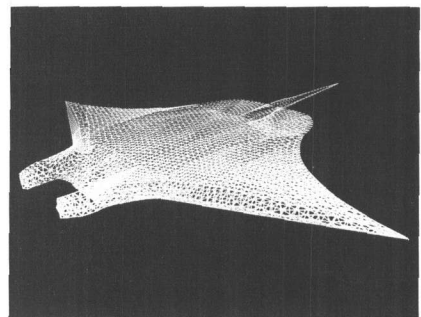
### Convective Channel Cooling



256 x 128 x 128

step 4000 260 us

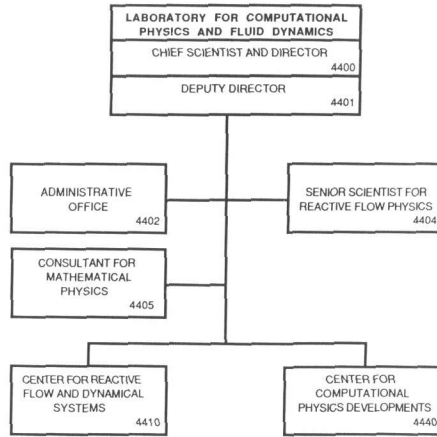
LCP&FD/PPD indicator fluid October 1990  
In one of the largest compressible fluid dynamics calculations performed to date, the NRL Connection Machine was used to simulate the turbulence generated by a charged-particle beam in dusty air using a  $256 \times 128 \times 128$  computational mesh.



Undersea propulsion in nature is generally of two types, anguliform motions with the entire body deforming as in eels, and carangiform motions, which involve flapping of a tail or waving of wings such as in dolphins and manta rays. Manta rays, due to their similarity to aircraft, are a good starting point for studying carangiform vehicles. The figure shows a manta ray gridded for a numerical simulation.



Dr. J.P. Boris



### Basic Responsibilities

The Laboratory for Computational Physics and Fluid Dynamics is responsible for the research leading to and the application of advanced analytical and numerical capabilities that are relevant to Navy, DoD, and other programs of national interest. This research is pursued in the fields of compressible and incompressible fluid dynamics, reactive flows, fluid/structure interaction including submarine and aerospace applications, atmospheric and solar geophysics, magnetoplasma dynamics for laboratory and space applications, application of parallel processing to large-scale problems such as unstructured grid generation for complex flows and target tracking and correlation for battle management, and in other disciplines of continuum and quantum computational physics as required to further the overall mission of the Naval Research Laboratory. The specific objectives of the Laboratory for Computational Physics and Fluid Dynamics are: to develop and maintain state-of-the-art analytical and computational capabilities in fluid dynamics and related fields of physics; to establish in-house expertise in parallel processing for large-scale scientific computing; to perform analyses and computational experiments on specific relevant problems using these capabilities; and to transfer this technology to new and ongoing projects through cooperative programs with the research divisions at NRL and elsewhere.

### Personnel

Full-time civilian: 22

#### Key Personnel

Name	Title	Code
Dr. J.P. Boris	Chief Scientist and Director	4400
Dr. W.C. Sandberg	Deputy Director	4401
Mrs. C. Adams	Administrative Officer	4402
Dr. E.S. Oran	Senior Scientist for Reactive Flow Physics	4404
Dr. D.L. Book	Consultant for Mathematical Physics	4405
Dr. K. Kailasanath	Head, Center for Reactive Flow and Dynamical Systems	4410
Mr. J.H. Gardner, Jr.	Head, Center for Computational Physics Developments	4440

Point of contact: Mrs. C. Adams, Code 4402, (202) 767-6581

# Condensed Matter and Radiation

## Sciences Division

Code 4600

### Research Activity Areas

#### Radiation Effects

- Satellite survivability
- Single event upsets
- Device and material damage and hardening
- Ultrafast charge collection
- Space experiments
- Superconductivity
- Nuclear radiation detection
- 60-MeV LINAC

#### Directed Energy Effects

- Interaction of laser and microwave radiation with materials and systems
- Interaction of particle beams with materials
- Solid state spectroscopy
- Atomic and molecular interactions with surfaces and interfaces
- Environmental effects on aircraft wiring
- Lethality assessment

#### Surface Modification

- Modification of surfaces by ion implantation
- Deposition of thin films by ion beam assisted deposition and pulsed

laser deposition

- Radiation effects from high energy, charged particle beams
- Surface analyses by accelerator based techniques
- Ion beam etching
- 200-kV ion implantation systems
- 3-MV tandem ion accelerator

#### Dynamics of Solids

- X-ray sources, optics, and detectors
- X-ray analysis of materials
- Plasma spectroscopy
- Synchrotron radiation applications
- Phase transformations
- Shock Physics
- Hypervelocity impact
- Radiation effects in microelectronics
- Synchronized laser facility

#### Complex Systems Theory

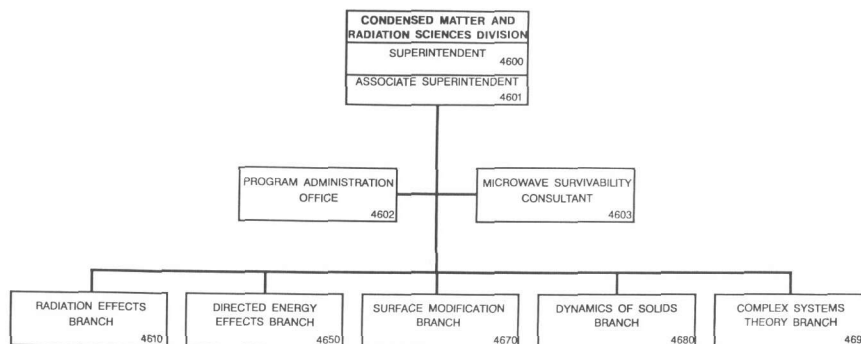
- Solid-State Supercomputing
- Electronic structure theory
- Molecular dynamics
- Defect and cluster computations
- Theory of alloys
- Atomic physics theory



An elevated view showing the NRL 3 MeV Tandem Van de Graaff Accelerator and associated beam lines



Dr. D. J. Nagel



### Basic Responsibilities

The Condensed Matter and Radiation Sciences Division conducts three broad programs of basic and applied research on the fundamental properties of materials and on the interactions of various types of radiation with matter. Physical properties of condensed matter are investigated theoretically and experimentally. Radiation damage produced in materials, components, subsystems, and systems by radiation, ranging from microwave and laser beams through charged and neutral particle beams in the megavolt region, is studied. Techniques to use radiation for beneficial modification and characterization of materials are also developed. Radiations of military significance are studied and simulated in the laboratory by various radiation facilities maintained and operated by the Division primarily for DoD users.

### Personnel

Full-time civilian: 100

### Key Personnel

Name	Title	Code
Dr. D.J. Nagel	Superintendent	4600
Dr. G.P. Mueller*	Associate Superintendent	4601
Ms. B. Murphy	Head, Program Administration Office	4602
Dr. J.W. Butler	Microwave Survivability Consultant	4603
Mr. J.C. Ritter	Head, Radiation Effects Branch	4610
Dr. T.J. Weiting	Head, Directed Energy Effects Branch	4650
Dr. F.A. Smidt	Head, Surface Modification Branch	4670
Dr. M.I. Bell	Head, Dynamics of Solids Branch	4680
Dr. B.M. Klein	Head, Complex Systems Theory Branch	4690

**Point of contact:** Ms. B. Murphy, Code 4602, (202) 767-3407

\*Acting

# Plasma Physics Division

## Code 4700

### Research Activity Areas

#### Laser Plasma

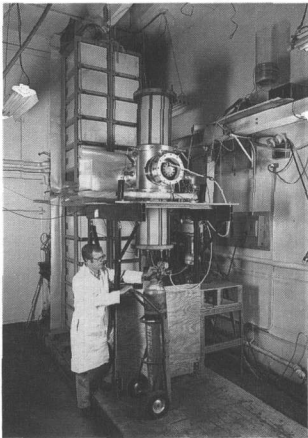
- Laser-plasma interaction
- Laser fusion, inertial confinement
- Laser-plasma diagnostics
- Laser-driven X-ray lasers
- KrF laser development
- Strongly coupled plasmas

#### Radiation Hydrodynamics

- Pulsed-power radiation source and power-flow development
- X-ray laser modeling
- Dense plasma atomic structure, processes, and equations of state
- Radiation hydrodynamics of dense Z-pinches and laser-produced plasmas
- Plasma-radiation diagnostics
- Numerical simulation of high-density plasma

#### Beam Physics

- Modified betatron accelerator
- Rebatron accelerator
- High-quality electron beams
- Wake field accelerators



PAWN is a compact, high-power pulse generator. A megajoule of energy is initially stored in the low-voltage, air-insulated capacitor bank. Discharge of this bank into the even more compact, cylindrical, vacuum inductor produces the reservoir of magnetic energy to be used by the generator. Power amplification is achieved by opening switches in steps. At each successive step, the switch opens faster resulting in a pulse with higher voltage and shorter pulse duration. The PAWN generator is expected to produce the same pulse output as the Gamble II generator that is nearly 50 times larger. The physicist is pressurizing the opening switch cartridges with gas to provide megavolt insulation.

- Application of high-current relativistic electron beams to microwave and millimeter wave generation, e.g., gyrotrons, short-pulse FEL, and CARM
- Plasma microwave electronics

#### Pulsed Power Physics

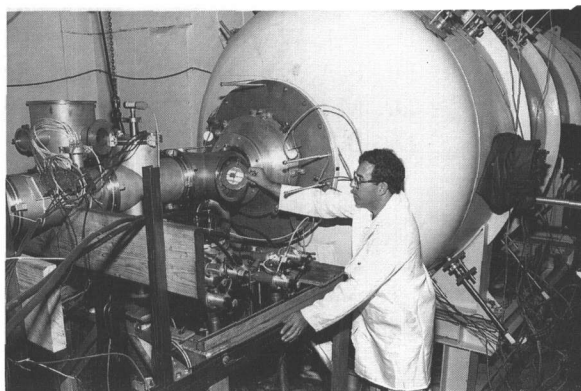
- Production of intense relativistic electron beams
- Electron beam propagation and focusing
- Pulse-power-driven X-ray lasers
- Generation of intense ion beams
- Inductive and capacitive energy storage

#### Space Plasma Physics

- Theoretical and numerical simulation of ionospheric and magnetospheric phenomena
- High-altitude, nuclear weapons effects on the ionosphere/magnetosphere
- Ionospheric-magnetospheric coupling
- Rocket, satellite, and shuttle-borne natural and active experiments
- Laboratory simulation of space plasma processes
- Solar-plasma processes

#### Charged Particle Physics

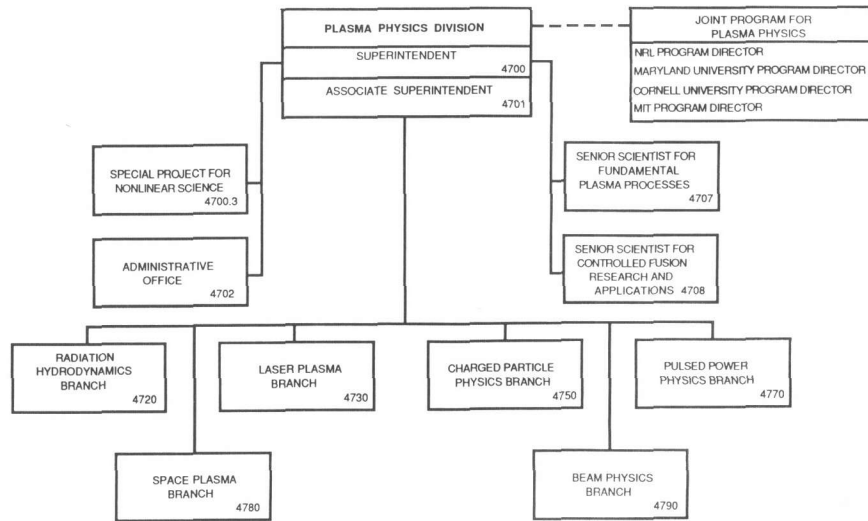
- Charged particle beam generation
- Propagation of high-energy charged particle beams
- Radiation source development
- Plasma channels in air
- Experimental study of plasma chemistry
- Dense Z-Pinch
- Applications of modulated electron beams



The SuperIBEX CPB generator injects high current detection beams into this propagation chamber. Diagnostics at the input and along the chamber are used to measure beam quality and propagation stability.



Dr. S.L. Ossakow



### Basic Responsibilities

The Plasma Physics Division conducts a broad theoretical and experimental program of basic and applied research in plasma physics, laboratory and space plasmas, intense electron and ion beams, atomic physics, pulsed power sources, and laser physics. The effort of the Division is concentrated on a few closely coordinated theoretical and experimental programs. Considerable emphasis is placed on large-scale numerical simulations related to plasma dynamics; ionospheric, magnetospheric, and atmospheric dynamics; the effects of high-altitude nuclear weapons on the atmosphere; thermonuclear plasma confinement; atomic physics; and relativistic electron beam propagation. Areas of experimental interest include: relativistic electron beams, laser-matter interaction, thermonuclear fusion, electromagnetic wave generation, the generation of intense ion beams, advanced accelerator development, inductive energy storage, the interaction of charged particle beams with the atmosphere, and in-situ space plasma measurements.

### Personnel

Full-time civilian: 125

### Key Personnel

Name	Title	Code
Dr. S.L. Ossakow	Superintendent	4700
Dr. V.L. Patel	Associate Superintendent	4701
Dr. P. Palmadesso	Head, Special Project for Nonlinear Science	4700.3
Ms. T. Mason	Administrative Officer	4702
Dr. W. Manheimer	Senior Scientist, Fundamental Plasma Processes	4707
Dr. A.E. Robson	Senior Scientist, Controlled Fusion Research & Applications	4708
Dr. J. Davis	Head, Radiation Hydrodynamics Branch	4720
Dr. S. Bodner	Head, Laser Plasma Branch	4730
Dr. R.A. Meger	Head, Charged Particle Physics Branch	4750
Dr. G. Cooperstein	Head, Pulsed Power Physics Branch	4770
Dr. B. Ripin	Head, Space Plasma Branch	4780
Dr. P. Sprangle	Head, Beam Physics Branch	4790

Point of contact: Dr. V.L. Patel, Code 4701, (202) 767-2997

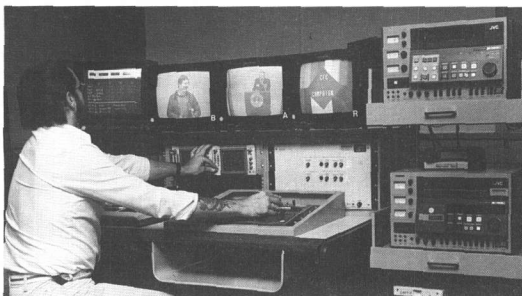
## Technical Information Division Code 4800

- Historian
- Information Services
- Research Library and Technical Information Center
- Microcomputer Software Support Center
- Publications
- Photographic Services
- Graphics Design Services



Microcomputer Software Support Center features IBM-compatible and Macintosh user work station.

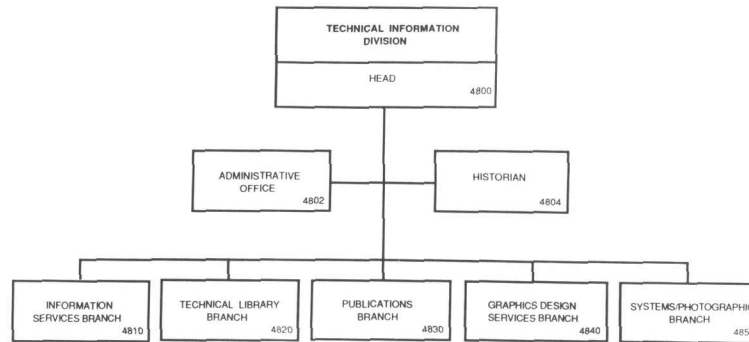
The graphic artists in the Graphic Design Services Branch design visuals and create artwork for NRL presentations and publications.



A full-service video/television production facility is available to produce professional-quality live and remote video technical reports. Complete editing, directing, and duplicating support are also available for video productions.



Mr. P. Imhof



### Basic Responsibilities

The Technical Information Division provides centralized support to the Laboratory, and sometimes the Office of Naval Research, by collecting, retaining, processing, publishing, presenting, and distributing information in many forms to many audiences.

The Technical Information Division supports the Laboratory by editing and publishing reports and publications; by providing a full range of Library services, including the Microcomputer Software Support Center, specialized scientific and general photographic services, illustration and visual aid services, DICOMED support, scientific composition, special projects graphics, auditorium and meeting support, collection and maintenance of historical data, exhibits, video data-gathering services; by managing public and internal information programs (publishing *Labstracts*, NRL's biweekly newspaper, and programming NRL's television network (NTN)); and by conducting Freedom of Information Act activities, as required by law.

### Personnel

Full-time civilian: 103

### Key Personnel

Name	Title	Code
Mr. P. Imhof	Head, Technical Information Division	4800
Mrs. C. Uffelman	Administrative Officer	4802
Dr. D. van Keuren	Historian	4804
Mr. J.W. Gately, Jr.	Head, Information Services Branch and Public Affairs Officer†	4810
Ms. L. Stackpole	Head, Technical Library Branch	4820
Mr. T. Calderwood	Head, Publications Branch	4830
Ms. L. Jackson	Head, Graphics Design Services Branch	4840
Mr. J. Lucas	Head, Systems/Photographic Branch	4850

**Point of contact:** Mrs. C. Uffelman, Code 4802, (202) 767-3370

†Additional Duty

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		<b>Warfare Systems and Sensors Research Directorate</b>		

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## **Warfare Systems and Sensors Research Directorate**

**Code 5000**

The Warfare Systems and Sensors Research Directorate performs basic research and development for major generic Navy systems. The emphasis is on radar, electronic warfare, undersea warfare systems, and the integration of these primary sensors by communications and battle management systems. The Directorate conducts an extensive experimental program in the field, using both ship and aircraft platforms to support the above activities. Programs in ocean engineering, environmental factors, artificial intelligence, and calibration and standards for underwater acoustic devices are pursued in support of research and development for Navy systems. In addition, the Directorate has responsibility for providing specialized computing and computer networking on a Laboratory-wide basis.

## Associate Director of Research for Warfare Systems and Sensors Research

Code 5000



Mr. R.R. Rojas

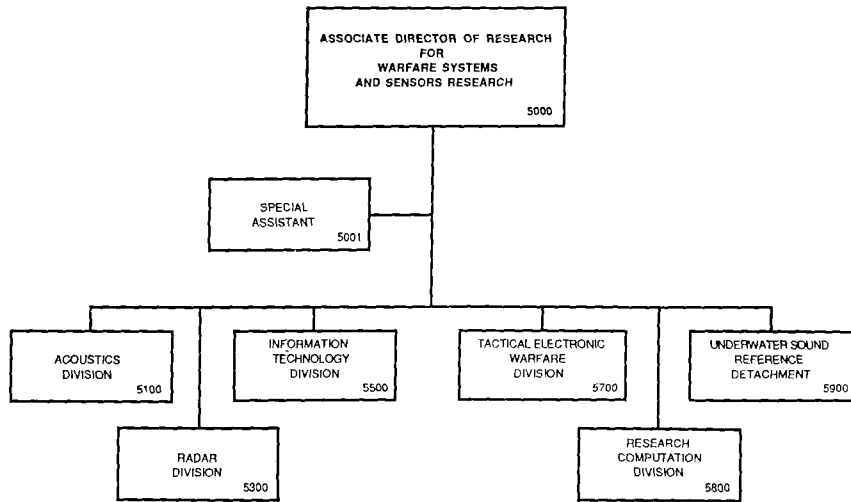
Mr. Rojas [REDACTED]. He attended City College of New York, where in 1952 he received a B.E.E. degree. In 1961, he received an M.E.E. degree from Drexel Institute of Technology, Philadelphia. Further graduate studies in mathematics and engineering were pursued at the University of Pennsylvania, Philadelphia.

From 1952 to 1960, Mr. Rojas was a project engineer in the Missile Department at Philco Corporation where he participated in the Talos, Terrier, and Tartar missile fuze programs and the Terrier missile guidance project. While at Philco, he received a company achievement award for his work on the design of specialized missile test equipment. From 1960 to 1969, he was manager of the Hydroacoustics Department at the Magnavox General Atronics Corporation. At General Atronics he was active in the area of signal processing techniques as applied to sonar, communication systems, and seismic detection systems.

In 1969, he joined the Naval Research Laboratory as Head of the Advanced Undersea Surveillance Program. In this capacity he was responsible for directing an experimental and theoretical program whose purpose was to evaluate and develop advanced surveillance systems for the Navy. Mr. Rojas served as Associate Director of Research and Director of Oceanology from 1977 until 1980, Associate Director of Systems Research and Technology Directorate from 1980 to 1986, and is currently Associate Director of the Warfare Systems and Sensors Research Directorate. Mr. Rojas also was on the graduate teaching staff at the Pennsylvania State University.

Mr. Rojas' research interests are centered on signal processing and the physics of underwater acoustic propagation, ambient noise, and reverberation.

Mr. Rojas is a member and Fellow of the Acoustical Society of America, Sigma Xi, the Institute of Electrical and Electronics Engineers, and the Association of Old Crows; he is also a charter member of the Marine Technology Society.



### Key Personnel

Name	Title	Code
Mr. R.R. Rojas	Associate Director of Research for Warfare Systems and Sensors Research	5000
Mrs. B.L. Fleming	Special Assistant	5001
Dr. D.L. Bradley	Superintendent, Acoustics Division	5100
Dr. M.I. Skolnik	Superintendent, Radar Division	5300
Dr. R.P. Shumaker	Superintendent, Information Technology Division	5500
Dr. J.A. Montgomery	Superintendent, Tactical Electronic Warfare Division	5700
Mr. R.F. Saegner	Head, Research Computation Division	5800
Dr. J.E. Blue	Superintendent, Underwater Sound Reference Detachment	5900

**Point of contact:** Mr. R.R. Rojas, Code 5000, (202) 767-3294

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\*Acting

# Acoustics Division

Code 5100

## Staff Activities

Special programs management  
Systems studies

System concepts and evaluation  
*USN Journal of Underwater Acoustics*

## Research Activity Areas

### Marine Physics

Geophysics  
Geology  
Oceanographic features that influence underwater acoustics

### Applied Ocean Acoustics

Airborne sensor systems  
Bottom-limited acoustics  
Arctic underwater acoustics  
Propagation  
Ambient noise measurements and modeling  
Spectral estimation  
Signal processing

### Physical Acoustics

Structural acoustics  
Reflection, diffraction, scattering by bodies  
Target strength modeling  
Fiber-optic acoustic sensors  
Acoustics of coatings  
Hydrodynamic/acoustic interaction with elastic bodies

### Signal Processing

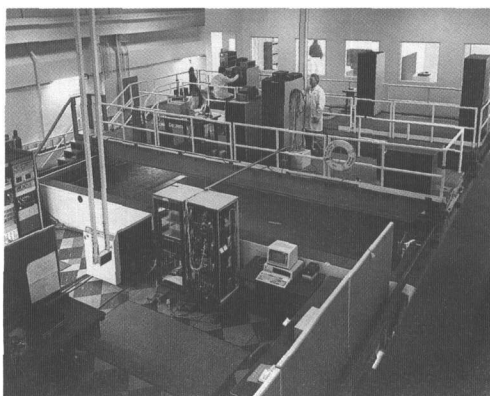
Signal processors  
Pattern recognition  
Processing methodology  
Parallel processing

### Acoustics Systems

Propagation, coherence, and wave-front behavior  
Large-scale spatial and temporal integration  
Low-frequency monostatic and multistatic reverberation  
Shallow-water acoustics  
Mode analysis  
Models of signal and noise fields  
Sensor fusion

### Marine Systems

Autonomous vehicle development  
Vehicle stability, control, and navigation  
Sensor research and development  
Adaptive sensor and control systems  
Scientific visualization



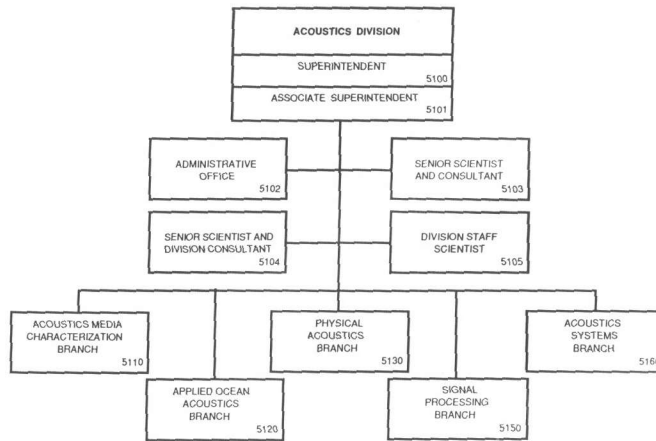
Structural acoustics studies in the instrumented NRL pool facility



Measurements at sea deploying a towed array in the North Atlantic



Dr. D.L. Bradley



### Basic Responsibilities

The Acoustics Division conducts basic and applied research in undersea physics. The basic research areas are: signal processing; ocean acoustics and the associated description of the ocean environment as it impacts advanced systems; and physical acoustics. The applied spectrum includes: developing and proving system concepts; signal processing for active and passive detection, tracking and classification of underwater targets; echo strength; structural acoustics; large area assessment techniques; and development of processing systems and techniques. Also included are basic and applied research in marine technology for ocean applications. The Division program is interactive with the ONR Contract Research Program, NOARL, and other Navy laboratories, both U.S. and foreign. The Division is responsible for bringing the Connection Machine (a parallel processor computer) online as part of NRL's commitment to maintaining a state-of-the-art computational capability.

### Personnel

Full-time civilian: 158

### Key Personnel

Name	Title	Code
Dr. D.L. Bradley	Superintendent	5100
Dr. J.T. Warfield	Associate Superintendent	5101
Mrs. N.J. Beauchamp	Administrative Officer	5102
Dr. B.G. Hurdle	Senior Scientist and Consultant	5103
Dr. S. Hanish	Senior Scientist and Division Consultant	5104
Dr. B.E. McDonald	Division Staff Consultant	5105
Mr. H.S. Fleming	Head, Acoustics Media Characterization Branch	5110
Dr. O. Diachok	Head, Applied Ocean Acoustics Branch	5120
Dr. J. Bucaro	Head, Physical Acoustics Branch	5130
Mrs. E.E. Wald	Head, Signal Processing Branch	5150
Dr. L.B. Palmer	Head, Acoustics Systems Branch	5160

Point of contact: Dr. D.L. Bradley, Code 5100, (202) 767-3482

# Radar Division

Code 5300

## Staff Activities

Systems research  
Electromagnetic propagation  
Electromechanical design  
Signal processing

## Research Activity Areas

### Radar Analysis

Radar systems  
Target signature prediction  
Electromagnetics and antennas

### Radar Techniques

High-frequency over-the-horizon radar  
Signal analysis  
Space-based radar

### Search Radar

Shipboard surveillance radar  
Precision tracking techniques  
Air traffic control

### Target Characteristics

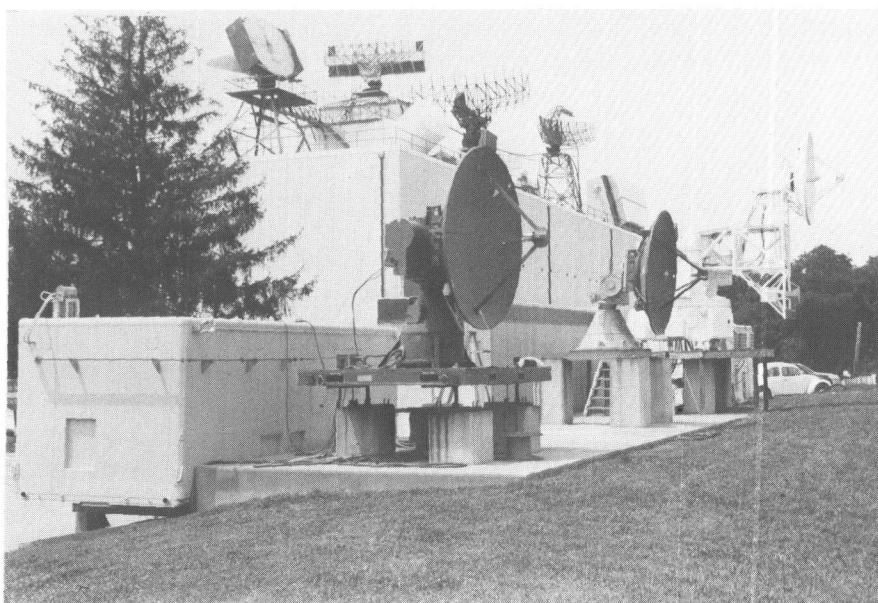
Electronic counter-countermeasures  
New system concepts  
Target signature analysis

### Identification Systems

Mark XII IFF improvements  
NATO identification system (Mk XV)  
Future identification technology

### Airborne Radar

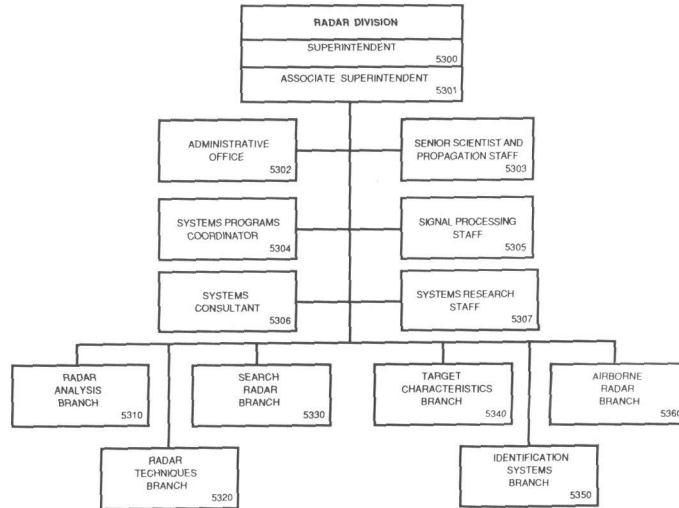
Airborne early-warning radar (AEW)  
Inverse synthetic aperture radar (ISAR)



Radar test site at Building 75, Chesapeake Bay Detachment (Chesapeake Beach, MD) showing radar antennas used in experimental development by the Radar Division. On the roof, from left to right: experimental back-to-back 2D/3D air surveillance radar test bed antennas; a directed mirror antenna (DMAR), a dual-frequency mirror-scan antenna with mechanically agile beam steering; antenna for Senrad, an experimental L-band system; and antennas for the SPS-49, SPS-10, IFF, SPS-40 and the fixed array surveillance radar (FASR) phased array. In the foreground from left to right: a high resolution X-band clutter radar (antenna and mount from the Marine Corp TPQ-27) with associated electronics van; the antenna and van for the Point Defense Demonstration Radar system; and the antenna for the high range resolution monopulse (HRRM) system.



Dr. M.I. Skolnik



### Basic Responsibilities

The Radar Division conducts research on basic physical phenomena of importance to radar and related sensors, investigates new engineering techniques applicable to radar, demonstrates the feasibility of new radar concepts and systems, performs related systems analyses and evaluation of radar, and provides special consultative services. The emphasis is on new and advanced concepts and technology in radar and related sensors that are applicable to enhancing the Navy's ability to fulfill its mission.

### Personnel

Full-time civilian: 150

### Key Personnel

Name	Title	Code
Dr. M.I. Skolnik	Superintendent	5300
Mr. I.D. Olin	Associate Superintendent	5301
Mrs. C. Hill	Administrative Officer	5302
Dr. L.B. Wetzel	Senior Scientist and Head, Propagation Staff	5303
Mr. D.F. Hemenway	Systems Programs Coordinator	5304
Mr. J.P. Letellier	Head, Signal Processing Staff	5305
Mr. J. Pavco	Systems Consultant	5306
Mr. C.E. Jedrey	Head, Systems Research Staff	5307
Dr. G.A. Andrews	Senior Consultant	5308
Dr. G.V. Trunk	Head, Radar Analysis Branch	5310
Mr. J.M. Headrick	Head, Radar Techniques Branch	5320
Dr. C.L. Temes	Head, Search Radar Branch	5330
Dr. B.H. Cantrell	Head, Target Characteristics Branch	5340
Mr. C.M. Veronda	Head, Identification Systems Branch	5350
Mr. T.L. apRhys	Head, Airborne Radar Branch	5360

Point of contact: Mr. I.D. Olin, Code 5301, (202) 767-2089

# Information Technology Division

Code 5500

## Research Activity Areas

### Navy Center for Applied Research in Artificial Intelligence

- Natural language understanding for message processing
- Natural language interfaces
- Automated fault diagnosis
- Expert systems for decision aids and consultation
- Machine learning
- Robotics software and computer vision

### Communication Systems

- Network design
- Secure communication systems
- Modulation, coding, and waveform design
- Satellite communication system technology
- Distributed simulation and prototyping

### Human-Computer Interaction (HCI) Laboratory

- Matching interface style with applications
- Devices/techniques for HCI
- Voice processing (synthesis, recognition, transmission, etc.)
- Man-in-loop interface evaluation

### Center for Secure Information Technology

- Security architecture
- Formal proofs of system security
- COMSEC application technology
- Secure networks
- Software engineering for secure systems
- Key management and distribution

### Transmission Technology

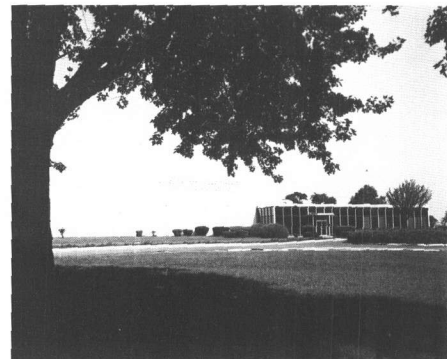
- Arctic communication
- Submarine communication technology
- Communication system architecture
- Communication antenna/propagation technology
- Signal processing for high-frequency intercept system

### Battle Management Technology

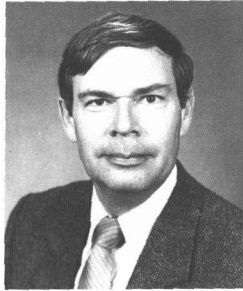
- Command decision support
- Parallel computing
- Battle management/C<sup>3</sup>
- Data fusion technology
- Database management technology
- Real-time parallel processing
- Distributed simulation



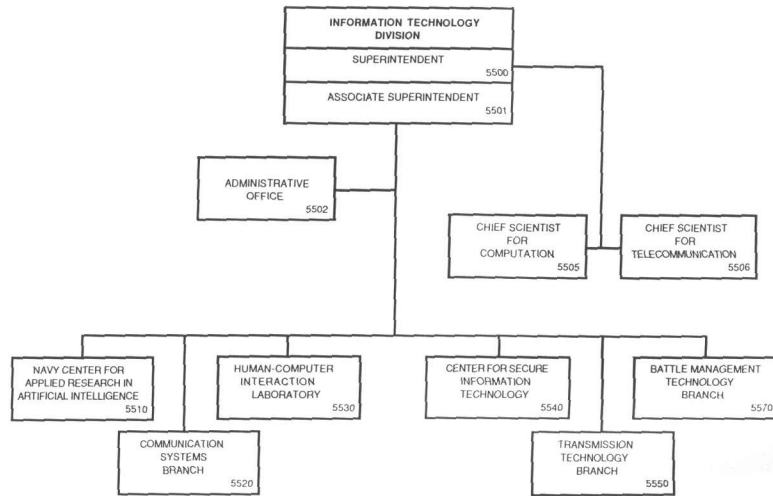
NRL scientists participate in yearly ICEX field test conducted in the Arctic. The goal of this work is to better understand the processes that limit the performance of communication channels having strategic value in this important geographic region.



The Navy Center for Applied Research in Artificial Intelligence is engaged in research and development designed to address the application of artificial intelligence technology and techniques to critical Navy and national problems.



Dr. R.P. Shumaker



### Basic Responsibilities

The Information Technology Division conducts research and development programs in the collection, transmission, and processing of information to provide a basis for improving the conduct of military operations. The organization of the Division is directed toward addressing the technologies and subsystems necessary to develop architectures and system designs for the next-generation battle-force warfare systems.

### Personnel

Full-time civilian: 174

### Key Personnel

Name	Title	Code
Dr. R.P. Shumaker	Superintendent	5500
Mr. W.D. Long	Associate Superintendent	5501
Ms. J. Saunders	Administrative Officer	5502
Vacant	Chief Scientist for Computation	5505
Mr. D.I. Himes	Chief Scientist for Telecommunication	5506
Mrs. L.C. Davis*	Director, Navy Center for Applied Research in Artificial Intelligence	5510
Mr. E.L. Althouse	Head, Communication Systems Branch	5520
CDR R.C. Carter	Head, Human-Computer Interaction Laboratory	5530
Mr. D.I. Himes	Director, Center for Secure Information Technology	5540
Mr. E.J. Kennedy	Head, Transmission Technology Branch	5550
Mr. M.S. McBurnett	Head, Battle Management Technology Branch	5570

Point of contact: W.D. Long, Code 5501, (202) 767-2954

\*Acting

# Tactical Electronic Warfare Division

Code 5700

## Staff Activities

Long-range EW strategic planning  
Lead laboratory coordinating  
Communications CM Group  
Central Target Simulator Program  
Effectiveness of Naval EW Systems (ENEWS)  
Special Facilities Development Group

## Research Activity Areas

### Off-Board Countermeasures

Expendable technology  
Expendable devices  
Off-board systems  
Decoys

### Airborne Electronic Warfare Systems

Air systems development  
Penetration aids  
Power source development  
Jamming and deception  
Millimeter-wave technology

### Ships Electronic Warfare Systems

Ships systems development  
Jamming technology  
Deception techniques

EW antennas  
Threat simulators

### Electronic Warfare Support Measures

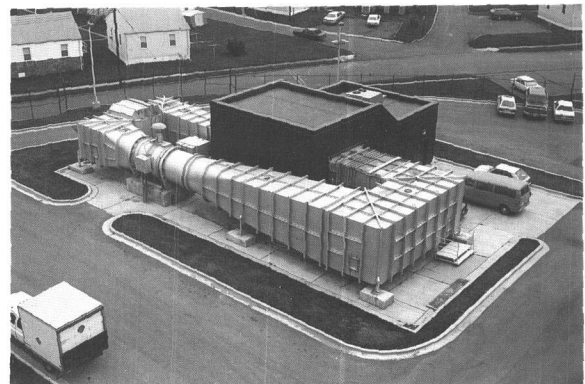
Intercept systems and direction finders  
RF signal simulators  
Systems integration  
Command and control interfaces  
Signal processing

### Advanced Techniques

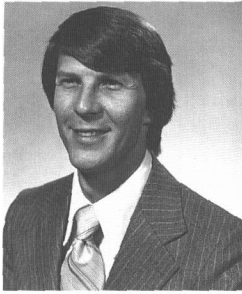
Analysis and modeling simulation  
New EW techniques  
Experimental systems  
EW concepts  
Infrared technology



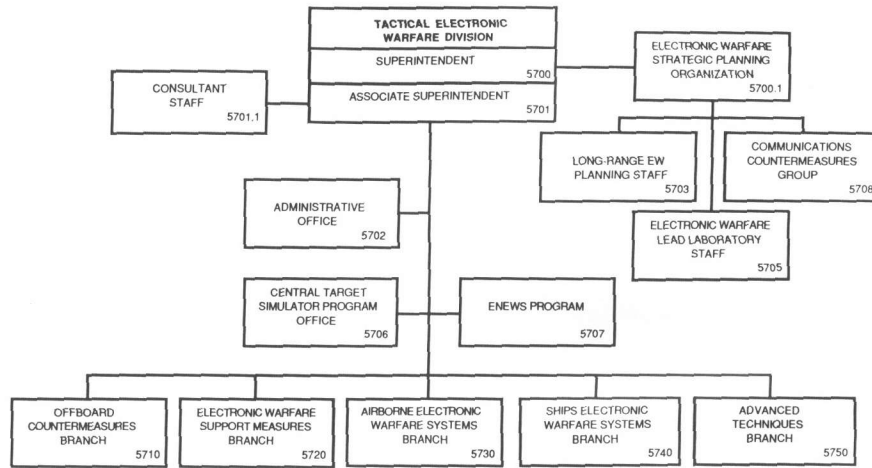
The Tactical Electronic Warfare Division is housed in the newly enlarged Building 210. This facility contains many special laboratories to support research and development of countermeasures against communication, radar, and IR threats.



The offboard test platform is a continuous flow, low-speed wind tunnel, optimized for testing small unmanned air vehicles. The facility is especially suited to the study of subsonic low Reynolds number aerodynamics, due to its low turbulence intensity.



Dr. J.A. Montgomery



### Basic Responsibilities

The Tactical Electronic Warfare Division (TEWD) is responsible for research and development in support of the Navy's tactical electronic warfare requirements and missions. These include electronic warfare support measures, electronic countermeasures, and supporting counter-countermeasures, as well as studies, analyses, and simulations for determining and improving the effectiveness of these systems.

### Personnel

Full-time civilian: 246

### Key Personnel

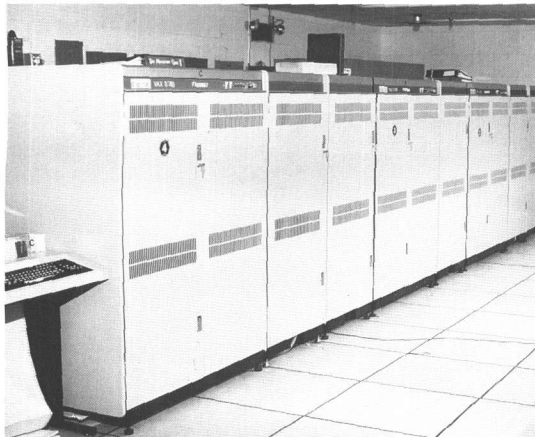
Name	Title	Code
Dr. J.A. Montgomery	Superintendent	5700
Mr. H.W. Zwack	Associate Superintendent/Head, Consultant Staff	5701/5701.1
Dr. C.H. Heider	Head, Electronic Warfare Strategic Planning Organization	5700.1
Mr. D.M. Swann	Administrative Officer	5702
Dr. C.H. Heider	Head, Long-Range EW Planning Staff	5703
Vacant	Head, Electronic Warfare Lead Laboratory Staff	5705
Mr. A.A. Di Mattesa	Manager, Central Target Simulator Program Office	5706
Mr. D.F. Grady	Manager, ENEWS Program	5707
Mr. W.W. Everett	Head, Communications Countermeasures Group	5708
Dr. F.J. Klemm	Head, Offboard Countermeasures Branch	5710
Mr. T. Jones	Head, Electronic Warfare Support Measures Branch	5720
Mr. J.C. Constantine	Head, Airborne Electronic Warfare Systems Branch	5730
Mr. H.E. Crecraft	Head, Ships Electronic Warfare Systems Branch	5740
Dr. G.E. Friedman	Head, Advanced Techniques Branch	5750

Point of contact: Mr. H.W. Zwack, Code 5701, (202) 767-3622

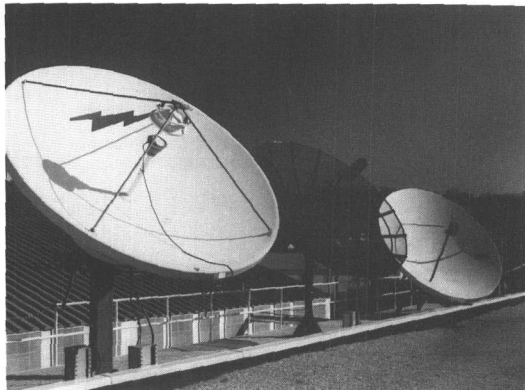
## Research Computation Division Code 5800



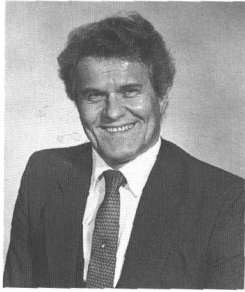
The Cray X-MP/216 multiprocessor supercomputer provides very high-speed vector and scalar processing with a peak processing speed of 488 million floating-point operations per second (MFLOPS) with a sustainable speed of 105 MFLOPS per processor



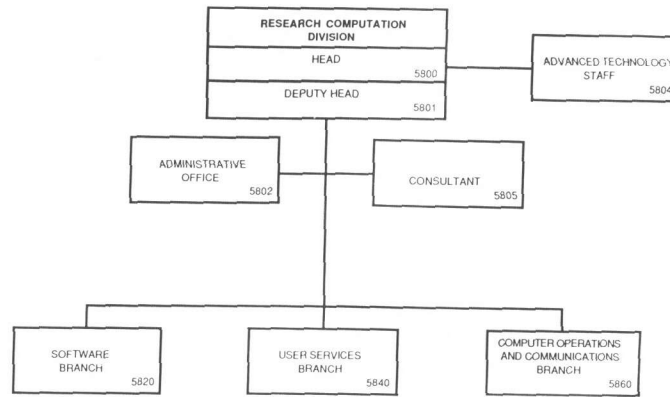
These four VAX 11/785s provide access to the Cray X-MP/216 from NRL's local area network and the Defense Data Network, thus providing access from terminals, PCs, minicomputers, workstations, and other computers throughout the country



Satellite dishes provide video reception for NICENET; including news, weather, seminars, and training programs



Mr. R.F. Saenger



### Basic Responsibilities

The Research Computation Division (RCD) provides a wide variety of computing and networking services to more than 1700 scientists, analysts, and engineers at NRL/ONR throughout the United States and at remote locations from London to Tokyo. These services include high-volume, time-shared, local and remote batch processing, interactive graphics, telecommunications processing, and user support.

The RCD manages and operates NRL's Central Computing Facility (CCF), a totally integrated computer system consisting of a Cray X-MP/216 multiprocessor with its associated support equipment, and a high-speed network of Digital Equipment Corporation VAX 785 plus VAX 8350 computer systems that facilitate communications between the user community and the CCF. Both local and remote users access the CCF through their host computers (including personal workstations) or by terminals. The RCD also manages and operates the NRL Integrated Communications Environment Network (NICENET), which is the local area network for NRL. NICENET encompasses data and video services as well as gateways to networks and computer systems worldwide (e.g. Internet, DDN/MILNET, SURANET/NFSNET, USAN, SPAN).

The RCD also provides appropriate ADP technical logistic support services for NRL; identifies ADP requirements and may secure and administer contractual ADP support services; and supports the Navy Laboratory Computing Committee and the Navy Laboratory Computer Network.

### Personnel

Full-time civilian: 51

### Key Personnel

Name	Title	Code
Mr. R.F. Saenger	Head, Research Computation Division	5800
Ms. D.E. Gossett	Deputy Head	5801
Ms. B.M. Thomas	Administrative Officer	5802
Mr. R.F. Saenger*	Head, Advanced Technology Staff	5804
Mr. H.K. Brock	Head, Consultant Staff	5805
Mr. G.E. Perez	Head, Software Branch	5820
Ms. H.K. Howell	Head, User Services Branch	5840
Mr. J.N. Lockard	Head, Computer Operations and Communications Branch	5860

**Point of contact:** Mr. R.F. Saenger, Code 5800, (202) 767-2751

\*Acting

# Underwater Sound Reference Detachment

## Code 5900

### Research Activity Areas

#### Measurements

- Calibration theory and accuracy
- Measurement methods
- Standard calibration services
- Sonar transducer test and evaluation
- Transduction and radiation theory
- Wavenumber calibration
- Explosive shock testing

#### Acoustical Systems

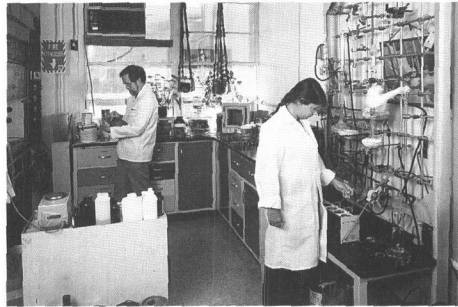
- Computation services
- Digital systems
- Analog systems
- Signal analysis
- Low-noise preamplifiers
- Measurement systems

#### Acoustic Materials

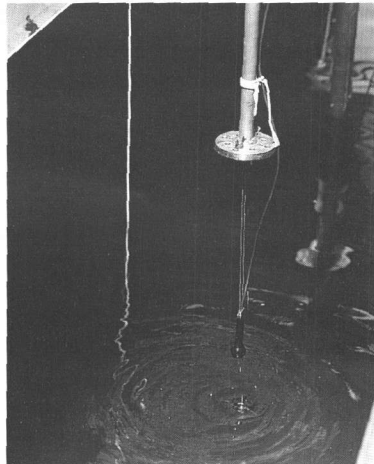
- Polymers
- Transduction materials
- Adhesives
- Measurements
- Quality control
- Chemical analysis

#### Transducers

- Electroacoustic standards
- Acoustic sources
- Specialized electroacoustic transducers
- Transducer loan services
- Transducer reliability
- Sonar transducers
- Accelerated life testing
- Transducer modeling



Chemistry laboratory where polymer materials used in underwater acoustical systems are developed and analyzed



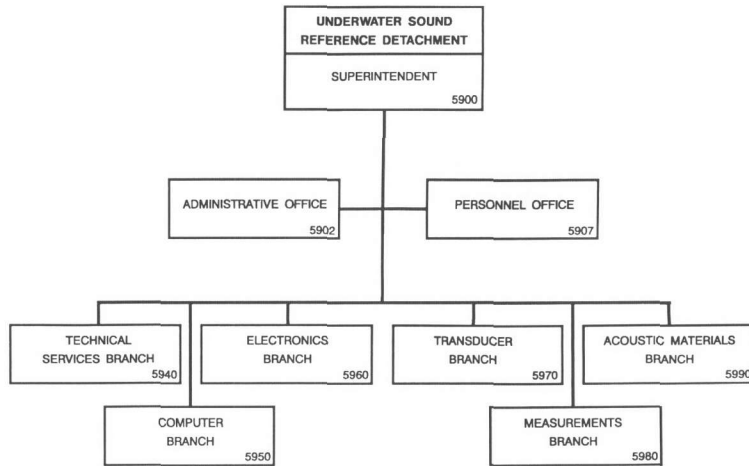
A USRD standard F42C transducer being raised from a test well



Technician lowering the cover to the smaller of the two ports of entry/exit to the anechoic tank pressure vessel in preparation for a test. The tank is used to test various types of sonar transducers as a function of temperature and pressure.



Dr. J. E. Blue



### Basic Responsibilities

The Underwater Sound Reference Detachment (USRD) serves as the principal Navy expert in the theory and practice of underwater sound measurements. Specialized facilities provide acoustic calibration and test and evaluation measurements for acoustic transducers and materials. These facilities can simulate actual ocean temperatures and pressures over a broad frequency range, allowing them to accommodate nearly all underwater acoustic devices. The USRD conducts research and development on the theory and design of underwater electroacoustic transducers and in developing analytical techniques and instrumentation for electrical, mechanical, and electroacoustic testing of transducers and transducer components. Research is also conducted in the area of materials used to generate, transmit, and absorb underwater sound. It is a link in the traceability of underwater sound measurements to the National Institute of Standards and Technology (formerly the National Bureau of Standards), supplying calibrated transducers for use in calibration and development of underwater acoustic weapons and sonar transducers. This provides greater uniformity, accuracy, and reliability in underwater acoustic measurement throughout the Navy and industry. The USRD participates in the establishment of Navy, national, and international standards for underwater acoustics.

### Personnel

Full-time civilian: 113

#### Key Personnel

Name	Title	Code
Dr. J.E. Blue	Superintendent	5900
Dr. R.W. Timme	Associate Superintendent	5901
Ms. T.E. Givens	Head, Administrative Office	5902
Dr. R.W. Timme†	Program Manager for External Transitions	5904
Dr. A.E. Markowitz	Program Manager for Internal Transitions	5905
Ms. G. Stith	Head, Personnel Office	5907
Mr. S.E. Forsythe	Head Acoustical Systems Branch	5930
Mr. G.E. Woods	Head, Technical Services Branch	5940
Dr. R.Y. Ting*	Head, Transducer Branch	5970
Dr. A.L. Van Buren	Head, Measurements Branch	5980
Dr. R.Y. Ting	Head, Acoustic Materials Branch	5990

**Point of contact:** Ms. T.E. Givens, Code 5902, (407) 857-5184

†Additional duty

\*Acting

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		<b>Materials Science and Component Technology Directorate</b>		

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## **Materials Science and Component Technology Directorate**

**Code 6000**

The Materials Science and Component Technology Directorate carries out a multidisciplinary research program whose objectives are the discovery and exploitation of new improved materials, the generation of new concepts associated with materials behavior, and the development of advanced components based on these new and improved materials and concepts. Theoretical and experimental research is carried out to determine the scientific origins of materials behavior and to develop procedures for modifying these materials to meet important naval needs for advanced platforms, electronics, sensors, and photonics. The program includes investigations of a broad spectrum of materials includ-

ing insulators, semiconductors, superconductors, metals and alloys, optical materials, polymers, plastics, and artificially structured biomolecular materials and composites, which are used in important naval devices, components, and systems. New techniques are developed for producing, processing, and fabricating these materials for crucial naval applications.

The synthesis, processing, properties, and limits of performance of these materials in natural or radiation environments, components under deleterious conditions such as those associated with the marine environment, neutron or directed energy beam irradiation, or extreme temperatures and pressures, are established.

## Associate Director of Research for Materials Science and Component Technology

Code 6000



Dr. B.B. Rath

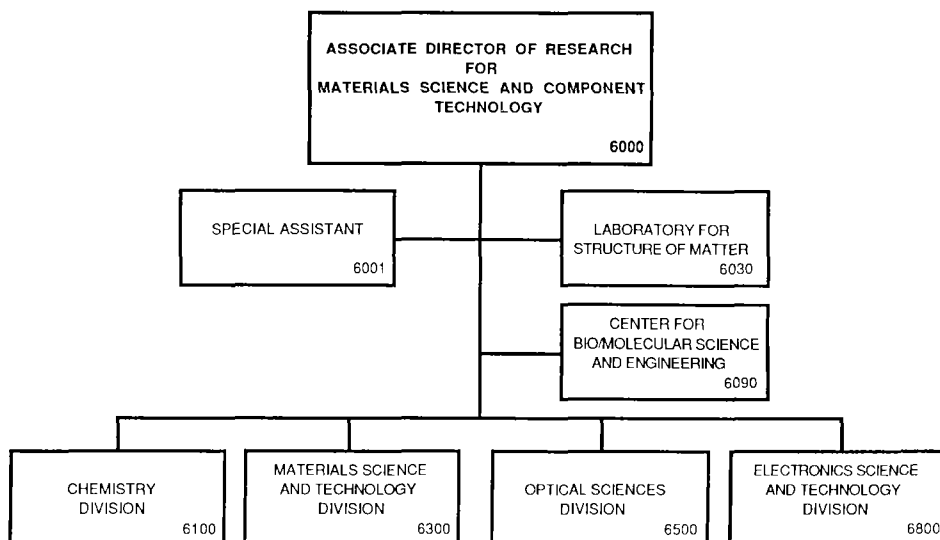
Dr. Rath [REDACTED] He received a B.S. degree in physics and mathematics from Utkal University, an M.S. in metallurgical engineering from Michigan Technological University, and a Ph.D. from the Illinois Institute of Technology.

Dr. Rath was Assistant Professor of Metallurgy and Materials Science at Washington State University from 1961 to 1965. From 1965 to 1972, he was with the staff of the Edgar C. Bain Laboratory for fundamental research of the U.S. Steel Corporation. From 1972 to 1976, he headed the Metal Physics Research Section of the McDonnell Douglas Research Laboratories, in St. Louis, Missouri, until he came to NRL as Head of the Physical Metallurgy Branch. During this period he was adjunct Professor at the Carnegie-Mellon University, the University of Maryland, and the Colorado School of Mines. Dr. Rath served as Superintendent of the Materials Science and Technology Division from 1982 to 1986, when he was appointed to his present position.

Dr. Rath is recognized in the fields of solid state transformations, grain boundary migrations, and structure-property relationships in metallic systems. He has published over 140 papers in these fields and edited several books and conference proceedings.

Dr. Rath serves on several planning, review, and advisory boards including the Department of Defense, Joint Directors of Laboratories, National Materials Advisory Board of the National Academy of Science, National Science Foundation, Carnegie-Mellon University, University of Virginia, and Colorado School of Mines. He serves as the Navy representative to the panel of The Technical Cooperation Program (TTCP) countries and the Indo-U.S. Joint Commission on Science and Technology.

Dr. Rath is a fellow of the American Society for Materials-International (ASM), Washington Academy of Sciences, a member of Sigma Xi, and The Metallurgical Society (TMS). He serves as a member of the Board of Directors of TMS, editorial board of international journals, and as chairman of several committees of TMS and ASM.



### Key Personnel

Name	Title	Code
Dr. B.B. Rath	Associate Director of Research for Materials Science and Component Technology	6000
Mr. R.A. Gray	Special Assistant	6001
Dr. J. Karle	Chief Scientist, Laboratory for Structure of Matter	6030
Dr. J. Schnur	Head, Center for Bio/Molecular Science and Engineering	6090
Dr. J.S. Murday	Superintendent, Chemistry Division	6100
Dr. D.U. Gubser	Superintendent, Materials Science and Technology Division	6300
Dr. T.G. Giallorenzi	Superintendent, Optical Sciences Division	6500
Dr. G.M. Borsuk	Superintendent, Electronics Science and Technology Division	6800

**Point of contact:** Mrs. J. Smithwick, Code 6000A, (202) 767-3566

# Laboratory for Structure of Matter

Code 6030

## Basic Responsibilities

The Laboratory for Structure of Matter carries out experimental and theoretical investigations of the atomic, molecular, glassy, and crystalline structures of materials. The methods of X-ray, electron, and neutron diffraction are used in a broad program of structural studies that can form the basis for understanding and interpreting the results of research investigations in a wide variety of scientific disciplines. Structural investigations relate structure to function, facilitate industrial syntheses and the creation of new materials with improved properties, and provide foundation information for numerous associated disciplines and studies. Applications are made, for example, to propellants, explosives, dense energetic materials, absorptive carbons, metallic glasses, device materials, ion carriers, antibiotics, analgesics, reversible oxygen carriers, and synthetic reaction intermediates and final products.

## Personnel

Full-time civilian: 12



Dr. J. Karle  
Recipient of 1985 Nobel Prize in Chemistry

## Key Personnel

Name	Title
Dr. J. Karle	Chief Scientist, Laboratory for Structure of Matter

**Point of contact:** Dr. C. George, Code 6030, (202) 767-3463

# Center for Bio/Molecular Science and Engineering

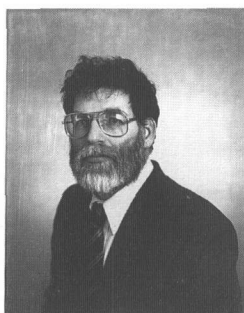
Code 6090

## Basic Responsibilities

The Center for Bio/Molecular Science and Engineering conducts research in biotechnology aimed at solutions of problems for the Navy, Department of Defense, and the nation at large. Long-term research directions focus on complex bio/molecular systems and are aimed at gaining a fundamental understanding of the structures and functions of biologically-derived systems. The staff of the Center is an interdisciplinary team performing basic and applied research in a number of diverse areas including biochemistry, biophysics, synthesis, and thin-film fabrication. Because of the interdisciplinary nature of this work, most of the research being performed in the Center is of a collaborative nature. The Center Associate concept is a key way of establishing this collaboration. Center Associates come from other research areas within NRL as well as universities, industry, and other Government laboratories.

## Personnel

Full-time civilian: 20



Dr. J.M. Schnur

## Key Personnel

Name	Title
Dr. J.M. Schnur	Head, Center for Bio/Molecular Science & Engineering
Dr. B.P. Gaber	Deputy Head, Center for Bio/Molecular Science & Engineering
Dr. J.M. Calvert	High Resolution Patterning Program Manager
Dr. E.L. Chang	Archaeobacteria Research Program Manager
Dr. T.L. Fare	ONT Receptor Based Biosensor Program Manager
Dr. F.S. Ligler	Immuno/Bio Sensors Program Manager
Mr. R.R. Price	Tubule Based Antifouling Paint Program Manager
Dr. A.S. Rudolph	Red Blood Cell Surrogate Program Manager
Dr. P.E. Schoen	ONT Tubule Based Materials Program Manager
Dr. A. Singh	Advanced Polymerizable Lipid Synthesis
Dr. R.B. Thompson	ONT Fiber Optic Sensor Program Manager

Point of contact: Mrs. C. Schmidt, Code 6090A, (202) 767-3557

# Chemistry Division

Code 6100

## Staff Activity

Fire Protection and Damage Control  
Program Office

## Research Activity Areas

### Chemical Diagnostics

- Optical diagnostics of chemical reactions
- Kinetics of gas phase reactions
- Trace analysis
- Atmosphere analysis and control
- Ion/molecule processes
- Theoretical chemistry

### Materials Chemistry

- Synthesis and evaluation of innovative polymers
- Functional organic coatings
- Polymer characterization
- Quality control methodology
- Degradation and stabilization mechanisms
- High-temperature resins
- OMCVD materials

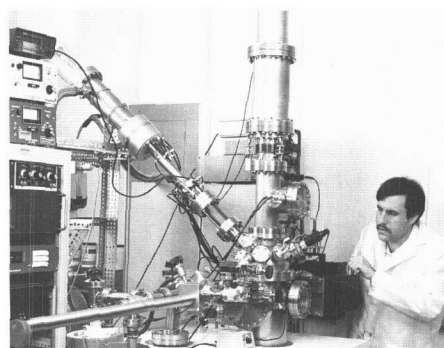
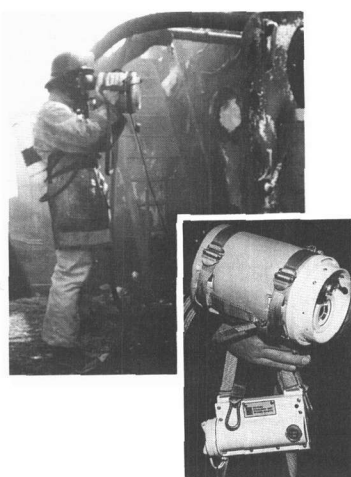
### Surface/Interface Chemistry

- Tribology
- Surface properties of materials
- Surface/interface analysis
- Chemical microdetectors
- IR/RF decoy materials
- Surface reaction dynamics
- High-temperature chemistry
- Diamond films
- Beam-enhanced chemistry

### Combustion & Fuels

- Distillate fuels research
- Combustion dynamics
- Fire protection and suppression
- Personnel protection
- Modeling and scaling of combustion systems
- Chemical and biological defense
- Synthetic fuels
- Safety and survivability
- Corrosion prevention
- Solution chemistry

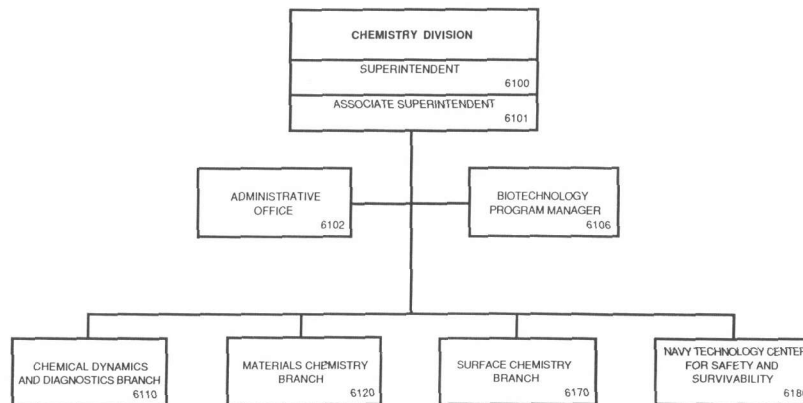
Navy combatant ships are now receiving Naval Firefighters Thermal Imagers (NFTIs) as a result of a 4-year evaluation and testing program conducted by NRL scientists. NFTI, which has already been used in one fire aboard an aircraft carrier, allows firefighters to immediately locate and extinguish a fire.



This state-of-the-art time-of-flight secondary ion mass spectrometer (SIMS), constructed at NRL, is one of only four in the world, and is the only one in the United States. It has the ability to analyze submonolayer thin films on surfaces with a demonstrated mass range of over 9000 amu and a mass resolution of 2000. It is successfully used for analyzing both organic and inorganic materials and can be applied to a wide range of both basic and applied research areas.



Dr. J. S. Murday

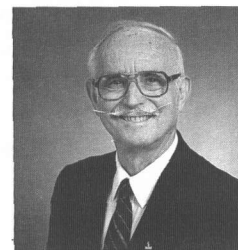


### Basic Responsibilities

The Chemistry Division conducts basic and applied research and development studies in the broad fields of chemical diagnostics, materials chemistry, surface and electrochemistry, combustion, and fuels chemistry. Specialized programs within these fields include organic polymeric materials, coatings, dynamics, laser chemistry, electroactive polymers, tribology, physical and chemical characterization of surfaces and theory of surfaces, chemistry of electronic materials, submarine atmosphere analysis and control, lipid chemistry, membranes and novel structures, sensors, solution chemistry.

### Navy Technology Center for Safety and Survivability

To enhance protection of Navy personnel and platforms from damage and injury in peace and wartime, the Center performs RDT&E on fire and personnel protection, fuels, chemical defense, submarine atmospheres, and damage control aspects of ship and aircraft survivability; supports Navy and Marine Corps requirements in these areas, and acts as a focus for technology transfer in safety and survivability.



Dr. H.W. Carhart

### Personnel

Full-time civilian: 120

### Key Personnel

Name	Title	Code
Dr. J.S. Murday	Superintendent	6100
Dr. W.B. Fox	Associate Superintendent	6101
Ms. B.L. Russell	Administrative Officer	6102
CAPT W.W. Schultz, USN	Biotechnology Program Manager	6106
Dr. J. McDonald	Head, Chemical Dynamics & Diagnostics Branch	6110
Dr. W.B. Moniz	Head, Materials Chemistry Branch	6120
Dr. D.L. Venezky	Head, Surface Chemistry Branch	6170
Dr. H.W. Carhart	Head, Navy Technology Center for Safety and Survivability	6180

Point of contact: Ms. B. Russell, Code 6102, (202) 767-2460

# Materials Science and Technology Division

Code 6300

## Research Activity Areas

### Materials Physics

- Superconductivity
- Magnetism
- Electronic properties
- Metallic film growth and characterization

### Physical Metallurgy

- Phase transformations and defect states
- Microstructure-property relationships
- Elasticity, plasticity, mechanical phenomena
- Surface processing
- Alloy development
- Elevated temperature behavior of materials
- Rapid solidification processing of materials

### Mechanics and Structural Properties

- Micromechanisms of crack growth
- Subcritical crack growth and fracture
- Failure mechanisms and criteria
- Computational, fracture, and structural mechanics
- Constitutive theories
- Reliability analysis and failure modes of components and systems

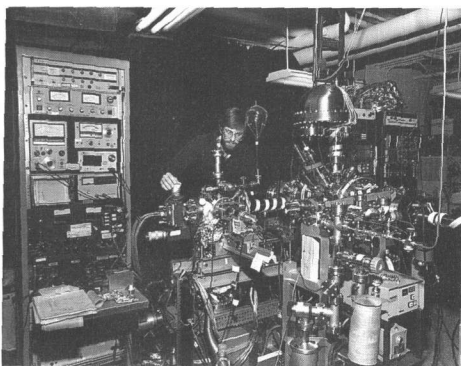
- Nondestructive evaluation
- Performance and survivability
- Elevated temperature materials

### Composites and Ceramics

- Processing, fabrication, and microstructural characterization
- Thermostructural applications
- Ceramics for electronic, piezoelectric, optical, and other nonmechanical applications
- Physical, mechanical, and failure characterization and analysis

### Environmental Effects

- Microstructural characterization
- Influence of environment on high-temperature materials
- Corrosion science and mechanisms
- Stress corrosion cracking
- Surface protection and inhibitors
- Marine corrosion



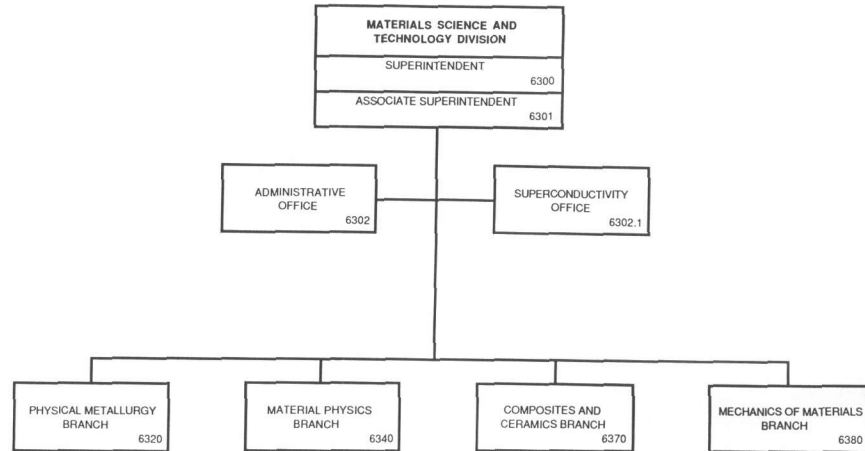
The growth of single crystal magnetic films on semiconductor substrates for electronics applications is observed.



Ultrasonic imaging and analysis system for nondestructive inspection of irregular objects and simple bodies of revolution. The computer-interactive automated system provides acoustic images of bodies fabricated from metals or composites in real time, with visual indicators of defects that may be present.



Dr. D.U. Gubser



### Basic Responsibilities

The Materials Science and Technology Division conducts basic and applied research and engages in exploratory and advanced development of materials having substantive value to the Navy. R&D programs encompass the intrinsic behavior of metals, alloys, ceramics, glasses, and composites and their performance and reliability in naval structures and devices. Program objectives include achieving fundamental understanding of the mechanical, physical, electrical, magnetic, superconducting, and electrochemical properties of materials; identifying composition, processing, and microstructural parameters to produce improved materials; and developing guidelines for the selection, design, and certification of materials for life-cycle management of naval structures and systems. This diversity of programs is carried out by interdisciplinary teams of material scientists, metallurgists, ceramists, physicists, chemists, and engineers, using the most advanced testing facilities and diagnostic techniques.

### Personnel

Full-time civilian: 130

#### Key Personnel

Name	Title	Code
Dr. D.U. Gubser	Superintendent	6300
Mr. R.W. Judy, Jr.	Associate Superintendent	6301
Mrs. S.A. McIntire	Administrative Officer	6302
Dr. D.U. Gubser	Program Administrator, Superconductivity Office	6302.1
Dr. C.R. Crowe	Head, Physical Metallurgy Branch	6320
Dr. S.A. Wolf	Head, Material Physics Branch	6340
Dr. S.C. Sanday	Head, Composites and Ceramics Branch	6370
Dr. R. Badaliance	Head, Mechanics of Materials Branch	6380

Point of contact: Mrs. B. Wood, Code 6300A, (202) 767-2926

# Optical Sciences Division

Code 6500

## Staff Activities

Program analysis and development  
Special systems analysis  
Technical study groups

Technical contract monitoring  
Theoretical studies

## Research Activity Areas

### Optical Probes

Laser-matter interactions  
Photophysical processes  
Nonlinear optical phenomena  
Electronic properties of materials  
Optical instrumentation  
Interferometry

### Advanced Concepts

IR low observables  
IR space surveillance systems  
EO/IR systems analysis  
Airborne IR search and track technology  
Atmospheric IR measurements  
Ship IR signatures

### Applied Optics

Optical image and information processing  
Optical technology  
Ultraviolet component development and  
UV countermeasures  
Atmospheric optics  
Propagation studies  
Laser radar

### Laser Physics

Molecular and chemical laser physics  
Interferometry  
Laser chemical kinetics  
Diode laser pumped solid state lasers

Electrically driven lasers  
Laser-induced reactions  
Laser materials diagnostics  
Nonlinear frequency conversion  
Beam cleanup technology  
Optical phase conjugation  
Optical instrumentation and probes

### Electro-Optical Technology

Optical and IR countermeasures  
Detection signal processing studies  
Optical seeker studies  
Solid state laser development  
Optical imager development  
Optical interactions in semi-  
conductor superlattices  
Nonlinear optical organic solids

### Optical Techniques

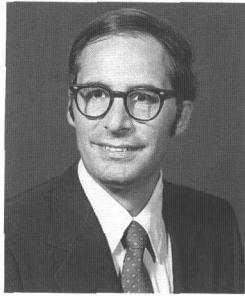
Picosecond light pulses  
Diode laser applications  
Optical waveguides  
Radiation-induced defects  
Optical control of solid state electronic devices  
Fiber-optic sensors  
Integrated optics  
Fiber-optic materials and fabrication



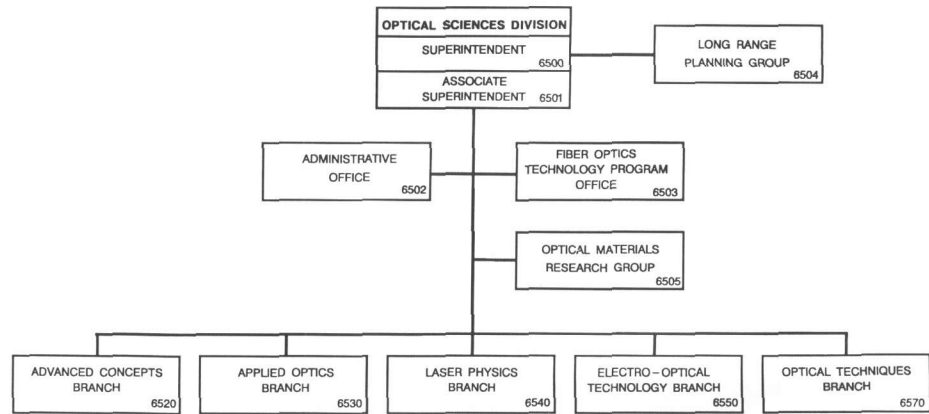
The Missile Seeker Evaluation Facility is a computerized facility that is used to evaluate optical countermeasures to infrared missile seekers and infrared imaging sensors.



The Focal Plane Array Evaluation Facility consists of the optical sources and electronics required to evaluate monolithic or hybrid infrared focal plane arrays that use charge-coupled device, charge-injection device, direct readout, or charge-imaging matrix technologies.



Dr. T.G. Giallorenzi



### Basic Responsibilities

The Optical Sciences Division carries out a variety of research, development, and application-oriented activities in the generation, propagation, detection, and use of radiation in the wavelength region between near-ultraviolet and far-infrared wavelengths. The research, both theoretical and experimental, is concerned with discovering and understanding the basic physical principles and mechanisms involved in optical devices, materials, and phenomena. The development effort is aimed at extending this understanding in the direction of device engineering and advanced operational techniques. The applications activities include systems analysis, prototype system development, and exploitation of R&D results for the solution of optically related military problems. In addition to its internal program activities, the Division serves the Laboratory specifically and the Navy generally as a consulting body of experts in optical sciences. The work in the Division includes studies in quantum optics, laser physics, optical waveguide technologies, laser-matter interactions, atmospheric propagation, optical technology, holography, optical warfare, optical data processing, optical systems, optical materials, radiation damage studies, IR surveillance and missile seeker technologies, IR signature measurements, optical recording materials, and optical diagnostic techniques. A significant portion of the effort is devoted to developing, analyzing, and using special optical materials. Various field measurement programs on optical problems of specific interest are also conducted.

### Personnel

Full-time civilian: 136

### Key Personnel

Name	Title	Code
Dr. T.G. Giallorenzi	Superintendent	6500
Mr. J.M. McMahon*	Associate Superintendent	6501
Mrs. D.D. Nolan	Administrative Officer	6502
Mr. G. Cogdell	Head, Fiber Optics Technology Program Office	6503
Dr. J.C. Kershenstein	Long-Range Planning Group	6504
Mr. J.M. McMahon	Long-Range Planning Group	6504
Dr. R.A. Patten	Long-Range Planning Group	6504
Dr. D.L. Esterowitz	Long-Range Planning Group	6504
Dr. E.J. Friebele	Head, Optical Materials Research Group	6505
Dr. J.C. Kershenstein	Head, Advanced Concepts Branch	6520
Dr. R.A. Patten	Head, Applied Optics Branch	6530
Dr. B. Feldman	Head, Laser Physics Branch	6540
Dr. L. Esterowitz	Head, Electro-Optical Technology Branch	6550
Dr. J. Weller	Head, Optical Techniques Branch	6570

**Point of contact:** Mrs. D. Nolan, Code 6502, (202) 767-2855

\*Acting

# Electronics Science and Technology Division

Code 6800

## Research Activity Areas

### Electronic Materials

Preparation and development of magnetic, dielectric, optic, and semiconductor materials  
Electrical, optical, and magneto-optical studies of semiconductor microstructures, surfaces, and interfaces  
Impurity and defect studies  
Structural and electronic properties of amorphous semiconductors  
Condensed matter theory  
High magnetic field phenomena

### Surface and Interface Sciences

Metal organic chemical vapor deposition  
Surface and interface physics  
Vacuum surface research  
Processing research for nanometric electronics  
Growth and characterization of surfaces and interfaces  
High-temperature superconductors

### Microwave Technology

Microwave, millimeter-wave, and submillimeter-wave component and circuit research

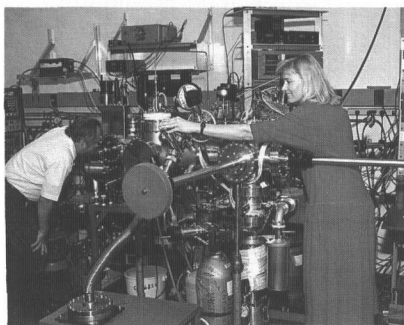
Microwave and millimeter-wave integrated circuits  
Surface acoustic wave devices  
High-frequency-device design, simulation, and fabrication  
Ion implantation technology  
Reliability and failure physics of electronic devices and circuits

### Solid State Devices

Solid-state optical sensors  
Radiation effects/hardening of electronic devices, circuits, and optoelectronic sensors  
Microelectronics device research and fabrication  
Solid state circuits research  
Signal processing research

### Vacuum Electronics

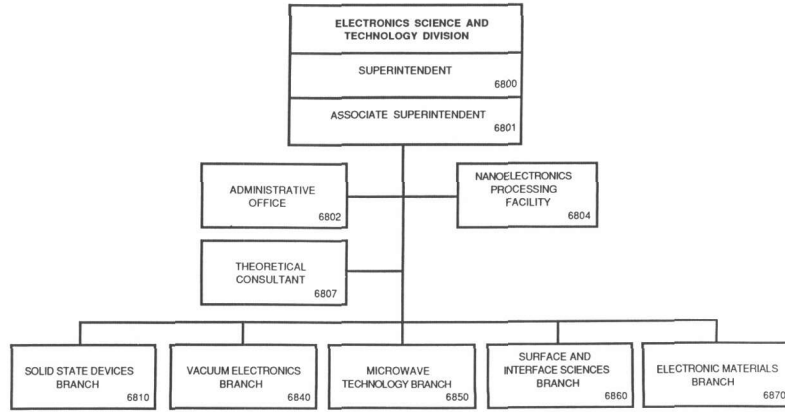
Microwave and millimeter power amplifier research and development  
Cathode research and development  
Thermionic energy conversion  
Field emission arrays  
Vacuum electronic devices  
Tube fabrication and support technology



Working with high temperature superconducting film growth system



Dr. G. M. Borsuk



### Basic Responsibilities

The Electronics Science and Technology Division conducts programs of basic science and applied research and development in materials growth and properties, surface physics, microstructure electronics, microwave techniques, microelectronic device research and fabrication, vacuum electronics, high-power microwave generation, and cryoelectronics, including superconductors. The activities of the Division couple device research both to basic materials investigations and to systems research and development needs.

### Personnel

Full-time civilian: 140

### Key Personnel

Name	Title	Code
Dr. G.M. Borsuk	Superintendent	6800
Dr. S. Teitler	Associate Superintendent	6801
Mrs. M. Bozzi	Administrative Officer	6802
Dr. M.C. Peckerar	Head, Nanoelectronics Processing Facility	6804
Dr. K.L. Ngai	Theoretical Consultant	6807
Dr. J.M. Killiany	Head, Solid State Devices Branch	6810
Dr. R.K. Parker	Head, Vacuum Electronics Branch	6840
Dr. D. Webb	Head, Microwave Technology Branch	6850
Dr. N. Bottka	Head, Surface and Interface Sciences Branch	6860
Dr. N.D. Wilsey	Head, Electronic Materials Branch	6870

Point of contact: Dr. S. Teitler, Code 6801, (202) 767-2807

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		<b>Naval Center for Space Technology</b>		

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## **Naval Center for Space Technology**

**Code 8000**

In its role to preserve and enhance a strong space technology base and provide expert assistance in the development and acquisition of space systems that support naval missions, the Naval Center for Space Technology activities extend from basic and applied research through advanced development in all areas of interest to the Navy space program. These activities include developing spacecraft, systems using these spacecraft, and ground command and control stations. Principal functions of the Center include understanding and clarifying requirements; recognizing and prosecuting promising research and development; analyzing and testing systems to quantify their capabilities; developing operational

concepts that exploit new technical capabilities; system engineering to allocate design requirements to subsystems; and engineering development and initial operation to test and evaluate selected spacecraft subsystems and systems. The Center is a focal point and integrator for those divisions at NRL whose technologies are used in space systems. The Center also provides systems engineering and technical direction assistance to system acquisition managers of major space systems. In this role, technology transfer is a major goal and motivates a continuous search for new technologies and capabilities and the development of prototypes that demonstrate the integration of such technologies.

## Director of Naval Center for Space Technology

Code 8000

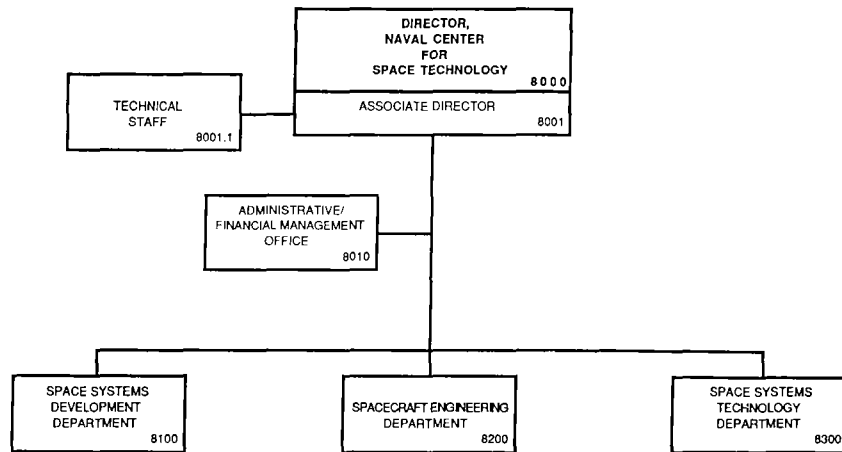


Mr. P.G. Wilhelm

Mr. Wilhelm [REDACTED] [REDACTED] He attended Purdue University, where he received a BSEE degree in 1957. By 1961, he had completed all the course work for an MSE degree from George Washington University.

From 1957 to 1959, Mr. Wilhelm served as an electrical engineer with Stewart Warner Electronics where he was assigned to a project to redesign the UPM-70, a Navy radar test set. In March 1959, he joined the Naval Research Laboratory as an electrical scientist in the Electronics Division. In December 1959, he joined the Satellite Techniques Branch. In 1961, he became Head of the Satellite Instrument Section; in 1965, he became Head of the Satellite Techniques Branch; and in 1974, Head of the Spacecraft Technology Center. In these positions, he performed satellite system design, equipment development, environmental testing, launch operations, and orbital data handling. In 1981, he was named the Superintendent of the Space Systems and Technology Division, the Navy's principal organization, or "lead Laboratory," for space. He is credited with contributions in the design, development, and operation of 78 scientific and Fleet-support satellites. He has been awarded five patents. In October 1986, he was appointed Director of the newly established Naval Center for Space Technology. The Center's mission is to "preserve and enhance a strong space technology base and provide expert assistance in the development and acquisition of space systems which support naval missions."

Mr. Wilhelm has been recognized with numerous awards including the Navy's Meritorious Civilian Service Award, the Distinguished Civilian Service Award, the Presidential Meritorious Executive Award, NRL's Space Systems Program Achievement Award, the Institute of Electrical and Electronics Engineers Aerospace and Electronic Systems Group Man of the Year Award in 1981, the NRL E.O. Hulburt Annual Science and Engineering Award for 1982, and the Dexter Conrad Award. He also has been elected a Fellow of the Washington Academy of Sciences and an Associate Fellow of the American Institute of Aeronautics and Astronautics.



### Key Personnel

Name	Title	Code
Mr. P.G. Wilhelm	Director, Naval Center for Space Technology	8000
Mr. F.V. Hellrich	Associate Director, Naval Center for Space Technology	8001
Mr. F.V. Hellrich†	Head, Technical Staff	8001.1
Mrs. L.T. McDonald	Head, Administrative/Financial Management Office	8010
CDR R.H. Meurer, Jr., USN	Military Deputy for Space Programs	8020
Mr. R.E. Eisenhauer	Superintendent, Space Systems Development Department	8100
Mr. R.T. Beal	Superintendent, Spacecraft Engineering Department	8200
Mr. L.M. Hammarstrom	Superintendent, Space Systems Technology Department	8300

**Point of Contact:** Mr. F.V. Hellrich, Code 8001, (202) 767-6549

†Additional duty

# Space Systems Development Department

Code 8100

## Research Activity Areas

### Special Projects

Advanced and experimental communications systems for spacecraft and Earth terminals  
Investigations and technology assessment of advanced satellite programs

### Spacecraft Engineering

Spacecraft power and ordnance systems  
Aerospace systems fabrication  
Quality assurance and reliability  
Spacecraft test systems designs

### Advanced Systems Development

Survivability concepts  
Spaceborne signal and data processors development

Spacecraft telemetry, command, and data management

### Communications Systems Technology

Advanced space and related ground communications systems  
Radio frequency active components and antennae  
Communications systems study and analysis  
Electromagnetic spectrum utilization  
Laser-based optical communications systems

### Terrestrial Systems

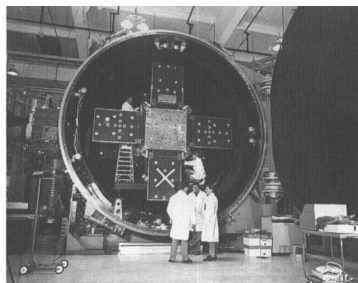
Software for collection systems control  
Advanced satellite ground station design  
Fleet-deployed satellite systems



The transportable ground station for the low-power atmospheric compensation experiment (LACE) spacecraft is shown in an operationally ready configuration. Housed in strong, low cost cargo "containers," the station is easily handled for shipment by truck, rail, ship, or aircraft.



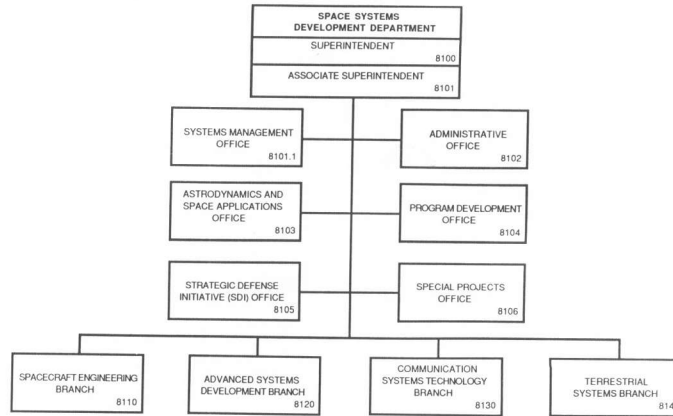
Ground station containers are swallowed by a C-141 cargo aircraft for overseas deployment.



Low-power atmospheric compensation (LACE) satellite is shown in preparation for thermal vacuum test simulating the space environment in The Spacecraft Engineering Department's (Code 8200) large chamber. LACE was successfully launched on February 14, 1990 and is fully operational performing SDIO experiments.



Mr. R.E. Eisenhauer



### Basic Responsibilities

The Space Systems Development Department (SSDD) is the space systems research and development organization of the Naval Center for Space Technology. The SSDD develops space systems (both satellite and ground elements) to support Navy mission requirements and develops new technologies for use in space. Research continually strives to improve performance, capacity, reliability, efficiency, and life-cycle cost. To this end, the SSDD defines system requirements based on overall mission objectives, develops alternative system architectures, and designs and develops optimized operational space/ground systems. These development responsibilities extend across the entire space/ground spectrum of hardware, software, and systems advanced technologies including digital processing and control, analog, power, communications, command and telemetry, radio frequency, optical, and electromechanical systems. The SSDD pursues advanced concepts studies, analyses, and technical enhancements that enable advanced systems.

### Personnel

Full-time civilian: 164

### Key Personnel

Name	Title	Code
Mr. R.E. Eisenhauer	Superintendent	8100
Mr. F.E. Betz	Associate Superintendent	8101
Mr. M.T. Powell*	Head, Systems Management Office	8101.1
Ms. D.E. Mignogna	Administrative Officer	8102
Mr. B. Kaufman	Head, Astrodynamics & Space Applications Office	8103
Mr. B.J. Lamb	Head, Program Development Office	8104
Mr. R.E. Palma	Head, Strategic Defense Initiative Office	8105
Mr. W.R. Webster	Head, Special Projects Office	8106
Mr. G.E. Flach	Head, Spacecraft Engineering Branch	8110
Mr. A.J. Fox	Head, Advanced Systems Development Branch	8120
Mr. J.F. Mattaino	Head, Communication Systems Technology Branch	8130
Mr. T.W. Fisher	Head, Terrestrial Systems Branch	8140

Point of contact: Ms. D.E. Mignogna, Code 8102, (202) 767-0432

# Spacecraft Engineering Department

Code 8200

## Research Activity Areas

### Design, Manufacturing and Processing

- Launch vehicle integration
- Spacecraft production design, planning, manufacturing, and assembly

### Systems Analysis and Test

- Spacecraft structural design
- Spacecraft environmental testing
- Mechanical analysis and testing

### Control Systems Branch

- Attitude and thermal control system
- Reaction control systems

Propulsion systems

Launch operations support

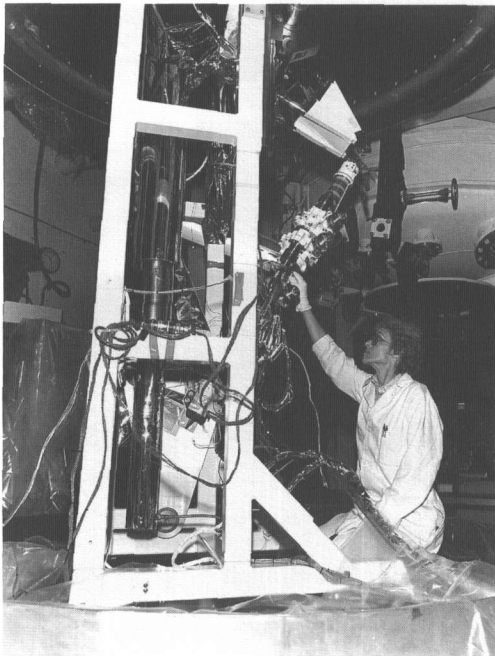
### Concept Development

Engineering analysis and conceptual design for new space systems

Flexible space structures research

Expert systems

Spaceborne applications of robotics



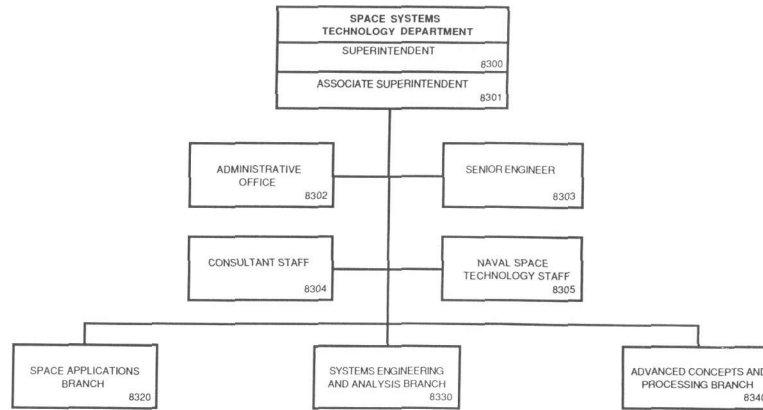
Ball-screw actuator being readied for vacuum-chamber test



A specially designed and constructed facility for the safe handling and testing of propellants used in Naval Center for Space Technology spacecraft



Mr. R.T. Beal



### Basic Responsibilities

The Spacecraft Engineering Department (SED) is the focal point for the Navy's in-house spacecraft capability. The two primary functions of the SED are to design and build spacecraft platforms in support of Navy missions and to provide transfer vehicles to inject these spacecraft into their unique mission orbits. The activities of the SED range from concept and feasibility planning through the on-orbit Initial Operational Capability (IOC) for Navy space systems. The SED provides analysis, design, and hardware expertise in structures and mechanisms, attitude control systems, propulsion and reaction control systems, thermal control systems, satellite design integration, launch vehicle integration, and satellite-to-boost-stage integration.

The SED functions as a program manager for Navy programs by providing systems engineering and technical direction while maintaining an active in-house satellite development, test, and fabrication capability. In this role, the SED performs as a prototype laboratory and pursues the program to facilitate the transfer of technology to industry so that production satellites can be built in a cost-effective environment. To accomplish this, the SED supports the Navy Program Acquisition Office by providing experienced technical consultation after the prototype is built at NRL.

### Personnel

Full-time civilian: 70

### Key Personnel

Name	Title	Code
Mr. R.T. Beal	Superintendent	8200
Vacant	Associate Superintendent	8201
Mrs. C. Warner	Administrative Officer	8202
Vacant	Consultant Staff	8203
Mr. A.D. Watts*	Head, Design, Manufacturing, and Processing Branch	8210
Mr. E. Senasack	Head, Systems Analysis and Test Branch	8220
Mr. S. Hollander	Head, Control Systems Branch	8230
Mr. M. Brown	Head, Concept Development Branch	8240

Point of contact: Mr. R.T. Beal, Code 8200, (202) 767-6407

\*Acting

# Space Systems Technology Department

## Code 8300

### Research Activity Areas

#### Navy Space Technology

Technical consultant to current Navy space programs  
Navy technology planning  
Exploratory development block management

Frequency standard development

#### Systems Engineering and Analysis

Space system integration and test  
Space system technical evaluation  
Space and naval warfare

#### Space Applications

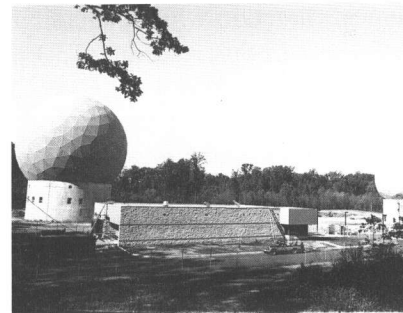
Navigation systems  
Time synchronization  
Hydrogen masers

#### Advance Concepts Processing Branch

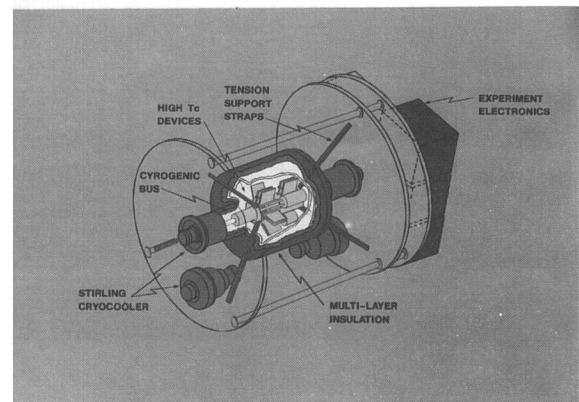
Coherent receiver development  
Spacecraft calibration systems  
Advance data processing development



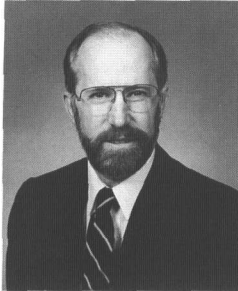
Satellite tracking and calibration facility located in Pomonkey, MD



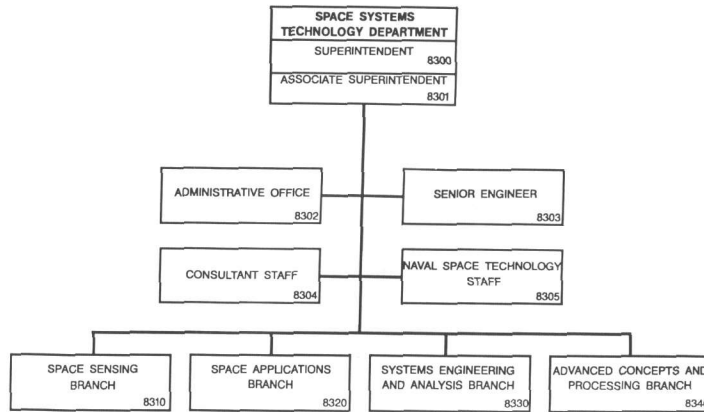
View of the Midway Research Center (MRC) space tracking facility in Stafford, VA



Demonstrates the feasibility of incorporating the revolutionary technology of high temperature superconductivity into space systems



Mr. L. Hammarstrom



### Basic Responsibilities

The Space Systems Technology Department (SSTD) is involved in a wide range of activities from basic research through concepts, technology, and testing of space systems. The department has highly skilled teams doing research on remote sensing of the oceans of the world and state-of-the-art frequency standards from the Global Positioning System and the Naval Observatory. It continues to improve the Naval Space Surveillance System. The SSTD builds complex receiving and transmitting systems that exploit the latest concepts in microprocessing and device technologies. Detailed analysis, simulation, and testing are performed on space systems. Hardware, software, and computer systems for use in space systems are being developed. Two remote field sites support the work. The SSTD interacts with operational forces in examining areas for future research and development.

### Personnel

Full-time civilian: 117

#### Key Personnel

Name	Title	Code
Mr. L.M. Hammarstrom	Superintendent	8300
Mr. G.W. Hoskins	Associate Superintendent	8301
Ms. E.M. Coates	Administrative Officer	8302
Mr. D.L. Pettit	Senior Engineer	8303
Mr. L.M. Hammarstrom	Head, Consultant Staff	8304
Mr. M. Lister	Consulting Expert for the Office of the Secretary of the Air Force	8304L
Mr. G.R. Price	Head, Naval Space Technology Staff	8305
Mr. R.L. Beard	Head, Space Applications Branch	8320
Mr. T.F. Lawton	Head, Systems Engineering and Analysis Branch	8330
Mr. J.N. O'Connor	Head, Advanced Concepts and Processing Branch	8340

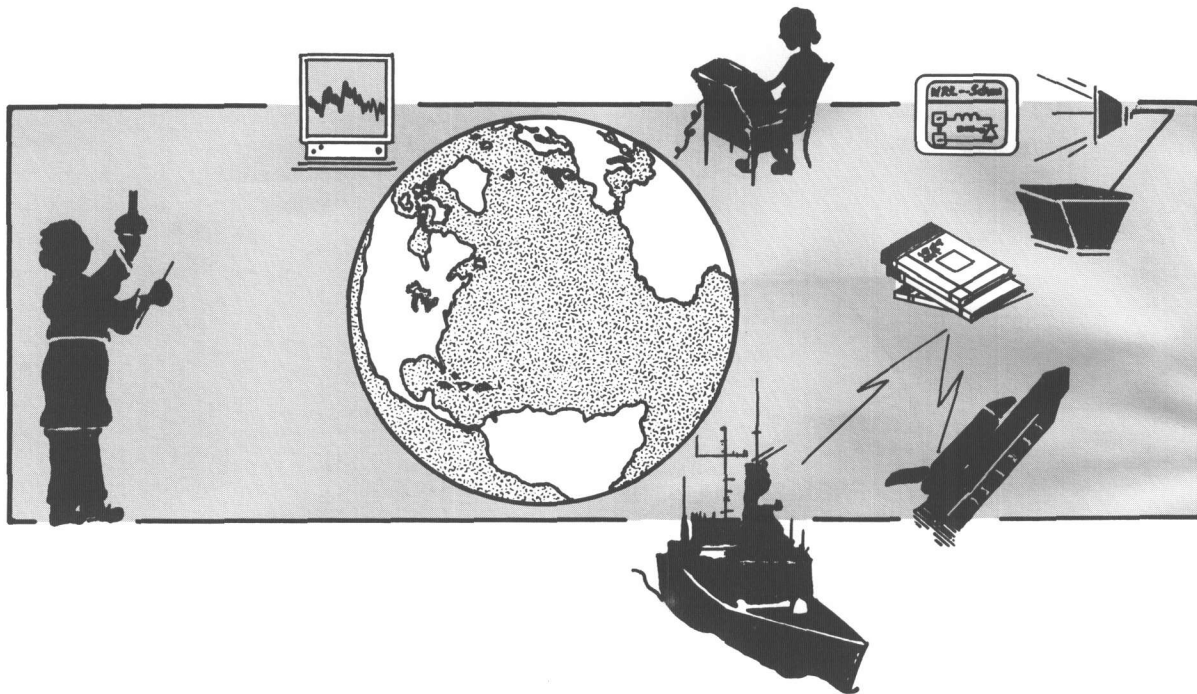
**Point of contact:** Ms. E.M. Coates, Code 8302, (202) 767-6546

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		<b>Technical Output, Fiscal, and Personnel Information</b>		

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# Technical Output



## Publications

Scientists and engineers at the Naval Research Laboratory have published more than 30,894 articles, reports, and books since the Laboratory was established in 1923. During fiscal year 1990, NRL researchers published 5 books, 721 journal articles, and 189 NRL reports. In addition, their works were described in 476 conference proceedings; 1972 presentations were made to scientific, military, and government audiences.

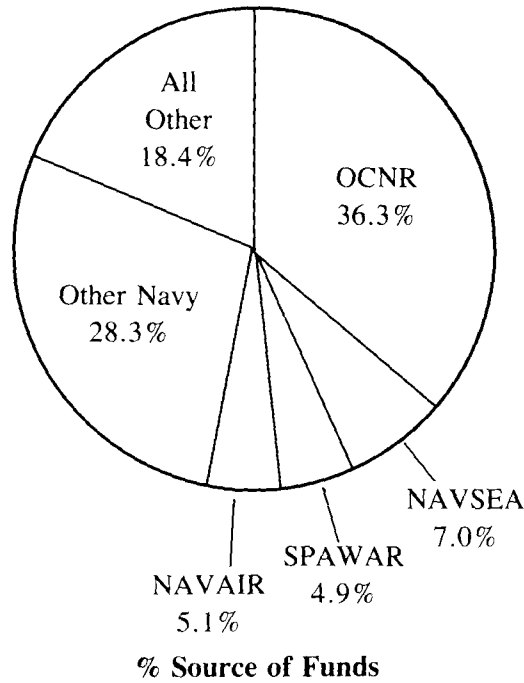
## Patents

NRL scientists have made significant contributions in many areas of technology. The quality and quantity of these contributions can be measured by the number of patents received and applications filed. During fiscal year 1990, researchers were awarded 44 patents; this brings NRL's total of patents issued since 1923 to 3373. The number of patent applications filed during this period increased to 94; 5 SIRs were also filed. To date, 26 SIRs have been issued to NRL researchers.

In 1986, Congress enacted the Federal Technology Transfer Act in an effort to encourage the commercial use of technology developed in federal laboratories. The Act allows Government inventors and the laboratories where they work to share the royalties generated by commercial licensing of their inventions. Also, the Act encourages the establishment of cooperative research and development agreements between laboratories such as NRL and nonfederal entities such as state and local governments, universities, and business corporations. Such cooperative R&D agreements can include the allocation in advance of patent rights on any inventions made under the joint research effort.

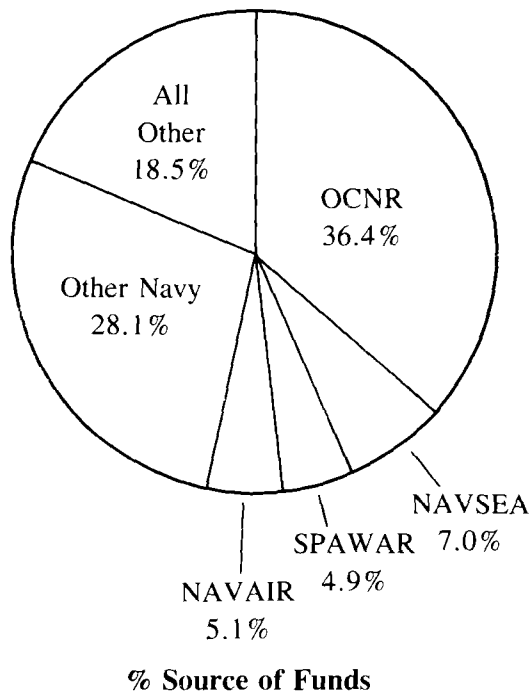
The 1986 Act has given additional impetus to the Laboratory's efforts to patent important inventions arising out of its various research programs.

**FY 1990 SOURCES OF NEW FUNDS (ACTUAL)**



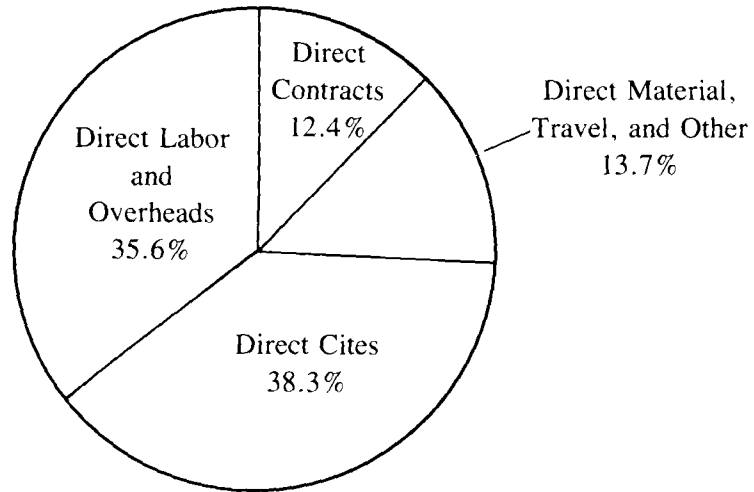
	<u>Reimbursable</u>	<u>\$M Direct Cite</u>	<u>Total</u>
Office of the Chief of Naval Research (OCNR)	148.0	88.0	236.0
Space and Naval Warfare Systems Command (SPAWAR)	19.0	12.9	31.9
Naval Air Systems Command (NAVAIR)	20.8	12.3	33.1
Naval Sea Systems Command (NAVSEA)	27.0	18.6	45.6
Other Navy	97.6	86.9	184.5
All Other	71.7	48.3	120.0
<b>Total Funds</b>	<b>384.1</b>	<b>267.0</b>	<b>651.1</b>

**FY 1991 SOURCES OF NEW FUNDS (PLAN)**



	\$M		<u>Total</u>
	<u>Reimbursable</u>	<u>Direct Cite</u>	
Office of the Chief of Naval Research (OCNR)	153.1	81.4	234.5
Space and Naval Warfare Systems Command (SPAWAR)	19.7	11.8	31.5
Naval Air Systems Command (NAVAIR)	21.5	11.3	32.8
Naval Sea Systems Command (NAVSEA)	27.9	17.2	45.1
Other Navy	101.0	80.1	181.1
All Other	74.2	44.6	118.8
<b>Planned Total Funds</b>	<b>397.4</b>	<b>246.4</b>	<b>643.8</b>

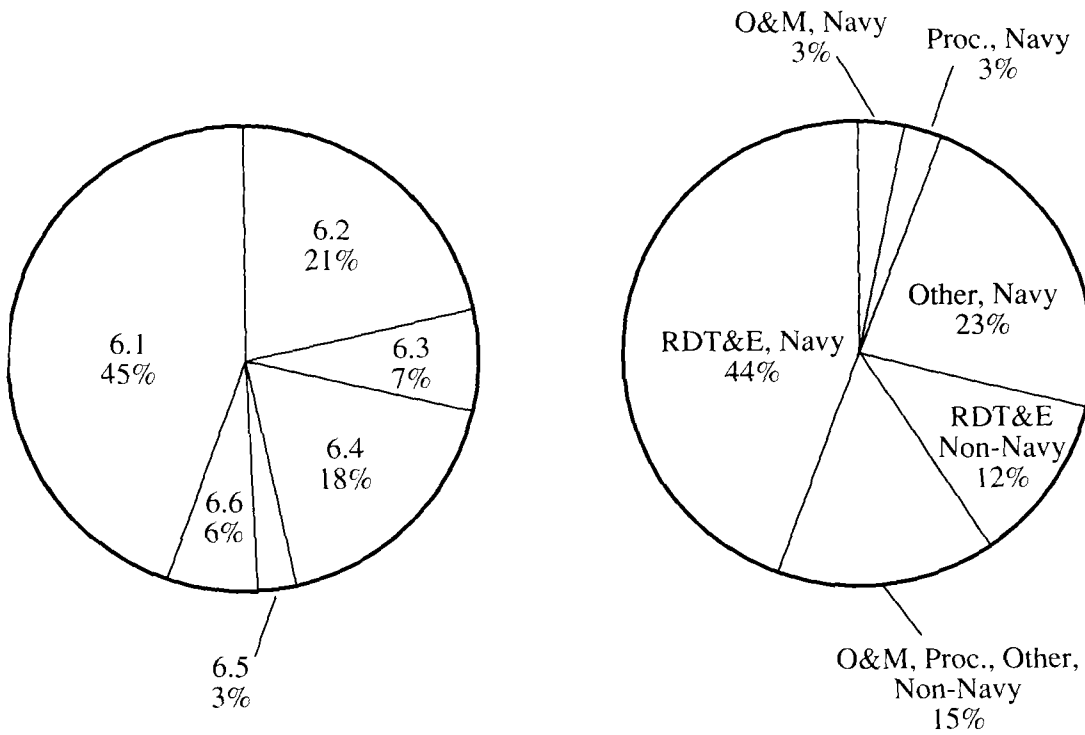
**FY 1991 DISTRIBUTION OF NEW FUNDS (PLAN)**



**% Distribution of Funds**

	<u>\$M</u>
Direct Labor	119.7
General Overhead	46.7
Indirect Overhead	63.1
Direct Material, Travel and Other	88.2
Direct Contracts	79.7
Direct Cites	246.4
<b>Total</b>	<b>643.8</b>

**FY 1991 REIMBURSABLE NEW FUNDS BY CATEGORY (PLAN)**



**% Distribution of RDT&E, Navy (\$172.6)**

**% Distribution Reimbursable (\$397.4)**

Category	\$M		Total
	Navy	Non-Navy	
6.1 Research	77.7	1.6	79.3
6.2 Exploratory Development	36.8	9.3	46.1
6.3 Advanced Development	12.4	33.4	45.8
6.4 Engineering Development	31.5	0.9	32.4
6.5 Management & Support	4.3	0.3	4.6
6.6 Operational Systems Development	9.9	3.5	13.4
Subtotal RDT&E	172.6	49.0	221.6
Operation & Maintenance	10.4	10.4	10.4
Procurement	13.3	13.3	13.3
Other	91.7	91.7	91.7
Total Funds	288.0	109.4	397.4

## Personnel\*

### Civilian

Full-time, Permanent (FTP)	
Graded	2973
Ungraded	356
Total	3329
Temporary, Part-time, Intermittent (TPTI)	
(TPTI)	237
<b>Total Civilian</b>	<b>3566</b>

### Graded FTP Breakdown

Scientists, Engineers, and SES	1569
Administrative—Professional	37
Administrative—Management	437
Technicians	439
Other-Clerical	398
Other-General	93
Total	2973

### Civilian Budgeted

End-Strength	3641
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### Military

Officers	47
Enlisted	67

Total Military	114
Military Allowance	116

On Board	Total Military	Total Civilian	FTP	TPTI	FTP Ungraded	FTP Graded
3680	114	3577	3329	237	356	2973

### Annual Civilian Turnover Rate (percent) (permanent employees only)

	1986	1987	1988	1989	1990
Research divisions	7.10	6.68	6.73	8.2	7.7
Nonresearch areas	11.32	12.14	11.83	14.5	14.6
Entire Laboratory	8.77	8.82	8.16	10.6	9.6

### Highest Academic Degrees Held by Permanent Employees

Bachelors	652
Masters	392
Doctorates	768

\*As of 30 September 1990

		<b>Professional Development</b>		

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## PROFESSIONAL DEVELOPMENT

NRL has established many programs for the professional and personal development of its employees so they may better serve the needs of the Navy. These programs develop and retain talented people and keep them abreast of advanced technology and management skills. Graduate assistantships, fellowships, sabbatical study programs, cooperative education programs, individual college courses, and short courses for personal improvement contribute to professional development.

Programs also exist for non-NRL employees. These programs enhance research efforts by providing means for non-NRL professionals to work at the Laboratory, thereby improving the interchange of ideas, meeting critical short-term technical requirements, and providing sources for new scientists and engineers. The programs include two-year graduate fellowships, faculty and professional interchanges, undergraduate work, and introducing gifted and talented high school students to the world of technology.

### Programs for NRL Employees

During 1990, NRL employees participated in approximately 5000 individual training events. Many of these were presented as either videotaped or on-site instructed courses on diverse technical subjects, management techniques, and enhancement of personal skills (efficient use of time, memory improvement, interpersonal communications, speed reading, etc.).

One common study procedure is for employees to work full time at the Laboratory and take job-related scientific courses at universities and schools in the Washington area. The training ranges from individual courses to full-time graduate- and postgraduate-level programs. Tuition for job-related training is paid by NRL. Formal programs offered by NRL include the following:

#### Graduate Programs

- The **Advanced Graduate Research Program** (formerly the Sabbatical Study Program) enables selected professional employees to devote full time to research or course work in their own or a related field for one academic year at an institution of their choice without the loss of regular salary, leave, or fringe benefits. NRL pays all education, travel, and moving expenses for the individual and dependents. The program is open to paraprofessional (and above) employees who have completed six years of Federal service, including four years at NRL.

- The **Edison Memorial Graduate Training Program** enables employees to pursue advanced studies in their fields at local universities. Eligible employees who are selected for participation in this program normally spend 24

hours of every work week in their studies. The criteria for eligibility include a minimum of one year of service at NRL, a bachelor's or master's degree in an appropriate field, and professional standing in keeping with the candidate's opportunities and experience.

- To be eligible for the **Select Graduate Student Program**, employees must have a college degree in an appropriate field and must have maintained at least a B average in undergraduate study. Accepted students devote a full academic year to graduate study. While attending school, they receive one half of their salary, and NRL pays for tuition, books, and laboratory expenses. During the summer, they work at the Laboratory and receive normal pay and fringe benefits.

- Research conducted at NRL may be used as **thesis material for an advanced degree**.

This original research is supervised by a qualified employee of NRL who is approved by the graduate school. The candidate should have completed the required course work and should have satisfied the language, residence, and other requirements of the graduate school from which the degree is sought. NRL provides space, research facilities, and supervision but leaves decisions on academic policy to the cooperating schools.

- **The Alfred P. Sloan Fellows Program** is designed for competent young executives whose job performance indicates senior management potential. The Sloan Fellows spend one year with the Massachusetts Institute of Technology faculty and with policymakers in industry and government. They study the theory and practice of effective and responsible management in a rapidly changing society.

- **The Education for Public Management Program** serves the training needs of individuals who are at midcareer and who have the talent to assume increasing responsibilities to direct agency programs and policies.

- **The Education Program for Federal Officials** exists for a small group of Federal employees who have demonstrated high competence and unusual promise. The Woodrow Wilson School of Princeton University has developed this program to enable selected mid-career officials to enlarge their knowledge in particular disciplines, to relate their fields of specialization to the broader concerns of government, and to sharpen their capacity for objective analysis of governmental problems.

- Federal Executive fellowships are available each year for employees to study in the **Brookings Institute Advanced Study Program**. In this program, the fellow is exposed to and participates in planning, developing, and conducting educational conferences on public policy issues for leaders in public and private life.

- **The Fellowship in Congressional Operations for Executives** provides an opportunity for some of the most promising young, technically oriented Federal executives to participate in a variety of assignments designed to

develop their knowledge and understanding of Congressional operations. These fellows share activities with other members of the Congressional Fellowship Program who come mainly from journalism, law, and college teaching.

- **The Maxwell Midcareer Development Program** of the Maxwell Graduate School of Citizenship and Public Affairs, Syracuse, New York, increases the managerial knowledge, ability, and skills of experienced Government officials who have been identified by their agencies as having potential for advancement to positions demanding progressively greater managerial and executive responsibilities.

- **The Practicing Engineer Advanced Study Program** of the M.I.T. Center for Advanced Engineering, Cambridge, Massachusetts, enables experienced engineers and applied scientists to work in-depth in technological areas pertinent to their professions, preparing for continued leadership in an age of unparalleled technological change.

- **The Science and Technology Fellowship Program**, a subsidiary of the Commerce Science Program, includes a variety of special events, lectures, seminars, visits, conferences, field trips, and interactions with key people from both the public and private sectors. Participants spend one week on Capitol Hill in an intensive, congressional orientation; they spend one week with the Brookings Institute, Science Policy Conference; and they take two week-long field trips for on-site inspection of scientific institutions and industrial complexes.

- **The Stanford-Sloan Program of the Graduate School of Business**, Stanford, California, gives exceptional young executives an opportunity to make an intensive study of new concepts and developments in business, to develop a top management perspective, and to broaden their intellectual horizons.

- **The Naval Postgraduate School (NPS)**, located in Monterey, California, provides graduate programs to enhance the technical preparation of Naval Officers and civilian employees who serve the Navy in the fields of science, engineering, operations analysis, and management. It awards a Master of Arts Degree in

National Security Affairs and a Master of Science Degree in many technical disciplines. In addition, a Doctor of Philosophy Degree may be earned in select fields of science and engineering.

NRL employees desiring to pursue graduate studies at NPS may apply for a maximum of six quarters away from NRL, with thesis work accomplished at NRL. Specific programs are described in the NPS Catalog. Participants will continue to receive full pay and benefits during the period of study.

### Continuing Education

- Local colleges and universities offer **undergraduate courses** at NRL for employees to improve their skills and keep abreast of current developments in their fields. These courses are also available at many other DoD installations in the Washington, D.C. area.

- The Employee Development Branch at NRL offers to all employees **short courses** in certain program areas that are not available at local schools; laboratory employees may attend these courses at nongovernment facilities as well. Interagency courses in management, personnel, finance, supervisory development, clerical skills, and other areas are also available.

### Other Programs

- **Foreign Liaison Scientist Program.** To assist the Chief of Naval Research (CNR), the Chief of Naval Operations (CNO), and the Commandant of the Marine Corps (CMC) in discharging their responsibilities on matters of general scientific and technical interest to the United States in the United Kingdom, Europe, and Far East, foreign liaison offices are maintained in several areas of the world. Foreign liaison scientists serve in these offices to establish relationships with overseas scientific activities and their scientists, to monitor contract and treaty agreements, and to promote the exchange of information and research results between foreign sources and the U.S. Navy R&D establishment. Each year, NRL will make assignments to the Office of Naval Research European Office (ONEUR), London, England, and the Office of Naval Research Liaison Office, Far

East (ONRFE), Tokyo, Japan. The purpose of such assignments is to acquaint a limited number of NRL's technical professionals with the functions of international operations, including such activities as developing productive liaison with foreign scientists and research activities, representing the interests of the U.S. Navy in multinational conferences and scientific meetings, and preparing technical reports and papers with editorial interpretation for appropriate audiences in the United States.

For further information on any of the above programs, contact the Employee Development Branch at (202) 767-2956.

### Technology Transfer

- The **Office of Research and Technology Applications Program (ORTA)** ensures the full use of the results of the nation's Federal investment in research and development by transferring Federally owned or originated technology to state and local governments and the private sector.

- The **Navy Science Assistance Program (NSAP)** establishes an information loop between the Fleet and the R&D shore establishments to expedite technology transfer to the user. The program addresses operational problems, focuses resources to solve specific technical problems, and develops a nucleus of senior scientific personnel familiar with the impact of current research and system performance on military operations.

- The **Scientist to Sea Program (STSP)** is a COMNAVSURFLANT initiative providing increased opportunities for Navy R&D laboratory/center personnel to go to sea to gain first-hand insight into operational factors affecting system design and performance.

Inquiries concerning NRL's programs should be made to Dr. Richard Rein at (202) 767-3744. Inquiries concerning NSAP or STSP programs should be made to Dr. George Abraham at (202) 767-3521.

### Growth Opportunities

NRL has several programs, professional society chapters, and informal clubs that enhance

the professional growth of employees. Some of these are listed below.

- The **Career Counseling Center** helps employees to define short- and long-range career goals, to improve their job-seeking skills, and to deal with issues affecting job productivity.

- A chartered chapter of **Women in Science and Engineering** (WISE) has been established at NRL. Informal monthly luncheons and seminars are held to inform scientists and engineers of women's research at NRL and to provide an informal environment for practicing their presentations.

- **Sigma Xi**, the Scientific Research Society, encourages original investigation in pure and applied science. The NRL chapter of approximately 450 active members meets nine times each year (from October to June) and sponsors a series of lectures on a wide range of pure and applied scientific topics of interest to both scientific and government communities. Each spring it sponsors an Edison Memorial Lecture at which a distinguished scientist, usu-

ally a Nobel Laureate, speaks on his or her research. The chapter also presents annual awards in pure and applied science.

- Any employee who is interested in developing effective self expression, listening, thinking, and leadership potential can join either of the two NRL chapters of **Toastmasters International**. Members of these clubs, who possess diverse career backgrounds and talents, meet three times a month to learn to communicate not by rules but by doing in an atmosphere of understanding and helpful fellowship.

Other programs that enhance the development of NRL employees include computer clubs (Edison Atari, Edison Commodore, and the NRL-IBM PC) and the Amateur Radio Club. The Recreation Club offers many facilities to promote physical fitness. The Showboaters, a nonprofit drama group, presents live theater for the enjoyment of NRL and the community and produces two major productions each year, in addition to occasional performances at Laboratory functions and benefits for local charities.

## Programs for Non-NRL Employees

Programs also exist for non-NRL employees. These programs encourage and support the participation of visiting scientists and engineers in research of interest to the Laboratory. Some of the programs may serve as stepping stones to Federal careers in science and technology. Their objective is to enhance the quality of Laboratory research activities through working associations and interchanges with highly capable scientists and engineers and to provide opportunities for outside scientists and engineers to work in the Navy laboratory environment. Along with enhancing NRL research, these programs acquaint participants with Navy capabilities and concerns.

### Recent Ph.D., Faculty Member, and College Graduate Programs

- The **National Research Council (NRC)/NRL Cooperative Research Associate-ship Program** selects associates who conduct research at NRL in their chosen fields in collaboration with NRL scientists and engineers. The tenure period is two years, and following their tenure, the Office of Naval Research offers the associate posttenure research grants tenable at an academic institution.

- The American Society for Engineering Education (ASEE) administers the **Office of Naval Technology (ONT) Postdoctoral Fellowship Program** to increase the involvement of highly trained scientists and engineers in disciplines to meet the evolving needs of naval technology. Appointments are for one year (renewable for a second and sometimes a third year). The appointments are competitive and are made jointly by ONT and ASEE.

- The American Society for Engineering Education also administers the **Navy/ASEE Summer Faculty Research Program** for university faculty members to work for 10 weeks with professional peers in participating Navy laboratories on research of mutual interest.

- The **NRL/United States Naval Academy (USNA) Cooperative Program for Scientific Interchange** allows faculty members of the U.S. Naval Academy to participate in NRL research. This collaboration benefits the

Academy by providing the opportunity for USNA faculty members to work on research of a more practical or applied nature. In turn, NRL's research program is strengthened by the available scientific and engineering expertise of the USNA faculty.

- The **Office of Naval Research Graduate Fellowship Program** helps U.S. citizens obtain advanced training in disciplines of science and engineering critical to the U.S. Navy. The three-year program awards fellowships to recent outstanding graduates to support their study and research. This research must lead to doctoral degrees in specified disciplines such as electrical engineering, computer sciences, material sciences, applied physics, and ocean engineering. Award recipients are encouraged to continue their study and research in a Navy laboratory during the summer.

Contact: Mrs. Jessica Hileman, (202) 767-3865

- The **United States Naval Academy Ensign Program** assigns Naval Academy graduates to NRL to work in areas of their own choosing and commensurate with their academic qualifications. These graduates provide invaluable summer research assistance while gaining experience in Navy R&D programs.

Contact: Military Administrative and Personnel Branch, (202) 767-2103

### Professional Appointments

- **Faculty Member Appointments** use the special skills and abilities of university faculty

members for short periods to fill scientific, engineering, professional, or analytical positions.

- **Consultants and experts** are employed because they are outstanding in their specialized fields or because they possess rare abilities but cannot normally be employed as regular full-time civil servants.

- **Intergovernmental Personnel Act Appointments** temporarily assign personnel from state or local governments or educational institutions to the Federal Government (or vice versa) to improve public services rendered by all levels of government.

Contact: Special Recruitment Programs Branch,  
(202) 767-3030

### **Undergraduate College Student Programs**

Several programs are tailored to the undergraduate that provide employment and work experience in naval research. These are designed to attract applicants for professional employment in the Laboratory's shortage category positions such as engineers, physicists, mathematicians, and computer scientists. The student employment programs foster an understanding of NRL job opportunities among students and educational personnel so that educators can provide students who will meet NRL's occupational needs. The employment programs for college students include:

- **The Cooperative Education Program** alternates periods of work and study for students pursuing bachelor degrees in engineering, computer science, or the physical sciences. Several universities participate in this program.

- **The Federal Junior Fellowship Program** hires students entering college to be assistants to scientific, professional, or technical employees.

- **The Summer Employment Program** employs students for the summer in paraprofessional and technician positions in engineering,

physical sciences, and computer sciences. A limited number of positions are also filled in administrative occupations.

- **The Student Volunteer Program** helps students gain valuable experience by allowing them to voluntarily perform educationally related work at NRL.

- **The 1040-Hour Appointment** employs students on a halftime basis to assist in scientific work that is related to their academic program. A limited number of positions are also filled in administrative occupations.

Contact: Special Recruitment Programs Branch,  
(202) 767-3030

### **High School Programs**

- **The Gifted and Talented Internship Program** provides a meaningful, part-time employment experience for high school graduates who plan to pursue a bachelor's degree in engineering, computer science, or the physical sciences.

Contact: Special Recruitment Programs Branch,  
(202) 767-3030

- **The DoD Summer Science and Engineering Apprentice Program** employs high school juniors and seniors to serve for eight weeks as junior research associates as part of a university grant program. Under the direction of a mentor, students gain a better understanding of research, its opportunities, and challenges through participation in scientific programs. Criteria for eligibility are based on science and mathematics courses completed and grades achieved; scientific motivation, curiosity, and capacity for sustained hard work; a desire for a technical career; teacher recommendations; and ability and achievement test scores.

- **The Clerical Cooperative Education Program** allows students to work part time while attending high school. Several high schools participate in this program.

Contact: Special Recruitment Programs Branch,  
(202) 767-3030

## 1990 Government Awards to Civilian Employees

	<b>Number</b>
Distinguished Presidential Rank Award	1
Meritorious Executive Award, Senior Executive Service	2
Senior Executive Service Bonus Award	10
Navy Meritorious Civilian Service Award	1
Captain Robert Dexter Conrad Award for Scientific Achievement	1
E.O. Hulburt Award for Science and Engineering	1
NRL Award for Achievement in the Field of Equal Opportunity	2
Navy Award of Merit for Group Achievement	8

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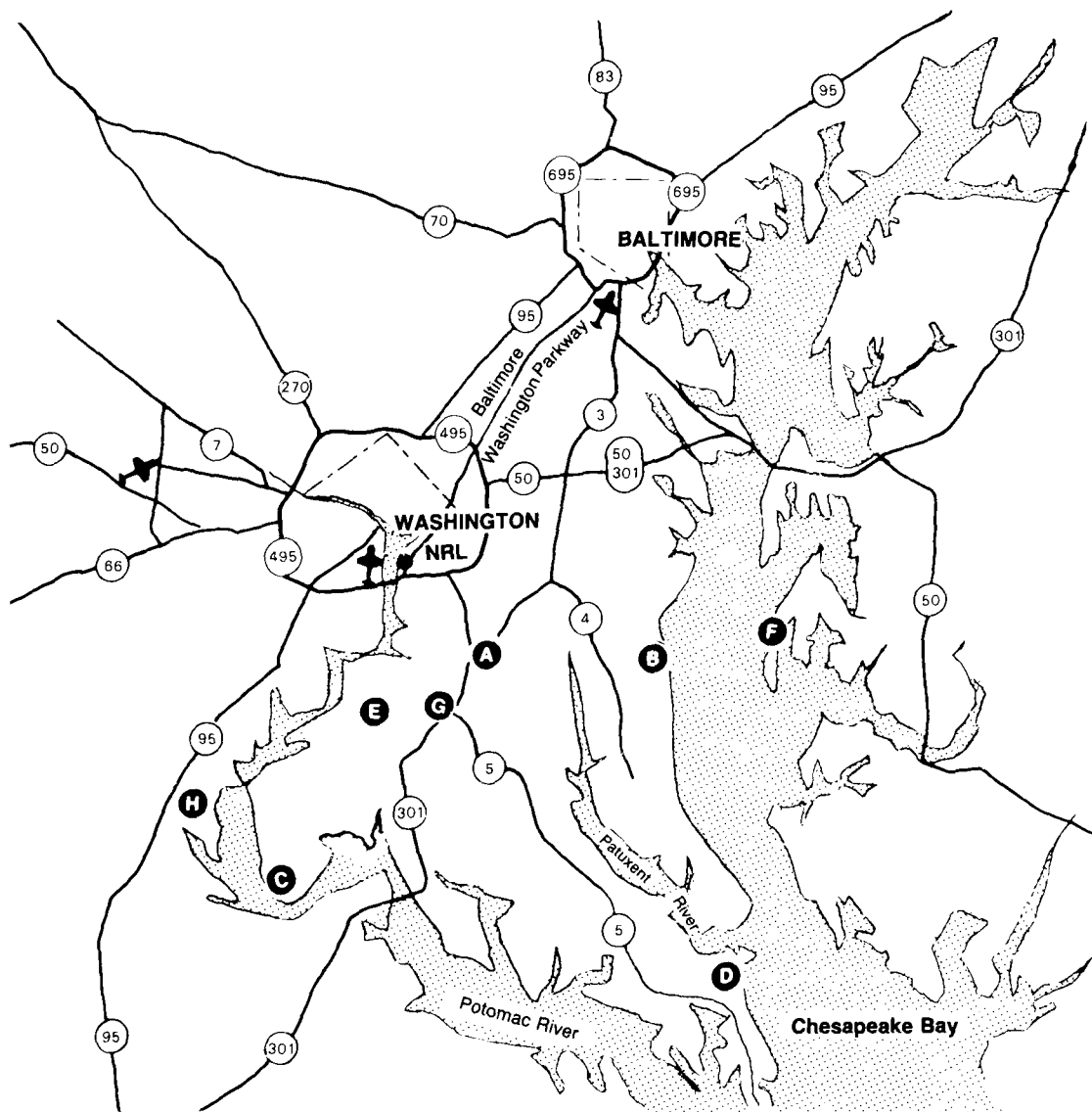
		<b>General Information</b>		

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## Location of Principal Field Stations



Approximate distance from NRL

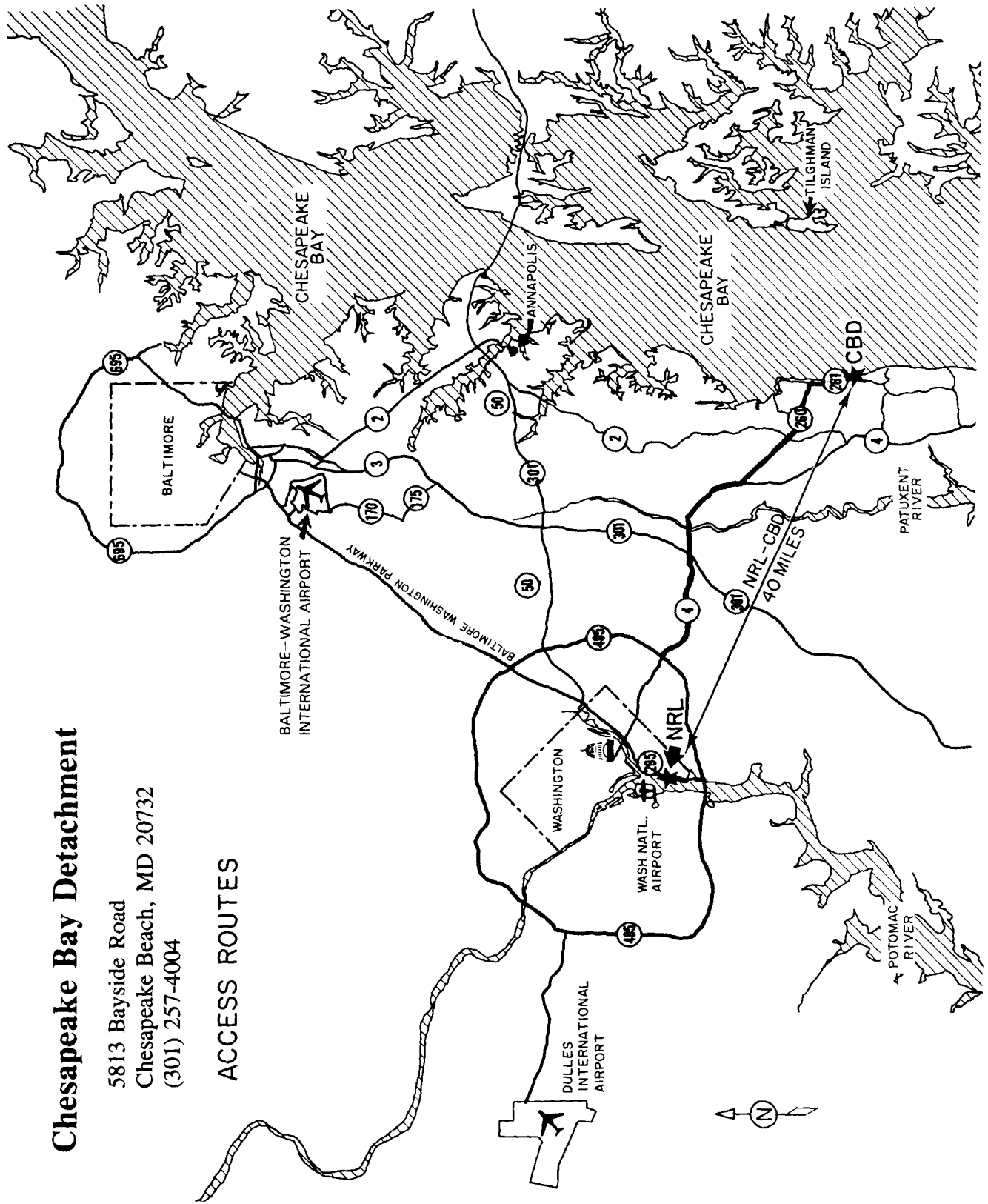
Location	Miles	Cognizant Code
A — Brandywine, MD	28	5500
B — Chesapeake Bay Detachment (CBD), Chesapeake Beach, MD	40	2700
C — Maryland Point (MD) Observatory	45	4130
D — Patuxent River (MD) Naval Air Station	64	1280
E — Pomonkey, MD	20	8325
F — Tilghman Island, MD	110	2700
G — Waldorf Radio Site, MD	24	5500
H — Midway Research Center, Quantico, VA	38	8341

The Underwater Sound Reference Detachment (Code 5900) is located at Orlando, FL

# Chesapeake Bay Detachment

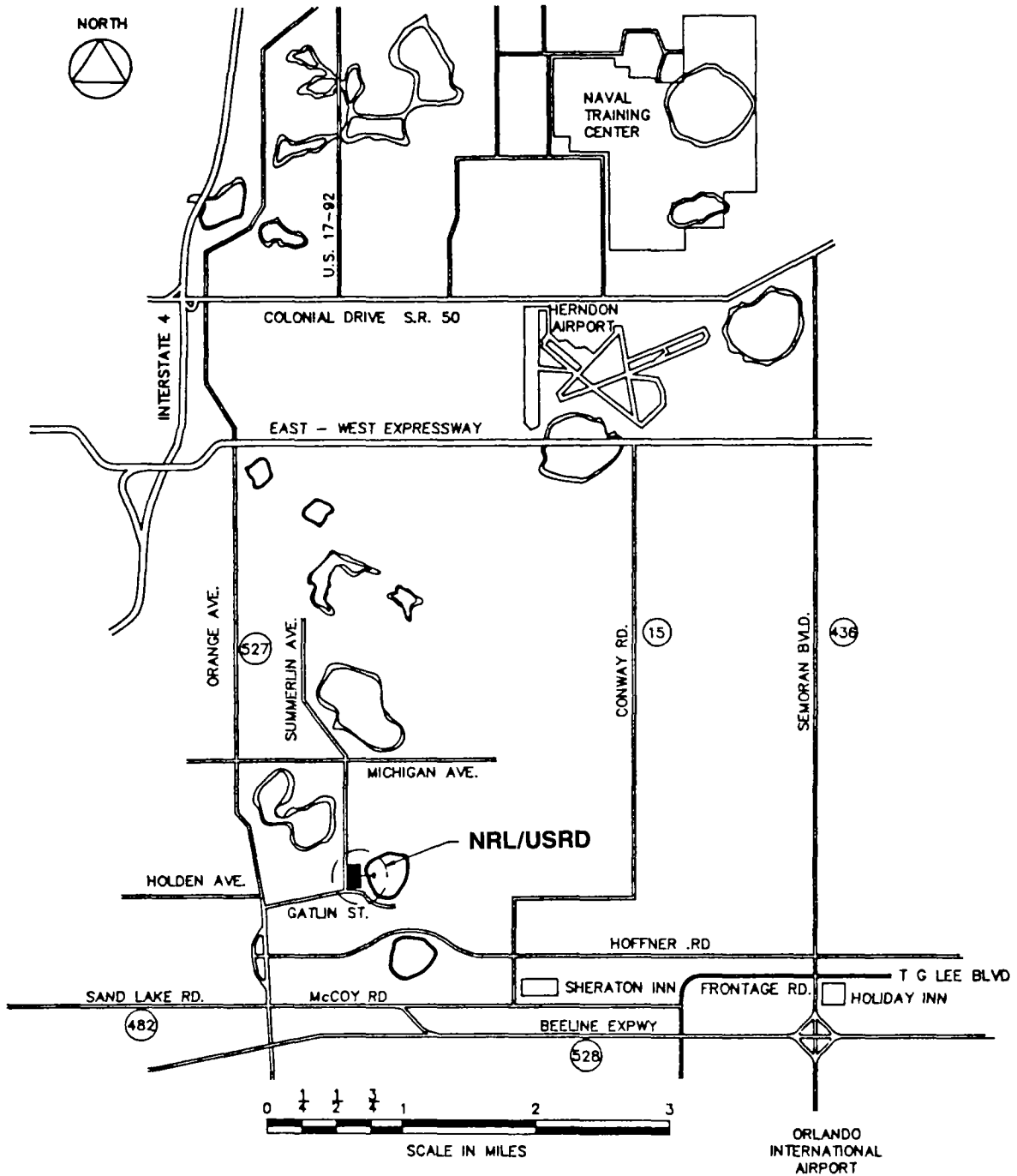
5813 Bayside Road  
Chesapeake Beach, MD 20732  
(301) 257-4004

## ACCESS ROUTES





# Underwater Sound Reference Detachment (Orlando, Florida)



Naval Research Laboratory  
 Underwater Sound Reference Detachment  
 P.O. Box 8337  
 Orlando, FL 32856-8337  
 (407) 857-5230

## KEY PERSONNEL

Code			Ext.
		(202) 76—	
		Autovon 29—	
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1000	Commanding Officer	CAPT P.G. Gaffney II, USN	73403
1001	Director of Research	Dr. T. Coffey	73301
1002	Chief Staff Officer/Inspector General	CAPT R.W. Michaux, USN	73621
1003	Associate Director of Research for Strategic Planning	Dr. W.M. Tolles	73584
1004	Scientific Consultant to the Director of Research	Dr. P. Mange	73724
1005	Head, Office of Management and Administration	Mrs. M. Oliver	73086
1005.8	Head, Administrative Services Staff	Ms. L.T. Warder	73858
1006	Exploratory Development Manager	Dr. S. Sacks	73666
1200	Head, Command Support Division	CAPT R.W. Michaux, USN	73621
1220	Head, Security Branch	Mr. M.B. Ferguson	73048/72240
1240	Head, Safety Branch	Mr. M.B. Ferguson	72249
1270	O in C Chesapeake Bay Detachment	CDR B.K. Jones, USN	(301) 257-4002
1280	O in C Flight Support Detachment (PAX River NAS)	LCDR G.R. Viggiano, USN	(autovon) 8-356-3751
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3008	Legal Counsel	Ms. H.J. Halper	72244
3803	Deputy Equal Employment Officer	Mr. W. Williams	72486
4810	Public Affairs Officer	Mr. J.W. Gately, Jr.	72541
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3400	Supply Officer	CDR W.E. Ralls, Jr., USN	73446
3500	Public Works Officer	Mr. D.K. Woodington,	73371
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8100	Supt., Space Systems Development Department	Mr. R.E. Eisenhauer	70410
8200	Supt., Spacecraft Engineering Department	Mr. R.T. Beal	76407
8300	Supt., Space Systems Technology Department	Mr. L.H. Hammarstrom	73920

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Medical Clinic ..... 7-3592

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