NAVAL RESEARCH LABORATORY

Washington, D. C. 20375-5000
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FACT BOOK



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The NRL Fact Book is prepared as a reference source for information about the Naval Research Laboratory. Unless otherwise noted, information is current as of 15 November 1986; individual division full-time personnel counts are as of 31 December 1986. To provide more timely information, a point of contact is listed for various activities.

The Naval Research Laboratory 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 will be furnished on request. Address all such inquiries to:

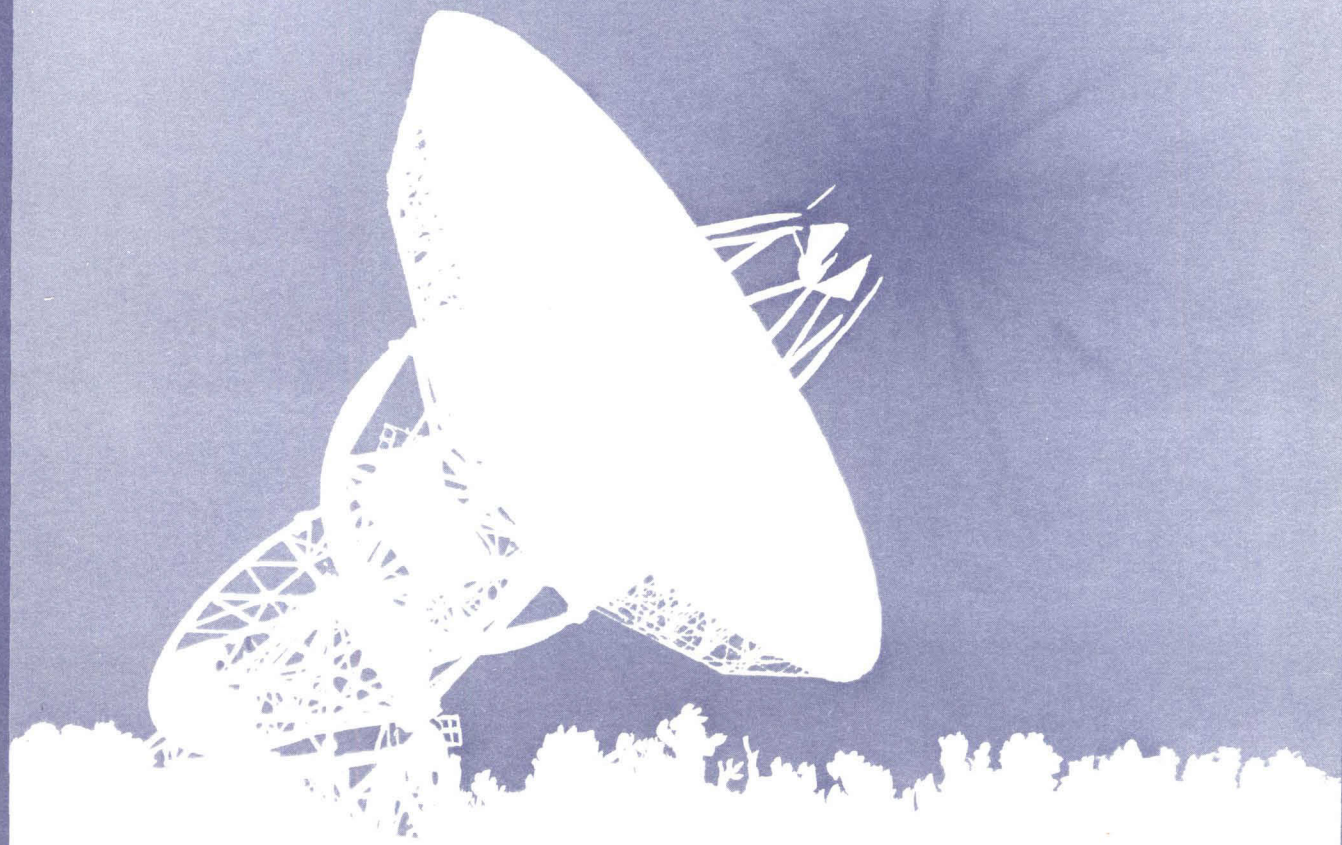
Civilian Personnel Office (Code 1810)
Naval Research Laboratory
Washington, DC 20375-5000

COVER: This 85-foot radio telescope at NRL's Maryland Point Observatory is one of two large radio telescopes at the facility. It has one of the highest gains of any telescope in the world in the frequency range 26 to 50 GHz. This makes this telescope a powerful tool to study objects in the universe such as quasars, radio galaxies, black holes, and star-forming regions in our galaxy. It is frequently used as an element of an interferometer that spans the globe by using a technique called very-long-baseline interferometry.

REVIEW AND APPROVED
July 1987



CAPT William C. Miller, USN
Commanding Officer



1987 FACT BOOK

NAVAL RESEARCH LABORATORY
WASHINGTON, DC 20375-5000

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INTRODUCTION TO THE NAVAL RESEARCH LABORATORY

Mission

The mission of the Naval Research Laboratory is 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. In fulfillment of this mission, the Naval Research Laboratory:

- Initiates and conducts scientific research of a basic and long-range nature in scientific areas of special interest to the Navy.

- Conducts exploratory and advanced technological development deriving from or appropriate to the scientific program areas.

- Within areas of technological expertise, develops prototype systems applicable to specific projects.

- Performs scientific research and development for other naval commands and, where specially qualified, for other agencies of the Department of Defense and, in defense-related efforts, for other Government agencies.

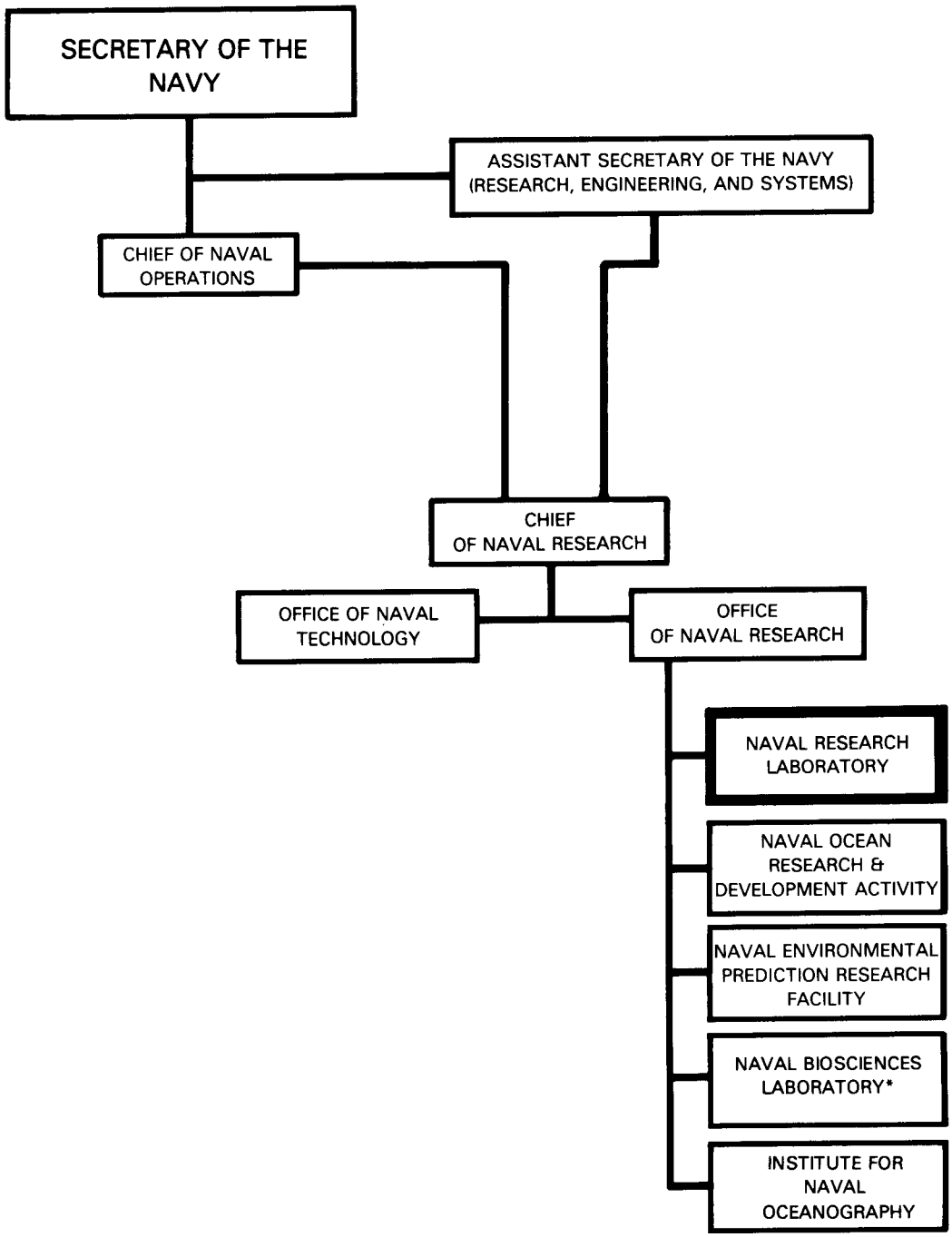
- Upon request from appropriate naval commands, assumes responsibility as the Navy's principal R&D center in areas of unique professional competence.

- Serves as the principal activity for the Navy and its contractors in providing accurate calibration, test, and evaluation services on acoustic transducers and materials; in providing a service whereby an inventory of calibrated standard acoustic transducers is maintained for issue; and in performing research and development to advance the state-of-the-art of acoustic measurements and standard transducers.

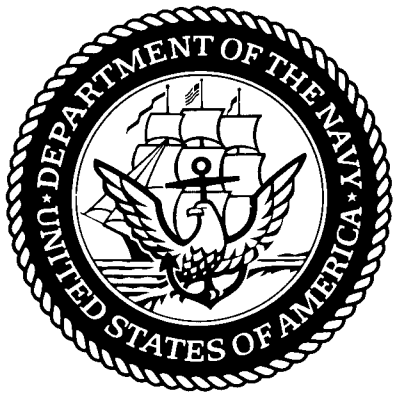
- Performs research and development on sonar transducers and related acoustic materials.

- Furnishes scientific consultative services for the Navy and, where specially qualified, for other agencies of the Department of Defense and, in defense-related efforts, for other Government agencies.

- Provides to the Navy determinations of performance characteristics of developmental and prototype devices through limited engineering test and evaluation services.



* TO BE DISESTABLISHED 30 SEPT.1987



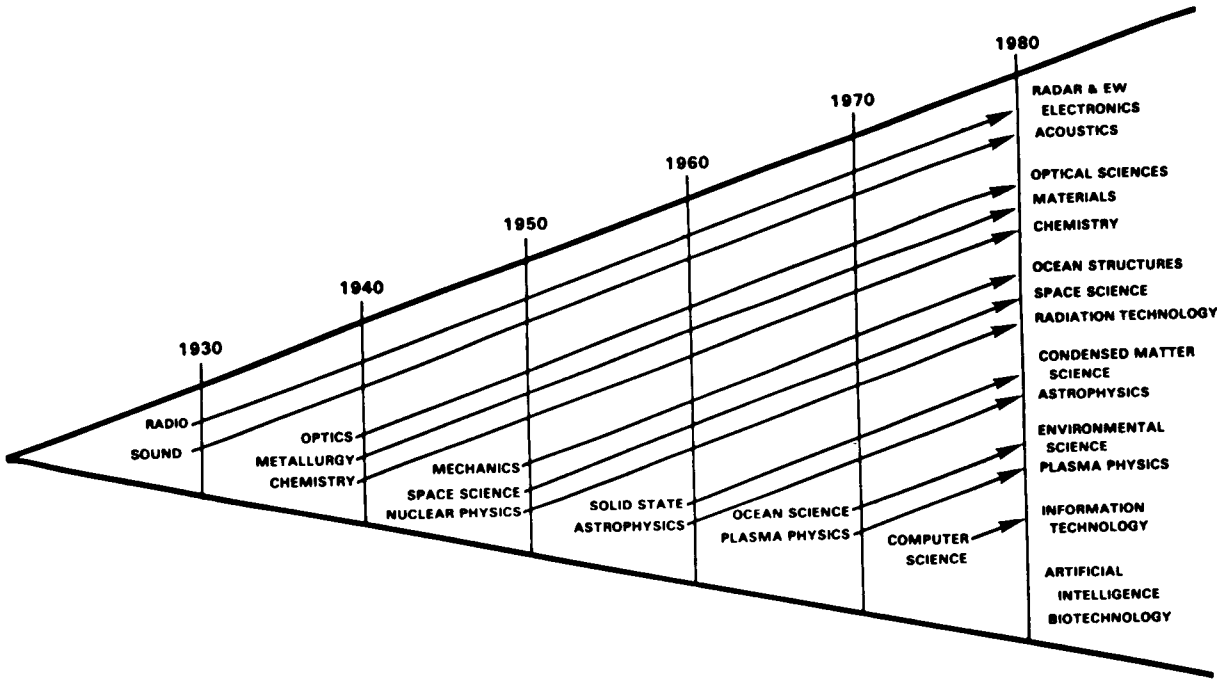
The Naval Research Laboratory in the Department of the Navy

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 Naval Research's effort to meet its scientific research responsibilities.

For its basic research effort, the Laboratory receives guidance from the Chief of Naval Research 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 by which 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 ONR contract research department.

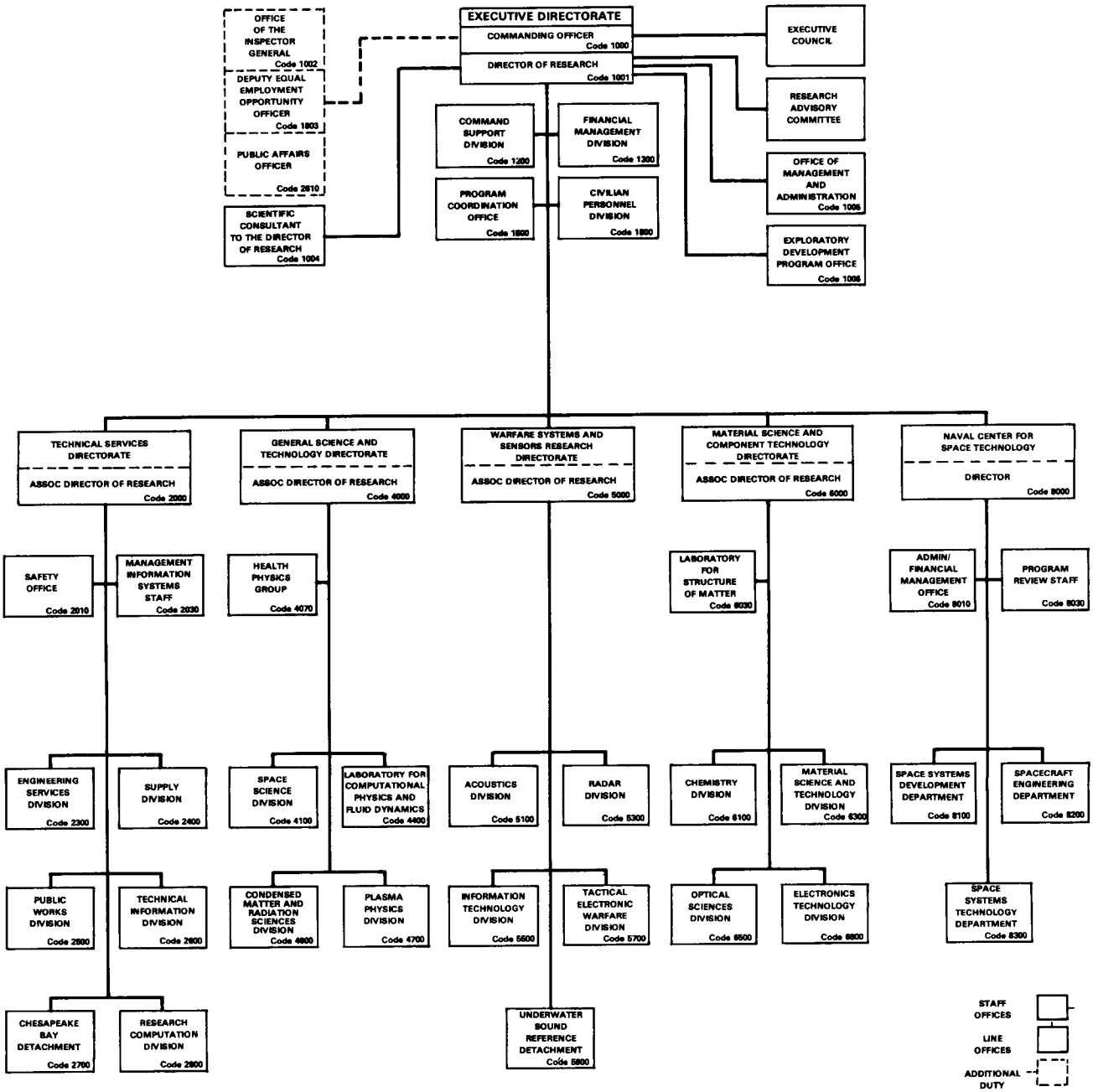


NRL PROGRAM EVOLUTION

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 from the two original areas of radio and underwater sound to more than 10 broad areas of scientific endeavor, encompassing many diverse fields.

NRL has been designated a major shore command and is led by a Navy captain who serves as commanding officer. The principal official under the commanding officer responsible for directing Laboratory operations is the director of research, a senior civilian. The Laboratory's overall management structure is built around four principal directorates and one technology center. Three research directorates—each headed by a senior civilian associate director of research—comprise 13 research divisions and detachments established along scientific discipline lines. The Technical Services Directorate, similarly led, consists of six support divisions and detachments. The recently established Naval Center for Space Technology—also led by a senior civilian director—consists of three departments.

NRL 1987 Organization Chart



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.

Computer Science and Artificial Intelligence
- Standard Computer Hardware, Development Environments, Operating Systems, and Runtime 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

Device Technology
- Integrated Optics
- Radiation-Hardened Electronics
- Microelectronics
- MM Wave Technology
- Hydrogen Masers for GPS

Directed Energy Technology
- High-Energy Lasers
- Chemical Lasers
- Laser Propagation
- High-Power Microwave Sources
- Charged-Particle Devices

Electronic Warfare
- Decoys (RF and IR)
- Repeaters/Jammers, EO/IR Active Countermeasures
- EW/C^3CM System Concepts

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 Electrooptical System Performance
- Air Quality in Confined Spaces
- Electromagnetic Background in Space
- Solar Activity
- Ionospheric Behavior

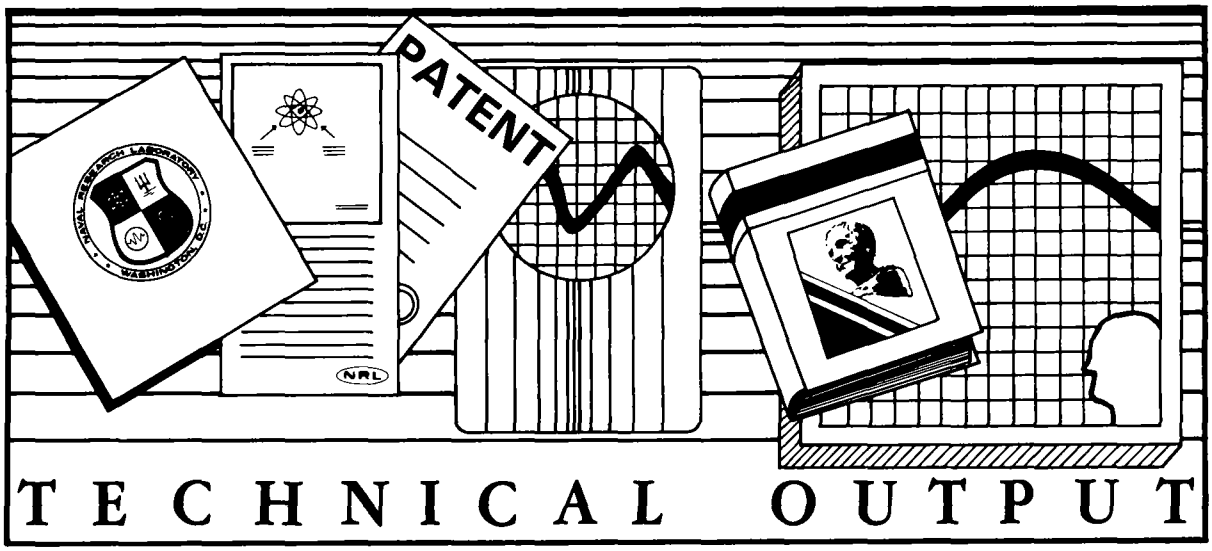
Information Management
- Antijam Communication Links
- Network Architectures
- Combat Management Information Systems

Materials
- Biomolecular Engineering
- Material Processing
- Advanced Alloy Systems
- Rapid Solidification Technology
- High-Temperature Materials
- Laser Fabrication and Processing
- Ceramics and Composite Materials

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
- Imaging Radars
- Target Classification/Identification
- Towed Acoustic Arrays
- Underwater Acoustic Propagation
- Electromagnetic Sensors—Gamma Ray to RF Wavelengths
- SQUID for Magnetic Field Detection
- Low Observables Technology

Undersea Technology
- Autonomous Vehicles
- Bathymetric Technology
- Anechoic Coatings



Publications

Scientists and engineers at the Naval Research Laboratory have published more than 29,000 articles, reports, and books since the Laboratory was established in 1923. During fiscal year 1986, NRL researchers published 514 journal articles and 241 NRL reports. In addition, their work was described in 128 conference proceedings; 1360 presentations were made to scientific, military, and government audiences.

Patents

NRL scientists have made significant contributions in many areas of technology. One measure of the quality and quantity of these contributions is the number of patents received. During fiscal year 1986, researchers here were awarded 62 patents; this brings NRL's total to 3138 patents issued since 1923.

Recently, Congress authorized a new form of patent protection known as the Statutory Invention Registration, or SIR. A SIR document provides all the protection generally needed by the Navy and carries all the prestige of a standard patent but at a significantly lower cost. SIRs are generally used to protect significant mission-related inventions that are primarily of military value and have little commercial application. In fiscal year 1986, 14 SIRs were issued to NRL researchers.

These patents and SIRs ensure the Navy's control over, and free use of, the technology it has developed.

Personnel*

Civilian

Full-time, Permanent (FTP)	
Graded	2758
Ungraded	444
Total	3202
Temporary, Part-time, Intermittent (TPTI)	
(TPTI)	181
Total Civilian	3383

Graded FTP Breakdown	
Scientists, Engineers, and SES	1450
Administrative—Professional	33
Administrative—Management	306
Technicians	527
Other-Clerical	373
Other-General	69
Total	2758

Civilian Budgeted	
End-Strength	3333

Military

Officers	39
Enlisted	58
Total Military	97
Military Allowance	98

On Board	Total Military	Total Civilian	FTP	TPTI	FTP Ungraded	FTP Graded
3480	97	3383	3202	181	444	2758

Annual Civilian Turnover Rate (percent)

	1982	1983	1984	1985	1986
Research divisions	7.22	7.65	7.54	8.43	7.10
Nonresearch areas	8.25	11.70	16.15	11.68	11.32
Entire Laboratory	7.63	9.21	10.80	9.68	8.77

Highest Academic Degrees Held by Permanent Employees

Bachelors	510
Masters	302
Doctorates	707

*As of 30 September 1986

Major Capabilities and Facilities

(Listed alphabetically by organizational unit)

Acoustics Division

- Large tank instrumented for investigating acoustic echo characteristics of targets
- Tank 9.1 m (30 ft) in diameter by 6.7 m (22 ft) deep, 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

Chemistry Division

- Bio/Molecular Engineering Facility
- Submicron 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
- CAMECA Ion Beam Microprobe

Chesapeake Bay Detachment (CBD, Chesapeake Beach, MD)

- 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 11-metric-ton (12-ton) payload capacity
- Fire Test Facility for fire extinguishment research
- Boat services

Civilian Personnel Division

- Supervisor/manager executive development
- Science, engineering, and computer courses
- Administrative support and general interest
- Mechanical and technical trades training
- Long-term and special programs
- Instructional television via tape, microwave and satellite transmissions, and computer-based training

Condensed Matter and Radiation Sciences Division

- Helium-3 Dilution Refrigerator
- 60-MeV Linear Electron Accelerator (Linac)
- 5-MV Positive Ion Van de Graaff Accelerator
- Ion Implantation Facility
- 2-MV Electron Van de Graaff Accelerator
- Cobalt-60 source
- Hypervelocity gun ranges

Electronics Technology Division

- Microelectronics Processing Facility
- Electron beam lithography system
- Electron microscopes and electrooptical analytical devices
- High Resolution Scanning Electron Microscope/Scanning Transmission Electron Microscope
- Crystal-growing facilities including bulk growth, molecular beam epitaxy, and organo-metallic chemical vapor deposition
- High Magnetic Field Facility
- A variety of electronic testing and analysis facilities

Engineering Services Division

- Mechanical, electronic, and project engineering and design
- Manual and computer-aided design and drafting
- Printed circuit CAD/CAM facility (REDAC)
- Shops for machining, sheet metal, welding, casting, plating, plastics, printed circuits, electronic assembly, and other fabrication services

A wide variety of testing and repair capabilities

Health Physics Staff

X-Ray and Gamma-Ray Calibration Facility

Information Technology Division

Extensive computer facilities
Microwave Space Research Facility
HF modem and channel simulation
Brandywine Antenna Range
Pomonkey Test Range
Signal Analysis Laboratory
Artificial Intelligence Computer Network
Distributed Simulation and Prototyping Test Bed

Laboratory for Computational Physics and Fluid Dynamics

VAX 11/780 plus peripherals, terminals, Network and MILNET, LANL X Cray and Net, APTEC DPS + FPS and NUMERIX Array Processors, Tektronix 4115 B and Evans Sutherland Graphics Stations, connected to the NRL Cray XMP—2M words, DEC frontend
DICOMED D-38 Design Station and NRL DICOMED microfilm recorder
Wave channel: a 30-m channel with fan and mechanical wavemaker instrumented for the study of wave generation and wave effects
Water tunnel: a large blow-down water channel with a 15-m-long test section for acoustic and flow-induced vibration studies of towed line arrays and flexible cables
Tow channel: a 20-m dual carriage tow channel with variable stratification for studies of geophysical flows and wakes

Laboratory for Structure of Matter

Two X-ray diffractometers
Electron diffractometer

Material Science and Technology Division

Ultrasonic gas atomizer
Hot 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
High-energy CW and pulsed lasers
Hot cells for universal testing of irradiated materials
Shock and Vibration Laboratory

Naval Center for Space Technology

CAD/CAM Facility
RF anechoic chambers
Thermal-vacuum chambers
Spin Balance Facility
Reverberation Chamber
Shock and Vibration Test Facility
Clean-room facilities
Satellite tracking, command, and control facilities
30.5-m (100-ft) wave tank for studying dynamics of wind waves and their interactions with long waves; uses microwave Doppler spectrometry and optical and photometric techniques
Spacecraft Fabrication and Assembly Facility
Propellant Handling Facility

Operational Services

Mobile research platforms: three P3A, one P3B Orion aircraft. Three of the aircraft are especially configured for scientific support. The ASW suites have been removed, and the interiors have been converted for research project installations. One aircraft remains in Fleet ASW configuration.

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 semiconducters
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
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
Beam lines at the National Synchrotron Light Source, Brookhaven, for extensive materials characterization
Focal Plane Array Evaluation Facility

Plasma Physics Division

PAWN, 1-MJ Compact Inductive Storage Facility
Gamble I and II High-Voltage Pulsed Power Generators
PHAROS III, Three-Beam Neodymium-Glass Laser and Target Facility
1000-J NRL CO_2 Laser
7-MJ Homopolar Generator
High-Power Free-Electron Laser and Gyrotron Facilities
Modified Betatron Accelerator

Public Works Division

Construction, engineering, repair, and other services to operate, maintain, and improve NRL's physical facilities, including utilities

Radar Division

Radar Cross Section Measurement System
Radar research and development test beds (at CBD)
Versatile C-, X-, and K_a-band monopulse precision tracking radar systems (at CBD)
IFF ground station
Interpretation facility for synthetic aperture radar (SAR)
Airborne APS-116 radar with SAR processing
Recording and control system for airborne adaptive array research
Noncooperative Target Recognition Facility
Antenna Measurement Laboratory
Digital Image Processing Laboratory
Computer-Aided Engineering (CAE) Facility

Research Computation Division

Cray XMP-24 Computer (frontended by three DEC VAX 11/785 computers), an extremely large, high speed, powerful computational system particularly well-suited for scientific and engineering usuage
DEC VAX 11/785s (3) Front end to the Cray XMP-24 computer, providing linkages to a wide variety of concurrent computer services to over 1300 scientists and engineers, both at NRL and at remote locations throughout the US. These services include high volume, time-shared, local and remote batch, active graphics, and telecommunications processing.
NRL Broadband Local Area Network (NICENET) that connects most NRL buildings for computer communications and provides gateways to nation-wide communications/computer capabilities.
Off-line graphics capability via TID's DICOMED
CALCOMP 1055 and 5200 Plotting Facilities
VAX-11/780 MIS Computer
DEC-10 MIS Computer
VAX-11/750 Milnet Connection

Space Science Division

Waldorf Annex (lower site). This facilitiy 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
26-m (85-ft) radio telescope at Maryland Point, Md.
Other antennas for radio astronomy
E.O. Hulburt Center for Space Research

Development and test facilities for space-borne 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

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

Technical Information Division

DICOMED (computer graphics system)
Electronic publishing
Technical library (2,000 subscriptions, 45,000 monographs, 50,000 technical reports)
LS-2000 on-line library catalog
Photographic laboratories
Writing, editing, publications consultation
Exhibit spaces
Design services
Video productions

Underwater Sound Reference Detachment (Orlando, FL)

2.8-hectare (7-acre) lake with a large pier and instrumentation for underwater acoustic studies
Anechoic tank for simulating ocean depths up to 700 m (2297 ft)
Smaller pressure vessels for simulating depths to 7000 m (22,966 ft)
Field station at Bugg Spring with floating platform and instrumentation for acoustic measurements

Major NRL Sites and Facilities

Station and Location	Acreage			Buildings/ Structures
	Navy Title	Easement or Purchase	Permit or Lease	
District of Columbia				
NRL	129.23		1.45	134/20
Cyclotron building site, Bolling AFB			5.25	1
Virginia				
Midway Research Center, Quantico	162.00			
Maryland				
NRL Flight Support Detachment, NAS Patuxent River*†			–	
Chesapeake Bay Detachment, Chesapeake Beach†	167.90		0.02	100/194
Multiple research site, Tilghman Island†	2.00			7/7
Dock facility, Fishing Creek, Chesapeake Bay			0.02	3/3
NRL Waldorf Annex, Waldorf†	23.94	35.16		18/24
Radio Astronomy Observatory, Maryland Point†	24.30		197.88	10/12
Radio antenna range, USAF Receiver Site, Brandywine†			22.98	
Free Space Antenna Range, Pomonkey†	14.12	28.40		9/13
Florida				
Underwater Sound Reference Detachment, Orlando†	10.46			26/21
USRD, Leesburg Bugg Spring			65.0	4/6

*Site or equipment used by NRL under an intraservice (Navy) or interservice agreement.
†See maps, General Information section.

PROPERTY

Land:

Owned	425 acres
Leased	419 acres

Acquisition Costs:

Real Property	$100.2 million
Equipment	$142.7 million

Buildings:

RDT&E	2,357,807 ft^2
Administrative	193,096 ft^2
Other	402,615 ft^2

Fiscal Information

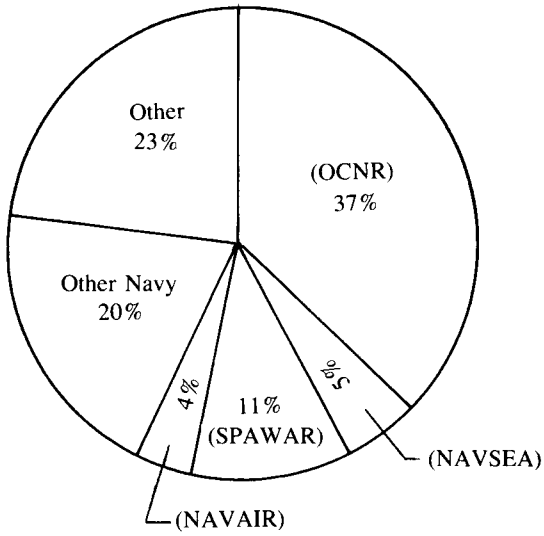
NRL FUNDING BY MAJOR SPONSOR
(NEW ORDERS RECEIVED)

Sponsor	FY 1986 Actual ($M)	FY 1986 Percent	FY 1987 Estimated ($M)	FY 1987 Percent
OCNR	128.8	37	118.2	37
SPAWAR	38.3	11	38.3	12
NAVAIR	13.9	4	9.5	3
NAVSEA	17.4	5	12.8	4
Other Navy	69.7	20	70.3	22
Total Navy	268.1	77	249.1	78
All Other (includes non-DoD sources)	80.1	23	70.3	22
Total Non-Navy	80.1	23	70.3	22
Total Funding	348.2	100.0	319.4	100.0

R&D PROGRAM FUNDS BY TYPE
(NEW ORDERS RECEIVED)

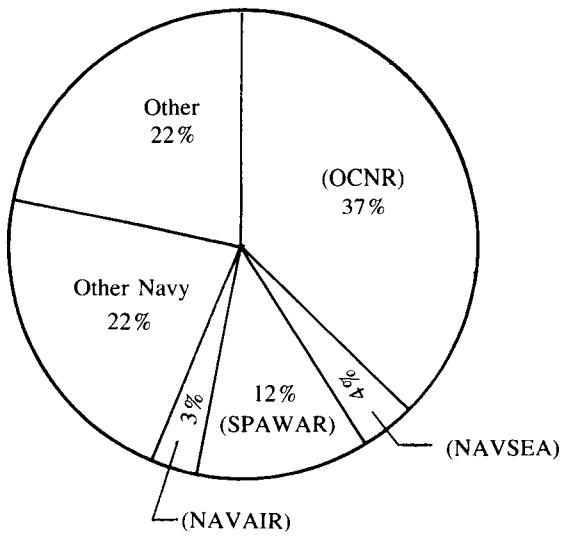
Type or Purpose of Funds	FY 1986 Actual ($M)	FY 1986 Percent	FY 1987 Planned ($M)	FY 1987 Percent
Reimbursable Funds				
Research, Development, Test and Evaluation, Navy				
6.1 Research	70.2	20.2	76.1	23.8
6.2 Exploratory Development	40.6	11.7	47.0	14.7
6.3 Advanced Development	19.3	5.6	16.5	5.2
6.4 Engineering Development	26.9	7.7	22.9	7.2
6.5 Management & Support	2.2	0.6	1.9	0.6
6.6 Operational Systems Development	12.3	3.5	10.5	3.3
RDT&E Navy Subtotal	171.5	49.3	174.9	54.8
Other RDT&E Subtotal	80.2	23.0	70.8	22.2
Total RDT&E	251.7	72.3	245.7	77.0
Other Procurement, Navy	3.7	1.1	3.9	1.2
Operation and Maintenance, Navy	18.1	5.1	7.6	2.4
Other	74.7	21.5	62.2	19.4
Total Reimbursable Funds	348.2	100.0	319.4	100.0
Direct Cite Funds	152.0		135.0	
Total Funds	500.2		454.4	

SOURCES OF FUNDS
FY 1986 (NEW ORDERS RECEIVED)



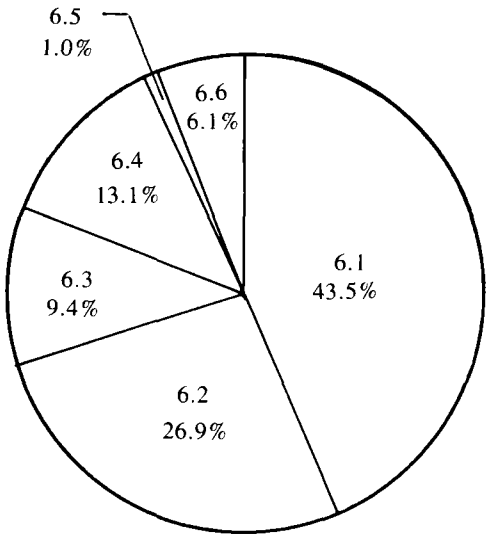
	$M
Office of the Chief of Naval Research (OCNR)	128.8
Naval Sea Systems Command (NAVSEA)	17.4
Space and Naval Warfare Systems Command (SPAWAR)	38.3
Naval Air Systems Command (NAVAIR)	13.9
Other Navy	69.7
Other	80.1
Actual Reimbursable Funds	348.2
Actual Direct Cite Funds	152.0
Total Funds	500.2

FY 1987 PLAN (NEW ORDERS)



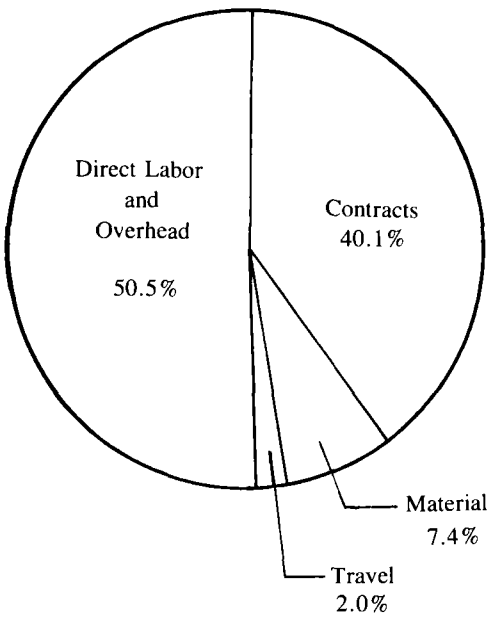
	$M
Office of the Chief of Naval Research (OCNR)	118.2
Naval Sea Systems Command (NAVSEA)	12.8
Space and Naval Warfare Systems Command (SPAWAR)	38.3
Naval Air Systems Command (NAVAIR)	9.5
Other Navy	70.3
Other	70.3
Planned Reimbursable Funds	319.4
Planned Direct Cite Funds	135.0
Planned Total Funds	454.4

RDT&E NAVY REIMBURSABLE FUNDS BY CATEGORY FY 1987 PLAN (NEW ORDERS)



	$M
6.1 Research	76.1
6.2 Exploratory Development	47.0
6.3 Advanced Development	16.5
6.4 Engineering Development	22.9
6.5 Management and Support	1.9
6.6 Operational Systems Development	10.5
Total Funds	174.9

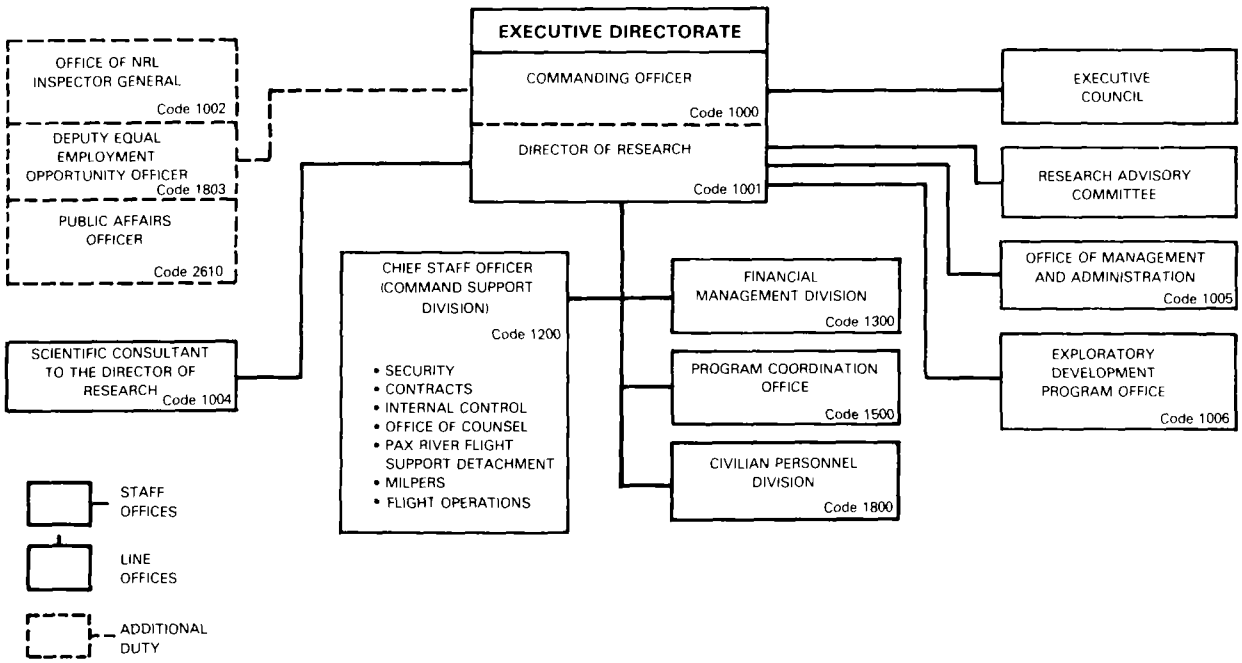
DISTRIBUTION OF REIMBURSABLE FUNDS FY 1987 PLAN



	$M
Contracts	128.2
Material*	23.5
Travel	6.5
Direct Labor and Overhead	161.2
Reimbursable Funds	319.4
Direct Cite Funds	135.0
Total Funds	454.4

*Also includes other costs, such as ADP charges, tuition, etc.

EXECUTIVE DIRECTORATE



Key Personnel

Name	Title	Code
CAPT W.C. Miller, USN	Commanding Officer	1000
Dr. T. Coffey	Director of Research	1001
Ms. Sol del Ande Eaton	Deputy Equal Employment Opportunity Officer	1803
CAPT M.A. Howard, USN†	Inspector General	1002
Mr. J.W. Gately, Jr.†	Public Affairs Officer	2610
Dr. P. Mange	Scientific Consultant to Director of Research	1004
Mrs. M. Oliver	Head, Office of Management and Administration	1005
Dr. S. Sacks	Head, Exploratory Development Program Office	1006
CAPT M.A. Howard, USN	Chief Staff Officer	1200
Mr. R.W. Steinbeck	Comptroller	1300
Dr. R.T. Swim	Head, Program Coordination Office	1500
Mr. D.J. Blome	Head, Civilian Personnel Division	1800

†Additional duty

The Executive Directorate



The Commanding Officer and the Director of Research share executive responsibility for the management of the Naval Research Laboratory; however, in accordance with Navy regulations, 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 Space Technology Center. They are supported by the Technical Services Directorate and the Executive Directorate. In addition, the Laboratory's operating staffs provide assistance in their special fields to the Commanding Officer and the Director of Research. The operating staffs are listed on the following pages of this publication.

Commanding Officer

Captain William C. Miller, USN, was born in Los Angeles, California, on December 1, 1940. He began his naval career at the United States Naval Academy where he earned his bachelor of science degree and was commissioned an ensign in 1962. After an initial tour as Communications Officer of the destroyer USS *Dupont* (DD-941), he attended graduate school at Stanford University, earning his master of science (1965) and doctor of philosophy (1967) degrees, both in electrical engineering.

Subsequent sea duty included weapons-related assignments on the guided missile cruiser USS *Gridley* (CG-21) and the guided missile destroyer USS *Sampson* (DDG-10), and command of two ships—the frigate USS *McCloy* (FF-1038) and the destroyer USS *Cushing* (DD-985).

His assignments ashore have included service on the personal staff of the Chief of Naval Operations, as a project officer at the Office of Naval Research, as a member of the Electrical Engineering faculty and later as Executive Assistant to the Superintendent of the United States Naval Academy, as Executive Assistant to the Assistant Secretary of the Navy (Shipbuilding and Logistics), and as Director of Low Observables Technology in the Office of the Chief of Naval Research. Captain Miller assumed his current duties as Commanding Officer of the Naval Research Laboratory in October 1986.

He was promoted to the rank of Captain in October 1982 and was selected in January 1987 for promotion to Rear Admiral. Captain Miller's personal awards include the Legion of Merit, a Gold Star in lieu of a second Legion of Merit, the Meritorious Service Medal, the Navy Achievement Medal, and several campaign and service medals. He is a twenty-year member of the Institute of Electrical and Electronics Engineers.

Director of Research

Dr. Timothy Coffey [redacted]. 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 and the Rear Admiral William S. Parsons Award for Scientific and Technical Progress (honorable mention). In 1981, he was awarded the Presidential Rank of Meritorious Executive.

Executive Council

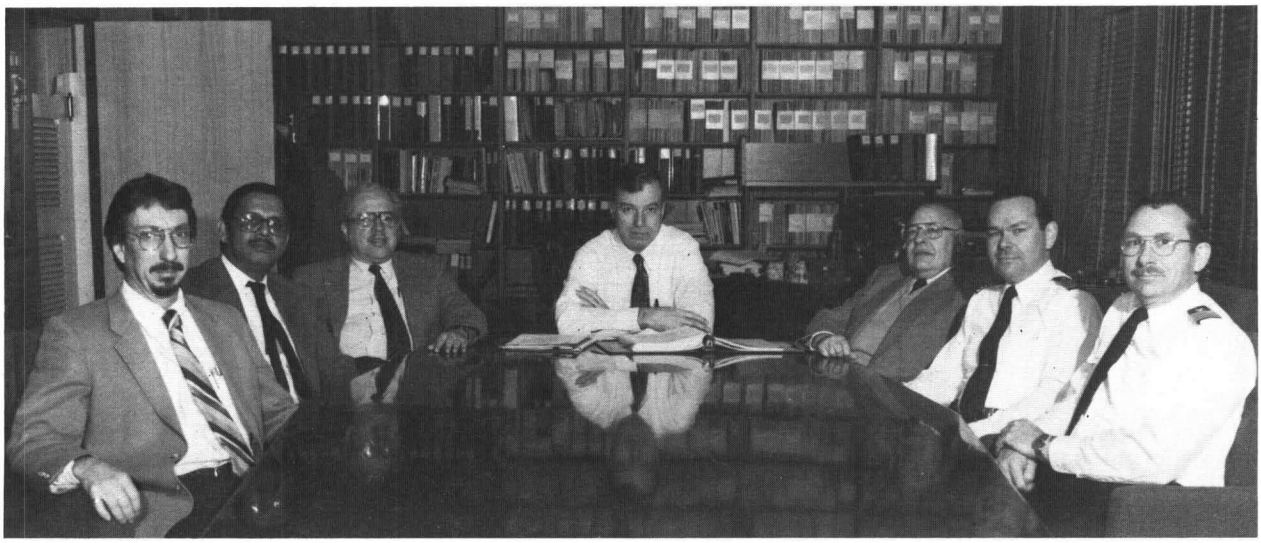


Executive Council

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 affect 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
Chief Staff Officer
Associate Directors of Research
Heads of Divisions
Chief Scientist, Laboratory for Computational Physics and Fluid Mechanics
Chief Scientist, Laboratory for Structure of Matter
Deputy Equal Employment Opportunity Officer
NRL Counsel
Public Affairs Officer
Head, Administrative Services Office
Head, Management Information Systems Staff

Research Advisory Committee



Research Advisory Committee

The Research Advisory Committee advises the Commanding Officer and the Director of Research on the scientific program and on 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

Inspector General



CAPT M.A. Howard

The Inspector General, when directed by the Commanding Officer, 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.

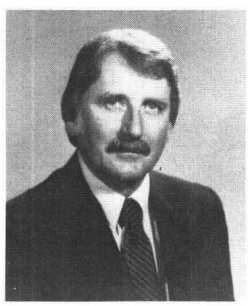
Deputy Equal Employment Opportunity Officer



Ms. Sol del Ande Eaton

The Deputy Equal Employment Opportunity Officer is the EEO program manager and the advisor to the Commanding Officer on all EEO matters. She manages the discrimination complaint process and directs the Laboratory's affirmative action plans and special emphasis programs (Federal Women's, Hispanic Employment, Handicapped, 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. She also advises SES and Merit Pay System employees on setting EEO objectives.

Public Affairs Officer

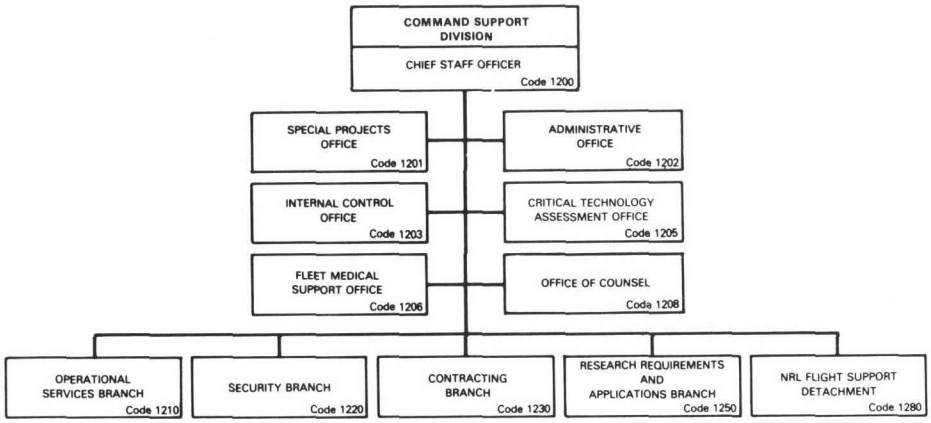


Mr. J. W. Gately, Jr.

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).



CAPT. M.A. Howard, USN



Basic Responsibilities

The Command Support Division is headed by the Chief Staff Officer who 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 he coordinates NRL's Research Reserve program.

The Division provides a military staff to the Commanding Officer and to the Director of Research for the purpose of 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.

The Division is responsible for physical, personnel, communications, information, industrial and ADP security, and fire protection. It provides intelligence support and support for international cooperative agreements in technology control, compiling and maintaining a comprehensive technical data base that includes the Military Critical Technologies List and a register of technical experts. It is further responsible for conducting research in medical support for wartime and civilian disaster management planning.

The Division provides major procurement services for the Laboratory. These services include consultant/advisory contract staff services, as well as administration and monitoring of contract performance.

It provides legal counsel and representation in the fields of procurement, business and commercial law, civilian personnel law, government regulations, intellectual property and patent law, EEO, standards of conduct, and litigation. The staff also coordinates the Laboratory's internal control program.

Personnel

Full-time civilian: 152
Military: 93

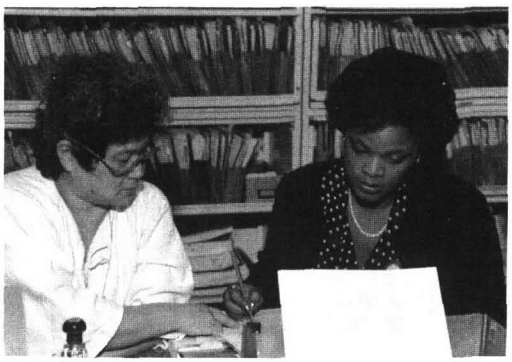
Key Personnel

Name	Title
CAPT M.A. Howard, USN	Chief Staff Officer
CDR G.R. McWilliams, USN	Special Projects Coordinator
Ms. M.L. Bond	Administrative Officer
Ms. M.S. Rathbun	Internal Control Officer
Mr. L.M. Winslow	Head, Technology Assessment Staff
Dr. P.B. Richards	Head, Fleet Medical Support Office
Ms. S.G. Weldon	Legal Counsel
CDR J. Taber, USN	Operational Services Officer
Mr. J.R. Gallagher	Communications/Message Center
Mr. M.B. Ferguson	Head, Security Branch
Mr. F. Washington	Head, Classification Management and Control Section
Mr. W.C. Bryan	Head, Special Security Office/Special Activities Office
Mrs. S.A. Cornwell	Head, Personnel and Physical Security Section
Mr. J.H. Ablard	Head, Contracting Branch
CDR T.E. Frazier, USN	Head, Research Requirements and Applications Branch
CDR D.P. Glanzman, USN	Head, OIC, NRL Flight Support Detachment

Point of Contact: Ms. M.L. Bond, Code 1202, 767-3204

Financial Management Division

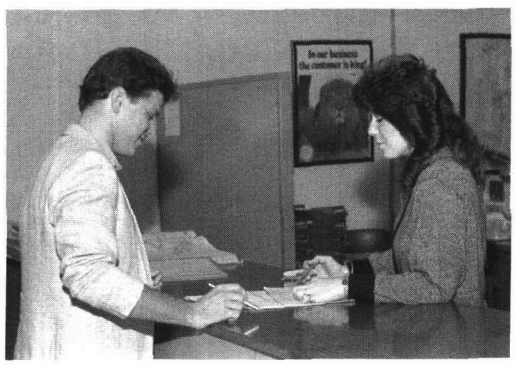
- **GENERAL ACCOUNTING**
- **COST ACCOUNTING**
- **SYSTEMS ACCOUNTING**
- **DISBURSING**
- **BUDGET**



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



As a support division, our most important assets are the dedicated, knowledgeable employees within our area. Pictured above, Financial Management Division employees are shown providing valuable services in vendor payment and researching prompt payment actions.

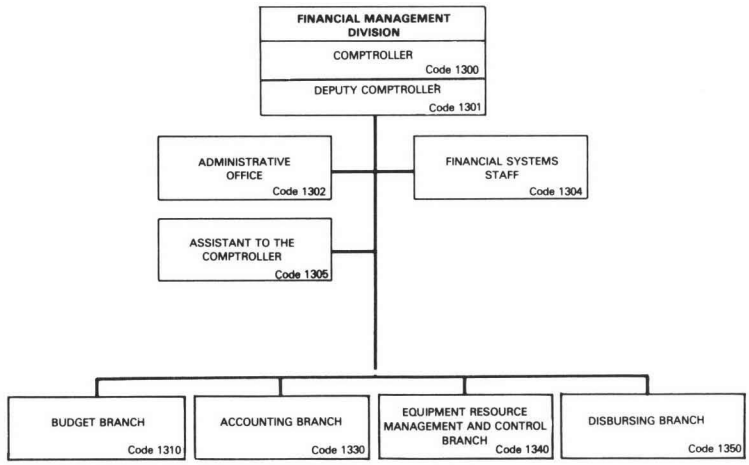




The Disbursing Branch is the most visible portion of the Financial Management Division. Their role in the Laboratory's operation and performance includes disbursing checks, processing travel orders, and auditing. Photographs above show the most important function of our division ... employee interaction with Laboratory employees in problem solving, researching and assistance.



Mr. R.W. Steinbeck



Basic Responsibilities

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

The Financial Management Division provides service to the Laboratory in budget formulation and funds administration, program and budget analysis, accounting and reporting, and disbursing. In addition, the division provides essential information and guidelines concerning equipment management.

Personnel

Full-time civilian: 92

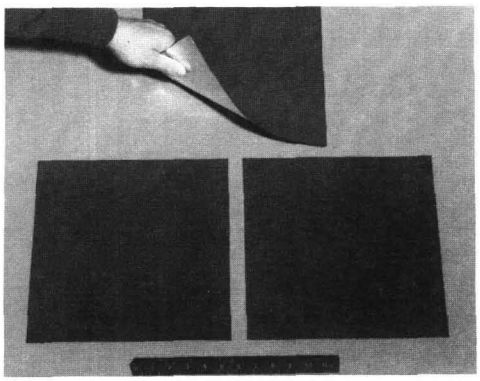
Key Personnel

Name	Title
Mr. R.W. Steinbeck	Comptroller
Mr. T.J. Santmyer	Deputy Comptroller
Ms. P.C. Reed	Administrative Officer
Vacant	Head, Financial Systems Staff
Mr. E.S York	Assistant to the Comptroller
Mr. H.A. Kinney	Head, Budget Branch
Mr. J. Thomas*	Head, Accounting Branch
Vacant	Head, Equipment Resource Management and Control Branch
Mrs. H. McCauley	Head, Disbursing Branch

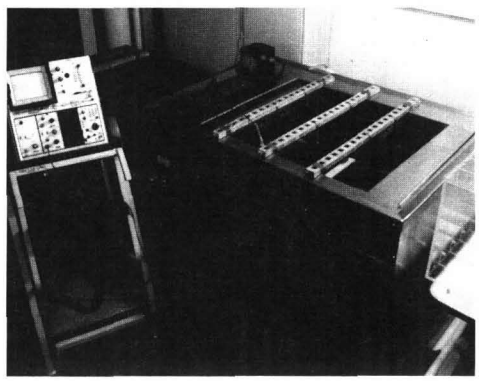
Point of contact: Ms. P.C. Reed, Code 1302, 767-2950

*Acting

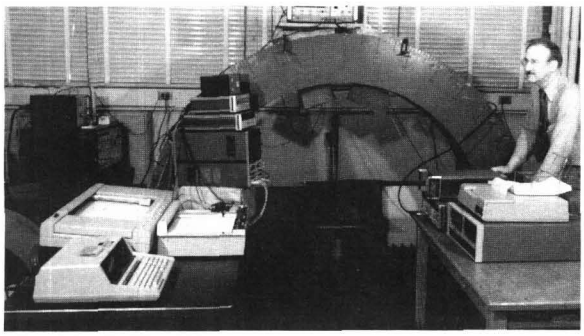
Program Coordination Office



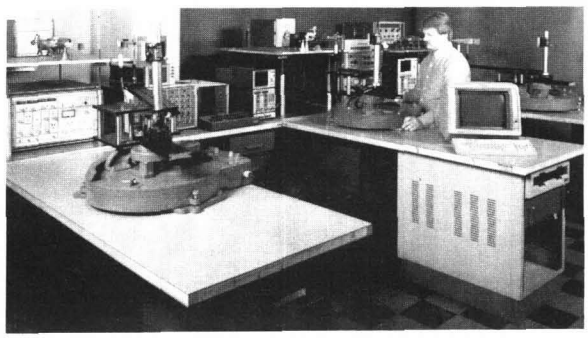
Material preparation



Environmental testing



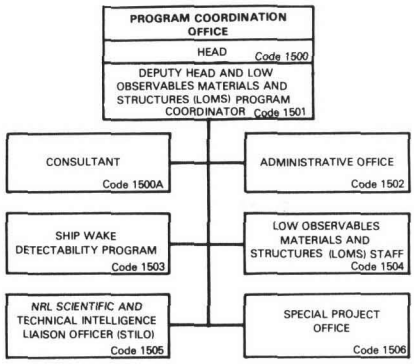
Characterization of materials



Automated material characterization



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 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 Scientific and Technical Liaison Program is contained within the PCO.

Personnel

Full-time civilian: 17

Key Personnel

Name	Title
Dr. R.T. Swim	Head, Program Coordination Office
Dr. D.W. Forester	Deputy and LO Program Coordinator
Mrs. D. Ernst*	Administrative Officer
Dr. R.T. Swim*	Head, Ship Wake Detectability Program
Dr. D.W. Forester*	Head, LOMS Staff
Mr. H. Bress	Consultant and NRL STILO

Point of contact: Dr. R. T. Swim, Code 1500, 767-3314

*Acting

Civilian Personnel Division

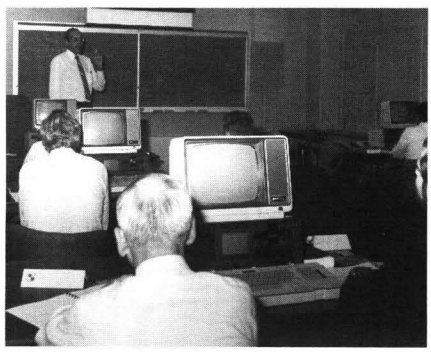
- **PERSONNEL OPERATIONS**
- **EMPLOYEE DEVELOPMENT**
- **EMPLOYEE RELATIONS**
- **EQUAL EMPLOYMENT OPPORTUNITY**



Personnel actions, records, and reports



EEO staff



Training—Management Use of Personal Computers



Personnel Operations reception area



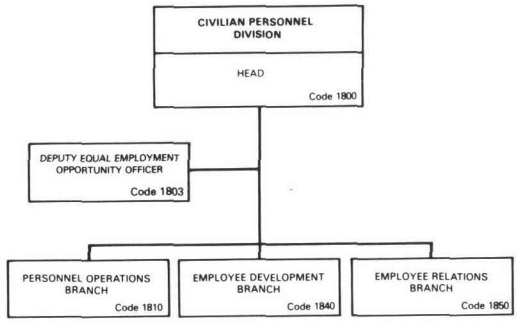
Employee Relations



Providing employment information



Mr. D.J. Blome



Director of Civilian Personnel

The Director of Civilian Personnel (OCNR Code 0124) of the Consolidated Civilian Personnel Office (Headquarters, ONR, NRL, and Naval Ocean Research & Development Activity) is Mr. F.D. Wallace. His office is located at the Office of Naval Research, Ballston Towers #1, 800 North Quincy Street, Arlington, VA 22217. The on-site NRL division head is Mr. D.J. Blome.

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: 45

Key Personnel

Name	Title
Mr. F.D. Wallace	Director of Civilian Personnel (OCNR Code 0124)
Mr. D.J. Blome	Head, Civilian Personnel Division
Mrs. P.L. Hetzler	Administrative Officer
Ms. S. Eaton	Deputy Equal Employment Opportunity Officer
Vacant	Federal Women's Program Manager
Ms. D.B. Cohen	Handicap/Hispanic Program Manager
Mr. D.J. Blome†	Head, Personnel Operations Branch
Mrs. B.A. Duffield	Employment Programs Manager
Mrs. C.A. Lowell	Classification and Pay Administration
Mr. A.H. Sass	Head, Employee Development Branch
Ms. J. Hupp	Head, Employee Relations Branch

Point of contact: Mrs. P. L. Hetzler, Code 1802, 767-3421

†Additional duty

TECHNICAL SERVICES DIRECTORATE

Technical Services Directorate

The Technical Services Directorate provides administrative and technical services required to support the mission of the Laboratory. This support is in the areas of technical information; facility construction and maintenance; engineering design and fabrication, supply; operating and maintaining the Laboratory's central computer facilities; and providing administrative information to management. In addition, the Directorate operates and maintains a field facility for NRL research at the Chesapeake Bay.

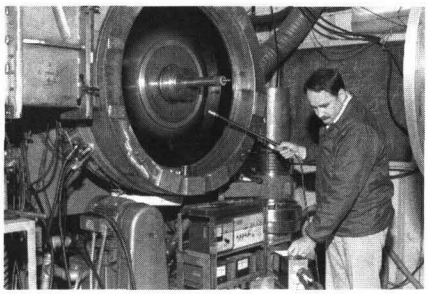
TECHNICAL SERVICES DIRECTORATE



The Information Services Branch is the focal point for NRL's media, public affairs, and internal relations programs



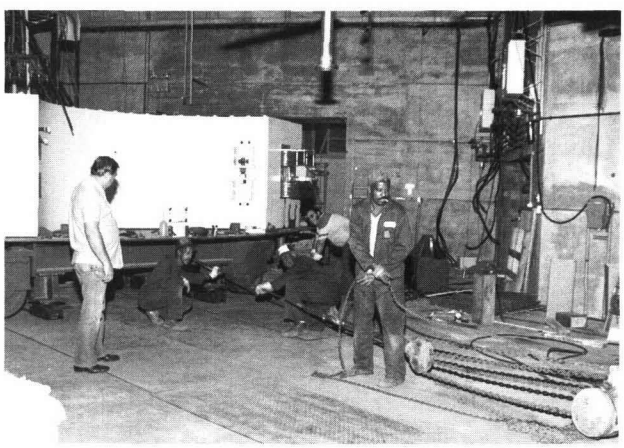
Mills, lathe, and matching center shown here are run by punched paper tape or by manually inputting computerized data



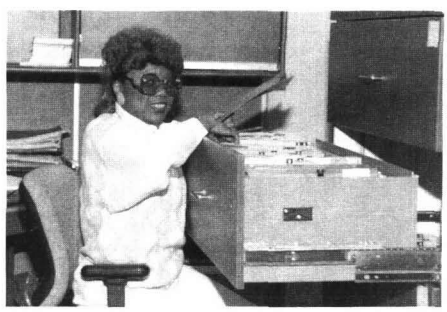
The Safety Office provides test and evaluation of confined space prior to entry of personnel



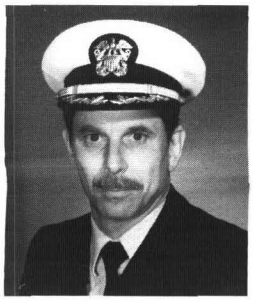
Editors ensure the professional presentation of research results



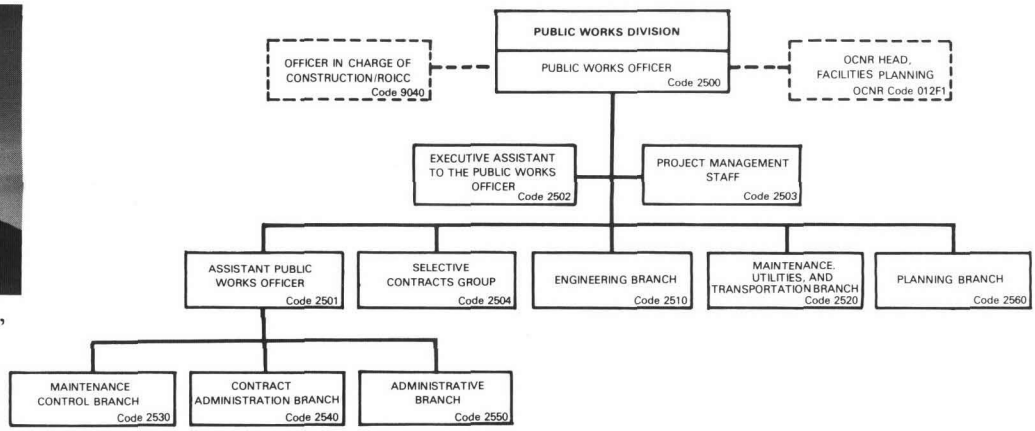
Public Works personnel move the cyclotron magnet



Supply technician researches a receipt control document



CDR T.R. Rampe,
CEC, USN



Basic Responsibilities

The Public Works Division is responsible for the physical plant of NRL. This includes: responsibility for the design, construction, maintenance, and repair of public works and utilities; responsibility for the operation of these public works and utilities in accordance with the technical standards of the Naval Facilities Engineering Command; and supporting the scientific program of the Laboratory by the construction, repair, and alteration of experimental and test equipment. In addition, the Division obtains required approvals for work for which the Division is responsible from the Chesapeake Division of the Naval Facilities Engineering Command, the Office of Naval Research, the Secretary of the Navy, and other authorities as appropriate.

The Public Works Division also supports the Office of Naval Research for Facilities Coordination and supports the Resident Officer in Charge of Construction on all Naval Facilities Engineering Command and certain research and development contracts at NRL.

Personnel

Full-time civilian: 346
Military: 2

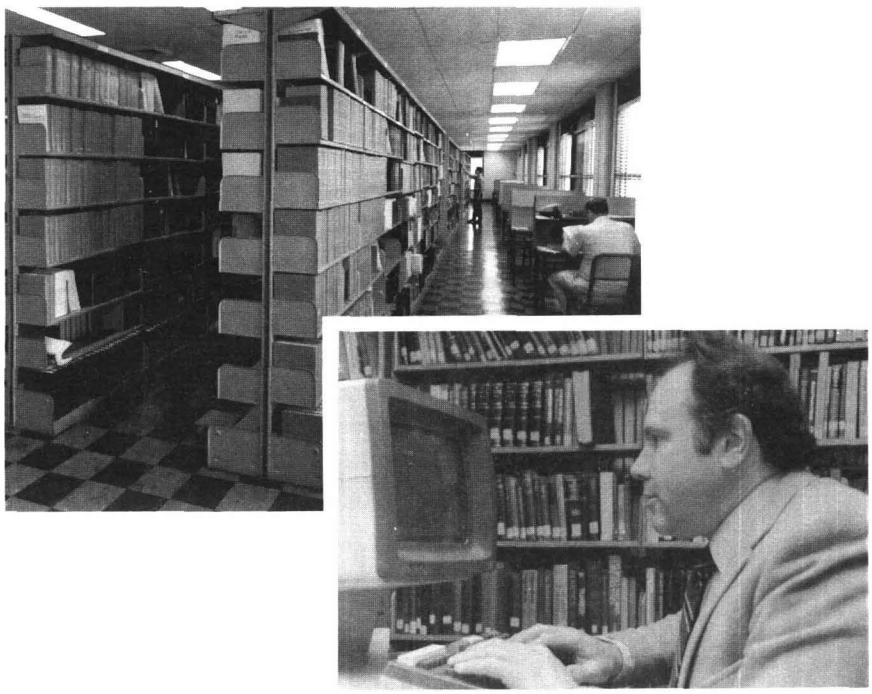
Key Personnel

Name	Title
CDR T.R. Rampe, CEC,USN	Public Works Officer/Officer in Charge of Construction/OCNR Shore Facilities Engineer
LT J. Dell, CEC, USN	Assistant Public Works Officer
Mr. J.P. Kosker	Executive Assistant to the Public Works Officer
Mr. T. Graves	Project Management Staff
Mr. G. Kitchin	Selective Contracts Group
Mr. J. Botkin	Head, Engineering Branch
Mr. C.B. Conner	Head, Maintenance, Utilities, & Transportation Branch
Mr. S. Harrison	Head, Maintenance Control Branch
Mrs. G. Johnson	Head, Contracts Administration Branch
Mrs. A. Coats	Head, Administrative Branch
Mr. D. Price	Head, Planning Branch

Point of contact: Mrs. A. Coats, Code 2550, 767-2168

Technical Information Division

- **INFORMATION SERVICES**
- **TECHNICAL LIBRARY**
- **PUBLICATIONS**
- **PHOTOGRAPHIC**



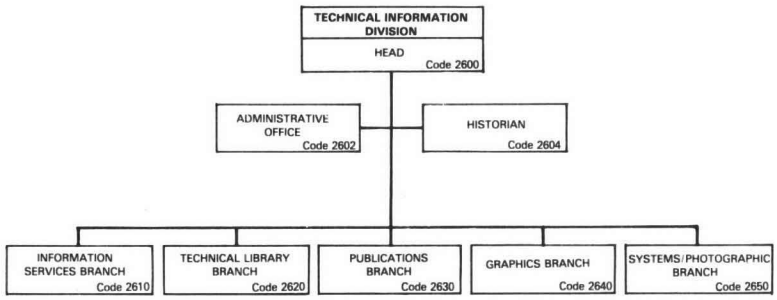
The Ruth H. Hooker Library provides access to an extensive collection of books, reports, and periodicals. Through online access and cooperative agreements most of the technical literature is available via interlibrary loan.



The Systems and Photographic Branch provides photographic support and video production services to the laboratory. This group also provides systems support to the rest of the division.



Mr. P. Imhof



Basic Responsibilities

The Technical Information Division provides centralized support to the Laboratory, and sometimes the Office of Naval Research, in the collection, retention, processing, publishing, presenting, and distribution of information in many forms to many audiences.

The following are the specific ways the Technical Information Division supports the Laboratory: by providing a full range of Library services; editing and publishing reports and publications; 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; management of public and internal information programs (publishing Labstracts, NRL's biweekly newspaper); and conducting Freedom of Information Act activities as required by law.

Personnel

Full-time civilian: 111

Key Personnel

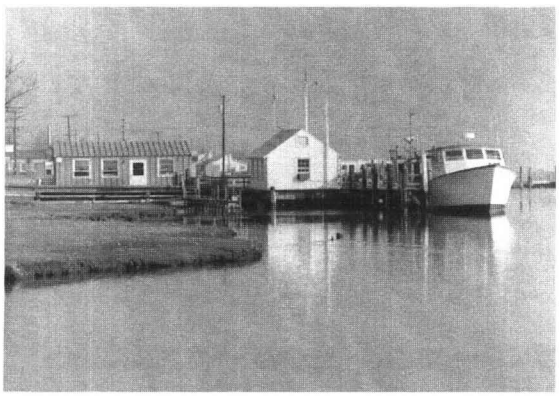
Name	Title
Mr. P. Imhof	Head, Technical Information Division
Mrs. C. Uffelman	Administrative Officer
Dr. D. Van Keuren	Historian
Mr. J.W. Gately, Jr.	Head, Information Services Branch and Public Affairs Officer*
Ms. L. Stackpole	Head, Technical Library Branch
Mr. T. Calderwood	Head, Publications Branch
Ms. L. Jackson	Head, Graphics Branch
Mr. J. Lucas	Head, Systems/Photographic Branch

Point of contact: Mrs. C. Uffelman, Code 2602, 767-3370

*Additional Duty

Chesapeake Bay Detachment

- ADMINISTRATIVE
- SECURITY
- OPERATIONS
- MAINTENANCE AND SUPPORT



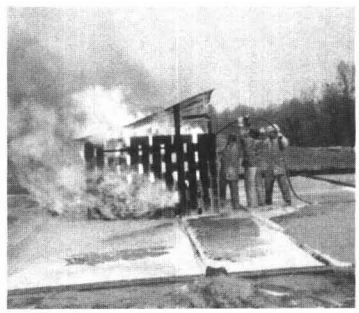
Research watercraft used to support research projects and for transportation to off-site facilities



Tilghman Island Facility located directly across the bay, 10 miles from CBD



Aerial view of the Chesapeake Bay Detachment



Fire Test Facility

Research Division Representatives

Optical Sciences Division
Mr. C. Gott, Field Experiments

Radar Division
Mr. J. Ahearn, Radar Division
Mr. M. Siegert, Target Characteristics Branch
Mr. J. Ward, Search Radar Branch
Mr. J.T. Ferrell, Radar Techniques Branch

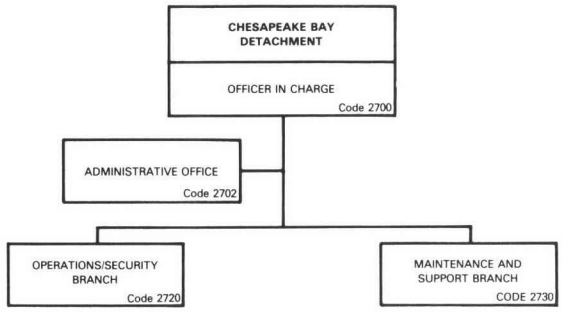
Tactical Electronic Warfare Division
Mr. V. J. Kutsch, Tactical Electronic Warfare Division

Chemistry Division
Dr. H. W. Carhart, Fire Test Facility

Condensed Matter and Radiation Sciences Division
Mr. Alan J. Zakraysek, Impact Vulnerability Staff



CDR S.I. Kummer



Basic Responsibilities

The Chesapeake Bay Detachment operates and maintains an independent military facility for NRL research. It has a variety of shops, plant facilities, and specialized equipment used to support a variety of NRL and tenant research and development projects that are best carried out at this location.

The Physical Plant

Located in a relatively clear area away from congestion and industrial interference, the main site, at Randle Cliff (Chesapeake Beach), Maryland, covers 68.1 hectares (167.9 acres) and has 183 structures of various sizes and types of construction, six of which are major laboratory buildings. There is over 86 m (282 ft) of usable dock space with a controlling water depth of 2.1 m (7 ft), located 3.2 km (2 mi) north of the main site in Chesapeake Beach. Off-site facilities include the Tilghman Island Facility, located directly across the Bay from CBD at a range of 16.25 km (10 mi).

Research watercraft available at CBD include a 74-ft LCM-8, one jack-up-barge, one 45-ft support craft, and one 36-ft patrol boat. These are used in support of research projects and for transportation to off-site facilities.

Personnel

Full-time civilian: 25
Military: 1

Key Personnel

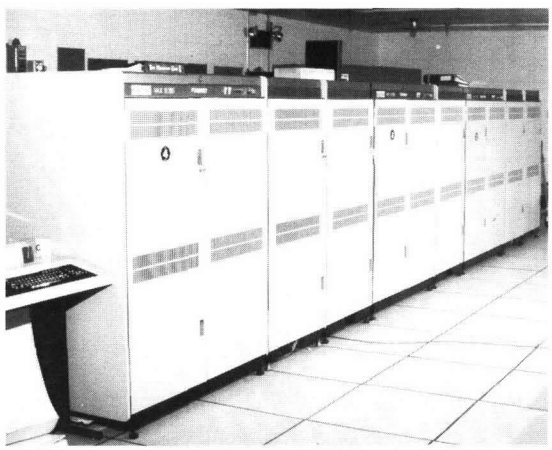
Name	Title
CDR S.I. Kummer, USN*	Officer in Charge
Mrs. M.J. Hamor	Administrative Officer
Mr. P.L. Phelps	Operations/Security Officer
Mr. T.N. Erwin	Maintenance and Support Officer

Point of contact: Mrs. M.J. Hamor, Code 2702, (301) 257-4004

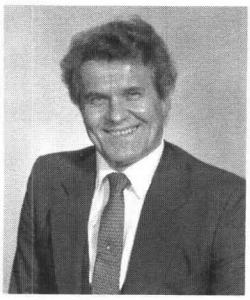
Research Computation Division



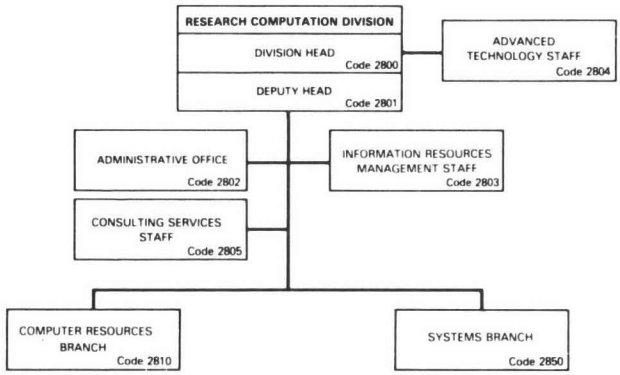
Cray X-MP/24 multiprocessor supercomputer that provides very high-speed vector and scalar processing. The Cray provides a per processor sustainable speed of 210 million floating point operations per second (MFLOPS) and has a central memory capacity of 4 million 64-bit words.



These three VAX 11/785s provide access to the Cray X-MP/24 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.



Mr. Rudi F. Saenger



Basic Responsibilities

The Research Computation Division (RCD) provides a wide variety of concurrent computer services to more than 1300 scientists, analysts, and engineers, both at NRL and at remote locations throughout the United States. These services include high-volume, time-shared, local and remote batch; active graphics; and telecommunications processing.

The RCD manages and operates NRL's Central Computer Facility (CCF), a totally integrated computer system consisting of a Cray X/MP multiprocessor with its associated support equipment, and a highspeed network of Digital Equipment Corporation VAX 700 plus VAX 8000 computer systems that facilitate communications between the user community and the CCF. The Cray X/MP, a class VI computer, is the fastest computer manufactured in the United States. Through use of local area networking (NICENET) and a world-wide networking system (Defense Data Network), both local and remote users access the CCF through their host computers (including personal workstations) or by terminals.

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. The Head of the RCD, by additional duty assignment, is the OCNR Special Assistant for Information Resources Management.

Personnel

Full-time civilian: 48

Key Personnel

Name	Title
Mr. Rudi F. Saenger	Head, Research Computation Division
Ms. D.E. Gossett	Deputy Head
Ms. B.M. Thomas	Administrative Officer
Mr. J.B. Smith	Head, Information Resources Management Staff
Mr. Rudi F. Saenger*	Head, Advanced Technology Staff
Mr. Rudi F. Saenger*	Head, Consulting Services Staff
Mr. George E. Perez	Head, Computer Resources Branch
Mr. Harvey K. Brock	Head, Systems Branch

Point of contact: Mr. Rudi F. Saenger, Code 2800, 767-2751

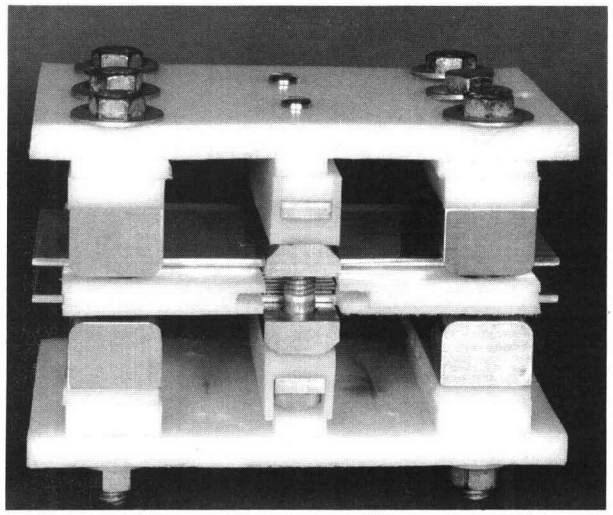
*Acting

GENERAL SCIENCE AND TECHNOLOGY DIRECTORATE

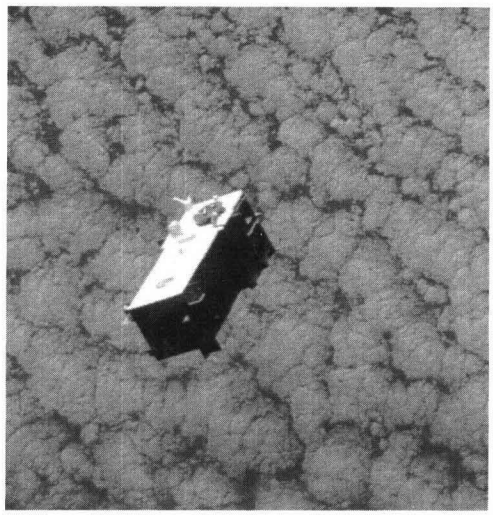
General Science and Technology Directorate

The Navy's operational effectiveness depends on its ability to keep pace with rapidly developing technologies. This directorate contributes to this requirement by conducting research in 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.

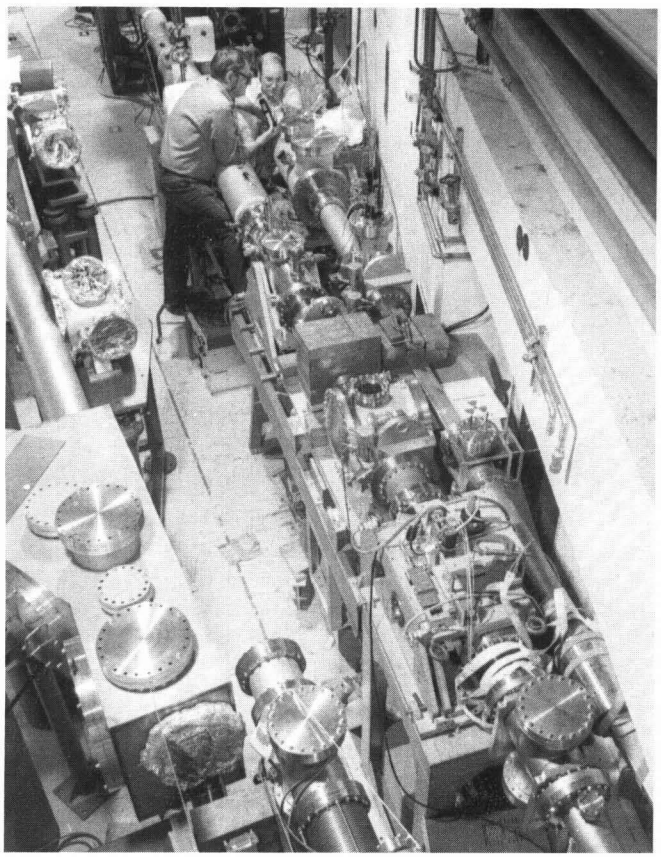
GENERAL SCIENCE AND TECHNOLOGY DIRECTORATE



Multimegampere opening switch for rail-gun experiments



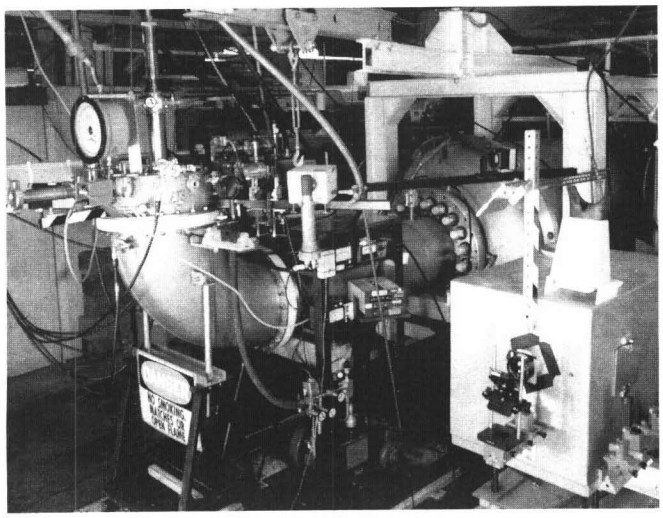
SPARTAN-I X-ray satellite after release from satellite



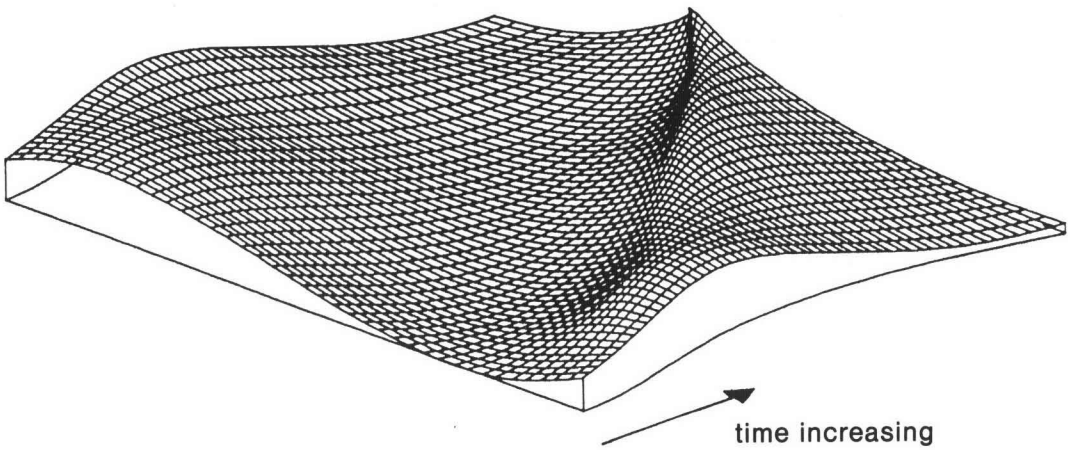
NRL synchrotron radiation beam lines at the National Synchrotron Light Source, Brookhaven



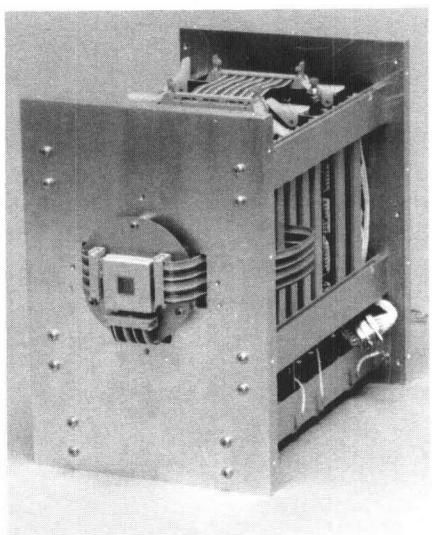
NRL payload specialist in orbit on Skylab-2 mission



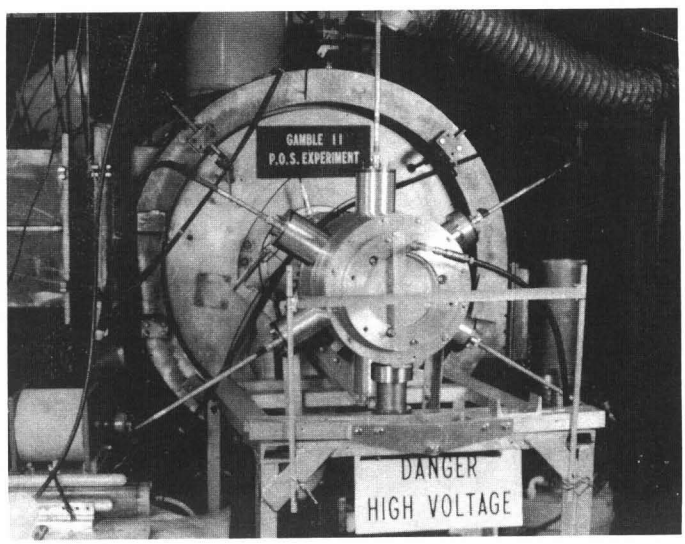
Pinch experiment for development of fusion plasmas



Numerical simulation of the temporal growth of a steep wave to the onset of breaking in deep water

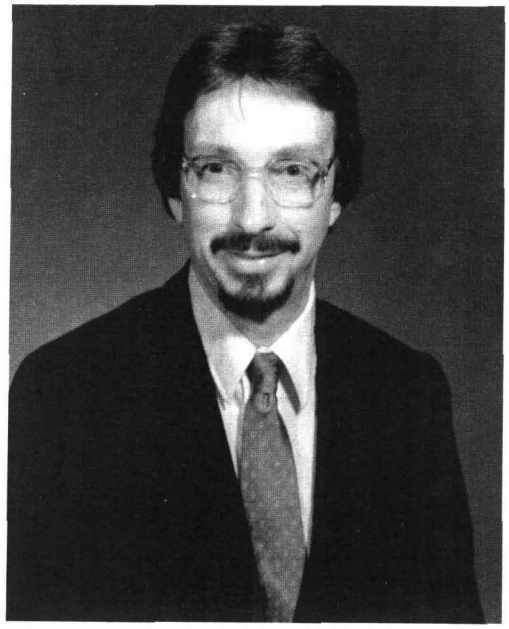


Radiation-hardened star-tracker—heart of autonomous satellite navigation system



One-thousand gigawatt plasma erosion opening switch

Associate Director of Research for General Science and Technology

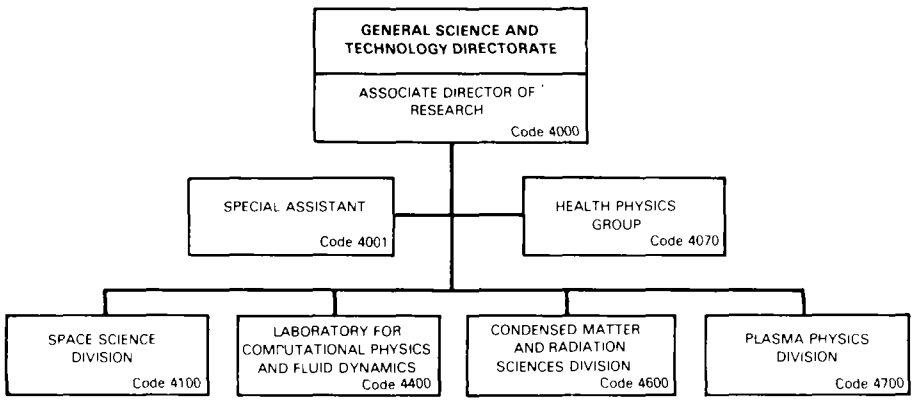


Dr. William R. Ellis

Dr. Ellis [redacted] He obtained his undergraduate degree in physics from Clemson University in 1962 and did his graduate work at Princeton University, where he obtained an M.S. degree in 1965 and a Ph.D. in 1967, gaining one of the first doctorates awarded in the emerging field of plasma propulsion.

In 1967-69, Dr. Ellis worked at the Culham Laboratory for Plasma Physics and Fusion Research in England, where he headed an experimental group investigating toroidal discharge physics problems in plasma confinement. In 1970, he accepted a position with the Los Alamos Scientific Laboratory in New Mexico where he became Associate Group Leader for the Scyllac experimental group in the Controlled Thermonuclear Research Division. In 1976, Dr. Ellis joined the Energy Research and Development Administration (ERDA), the predecessor agency of the Department of Energy. In 1979, he was appointed Director of the Department of Energy's Mirror Confinement Systems Division in the Office of Fusion Energy, Office of Energy Research, where he was responsible for programs to develop fusion power reactors based on the magnetic mirror confinement concept. Dr. Ellis was appointed Associate Director of Research and Director of General Science and Technology at the Naval Research Laboratory in October 1983.

Dr. Ellis is a member of the American Physics Society, American Nuclear Society, Sigma Xi, American Association for the Advancement of Science, and the American Geophysical Union. He served on the Executive and Prize Committees of the APS Division of Plasma Physics, the Program Committee of the International School of Plasma Physics in Varenna, and the Department of Energy's USA/USSR Joint Fusion Power Coordinating Committee. He has received the Department of Energy's Exceptional Service Award, and is a consultant to the High Power Microwave Executive Steering Group of the Under Secretary of Defense, a member of the Executive Steering Group's Program Implementation Panel, and Chairman of the Directed Energy Coordinating Committee of the Naval Research Laboratory. Dr. Ellis has published over 100 papers, reports, and articles in the areas of experimental and theoretical plasma physics and fusion research and he is a patentee in his field.



Key Personnel

Name	Title	Code
Dr. W.R. Ellis	Associate Director of Research for General Science and Technology	4000
Vacant	Special Assistant	4001
Mr. J.N. Stone	Head, Health Physics Group	4070
Dr. J.P. Boris	Chief Scientist and Director, Laboratory for Computational Physics and Fluid Dynamics	4400
Dr. H. Gursky	Superintendent, Space Science Division	4100
Dr. D.J. Nagel	Superintendent, Condensed Matter and Radiation Sciences Division	4600
Dr. S. Ossakow	Superintendent, Plasma Physics Division	4700

Point of contact: Nancy H. Sell, Code 4000A, 767-3324

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Health Physics Group

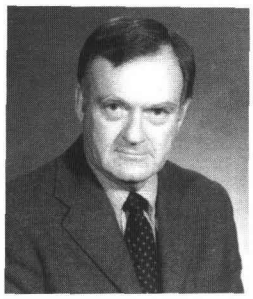
(Code 4070)

Basic Responsibilities

The Health Physics Group provides a Laboratory-wide protection program for the possession and use of all sources of ionizing and microwave radiation. The staff performs technical monitoring, evaluation, and research to assure that NRL radiological and microwave operations are safe and in compliance with federal, state, and Navy regulations. It provides employees with training, instructions, instruments, assistance, and controls needed to carry out their radiological and microwave safety responsibilities.

Personnel

Full-time civilian: 14



Mr. J. N. Stone

Key Personnel

Name	Title
Mr. J.N. Stone	Head, Health Physics Group
Mr. T.L. Johnson	Head, Research & Technical Support Section
Mr. R.B. Luersen	Head, Survey & Analysis Section

Point of contact: J.N. Stone, Code 6070, 767-2232

Space Science Division

Research Activity Areas

Atmospheric Physics
Boundary layer and electro-optics meteorology; aerosol and cloud atmospheric electricity

X-ray Astronomy
X-ray observation, analysis, and theory of space astronomical sources

Radio and Infrared Astronomy
Galactic/extragalactic radio/IR astronomy; VLBI interferometry, middle atmosphere microwave sensing

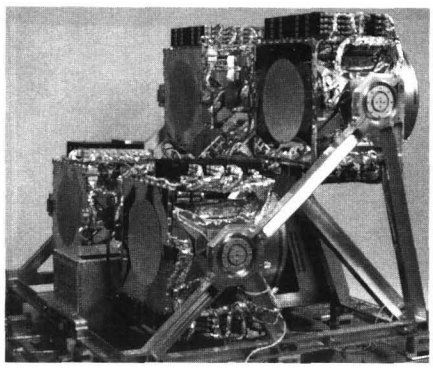
Ultraviolet Measurements
Ultraviolet astronomy; sensing/modeling of atmos/ionospheres

Gamma and Cosmic Ray Astrophysics
Gamma-ray astrophysics; solar-flare gamma-rays; space cosmic ray particle environment

Solar Physics
Solar ultraviolet spectroscopy, especially on shuttle/Spacelab

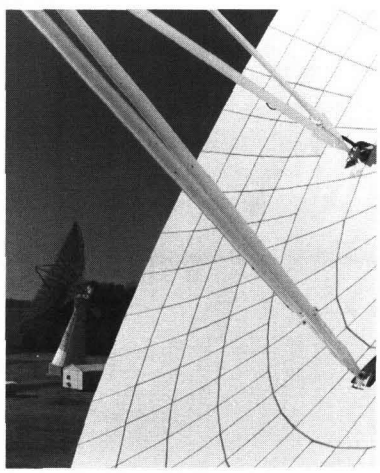
Solar-Terrestrial Relationships
Solar X-ray/EUV plasma diagnostics; coronal effects at earth

Ionospheric Effects
Ionospheric modification; ionospheric propagation, modeling

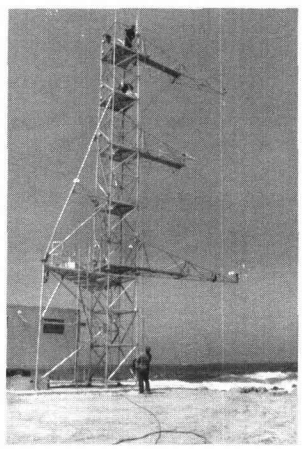


Oriented Scintillation Spectrometer Experiment (OSSE) for the Gamma Ray Observatory (GRO) Mission.

OSSE is an 1818 kg (4000 lb) instrument that will measure the continuum and search for gamma ray spectral lines in the 0.05 to 10 meV region by using four identical and independently movable detectors.



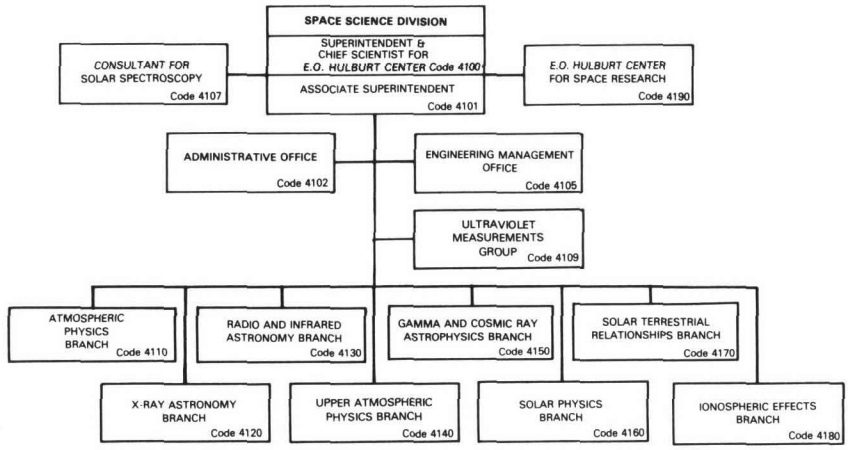
Radio Telescopes at Maryland Point (MD) Observatory



Marine Boundary Layer Experiment at San Nicolas Island, CA



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. Radio telescopes are used for astronomical observations and atmospheric sensing. Research results are of importance to radio communications, to utilization of the space environment, to weather prediction, and to 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: 133

Key Personnel

Name	Title
Dr. H. Gursky	Superintendent
Dr. R.G. Groshans	Associate Superintendent
Mrs. C.J. Marks	Administrative Officer
Mr. J. Vranick	Engineering Management Officer
Dr. R. Tousey	Consultant (Emeritus)
Dr. H. Gursky†	Chief Scientist, E. O. Hulburt Center for Space Research
Dr. H. Friedman	Chief Scientist (Emeritus) E. O. Hulburt Center for Space Research
Dr. G. Carruthers	Senior Astrophysicist
Dr. L. Ruhnke	Head, Atmospheric Physics Branch
Mr. G.G. Fritz	Head, X-Ray Astronomy Branch
Dr. K.J. Johnston	Head, Radio & Infrared Astronomy Branch
Dr. R.R. Meier	Head, Upper Atmospheric Physics Branch
Dr. J.D. Kurfess	Head, Gamma and Cosmic Ray Astrophysics Branch
Dr. G.E. Brueckner	Head, Solar Physics Branch
Dr. G.A. Doschek	Head, Solar Terrestrial Relationships Branch
Dr. J.M. Goodman	Head, Ionospheric Effects Branch

Point of contact: Mrs. Carolyn J. Marks, Code 4102, 767-3631

†Additional duty

Laboratory for Computational Physics and Fluid Dynamics

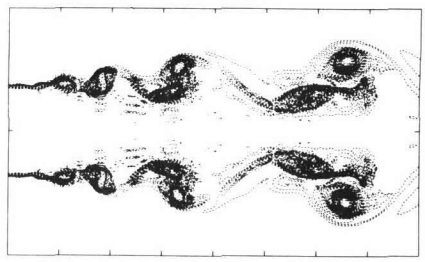
Research Activity Areas

Reactive Flows
- Fluid dynamics in combustion
- Turbulence in compressible flows
- Multiphase flows
- Molecular dynamics
- Theoretical quantum chemistry

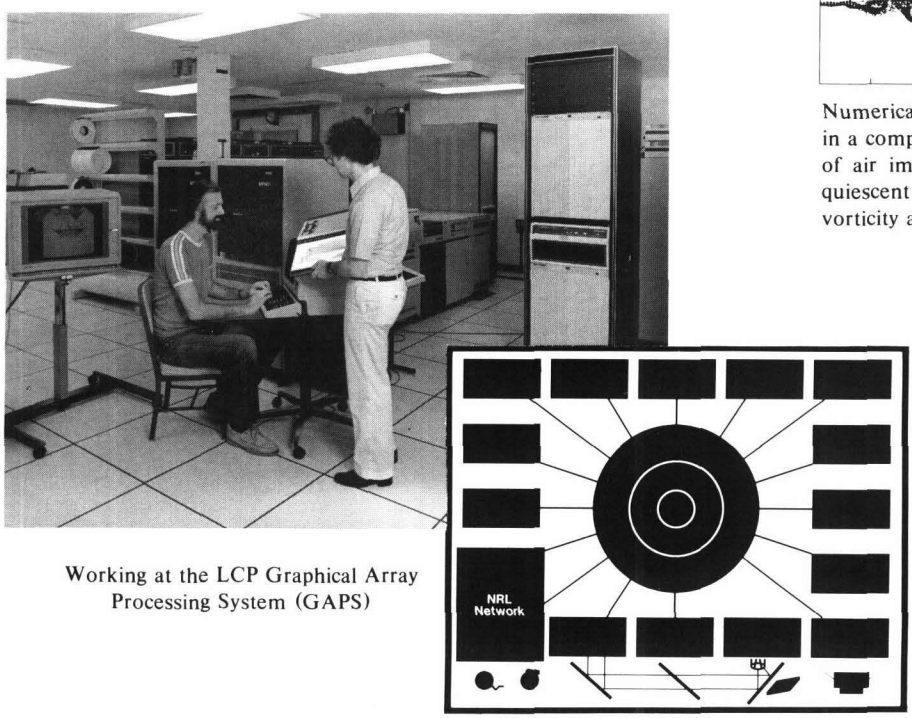
Fluid Structure Interaction
- Boundary layer hydrodynamics
- Marine hydrodynamics
- Computational hydrodynamics
- Hydro-acoustics

Applied Hydrodynamics
- Turbulent jets and wakes
- Nonlinear and breaking ocean waves
- Stratified flows
- Turbulence modeling

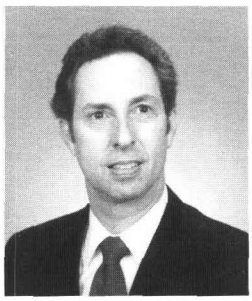
Computational Physics Developments
- Laser plasma interactions
- Inertial confinement fusion
- Solar physics modeling
- Dynamical gridding algorithms
- Advanced graphical and parallel processing systems



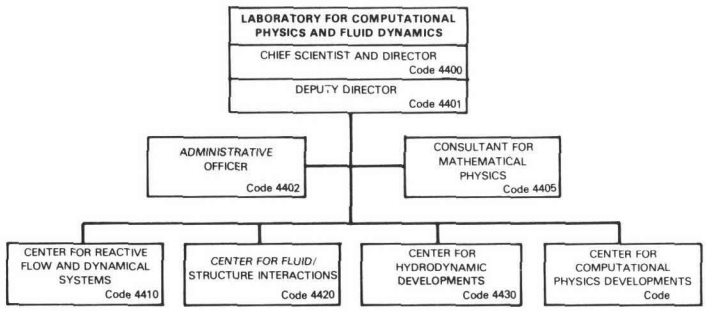
Numerical simulation of the vortex rollup in a compressible jet flow. A Mach 0.6 jet of air impinges from left to right into a quiescent background. Contours of fluid vorticity are depicted.



Working at the LCP Graphical Array Processing System (GAPS)



Dr. J.P. Boris



Basic Responsibilities

The Laboratory for Computational Physics and Fluid Dynamics is responsible for the research leading to and the applicaton of advanced analytical, numerical, and experimental capabilities which 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, atmospheric and ocean geophysics, magnetoplasma dynamics for laboratory and space applications, 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 analytic, computational, and experimental 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, computations, and 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: 33

Key Personnel

Name	Title
Dr. J.P. Boris	Chief Scientist and Director
Vacant	Deputy Director
Dr. D.L. Book	Consultant for Mathematical Physics
Ms. D. Miller	Administrative Officer
Dr. E.S. Oran	Head, Center for Reactive Flow and Dynamical Systems
Dr. O.M. Griffin	Head, Center for Fluid/Structure Interactions
Dr. S.E. Ramberg	Head, Center for Hydrodynamic Developments
Mr. J.H. Gardner	Head, Center for Computational Physics Developments

Point of contact: Ms. Darlene Miller, Code 4402, 767-6581

Condensed Matter and Radiation Sciences Division

Research Activity Areas

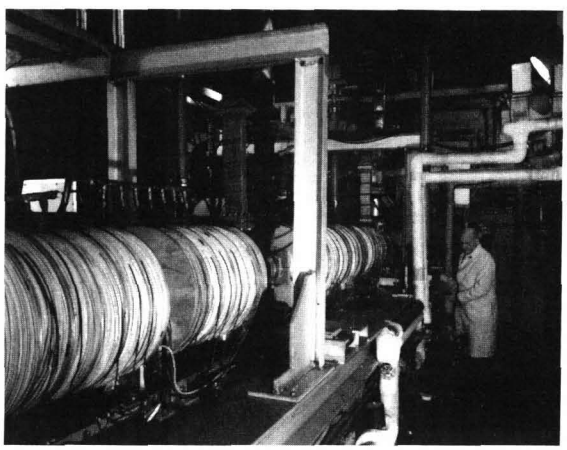
Condensed Matter Physics
- X-ray sources, optics, and detectors
- X-ray analysis of materials
- Plasma spectroscopy
- Synchrotron radiation applications
- Phase transformations
- Highly excited materials
- Radiation effects in microelectronics
- Condensed matter theory

Metal Physics
- Electronic and transport properties
- Magnetic/materials
- Multilayer structures
- Thin film science
- Superconductivity
- Nonlinear dynamics

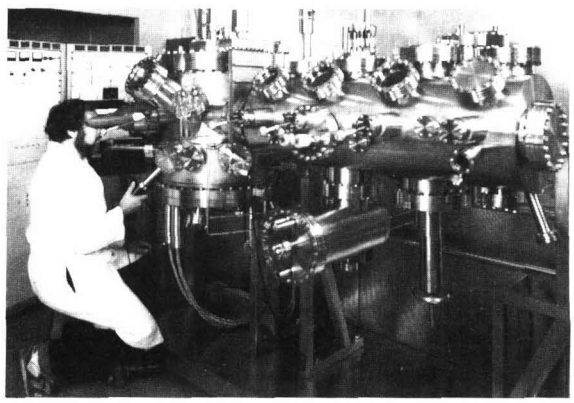
Materials Modification and Analysis
- Modification of surfaces by ion implantation and ion activated deposition
- Radiation effects from high-energy charged-particle beams
- Crystal studies by channeling techniques
- Sputtering by high-energy ions
- Theory of ion-solid interactions
- 200-kV ion implantation systems
- 3 MV tandem ion accelerator

Radiation-Matter Interactions
- Interaction of laser and microwave radiation with materials and systems
- Interaction of particle beams with materials
- Radiation transport calculations
- Energetic radiation applications
- Molecular collisions
- Hypervelocity impact

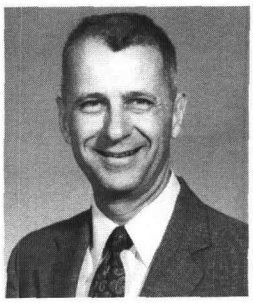
Radiation Survivability
- Satellite survivability
- Single event upsets
- Device and material damage and hardening
- Ultra-fast charge collection
- Space Experiments
- Nuclear radiation detection
- 60 MeV LINAC
- 2 MV Van de Graaff and co-60 sources



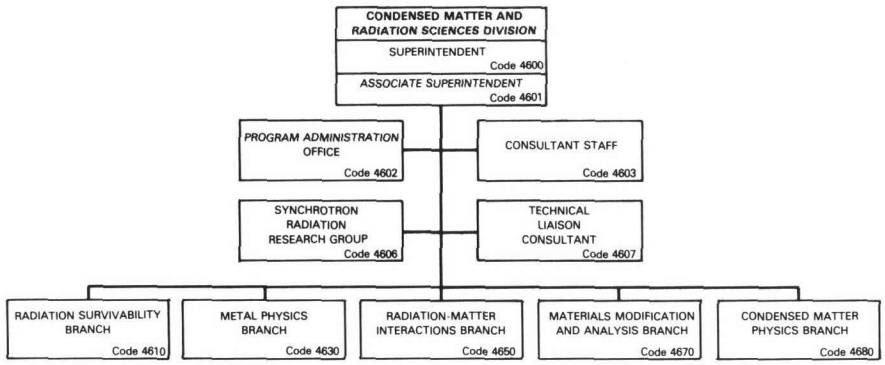
Adjusting the cooling system for the accelerator waveguides on the electron LINAC



Researcher observers crystal layering in this facility where superconducting lattices are developed. Ultimately, 100 single layers of crystals might be grown on a single substrate.



Dr. D. J. Nagel



Basic Responsibilities

The Condensed Matter and Radiation Sciences Division conducts a broad program 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 matter, including pure metals, alloys, crystals, semiconductors, superconductors, magnetic materials, lower dimensional materials, liquids, and plasmas, are investigated theoretically and experimentally as well as by various radiation probes. Damage produced by radiation, ranging from laser and x-ray beams through charged and neutral particle beams in the megavolt region, is studied. Techniques to utilize radiation for beneficial modification 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: 109

Key Personnel

Name	Title
Dr. D.J. Nagel	Superintendent
Ms. B. Murphy	Head, Program Administration Office
Dr. A.W. Saenz	Consultant, Non-Linear Dynamics
Dr. J.W. Butler	Consultant, Ion Beam Applications
Mr. S.J. Babjak	Consultant, Directed Energy Survivability
Dr. M. Kabler	Head, Synchrotron Radiation Research Group
Mr. J.C. Ritter	Head, Radiation Survivability and Detection Branch
Dr. D.U. Gubser	Head, Metal Physics Branch
Dr. J.B. Aviles, Jr.	Head, Radiation-Matter Interaction Branch
Dr. F.A. Smidt	Head, Materials Modification and Analysis Branch
Dr. B.M. Klein	Head, Condensed Matter Physics Branch

Point of contact: Ms. B. Murphy, Code 4602, 767-3407

Plasma Physics Division

Research Activity Areas

High-Power Electromagnetic Radiation
- Application of high-current relativistic electron beams to microwave and millimeter wave generation, e.g., gyrotrons and short pulse FEL
- Electron accelerators

Experimental Plasma Physics
- Plasma channels in air
- Experimental study of plasma chemistry
- Dense Z-pinch

Laser Plasma
- Laser-plasma interaction
- Laser fusion
- Plasma diagnostics
- Large glass laser facility
- Radiation physics

Plasma Radiation
- Radiation transport
- X-ray laser modeling
- Atomic structure and processes
- Radiation hydrodynamics

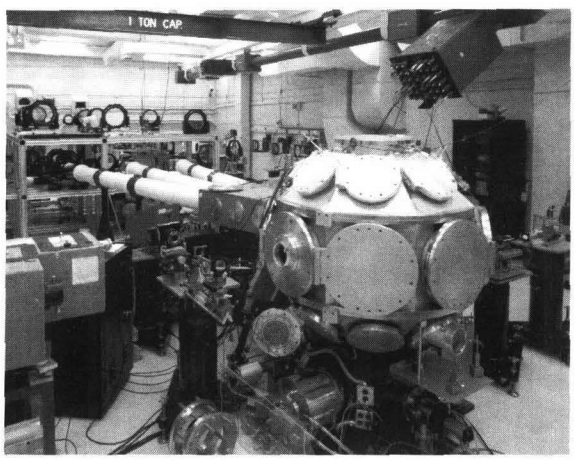
Advanced Beam Technologies
- Modified Betatron Accelerator
- Long pulse and two-stage FELs
- Rebatron Accelerator
- High-quality electron beams

Plasma Technology
- Production of intense relativistic electron beams
- Electron beam propagation and focusing
- Experimental research in high-power exploding wires
- Generation of intense ion beams
- Inductive energy storage

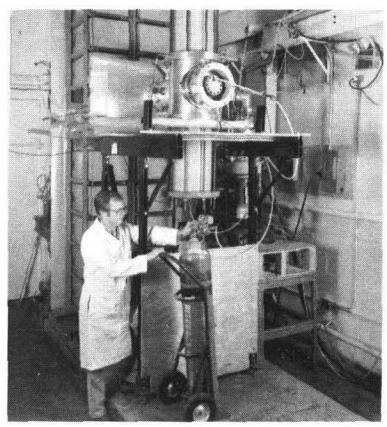
Geophysical and Plasma Dynamics
- Theoretical and numerical simulation of ionospheric and magnetospheric phenomena
- High-altitude nuclear weapons effects on the ionosphere/magnetosphere
- Solar-terrestrial relations
- Ionospheric-magnetospheric coupling

Plasma Theory
- Numerical simulation of high-density plasmas
- Theoretical study of nonlinear plasma dynamics
- Production and propagation of high-energy charged particle beams
- Radiation source development

Experimental Space Plasma Physics
- Rocket, satellite, and shuttle-borne natural and active experiments
- Laboratory simulation of space plasma processes



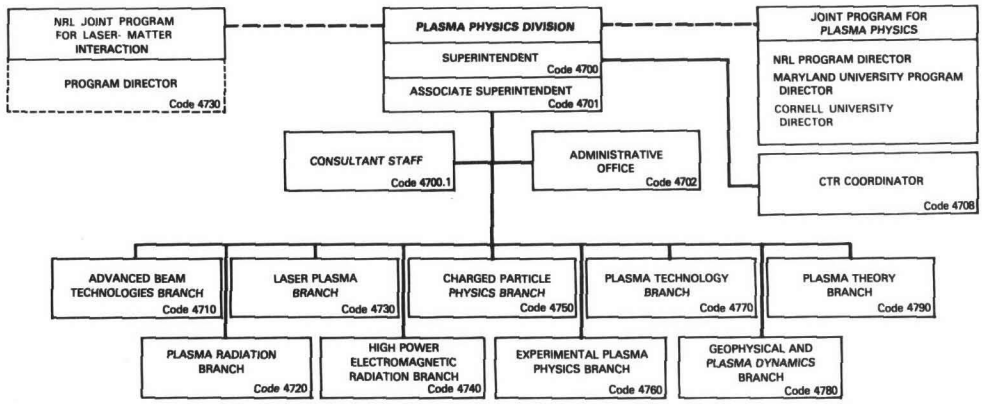
This is the target chamber of the Pharos III laser facility. Pharos III is a three-beam Nd:glass laser that can produce a kilojoule of energy in a few nanoseconds. When the light is focused onto a target, temperatures of 10 to 100 million degrees can be easily produced. The facility is being used to simulate high-altitude nuclear weapons effects, to study the physics of inertial confinement fusion, and to develop new x-ray lasers.



A new device called PAWN is being developed at NRL. It is a pulse generator that uses inductive energy storage and opening switch techniques to condition electrical power for various pulsed power applications.



Dr. S. Ossakow



Basic Responsibilities

The Plasma Physics Division conducts a broad program in basic and applied research in plasma physics, 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 relativisitic 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, and the interaction of charged particle beams with the atmosphere.

Personnel

Full-time civilian: 113

Key Personnel

Name	Title
Dr. S. Ossakow	Superintendent
Mr. I. Vitkovitsky	Associate Superintendent
Dr. W. Ali	Consultant
Dr. P. Palmadesso	Consultant
Dr. M. Friedman	Consultant
Ms. T. Mason	Administrative Officer
Dr. A. Robson	Coordinator, CTR Program
Dr. C. Kapetanakos	Head, Advanced Beam Technologies Branch
Dr. J. Davis	Head, Plasma Radiation Branch
Dr. S. Bodner	Head, Laser Plasma Branch
Dr. W. Manheimer	Head, High-Power Electromagnetic Radiation Branch
Dr. R.A. Meger	Head, Charged Particle Physics Branch
Dr. A. Robson	Head, Experimental Plasma Physics Branch
Dr. G. Cooperstein	Head, Plasma Technology Branch
Dr. J. Huba	Head, Geophysical and Plasma Dynamics Branch
Dr. P. Sprangle	Head, Plasma Theory Branch

Point of contact: Dr. S. Ossakow, Code 4700, 767-2723

WARFARE SYSTEMS AND SENSORS RESEARCH DIRECTORATE

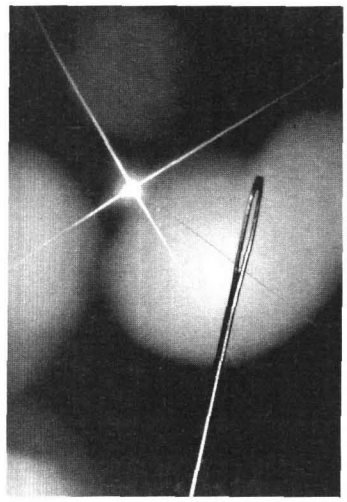
Warfare Systems and Sensors Research Directorate

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.

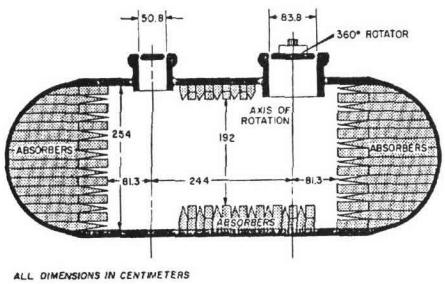
WARFARE SYSTEMS AND SENSORS RESEARCH DIRECTORATE



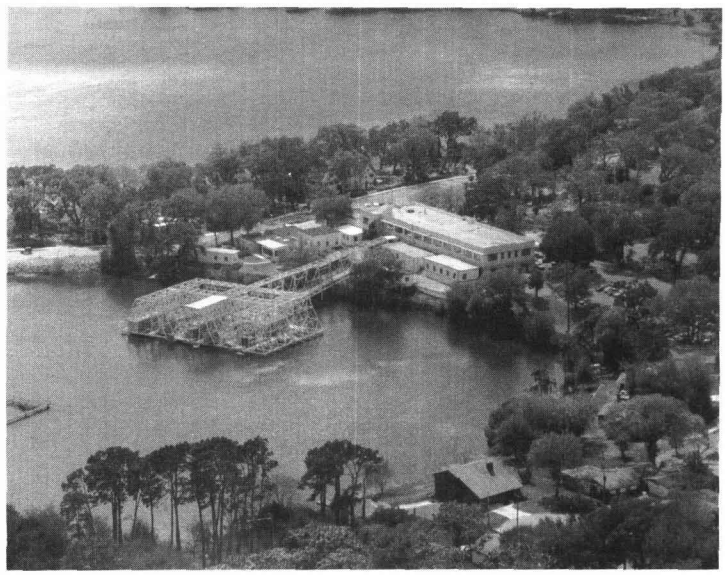
The Tactical Electronic Warfare Division extensively uses a P-3 aircraft as a flying Electronic Warfare Research, Development, Test, and Evaluation Laboratory



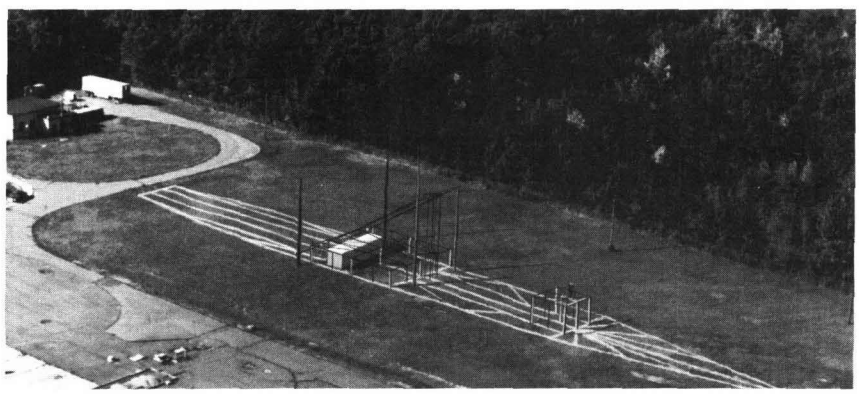
Fiber optics sensor research



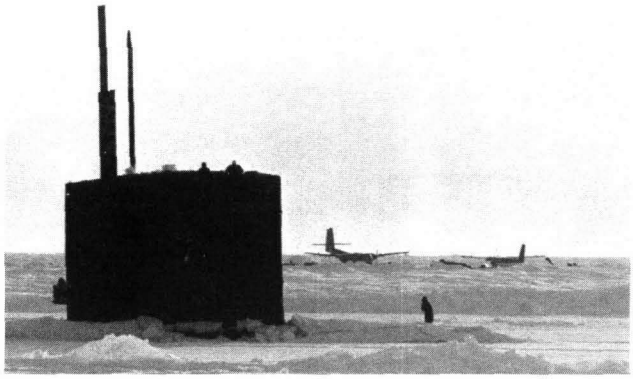
Schematic of anechoic tank at USRD Orlando, Florida



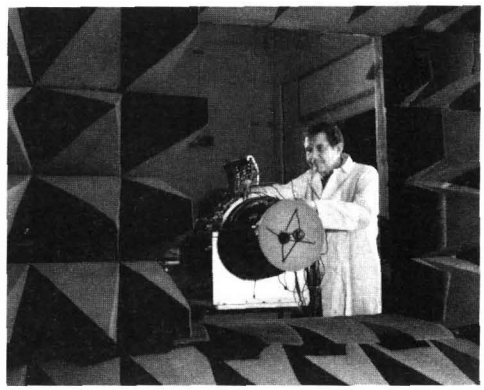
Aerial view of Underwater Sound Reference Detachment, Orlando, Florida



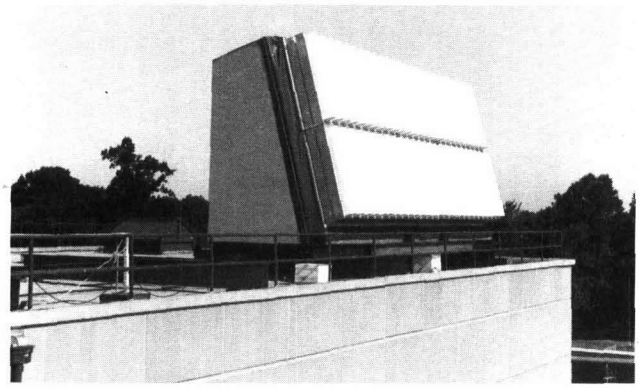
Simulated topside of ship for antenna and communication system measurements at Pomonkey, Maryland, Test Range



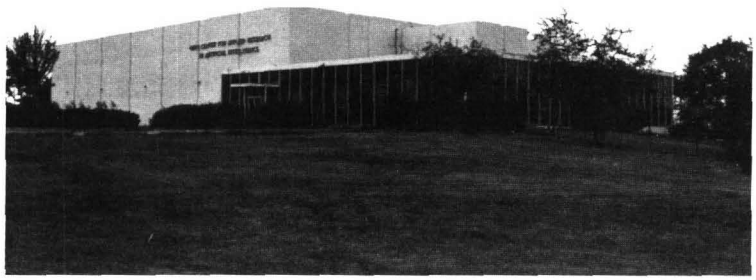
Arctic operations



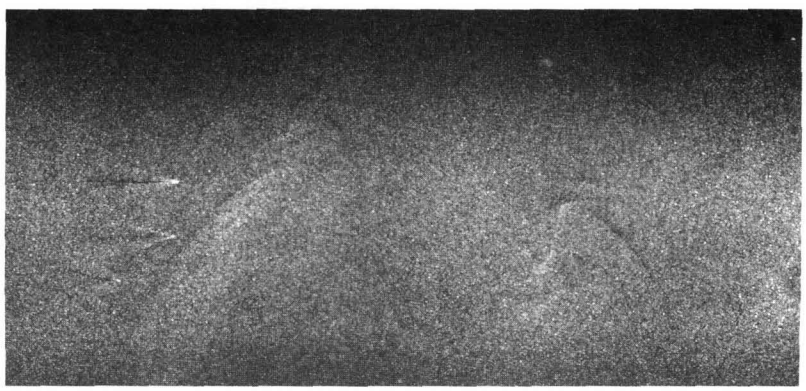
Electronic warfare RF testing facility



Fixed Array Surveillance Radar (FASR), a UHF long-range air-surveillance test bed radar

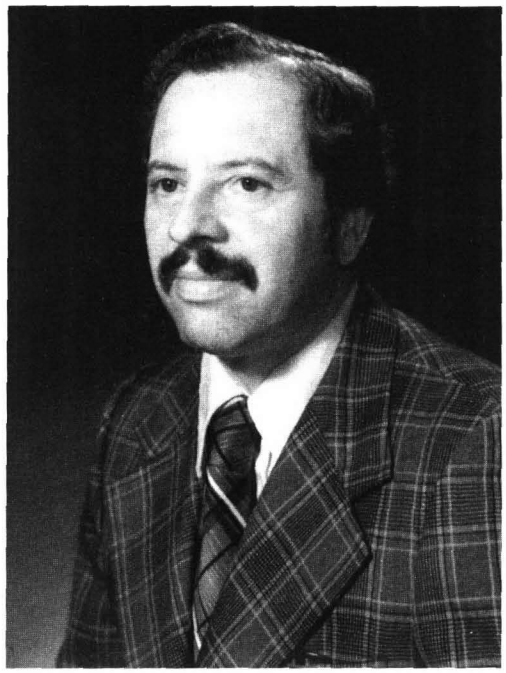


Navy Center for Applied Research in Artificial Intelligence



Radar image of three ships showing centerline wake and evidence of Kelvin Vee wake

Associate Director of Research for Warfare Systems and Sensors Research



Mr. R.R. Rojas

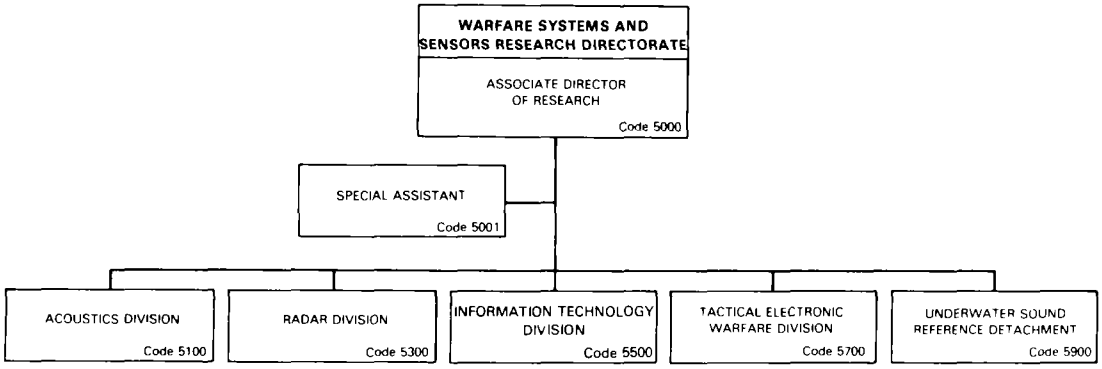
Mr. Rojas [redacted]. He attended City College of New York, where in 1952, he received a BEE degree. In 1961, he received an MEE degree from Drexel Institute of Technology, Philadelphia. Further graduate studies in mathematics and engineering were pursued at the University of Pennsylvania, Philadelphia.

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 of the Acoustic 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
Vacancy	Special Assistant	5001
Dr. D.L. Bradley	Superintendent, Acoustics Division	5100
Dr. M.I. Skolnik	Superintendent, Radar Division	5300
Dr. J.R. Davis	Superintendent, Information Technology Division	5500
Dr. J.A. Montgomery	Superintendent, Tactical Electronic Warfare Division	5700
Dr. J.E. Blue	Superintendent, Underwater Sound Reference Detachment	5900

Point of contact: Mr. R.R. Rojas, Code 5000, 767-3294

Acoustics Division

Staff Activities

Special Programs Management
Systems studies
Systems concepts and evaluation
Engineering research and development
Journal of Underwater Acoustics

Research Activity Areas

Acoustic Media Characterization
- Geophysical, geological, and oceanographic parameters that influence underwater acoustics

Applied Ocean Acoustics
- Airborne underwater acoustics
- Bottom-limited acoustics
- Arctic underwater acoustics
- Propagation
- Noise
- Ambient noise measurements and modeling
- Spectral estimation
- Signal Processing

Physical Acoustics
- Reflection, diffraction, scattering by bodies
- Target strength modeling
- Schlieren visualization
- Fiber-optic acoustic sensors
- Acoustics of coatings

Software Systems Development
- Tactical computers
- Tactical support software
- Signal processors

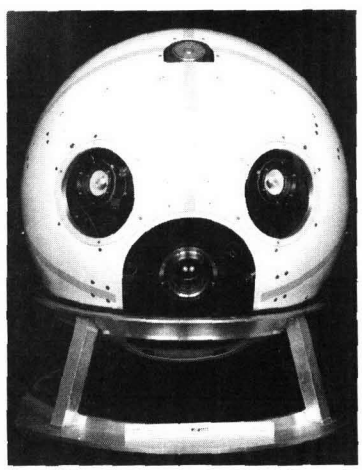
Large Aperture Acoustics
- Propagation, coherence, and wavefront behavior
- Large-scale spatial and temporal integration
- Array deformation
- Low-frequency monostatic and bistatic reverberation
- Shallow-water acoustics
  - Mode analysis
  - Models of signal and noise fields

Marine Systems
- Autonomous vehicle development
- Vehicle stability, control, and navigation
- Sensor research and development
- Adaptive sensor and control systems

Ocean Dynamics
- Mesoscale, fine-structure, microstructure variability
- Mixed layer and thermocline applications
- Ocean towed instrumentation techniques



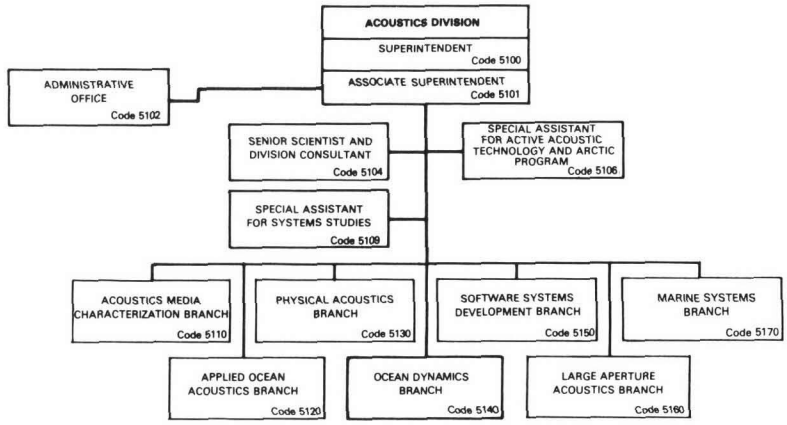
Arctic operations



Underwater inspection vehicle



Dr. D.L. Bradley



Basic Responsibilities

The Acoustics Division conducts basic and applied research in undersea acoustics. 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; large area assessment techniques; and development of Navy Data Processing Systems. Also included is basic and applied research in marine characteristics and technology for ocean applications. The Division program is interactive with the ONR Contract Research Program, NORDA, and other Navy laboratories, both U.S. and foreign.

Personnel

Full-time civilian: 135

Key Personnel

Name	Title
Dr. D.L. Bradley	Superintendent
Mr. B.G. Hurdle	Associate Superintendent
Mrs. N.J. Beauchamp	Administrative Officer
Dr. S. Hanish	Senior Scientist and Division Consultant
Mr. C.W. Votaw	Special Assistant for Arctic Program
Mr. M. Potosky	Special Assistant for Systems Studies
Mr. H.S. Fleming	Head, Acoustics Media Characterization Branch
Dr. O. Diachok	Head, Applied Ocean Acoustics Branch
Dr. J. Bucaro	Head, Physical Acoustics Branch
Mr. E.E. Rudd	Head, Ocean Dynamics Branch
Mrs. E.E. Wald	Head, Software Systems Development Branch
Dr. E. Franchi	Head, Large Aperture Acoustics Branch
Mr. D. Steiger	Head, Marine Systems Branch

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

Radar Division

Staff Activities

Systems research
Electromagnetic propagation
Electromechanical design

Research Activity Areas

Radar Analysis
- Automatic detection and tracking
- Radar signal processing
- Radar systems simulations
- Target signature modeling

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

Search Radar
- Shipboard surveillance radar
- Precision tracking techniques
- Air traffic control

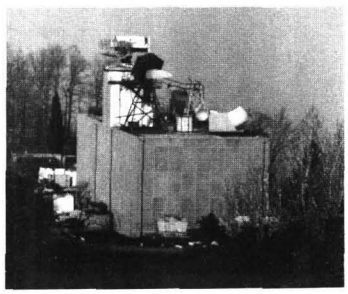
Target Characteristics
- Radar counter-countermeasures
- Adaptive signal processing
- Phased array radar
- Target signature analysis

Identification Systems
- Mark XII IFF improvements
- NATO Identification System (Mk XV)
- Future identification technology

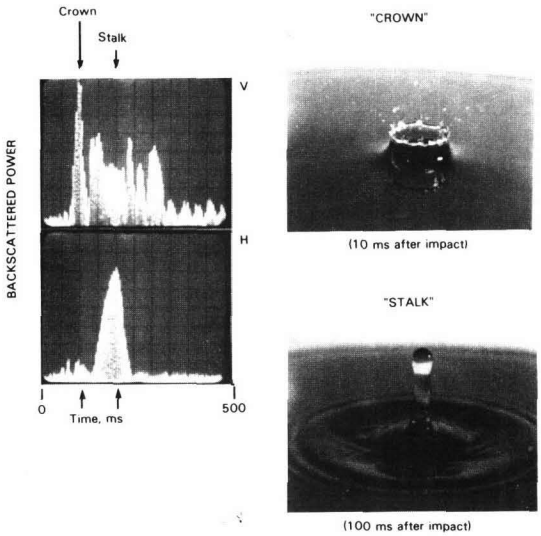
Airborne Radar
- Airborne early-warning radar (AEW)
- Inverse synthetic aperture radar (ISAR)

Electromagnetics
- Microwave antenna research
- Phased array antennas
- Adaptive array research

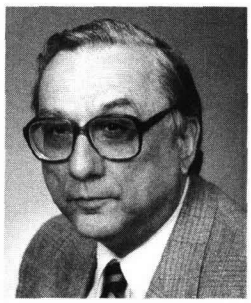
Systems Control and Research
- Image processing research
- Synthetic aperture radar (SAR) processing
- Multispectral image correlation
- Space sensor and mission analysis



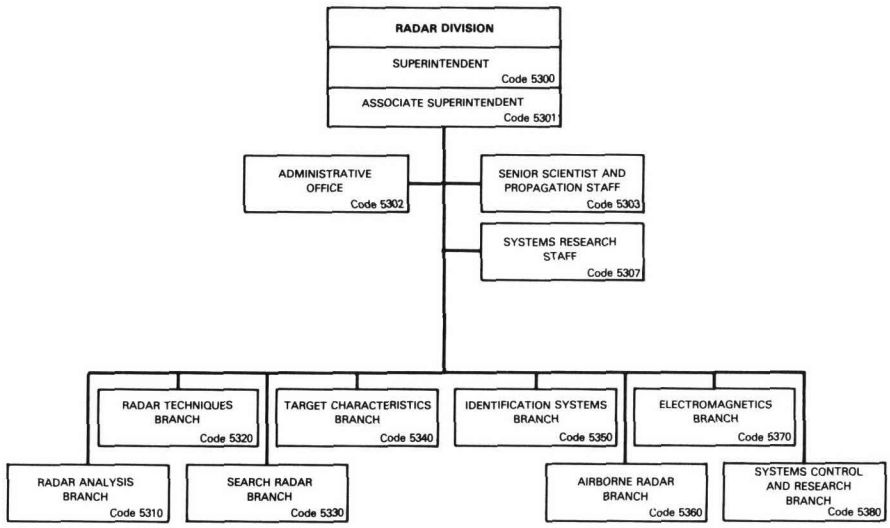
Radar test site at Chesapeake Bay Detachment (Chesapeake Beach, Maryland) on the roof of Building 75, showing the Senrad long-range air-surveillance radar (upper left), the 2D/3D radar test bed (center), and the DMAR mirror scan antenna radar (right). The phased-array surveillance radar (FASR) is in the background. Other radars not visible in this view include millimeter wave, K_a, X, and C-band instrumentation radars; surface search test-bed radars; Low Probability of Intercept (LPI) radar; and L band, UHF, and VHF surveillance radar test beds.



Time-history of the radar backscatter from a splashing drop in water for horizontal and vertical polarization. Radar frequency, 9 GHz; radar incidence angle, 15°; and drop size, 4 mm.



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 analysis 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
Dr. M.I. Skolnik	Superintendent
Mr. I.D. Olin	Associate Superintendent
Mrs. C. Hill	Administrative Officer
Dr. L.B. Wetzel	Senior Scientist and Head, Propagation Staff
Mr. J.E. Jedrey	Head, Systems Research Staff
Dr. G.V. Trunk	Head, Radar Analysis Branch
Mr. J.M. Headrick	Head, Radar Techniques Branch
Dr. C.L. Temes	Head, Search Radar Branch
Mr. W.H. Harper	Head, Target Characteristics Branch
Mr. C.M. Veronda	Head, Identification Systems Branch
Mr. T.L. apRhys	Head, Airborne Radar Branch
Mr. T.C. Cheston	Head, Electromagnetics Branch
Dr. A.F. Petty	Head, Systems Control & Research Branch

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

Information Technology Division

Research Activity Areas

Navy Center for Applied Research in Artificial Intelligence
- Natural language for automated message processing
- Automated fault diagnosis
- Expert systems for decision aids and consultation
- Machine learning

Communication System Engineering
- Network design
- Secure communication systems
- Speech processing
- Modulation, coding, and waveform design
- Satellite communication system technology
- Distributed simulation and prototyping

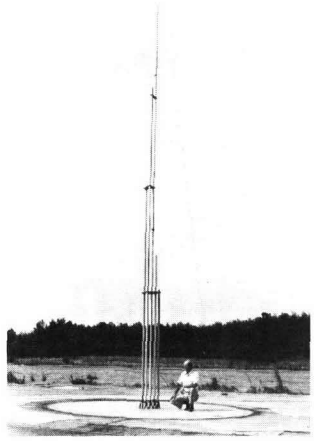
Transmission Technology
- Arctic communication
- Submarine communication technology
- Communication system architecture
- Communication antenna/propagation technology
- RF technology

Integrated Warfare Technology
- Combat management information system analyses
- Command information system design
- Communication, command, and control countermeasures
- Signal processing for high-frequency intercept system

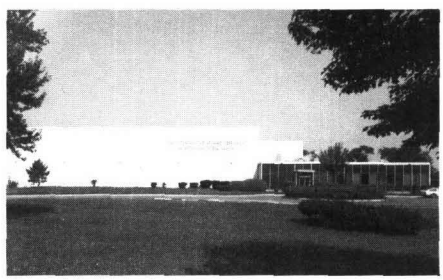
Computer Science and Systems
- Software engineering
- Information theory
- Message processing technology
- Computer security



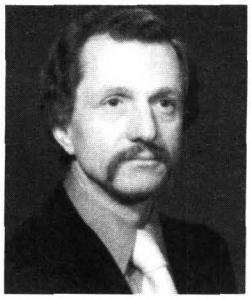
The Microwave Space Research Facility supports research and development activities in satellite-related communication systems operating in several parts of the RF spectrum.



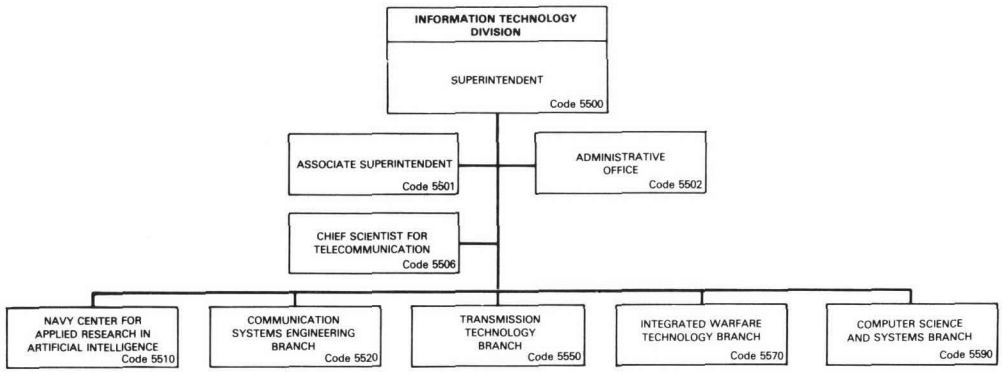
The HF wideband monopole transmitting antenna is a product of research and development efforts driven by requirements for an antenna to operate over a wide bandwidth at high RF power levels for application to environments where space for antenna installations is limited.



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. J.R. Davis



Basic Responsibilities

The Information Technology Division conducts research and development programs in the collection, transmission, and processing of information in order to provide a basis for improvement in 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: 138

Key Personnel

Name	Title
Dr. J.R. Davis	Superintendent
Mr. W.D. Long	Associate Superintendent
Vacant	Administrative Officer
Mr. D.I. Himes	Chief Scientist for Telecommunication
Dr. R.P. Shumaker	Director, Navy Center for Applied Research in Artificial Intelligence
Mr. E.L. Kline	Head, Communication System Engineering Branch
Mr. D.I. Himes	Head, Transmission Technology Branch
Mr. M.S. McBurnett	Head, Integrated Warfare Technology Branch
Mr. S.H. Wilson	Head, Computer Science and Systems Branch

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

Tactical Electronic Warfare Division

Staff Activities

Long-range EW strategic planning
Lead laboratory coordinating
Central Target Simulator Program
Effectiveness of Naval EW Systems (ENEWS)
Special Project Group
Counter command, control, communications, intelligence
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

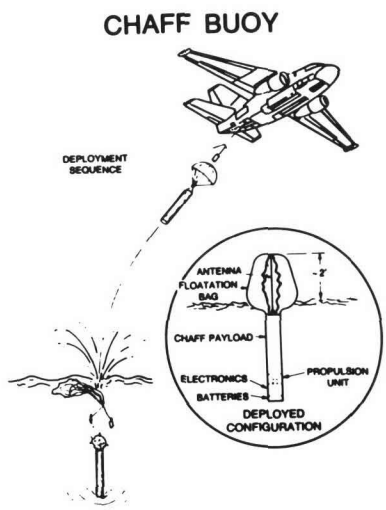
Ships Electronic Warfare Systems
- Ships systems development
- Jamming technology
- Deception techniques
- EW antennas
- Threat simulators

Electronic Warfare Support Measures
- Intercept systems and direction finders
- RF signal simulators
- Systems integration
- Command and control interfaces
- Signal processing

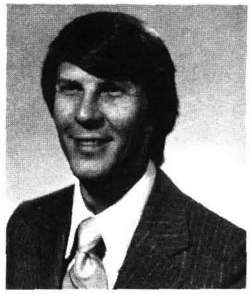
Advanced Techniques
- Analysis and modeling simulation
- New EW techniques
- Experimental systems
- EW concepts
- Infrared technology



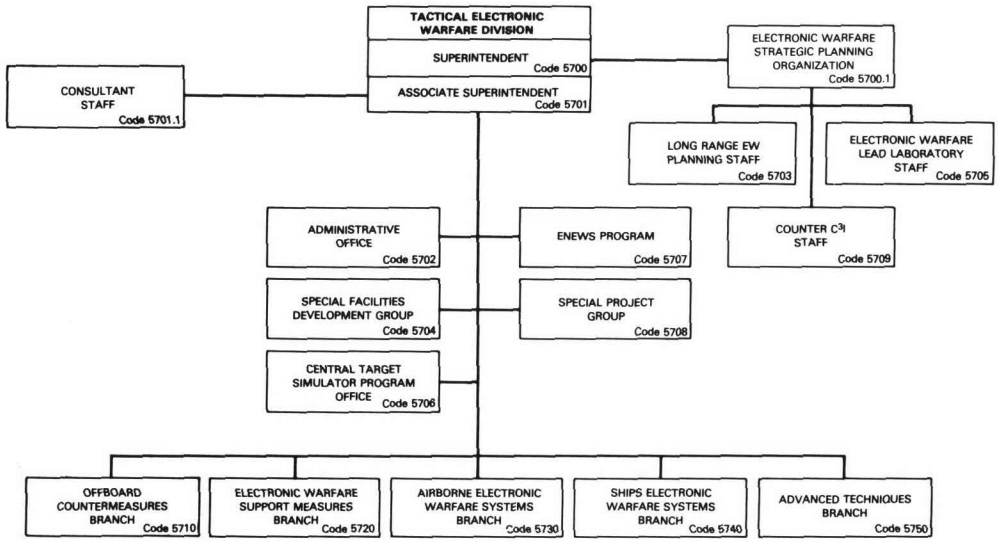
TEW's Flying Research, Development, Test, and Evaluation Laboratory. This instrumented P-3 aircraft is used to support electronic warfare research and development programs as well as Fleet exercises. Hung beneath the wings are pods that generate and receive signals being studied.



Research and development of off-board countermeasures and decoys are an important part of the Division's work. When deployed to the water surface, the chaff buoy shown here expels a chaff cloud to provide a false target to enemy radars.



Dr. J.A. Montgomery



Basic Responsibilities

The Tactical Electronic Warfare Division 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 the determination and improvements of the effectiveness of these systems.

Personnel

Full-time civilian: 196

Key Personnel

Name	Title
Dr. J.A. Montgomery	Superintendent
Mr. H.W. Zwack	Associate Superintendent
Dr. C.H. Heider	Head, EW Strategic Planning Organization
Ms. C. Rulapaugh	Administrative Officer
Mr. G. Meades	Division DILO
Dr. C.H. Heider	Head, Long-Range EW Planning Staff
Vacant	Head, Special Facilities Development Group
Mr. R.L. Aberg	Head, Electronic Warfare Lead Laboratory Staff
Mr. A.A. Di Mattesa	Manager, Central Target Simulator Program
Mr. D.F. Grady	Manager, ENEWS Program
Dr. R. Vest	Manager, Special Project Group
Mr. L.O. Sweet	Head, Counter-C^3 I Staff
Dr. F.J. Klemm	Head, Offboard Countermeasures Branch
Mr. T. Jones*	Head, Electronic Warfare Support Measures Branch
Mr. E.E. Koos	Head, Airborne Electronic Warfare Systems Branch
Mr. H.E. Crecraft	Head, Ships Electronic Warfare Systems Branch
Dr. G.E. Friedman	Head, Advanced Techniques Branch

Point of contact: Dr. G.P. Ohman, Code 5701, 767-3622

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Underwater Sound Reference Detachment

Research Activity Areas

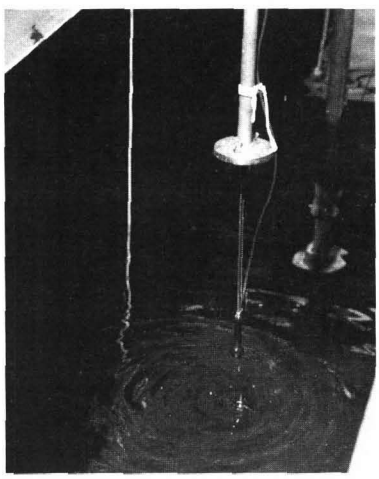
Measurements
- Calibration theory and accuracy
- Measurement methods
- Standard calibration services
- Sonar transducer test and evaluation
- Transduction and radiation theory
- Wave-number calibration
- Shock testing

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

Transducers
- Acoustic materials
- Acoustic material measurements
- Electroacoustic standards
- Acoustic sources
- Specialized electroacoustic transducers
- Standard loan services
- Transduction
- Transducer reliability
- Sonar transducers
- Accelerated life testing



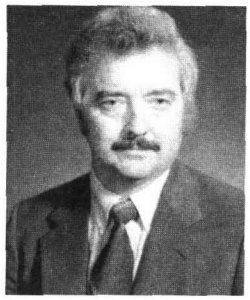
Chemistry laboratory where polymer materials used in underwater acoustical systems are developed and analyzed.



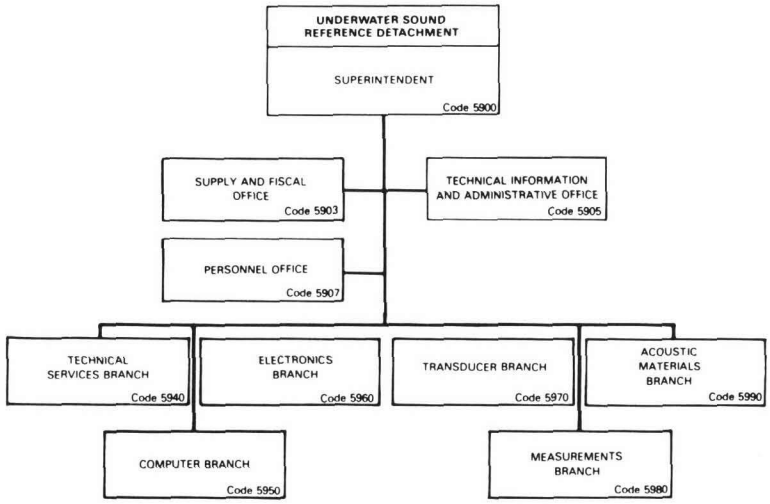
A USRD standard F42C transducer being raised from a test well



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 electromechanical bench-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 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 manages a Navy-wide sonar transducer reliability improvement program and participates in the establishment of Navy, national, and international standards for underwater acoustics.

Personnel

Full-time civilian: 100

Key Personnel

Name	Title
Dr. J.E. Blue	Superintendent
Dr. R.W. Timme†	Associate Superintendent
Mr. H.F. Bowman	Head, Supply and Fiscal Office
Ms. D.A. Pieper	Head, Technical Information Office
Ms. N.L. Rose	Head, Personnel Office
Mr. G. Woods	Head, Technical Services Branch
Mr. R.E. Scott	Head, Computer Branch
Mr. C.K. Brown	Head, Electronics Branch
Dr. R.W. Timme	Head, Transducer Branch
Dr. A.L. Van Buren	Head, Measurements Branch
Dr. R. Ting	Head, Acoustic Materials Branch

Point of contact: Mrs. L.R. Jevnager, Code 5905.1, (305) 857-5237

†Additional duty

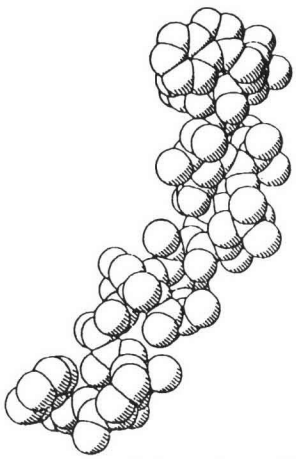
MATERIAL SCIENCE AND COMPONENT TECHNOLOGY DIRECTORATE

Material Science and Component Technology Directorate

The Material 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 Navy needs such as fire suppression. The program includes investigations of a broad spectrum of materials including insulators, semiconductors, superconductors, metals and alloys, optical materials, polymers, plastics, and artificially structured 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.

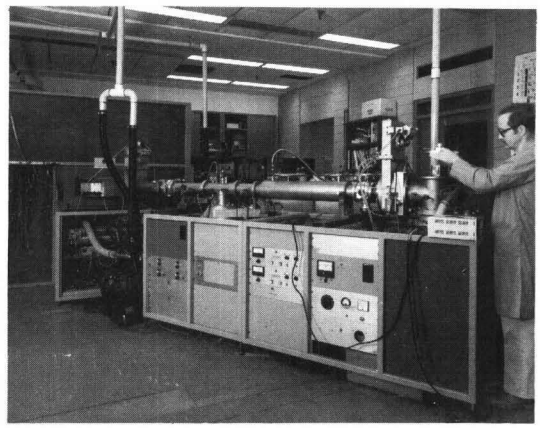
The properties and limits of performance of these materials in natural or radiation environments, components under deleterious conditions such as those associated with the marine environment, neutron or directed energy beam irradiation, or extreme temperatures and pressures, are established.

MATERIAL SCIENCE AND COMPONENT TECHNOLOGY DIRECTORATE

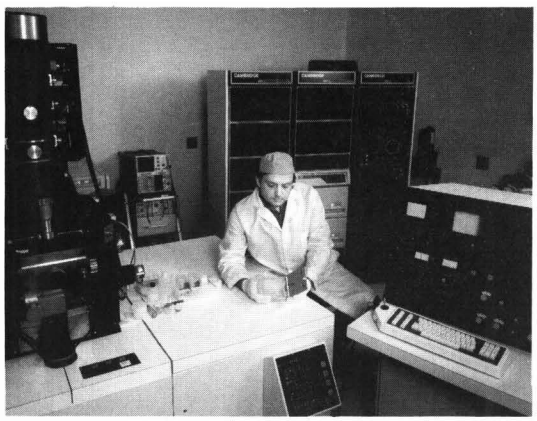


Hydrogen atoms not included

Space-filling model of the structure of an analog of the antibiotic zervamycin



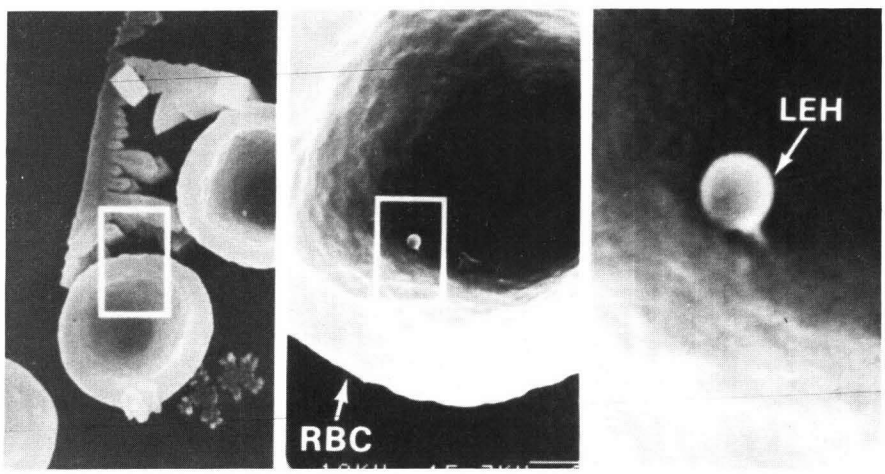
Ion implantation of semiconductor materials



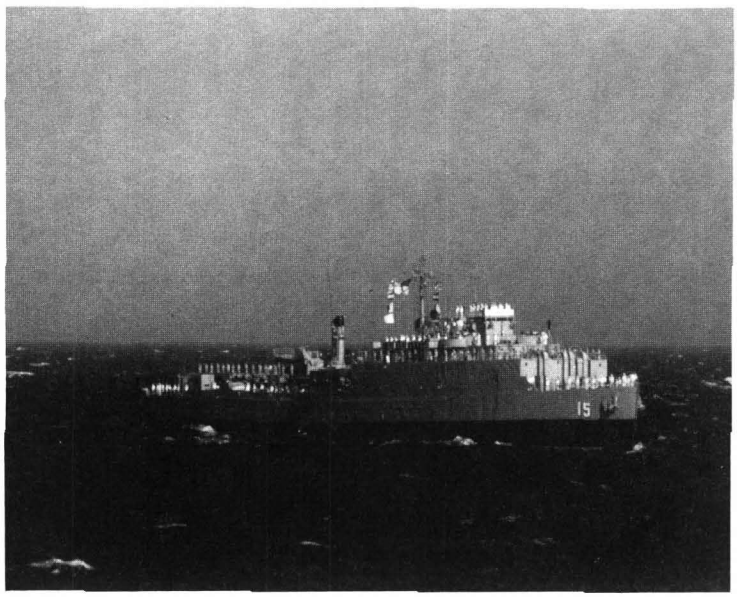
Electron beam lithography for microfabrication of semiconductor integrated circuits



Laser melt particle injection process



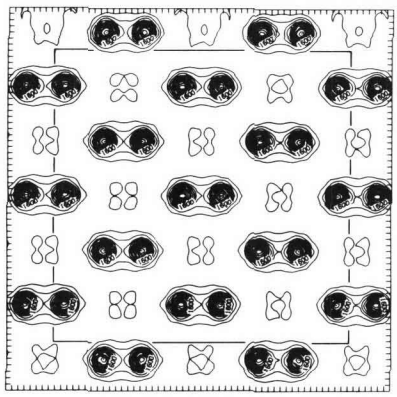
Studying liposome-encapsulated hemoglobin (LEH) as a synthetic red blood cell (RBC)



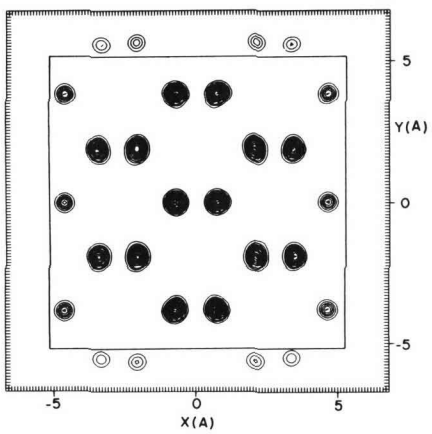
The ex-*Shadwell* (LSD-15)—advanced fire test laboratory for the Navy Center for Safety and Survivability



High-magnetic-field apparatus for spectroscopic characterization of materials



a. Original structure

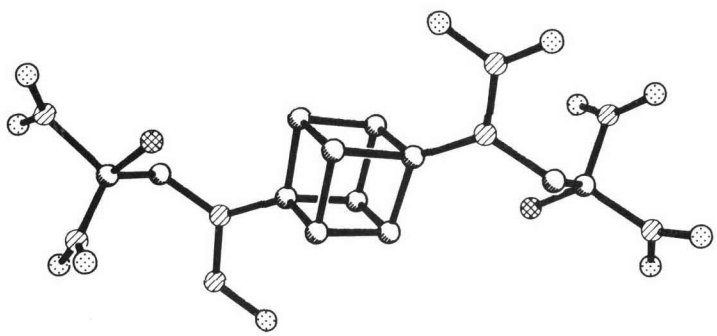


b. Reconstruction

Atomic resolution image reconstruction by use of microdiffraction patterns from overlapping regions



Picosecond Stimulated Raman Scattering Facility



Substituted cubane containing many nitro propellants

Associate Director of Research
for Material Science and Component Technology



Dr. B.B. Rath

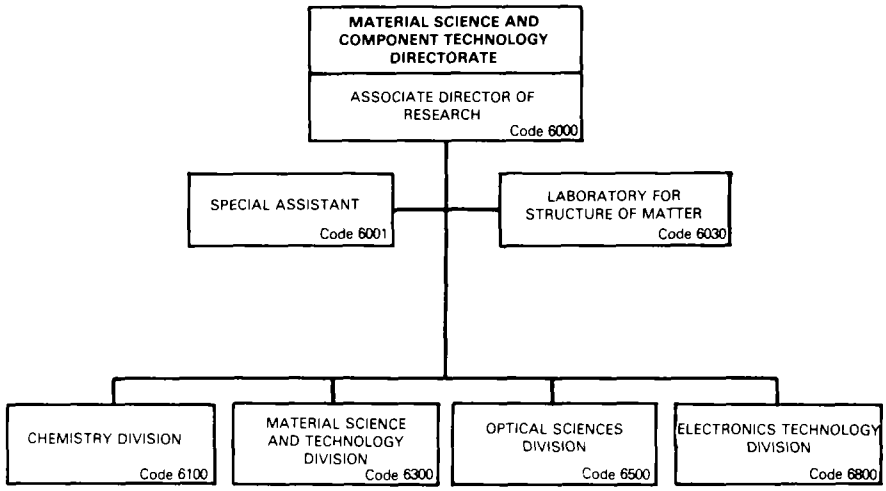
Dr. Rath [redacted] He received the B.S. degree in physics and mathematics from Utkal University, M.S. in metallurgical engineering from Michigan Technological University, and a Ph.D from the Illinois Institute of Technology.

Dr. Rath was Assistant Professor of Metallurgy and Materials Science at Washington State University from 1961-1965. 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 and the University of Maryland. From 1982 to 1986 he was Superintendent of the Material Science and Technology Division.

Dr. Rath is recognized in the fields of solid state transformations, grain boundary migrations and structure-property relationship in metallic systems. He has published over 100 papers in these fields and edited several books and conference proceedings.

Dr. Rath is a member of 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 is a member of the panel on Metals and Materials in Structures for the TTCP countries and the Indo-US Joint Commission on Science and Technology.

Dr. Rath is a fellow of the American Society for Metals (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 and as chairman of several committees of TMS and ASM.



Key Personnel

Name	Title	Code
Dr. B.B. Rath	Associate Director of Research for Material Science and Component Technology	6000
Dr. J. Karle	Chief Scientist, Laboratory for Structure of Matter	6030
Dr. W.M. Tolles	Superintendent, Chemistry Division	6100
Dr. B.B. Rath*	Superintendent, Material Science and Technology Division	6300
Dr. T.G. Giallorenzi	Superintendent, Optical Sciences Division	6500
Dr. G.M. Borsuk	Superintendent, Electronics Technology Division	6800

Point of contact: Virginia Bradley, Code 6000A, 767-3566

*Acting

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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

Key Personnel

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

Point of contact: Dr. Clifford George, Code 6030, 767-3463

Chemistry Division

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

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

Surface/Interface Chemistry
- Tribology
- Surface properties of materials
- Surface/interface analysis
- Chemical microdetectors
- IR/RF decoy materials
- Surface reaction dynamics

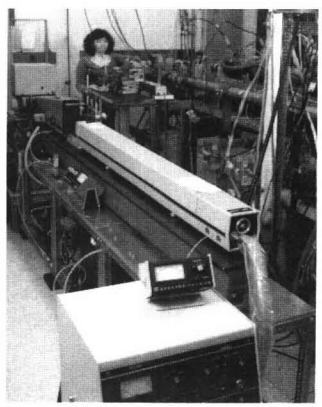
Inorganic & Electrochemistry
- Beam-enhanced chemistry
- Fundamental electrode reactions
- Corrosion prevention
- High-temperature chemistry
- Hetero- and homogeneous catalysis

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

Bio/Molecular Engineering
- Biophysical chemistry
- Immunochemistry
- Biomembranes
- Lipid and protein structure
- Molecular graphics
- Biosensors
- Polymerizable lipids
- Langmuir-Blodgett films
- Red blood cell surrogate
- Bio-derived microstructures



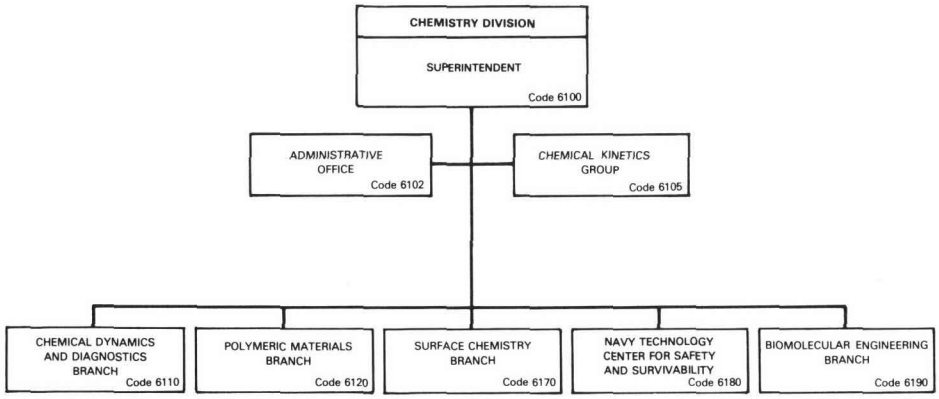
Navy combatant ships are now receiving Naval Firefighters Thermal Imagers (NFTIs) as a result of a 4-year evaluation and testing program conducted by NRL scientists. NFTI, which has already been used in one fire aboard an aircraft carrier, allows firefighters to immediately locate and extinguish a fire.



The NRL shock tube is equipped with infrared, visible light, and ultraviolet laser diagnostics and a computerized data-acquisition system. It is currently being used to study reactions that are important in high-temperature combustion systems and in the thermal decomposition of energetic materials.



Dr. W. M. Tolles



Basic Responsibilities

The Chemistry Division conducts basic and applied research and development studies in the broad fields of chemical diagnostics, polymeric materials, surface and electrochemistry, biomolecular engineering, 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, personnel protection (including chemical and biological defenses), fire suppression, and the chemistry and physics of synfuels.

Personnel

Full-time civilian: 120

Key Personnel

Name	Title
Dr. W.M. Tolles	Superintendent
Dr. W.B. Fox	Associate Superintendent
Ms. B.L. Russell	Administrative Officer
Dr. M.C. Lin	Head, Chemical Kinetics Group
Dr. A.B. Harvey	Head, Chemical Diagnostics Branch
Dr. W.B. Moniz	Head, Polymeric Materials Branch
Dr. J.S. Murday	Head, Surface Chemistry Branch
Dr. H.W. Carhart	Head, Navy Technology Center for Safety and Survivability
Dr. J. Schnur	Head, Biomolecular Engineering Branch

Point of contact: Ms. Brenda Russell, Code 6102, 767-2460

Material Science and Component Technology Division

Staff Activity

Laser Materials-Application Center
Failure Analysis and Fractography Staff

Research Activity Areas

Environmental Effects
- Microstructural characterization
- Micromechanisms of crack growth
- Corrosion science and mechanisms
- Stress corrosion cracking
- Surface protection and inhibitors

Physical Metallurgy
- Phase transformations and defect states
- Microstructure-property relationships
- Elasticity, plasticity, mechanical phenomena
- Laser welding and surface processing
- Alloy development
- Small angle neutron scattering
- Rapid solidification processing of materials

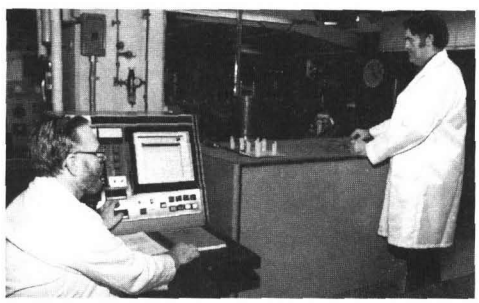
Mechanics of Materials
- Subcritical crack growth and fracture
- Failure criteria
- Computational, fracture, and structural mechanics
- Constitutive theories

Composite Materials
- Physical, mechanical, and failure characterization and analysis
- Fabrication and processing techniques
- High-temperature applications
- Marine corrosion

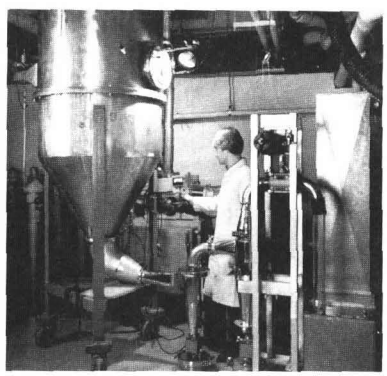
Ceramics
- Processing, fabrication, and microstructural characterization
- Thermostructural applications
- Ceramics for electronic, piezo-electric, optical, and other nonmechanical applications
- Physical, mechanical, and failure characterization and analysis

Thermostructural Materials
- Elevated temperature behavior of materials
- Influence of environment on high-temperature materials
- Basic mechanisms of radiation damage

Structural Integrity
- Failure mechanisms in advanced structural materials
- Reliability analysis and failure modes of components and systems
- Advanced techniques for nondestructive evaluation
- Shock and vibration protection



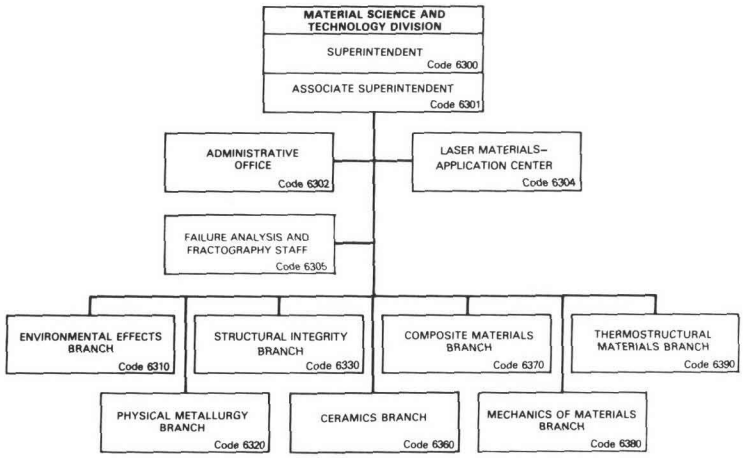
Hot isostatic press (HIP) facility for producing materials of unique alloy compositions and microstructures from metal and nonmetal powders, for eliminating micro and macro defects, and for precisely controlling the synthesis of ceramic and metal matrix composites.



High Pressure Gas Atomization (HPGA) System. The HPGA process is a high kinetic energy approach to ultrafine (<10 μm) metal powder production that uses the intense interaction of focused supersonic gas jets to disintegrate a molten metal stream. The fine sprays of droplets that result then solidify and are collected as powders.



Dr. B.B. Rath



Basic Responsibilities

The Material Science and Component Technology Division conducts basic and applied research and engages in exploratory and advanced development of materials technology 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, 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: 115

Key Personnel

Name	Title
Dr. B.B. Rath*	Superintendent
Mr. R.J. Goode	Associate Superintendent
Mrs. E. Wray	Administrative Officer
Mr. R.L. Stegman	Head, Laser Materials-Application Center
Mr. C.D. Beachem	Head, Failure and Fractography Analysis Staff
Mr. T.W. Crooker	Head, Environmental Effects Branch
Dr. R.A. Vandermeer	Head, Physical Metallurgy Branch
Dr. C.I. Chang	Head, Structural Integrity Branch
Dr. D. Lewis III*	Head, Ceramics Branch
Dr. S.C. Sanday	Head, Composite Materials Branch
Dr. R. Badaliance	Head, Mechanics of Materials Branch
Dr. D.J. Michel	Head, Thermostructural Materials Branch

Point of contact: Dr. B.B. Rath, Code 6300, 767-2926

*Acting

Optical Sciences Division

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
- Synchrotron radiation
- 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

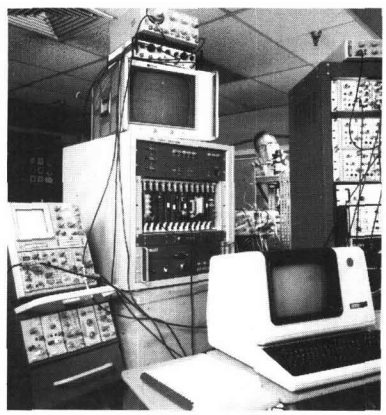
Laser Physics
- Molecular and chemical laser physics
- Interferometry
- Laser chemical kinetics
- Electrically driven lasers
- Laser-induced reactions
- Laser materials diagnostics
- Nonlinear frequency conversion
- Beam cleanup technology
- Optical phase conjugation
- Optical instrumentation and probes

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

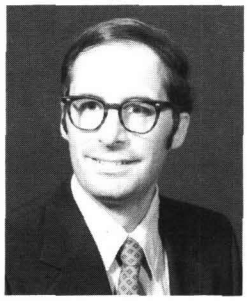
Optical Techniques
- Picosecond light pulses
- Diode laser applications
- Optical waveguides
- Radiation-induced defects
- Optical control of solid state electronic devices
- Fiberoptic sensors
- Integrated optics
- Fiberoptic materials and fabrication



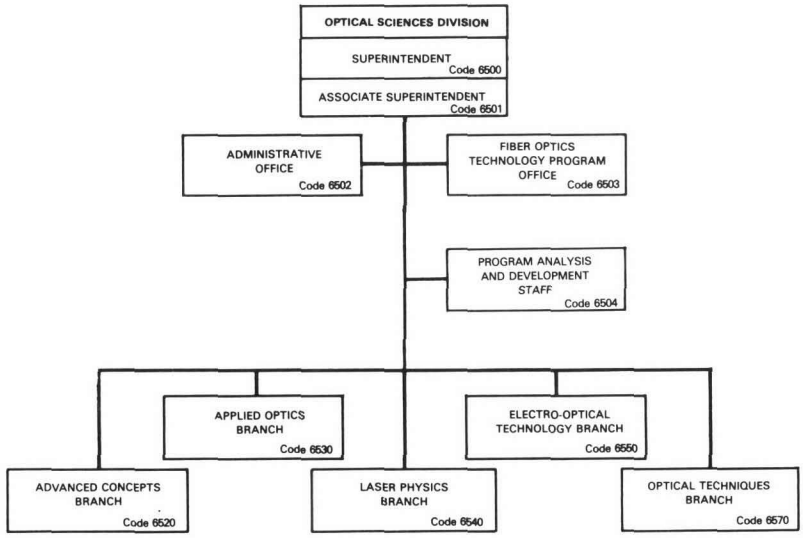
The Missile Seeker Evaluation Facility is a computerized facility that is used to evaluate optical countermeasures to infrared missile seekers and infrared imaging sensors.



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: 122

Key Personnel

Name	Title
Dr. T.G. Giallorenzi	Superintendent
Mr. J.M. McMahon	Associate Superintendent
Mrs. D.D. Nolan	Administrative Officer
Dr. J.C. Kershenstein	Program Analysis & Development Staff
Mr. J.M. McMahon	Program Analysis & Development Staff
Dr. R.A. Patten	Program Analysis & Development Staff
Dr. D.L. Esterowitz	Program Analysis & Development Staff
Mr. J.E. Donovan	Head, Fiber Optics Technology Program Office
Dr. J.C. Kershenstein	Head, Advanced Concepts Branch
Dr. R.A. Patten	Head, Applied Optics Branch
Dr. B. Feldman	Head, Laser Physics Branch
Dr. L. Esterowitz	Head, Electro-optical Technology Branch
Dr. J. Weller	Head, Optical Techniques Branch

Point of contact: Mrs. D. Nolan, Code 6502, 767-2855

*Acting

Electronics Technology Division

Research Activity Areas

Semiconductors
- Solid state theory
- Electrical, optical, and magneto-optical studies of semiconductor microstructures, surfaces, and interfaces
- Impurity and defect studies
- Structural and electronic properties of amorphous semiconductors

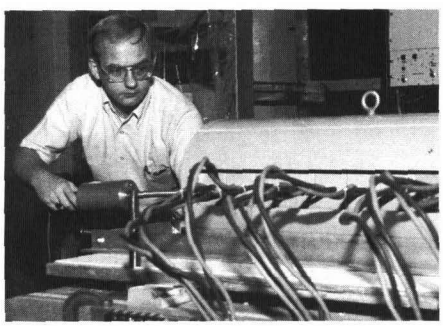
Surface Physics
- Surface and interface physics
- Cathode research and development
- Vacuum surface research
- Processing research for nanometric electronics
- Growth and characterization of surfaces and interfaces
- Thermionic energy conversion
- Field emission arrays

Microwave Technology
- Surface acoustic wave devices
- Microwave and millimeter-wave integrated circuits
- Microwave ferromagnetic components
- Microwave, millimeter-wave, and submillimeter-wave component and circuit research
- Superconducting devices and circuits
- Signal processing research

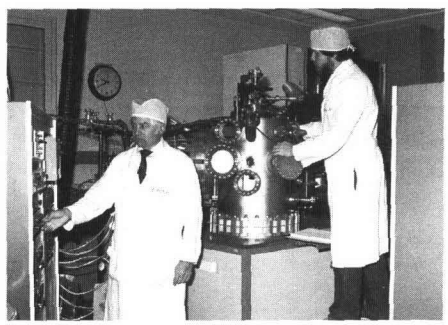
Solid State Devices
- Ion implantation technology
- High- and low-power device design, simulation, and fabrication
- Radiation effects/hardening, reliability, and failure physics of electronic devices, circuits, and optoelectronic sensors
- High-frequency devices
- IC device technology
- Solid state optical sensors

Electronic Material Technology
- Preparation and development of magnetic, dielectric, optic, and semiconductor materials
- Molecular beam epitaxy
- Metal organic chemical vapor deposition

Microwave and Millimeter Wave Tube Technology
- Microwave and millimeter power amplifier research and development
- Tube fabrication and support technology
- Vacuum electronic devices



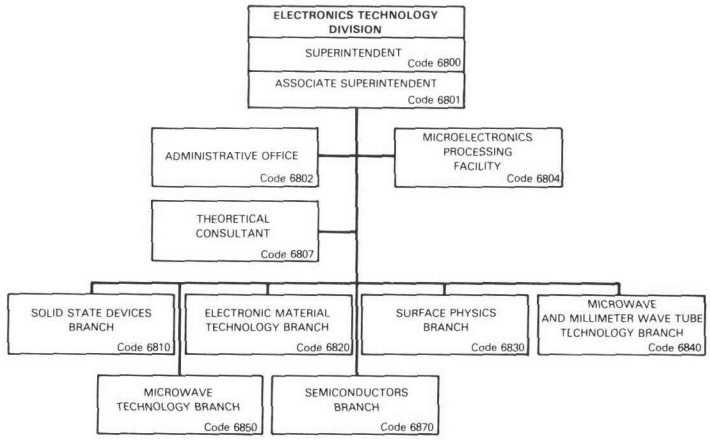
NRL scientist checks the digital magnetic field probe alignment in the high-power I/J-band ubitron experiment. The ubitron, a low-voltage free electron maser, holds high potential for providing the Navy a high-power, broadband source of millimeter-wave radiation.



The molecular beam epitaxy system is used in the growth of layered structures of III-V semiconductors with thicknesses and compositional and doping profiles that are accurately controlled on an atomic scale. The study of such specifically tailored semiconductor microstructures is one of the fastest growing and exciting areas of solid state science and technology.



Dr. G. M. Borsuk



Basic Responsibilities

The Electronics Technology Division conducts programs of basic science and applied research and development in the fields of electronic properties of solid materials (especially semiconductors), materials, surface physics, microwave techniques, microelectronic device research and fabrication, high-power microwave generation, and cryoelectronics. These programs represent major activity in microstructure electronics, solid-state devices, microelectronics, materials growth, vacuum electronics, and components and circuits. The activities of the Division couple basic electronics research to systems research and development needs.

Personnel

Full-time civilian: 130

Key Personnel

Name	Title
Dr. G.M. Borsuk	Superintendent
Dr. S. Teitler	Associate Superintendent
Mrs. A. McDaniel	Administrative Office
Dr. K.L. Ngai	Theory Consultant
Dr. M.C. Peckerar	Head, Microelectronics Processing Facility
Dr. J.M. Killiany	Head, Solid State Devices Branch
Mr. H. Lessoff	Head, Electronic Material Technology Branch
Dr. R.F. Greene	Head, Surface Physics Branch
Dr. R.K. Parker	Head, Microwave and Millimeter Wave Tube Technology Branch
Dr. B.E. Spielman	Head, Microwave Technology Branch
Dr. S.G. Bishop	Head, Semiconductors Branch

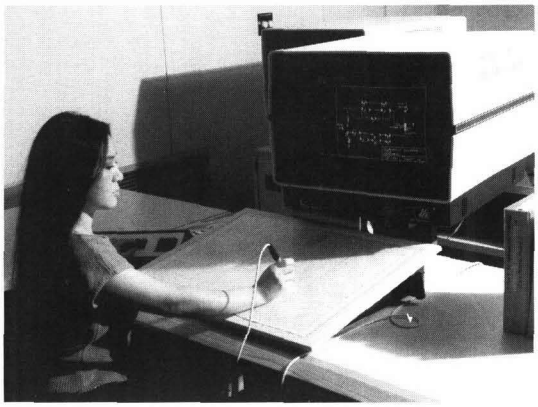
Point of contact: Dr. Sidney Teitler, Code 6801, 767-2807

NAVAL CENTER FOR SPACE TECHNOLOGY

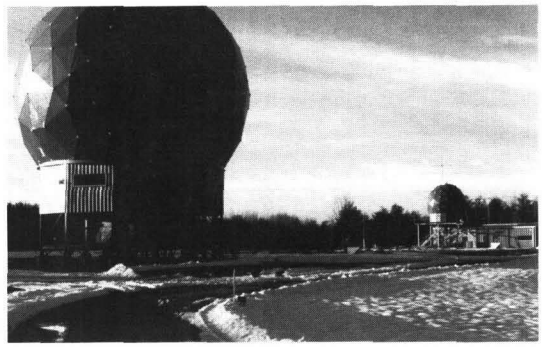
Naval Center for Space Technology

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.

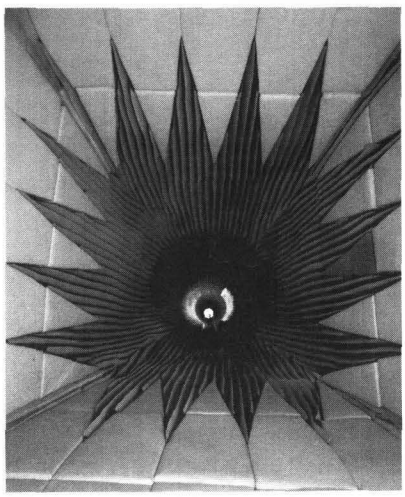
NAVAL CENTER FOR SPACE TECHNOLOGY



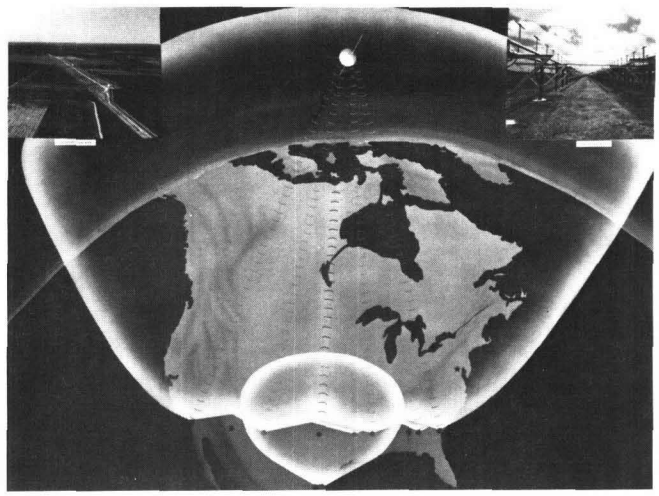
One station of the computer-aided design/computer-aided manufacturing (CAD/CAM) systems used for design and engineering of spacecraft



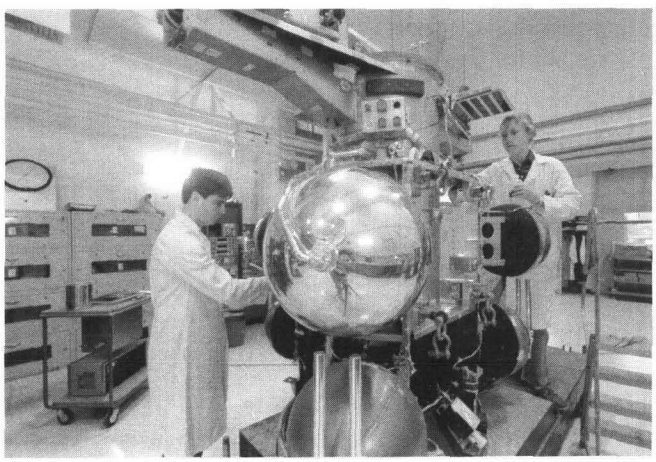
Satellite Tracking and Calibration Facility



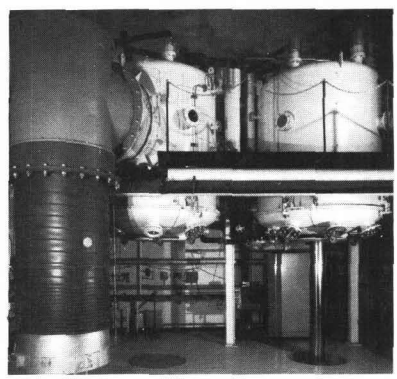
Transmitter end of one of NCST's RF anechoic chambers



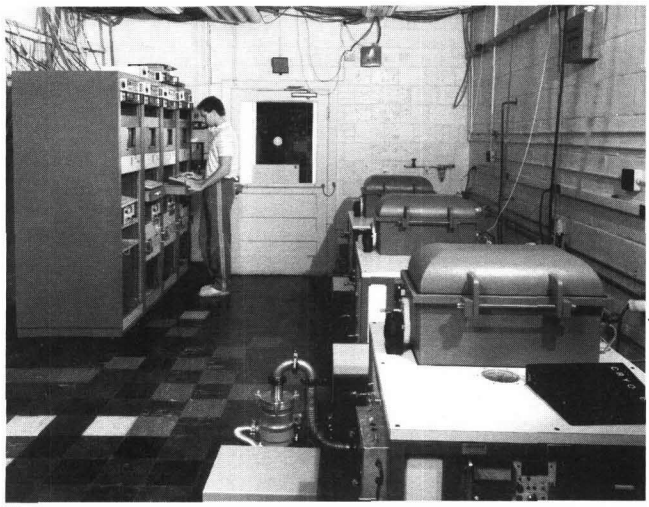
Navy Space Surveillance System developed at NRL



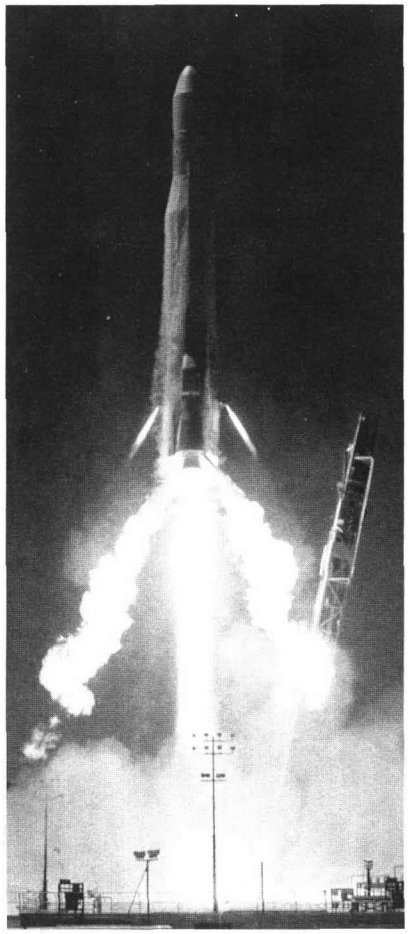
Spacecraft being assembled in the Assembly and Test Facility



Two bottom-loading thermal-vacuum chambers in the Test and Assembly Facility



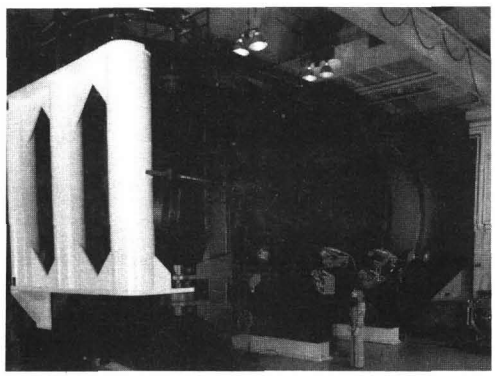
Part of NRL Space Clock Test Facility. Cesium clocks are tested in thermal-vacuum chambers (right) that are automatically controlled by the units at left



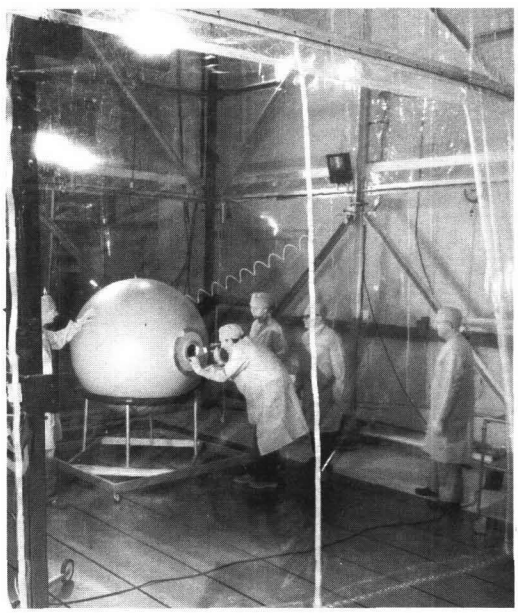
Launch of an NRL satellite



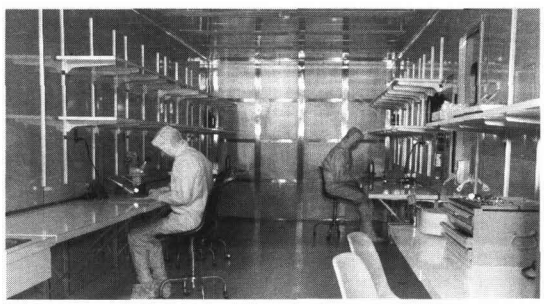
Example of spacecraft orbit analysis capability of the NCST Date Processing Facility



Exterior view NCST Thermal-Vacuum Chamber in the Assembly and Test Facility



Inspection of a spacecraft propellant tank in the NCST Test and Assembly Facility



NCST Clean Room where spacecraft components are cleaned, inspected, tested and assembled

Director of Naval Center for Space Technology

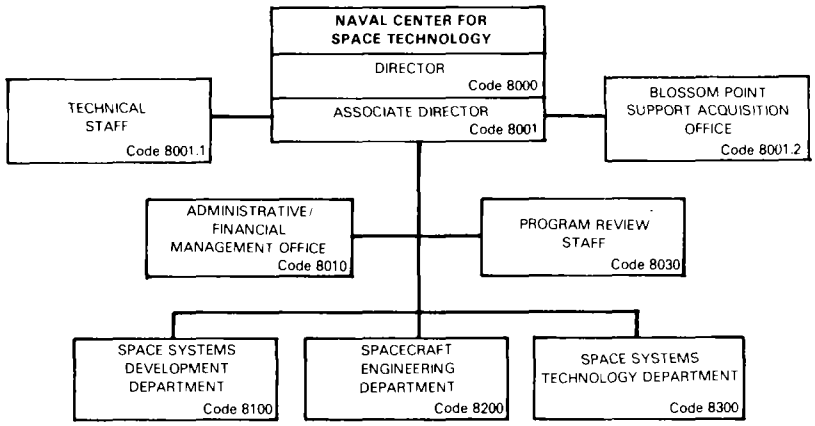


Mr. P.G. Wilhelm

Mr. Wilhelm [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. 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, 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
Mrs. L.T. McDonald	Head, Administrative/Financial Management Office	8010
Mr. L.E. Earl	Head, Program Review Staff	8030
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, 767-6549

*Acting

Space Systems Development Department

Research Activity Areas

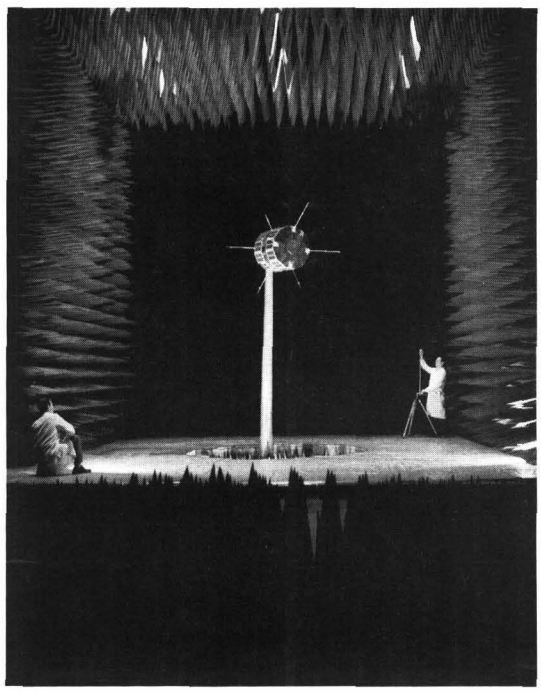
Special Projects
- Advanced and experimental communications systems for spacecraft and earth terminals
- Investigations and technology assessment of advanced satellite programs

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

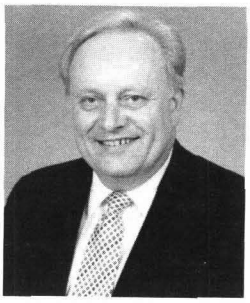
Advance Systems Development
- Survivability concepts
- Spaceborne signal and data processors development
- Spacecraft telemetry, command, and data management

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

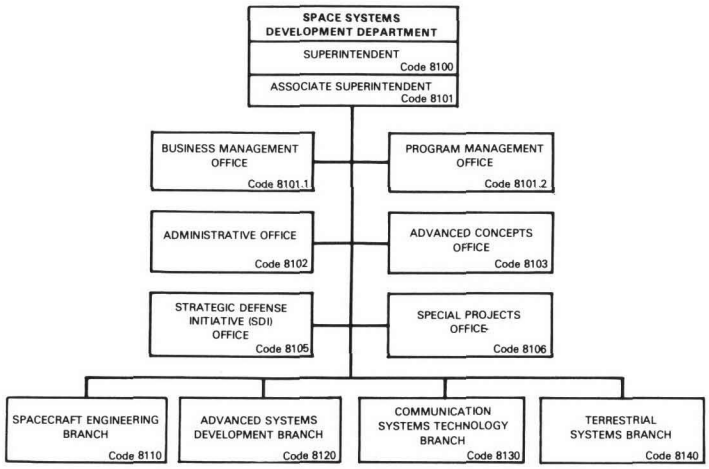
Terrestrial Systems
- Software for collection systems control
- Advanced satellite ground station design
- Fleet-deployed satellite systems



The RF Anechoic Chamber is used to test and qualify satellites and other spacecraft components. It simulates the RF environment of free space so that accurate measurements can be made.



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: 122

Key Personnel

Name	Title
Mr. R.E. Eisenhauer*	Superintendent
Mr. J.G. Winkler	Associate Superintendent
Ms. D.E. Mignogna	Administrative Officer
Mr. J.A. Reynolds	Head, Business Office
Mr. J. Asher	Head, Program Management Office
Mr. B. Kaufman	Head, Advanced Concepts Office
Mr. R.E. Palma	Head, Strategic Defense Initiative Office
Mr. L.E. Hearton	Head, Special Projects Office
Mr. G.E. Flach	Head, Spacecraft Engineering Branch
Mr. A.J. Fox	Head, Advanced Systems Development Branch
Mr. F.E. Betz	Head, Communication Systems Technology Branch
Mr. T.W. Fisher	Head, Terrestrial Systems Branch

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

*Acting

Spacecraft Engineering Department

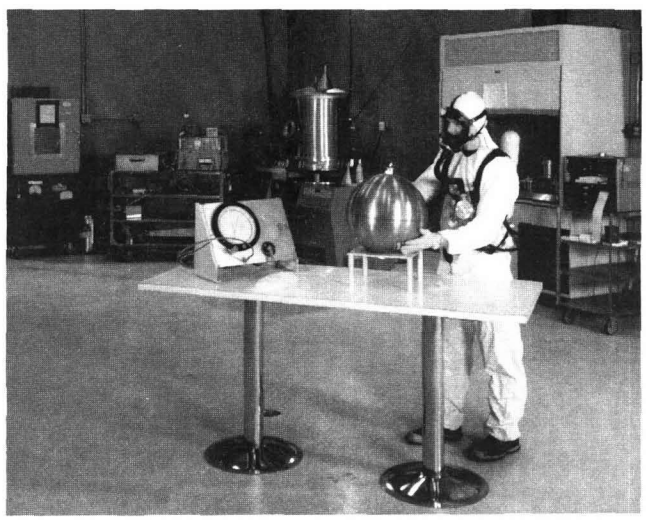
Research Activity Areas

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

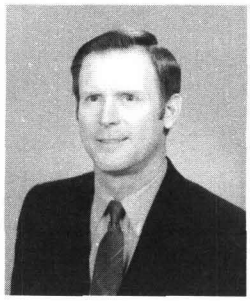
Systems Analysis and Test
- Spacecraft structural design
- Spacecraft environmental testing
- Mechanical analysis and testing

Control Systems Branch
- Attitude and thermal control system
- Reaction control systems
- Propulsion systems
- Launch operations support

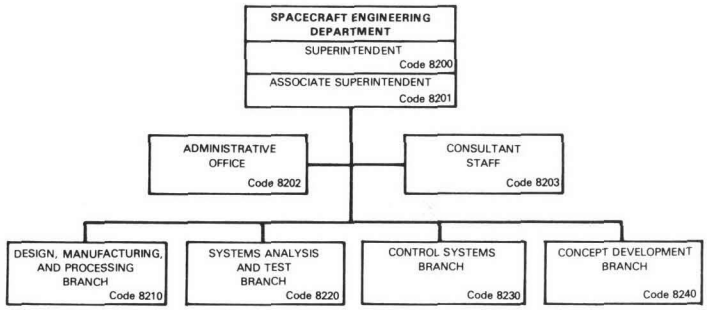
Concept Development
- Engineering analysis and conceptual design for new space systems
- Flexible space structures research
- Expert systems
- Spaceborne applications of robotics



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: 45

Key Personnel

Name	Title
Mr. R.T. Beal*	Superintendent
Vacant	Associate Superintendent
Vacant	Administrative Officer
Mr. R. Barnes	Consultant
Mr. R.T. Beal*	Head, Design, Manufacturing and Process Branch
Mr. E. Senasack	Head, Systems Analysis and Test Branch
Mr. S. Hollander	Head, Control Systems Branch
Dr. R. Lindberg	Head, Concept Development Branch

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

*Acting

Space Systems Technology Department

Research Activity Areas

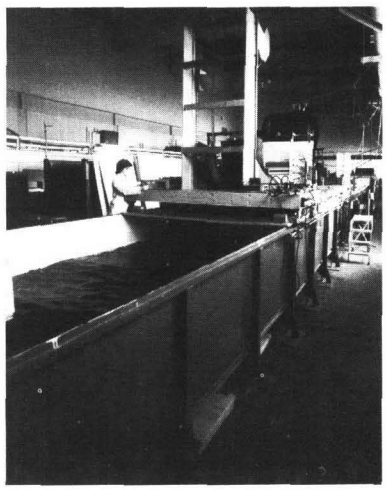
Navy Space Technology
- Technical consultant to current Navy space programs
- Navy technology planning
- Exploratory development block management

Space Sensing
- Surveillance sensor and algorithm development
- Electromagnetic and scatter research
- Surveillance system performance
- Requirements definition

Space Applications
- Navigation systems
- Time synchronization
- Hydrogen masers
- Frequency standard development

Systems Engineering and Analysis
- Space system integration and test
- Space system technical evaluation

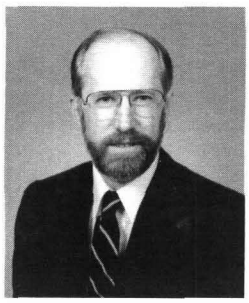
Advance Concepts Processing Branch
- Coherent receiver development
- Spacecraft calibration systems
- Advance data processing development



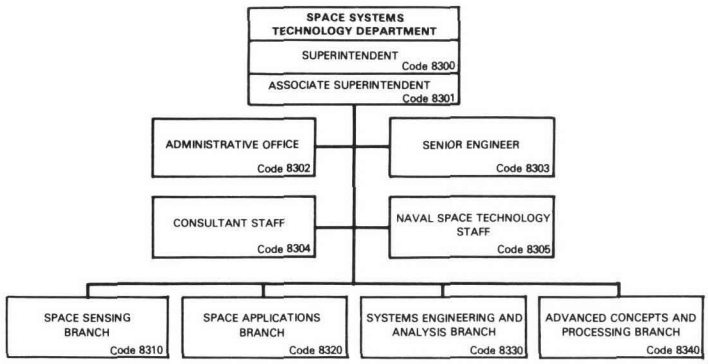
This 30.5-m wave tank is used to study the dynamics of wind waves and their interactions with long waves. Measurements are made by using microwave Doppler spectrometry and optical and photometric techniques.



In its precise time programs for the Naval Observatory and the NAVSTAR Global Positioning System (GPS), NRL has developed an extremely precise in-house time standard and equipment to test candidate clocks. These measurements can be made locally or via satellite or other special links. The link with the Observatory is precise to within 50 trillionths of a second.



Mr. L. Hammarstrom



Basic Responsibilities

The Space Systems Technology Department (SSTD) is involved in a wide range of activities from basic research to developing concepts for future space systems. The department has a highly skilled team doing research on remote sensing of the oceans of the world and state-of-the-art frequency standards for the Global Positioning System and the Naval Observatory. In addition, the SSTD builds complex receiving and transmitting systems that exploit the latest concepts in microprocessing and device technologies. The latest digital receiver design has been used to expand the performance of the Nav Spasur Satellite Surveillance Fence that NRL developed. Detailed analysis, simulation, and testing is performed on space systems. Various hardware and software systems for use in space systems are being developed. Two remote field sites, a large wavetank facility, and the NRL P-3 aircraft support the work. The SSTD interacts with operational forces in examining areas for future research and development.

Personnel

Full-time civilian: 96

Key Personnel

Name	Title
Mr. L.M. Hammarstrom*	Superintendent
Vacant	Associate Superintendent
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Mr. R.L. Beard	Head, Space Applications Branch
Mr. T.F. Lawton	Head, Test and Analysis Branch
Mr. J.N. O'Connor	Head, Advanced Concepts and Processing Branch

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PROFESSIONAL DEVELOPMENT

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 Laboratory 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 1986, NRL employees participated in approximately 4351 individual training events. Many of these were presented as either video-taped 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 graduate and postgraduate programs. Tuition for job-related training is paid by NRL. Formal programs offered by NRL include:

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 midcareer 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) in Monterey, California, provides advanced graduate study for selected Federal civilian employees who meet NPS academic requirements for the program in which they are interested, and whose employing agency is willing to act as sponsor.

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 which 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.

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

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, usually 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.

• The **Federal Executive Professional Association** (FEPA) provides testimony, recommendations, and constructive criticism of the policies of the Executive Branch on existing proposed legislation and on regulatory actions. It also assists various advisory boards and commissions concerned with professional employee relations and benefits. The FEPA meets monthly for seminars given by NRL management.

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 Associateship 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. NRL hosted 52 of these faculty participants in 1986.

• 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. The summer option began in 1983; 8 ONR graduate fellows chose NRL for their summer work in 1986.

Contact: Employee Development Branch, 767-2956

• 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.

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: Personnel Operations Branch, 767-3030

Undergraduate College Student Programs

Several programs are tailored to the undergraduate which 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: Personnel Operations Branch, 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: Personnel Operations Branch, 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: Employee Development Branch, 767-2956

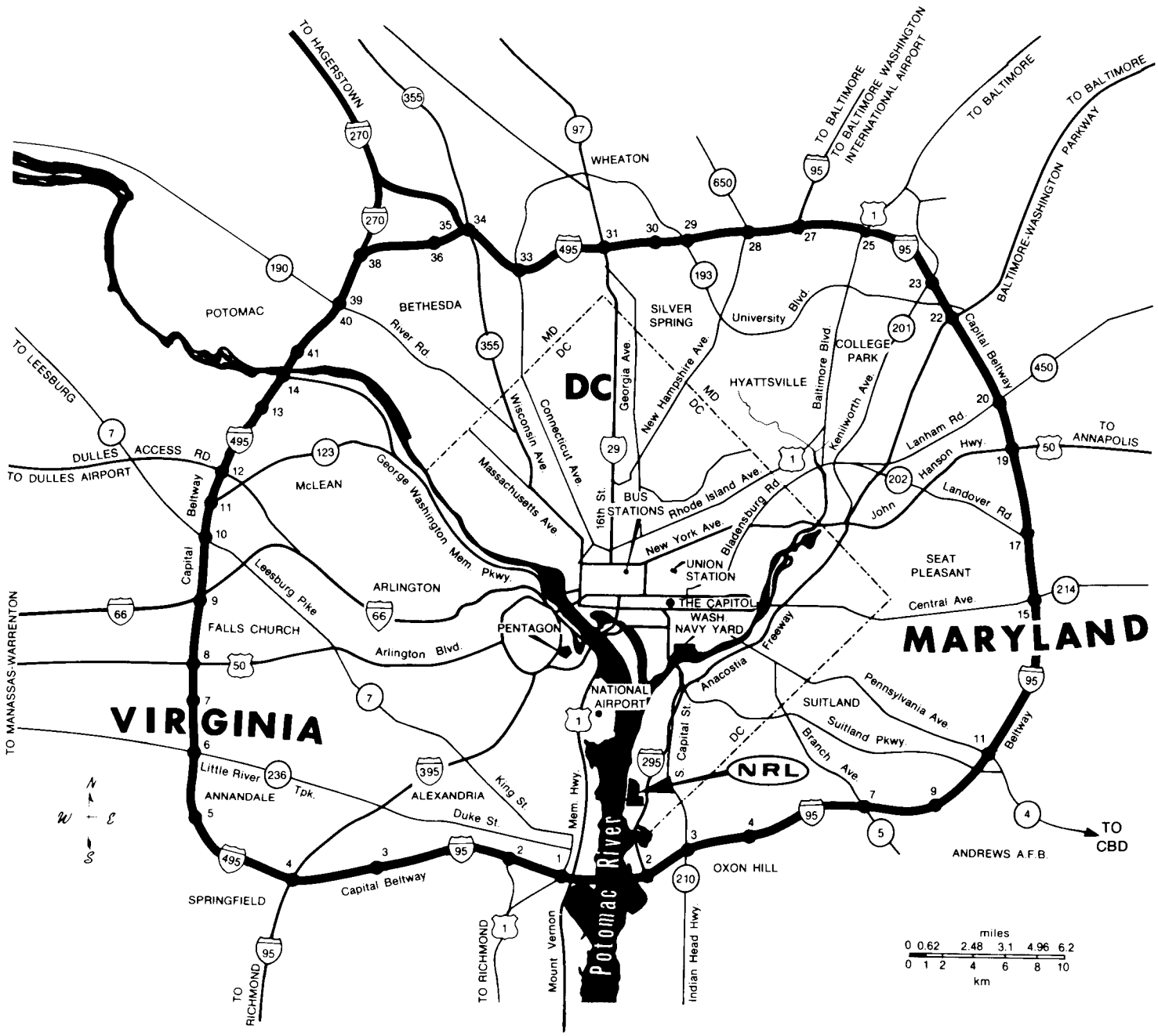
1986 Government Awards to Civilian Employees

	Number
The President's Award for Distinguished Federal Civilian Service	1
Secretary of the Navy Award for Distinguished Achievement in Science	1
Distinguished Executive Award, Senior Executive Service	1
Meritorious Executive Award, Senior Executive Service	1
Senior Executive Bonus Award	10
Federal Laboratory Consortium Special Award for Excellence in Technology Transfer	1
RADM William S. Parsons Award of the Navy League	1
Navy Meritorious Civilian Service Award	3
Navy Superior Civilian Service Award	2
E.O. Hulburt Award for Science	1
Navy Award of Merit for Group Achievement	1
NRL Award for Achievement in the Field of Equal Opportunity	2

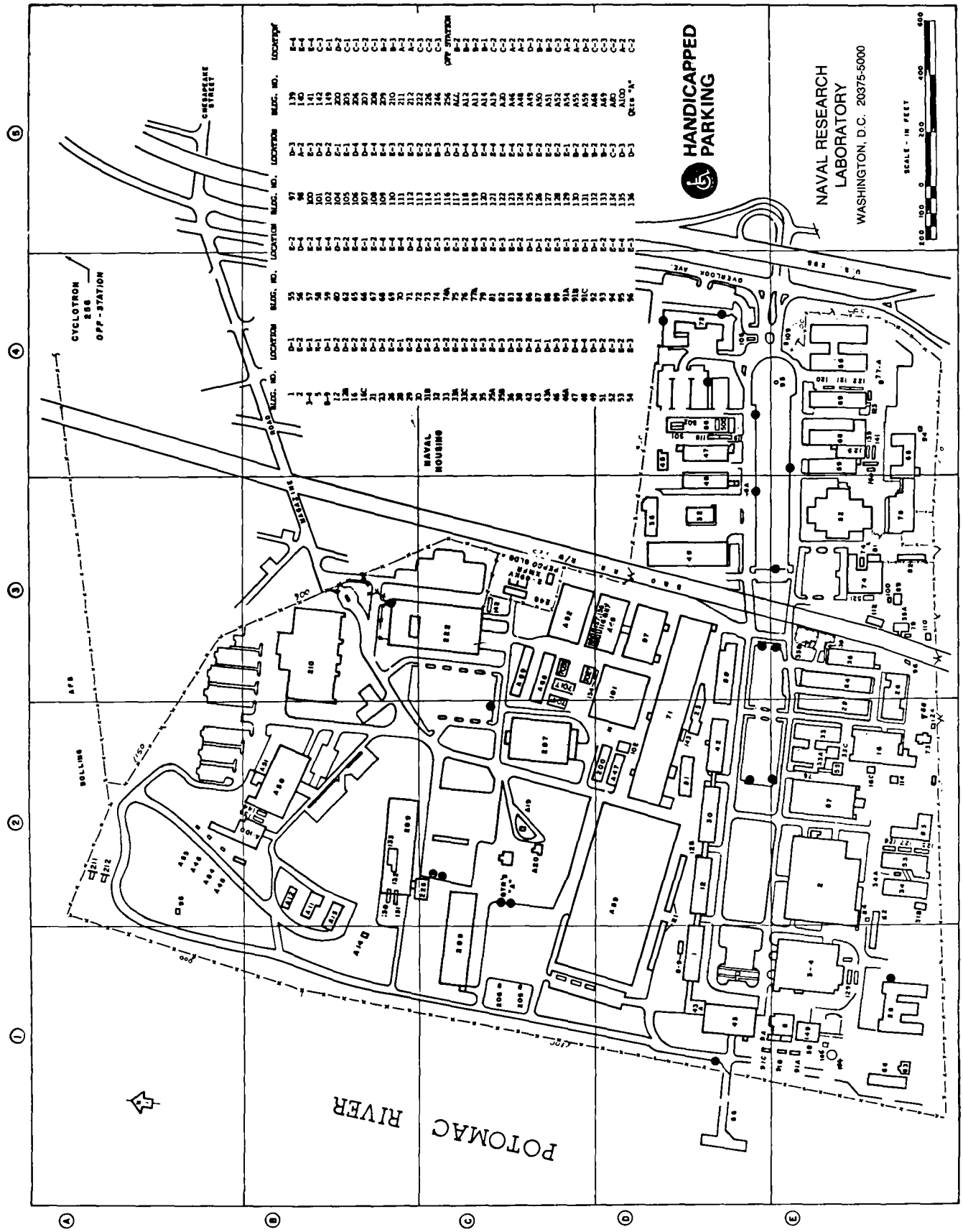


GENERAL INFORMATION

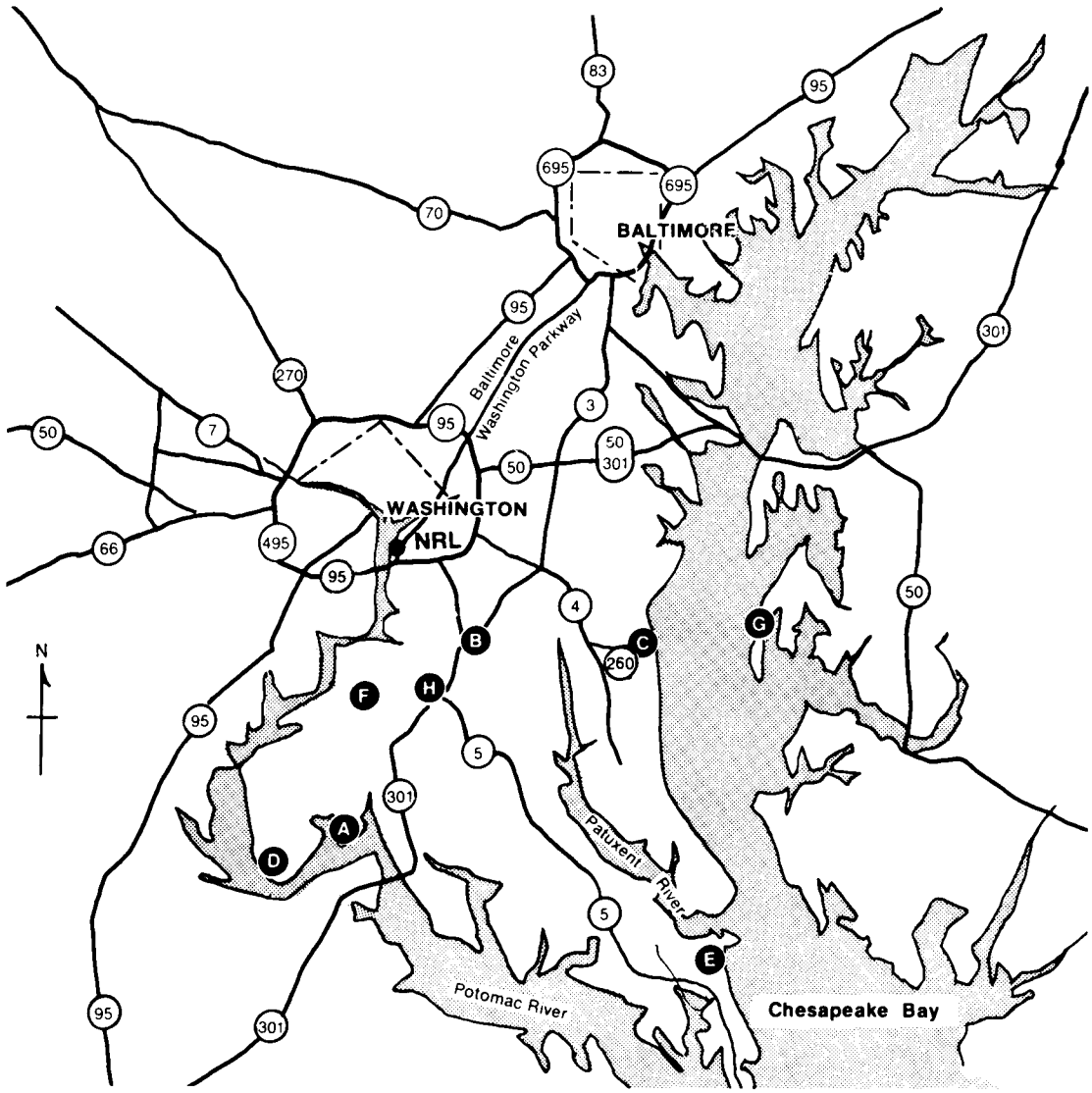
Location of NRL in the Capital Area



Location of Buildings at Main Site



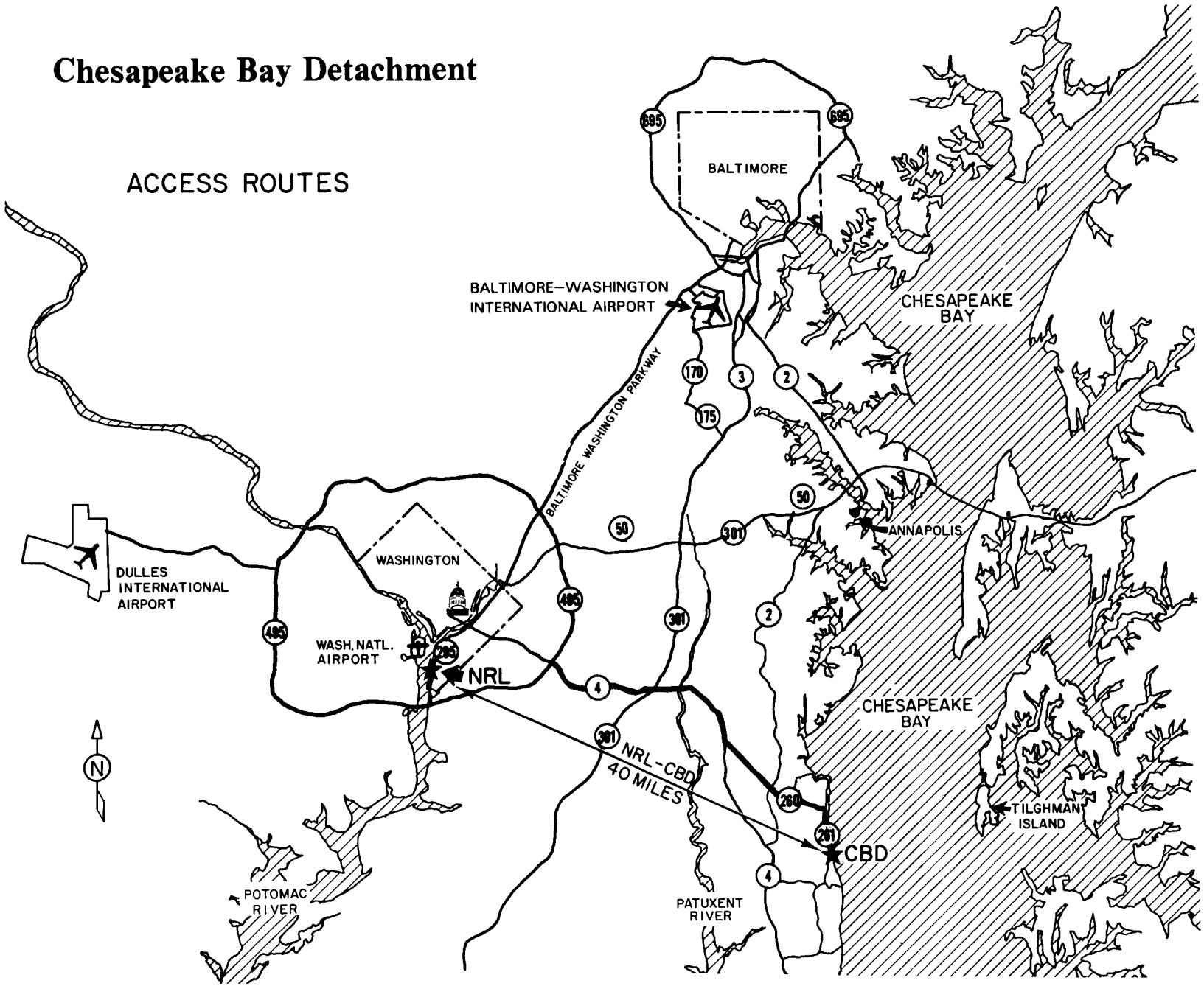
Location of Field Stations in Washington, D.C. Area



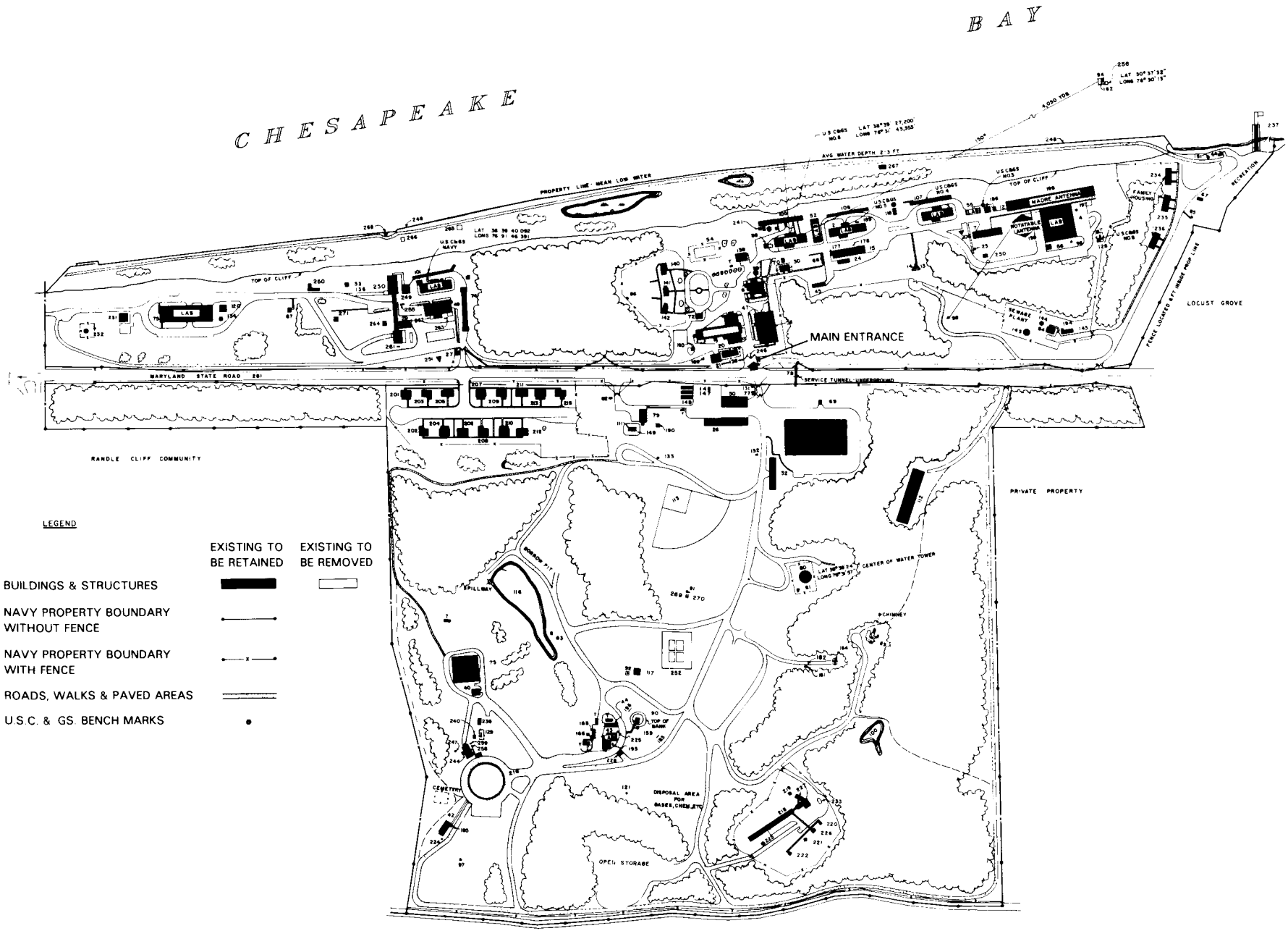
Approximate driving distance from NRL (in miles)

A — Blossom Pt., MD	40	E — Patuxent River Naval Station	64
B — Brandywine, MD	23	F — Pomonkey, MD	25
C — CBD (Chesapeake Bay Detachment)	40	G — Tilghman Island	110
D — Maryland Point Observatory	45	H — Waldorf Radio Site, MD	20

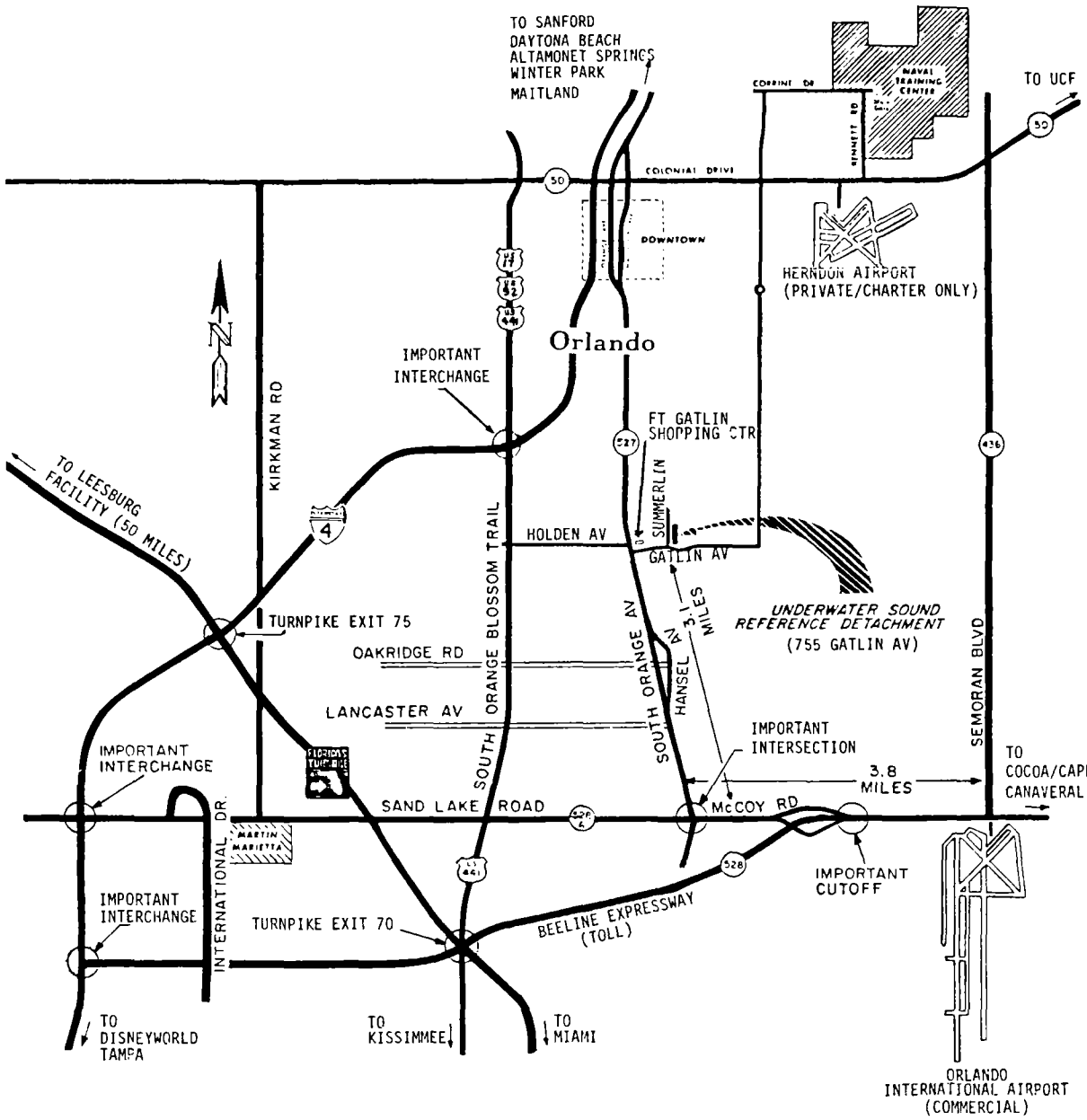
Chesapeake Bay Detachment



Location of Buildings at Chesapeake Bay Detachment



Underwater Sound Reference Detachment (Orlando, Florida)



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The cooperation and able assistance of the staffs of the Computerized Technical Composition Section, the Graphic Design Branch, and the Systems/Photographic Branch are acknowledged and appreciated.

Introduction to the Naval Research Laboratory

Executive Directorate

Technical Services Directorate

General Science and Technology Directorate

Warfare Systems and Sensors Research Directorate

Material Science and Component Technology Directorate

Naval Center for Space Technology

Professional Development

General Information