



FACT BOOK



JULY 1976

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NAVAL RESEARCH LABORATORY
Washington, D.C. 20375

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This document has been prepared as
a reference source of factual information
about the Naval Research Laboratory.

July 1976

The Naval Research Laboratory has a continuing need for physical scientists, mathematicians, engineers, and supporting personnel. Vacancies are filled without regard to race, creed, color, sex, or national origin. Information concerning current vacancies will be gladly furnished upon request. Address all such inquiries to the Personnel Office (Code 1800), Naval Research Laboratory, Washington, D.C. 20375.

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Aerial view of the Naval Research Laboratory main site

The Naval Research Laboratory

MISSION

To conduct a broadly based multidiscipline 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:

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

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

(c) Within areas of technological expertise, develops prototype systems applicable to specific projects.

(d) Performs scientific research 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.

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

(f) Provides to the Navy and its contractors standardized techniques and procedures for measurements and the accurate calibration of standard instruments in areas of special Navy needs.

(g) 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.

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

THE NAVY'S CORPORATE LABORATORY

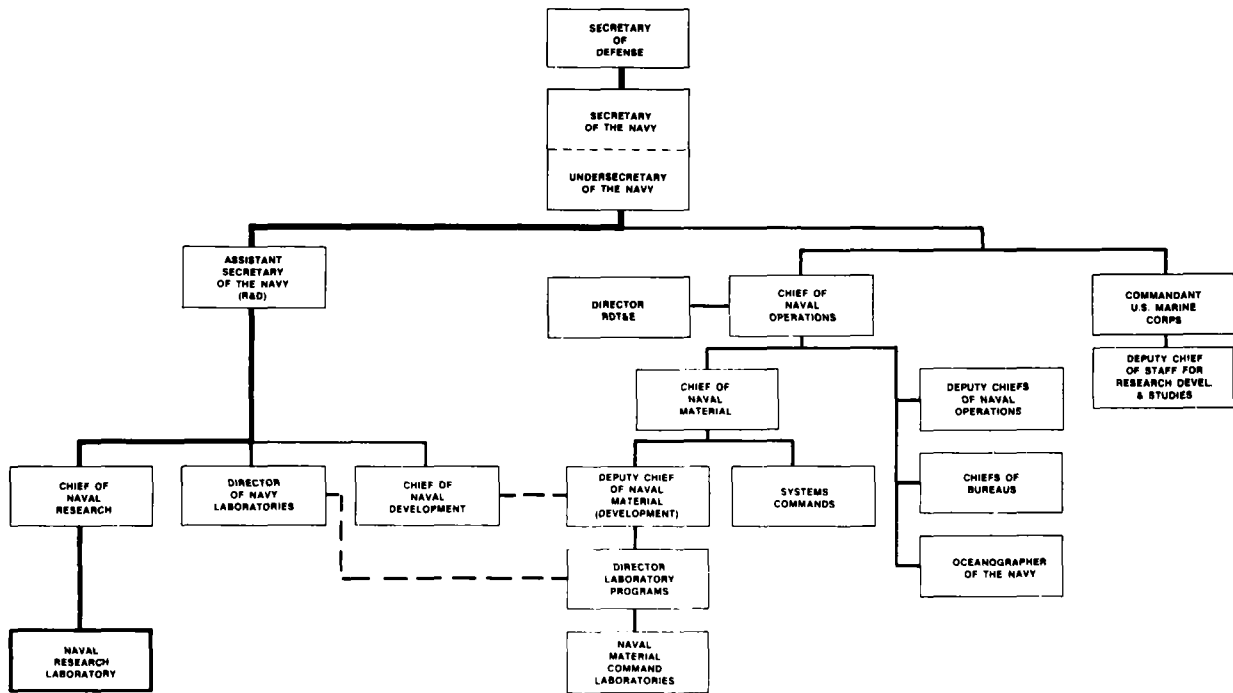
The Naval Research Laboratory is one of the principal in-house research and development institutions of the U.S. Government. It was established in 1923 to ensure that advancements in science and engineering could be readily applied to the Navy's needs. Directed always toward this end, the NRL research program has developed to its present status as a broadly based and coordinated effort in the physical, mathematical, and environmental sciences, in advanced engineering, and in naval analysis. The work of the Laboratory is conducted at the main establishment in the District of Columbia and at various field sites that provide unique environment and facilities not available at the main site.

Some principal elements of the research program include fundamental and applied work in radio wave propagation, oceanography, deep-sea instrumentation, submarine air purification, structural design theory, fracture mechanics, surface chemistry, optical physics, radar, underwater sound propagation, acoustic signal processing, sonar transducers, nuclear physics, radio astronomy, high-temperature lubricant, high-energy fuels, plasma physics, refractory metals, exotic materials for high-performance structures, x-ray astronomy, high-power lasers, solid-state physics, and stress-corrosion cracking of high-strength titanium steels and aluminum alloys.

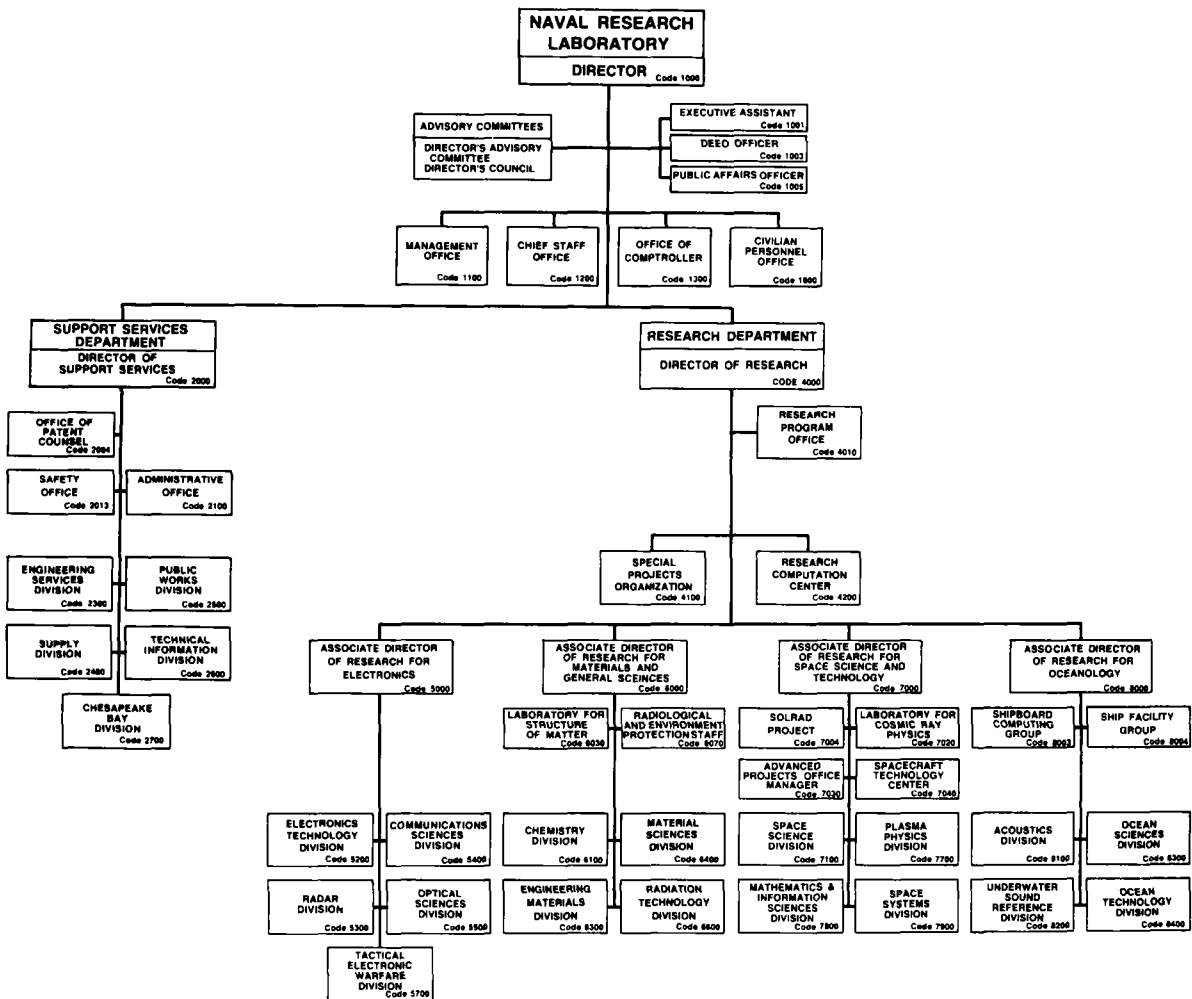
About 1,196 scientific and technical papers were produced in 1975 as a consequence of the research and development effort of the Laboratory staff. The figure includes 116 formal reports, 219 memorandum reports, about 491 articles published in professional society journals, and over 400 papers presented at scientific and technical meetings in the United States and in foreign countries.

In addition, 64 U.S. patents were issued in 1975 on inventions made by present and former employees of the Naval Research Laboratory. This figure brings the grand total of NRL patents, through the calendar year 1975, to 2,523.

In its investigations of broad scientific areas, in considering its findings for potential military applications, and in furnishing to the Naval Systems Commands and Secretariat expert consultative services relating to science and military systems, NRL functions as the corporate laboratory of the Navy. When NRL findings and capabilities have borne fruit in particular areas, the results are made known to and used by not only the Navy but also the Army, the Air Force, the Defense Advanced Research Projects Agency, the Atomic Energy Commission, and other agencies of the government.



Position of NRL in the Department of Defense structure



Organization chart of NRL

MILITARY AND CIVILIAN PERSONNEL

Military Personnel Attached to NRL as of April 1, 1976

<u>Officers</u>	<u>Authorized</u>	<u>On Board</u>
Captain	4	4
Commander	8	8
Lieutenant Commander	9	9
Lieutenant	7	9
Lieutenant (Junior Grade)	1	1
Ensign	0	0
Warrant Officer	<u>3</u>	<u>3</u>
Total	32	34
<i>Enlisted</i>	101	80

Civilian Employees on Rolls as of March 31, 1976

10 USC 1581 (formerly Public Law 313)		21
Classification Act (GS)		2807
Scientific and Professional	1427	
Technical Supporting	712	
General Administrative & Clerical	668	
Wage Board		762
General Wage Service (WG)	615	
Apprentices (WB)	44	
Printing & Lithographic Service (WI)	19	
Supervisory General Wage Service (WS)	58	
Supervisory, Planners & Estimators (WN)	2	
Planners, Estimators, etc.	22	
Leaders (WL)	2	
Total		3590

Annual Civilian Turnover Rate (percent)

	<u>1972*</u>	<u>1973*</u>	<u>1974</u>	<u>1975</u>
Research Department	7.8	7.5	5.9	5.9
Nonresearch Areas	9.6	12.0	11.3	10.2
Entire Laboratory	8.5	9.4	8.2	7.8

*Cost-of-living pension increases influenced the number of retirees

Highest Academic Degrees Held by Permanent Employees
(as of March 31, 1976)

Bachelors	637
Masters	376
Doctorates	510

FISCAL INFORMATION

NRL FUNDING BY MAJOR SPONSOR FISCAL YEARS 1975 and 1976

Sponsor	FY 1975		FY 1976	
	Millions of Dollars	Percent	Millions of Dollars	Percent
R&D PROGRAM				
ONR	32.6	18.4	39.4	22.4
SEA	13.6	7.7	13.3	7.5
ELEX	66.2	37.3	69.4	39.4
AIR	17.3	9.7	13.3	7.5
OTHER NAVY	16.4	9.2	14.6	8.3
TOTAL NAVY	146.1	82.3	150.0	85.1
OTHER DOD	16.1	9.1	10.5	6.0
NON-DOD	10.5	5.9	10.5	6.0
TOTAL R&D	172.7	97.3	171.0	97.1
NON R&D	3.6	2.0	4.0	2.3
CAPITAL IMPROVEMENT	1.3	.7	1.1	.6
TOTAL FUNDS	177.6	100.0	176.1	100.0

EXPENDITURES (Excluding Plant Account Funds) FY 1974-1975

Purpose	During FY 1975	During FY 1976
Materials, supplies and parts	\$ 16,400,000	\$ 16,900,000
Salaries and wages	81,100,000	82,800,000
Contractural services and other costs	78,800,000	75,300,000
TOTAL	\$176,300,000	\$175,000,000

CAPITAL PROPERTY

	As of Feb 1976
Class 1 (Land)	\$ 356,656
Class 2 (Buildings and improvements)	82,228,671
Class 3 (Equipment over 1.0K)	15,011,653
Class 4 (Industrial production equipment)	18,459,645
TOTAL CAPITAL PROPERTY	\$116,056,625

Office of the Director

The Director of the Naval Research Laboratory is a Navy Captain with appropriate educational background and experience. He is responsible for the overall operation and management of the Laboratory and its programs, and he executes the usual functions of command of a naval shore activity. The Directors of the Laboratory's two Departments, Research and Support Services, report to the Director. In carrying out the functions of his office, the Director is assisted by the Chief Staff Officer, the Comptroller, the Director of Civilian Personnel, an Executive Assistant, an EEO Coordinator, and a Public Affairs Officer.

Director, Naval Research Laboratory



Captain L. M. Noel

CAPTAIN L.M. NOEL [REDACTED] [REDACTED] [REDACTED] He attended Cornell University in Ithaca, New York, before entering the U.S. Naval Academy in 1945. He was graduated and commissioned an Ensign in June 1949.

CAPTAIN NOEL began graduate education in electronics at the U.S. Naval Postgraduate School at Monterey, California, but then shifted to an applied science program under ONR sponsorship at Princeton University, Princeton, N.J., where he received an M.A. Degree in mathematical statistics in 1956.

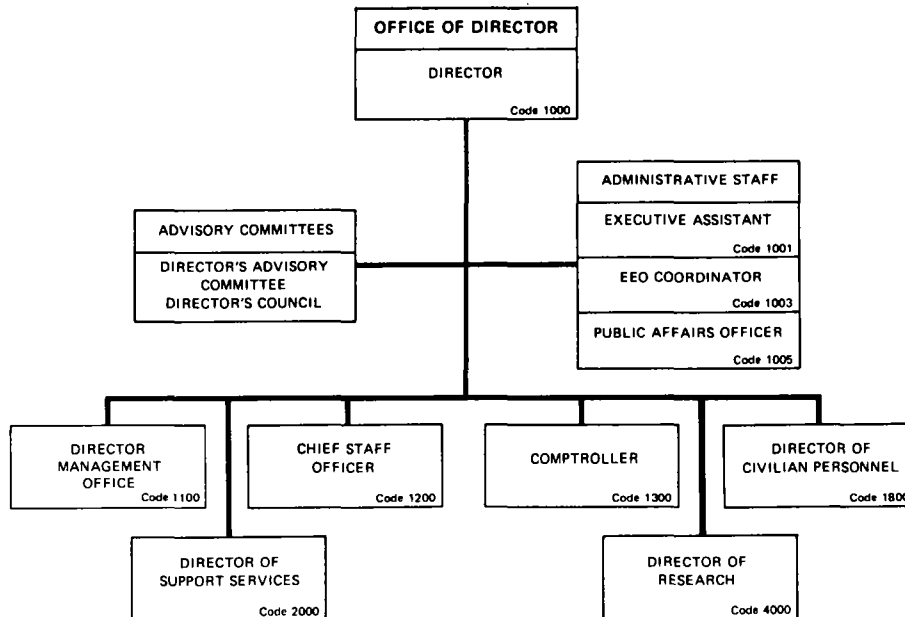
He has served in various shipboard assignments on carriers and minesweepers including duty in Korean waters during the Korean War. In 1958, CAPTAIN NOEL was designated for engineering duty and assigned to the Mare Island Naval Shipyard as Fleet Ballistic Missile (FBM) Project Officer in the construction of USS THEODORE ROOSEVELT (SSBN-6000) and USS ANDREW JACKSON (SSBN-619). Additional assignments in the FBM program included: Design Project Officer for SSBN-616 and 640 Classes at Supervisor of Shipbuilding, Groton, Conn. (1961-1965), and Senior Special Projects Representative at Cammell-Laird's Shipyard, Birkenhead, England (1965-1968) in connection with installation and test of POLARIS Weapon System on British FBM submarines HMS RENOWN (SSBN-02) and HMS REVENGE (SSBN-04).

In 1968, CAPTAIN NOEL reported to the Strategic Systems Project Office as Deputy Technical Director. In this capacity, he served during development and deployment of the POSEIDON Weapon System and development of the TRIDENT Weapon System.

CAPTAIN NOEL is a member of the Institute of Mathematical Statistics, Tau Beta Pi, and Eta Kappa Nu, and an associate member of Sigma Xi. For his work with the POSEIDON Fleet Ballistic Missile Program he was awarded the Meritorious Service Medal.

CAPTAIN NOEL is married to the former Sally Gibson of Ithaca, N.Y. The Noels have four children. They are Lionel, Jr., Dorothy, Andrew and David, and reside at 6728 Montour Drive, Falls Church, Va.

OFFICE OF THE DIRECTOR



Key Personnel

<u>Name</u>	<u>Title</u>	<u>Code</u>
CAPT L.M. Noel, USN	Director	1000
Mr. S.L. Cohen	Executive Assistant	1001
Mr. W.H. Webster	DEEO Officer	1003
Mr. J.E. Sullivan	Public Affairs Officer	1005
Mr. A.M. Toscano	Director, Management Office	1100
CAPT E.L. Ebbert, USN	Chief Staff Officer	1200
Mr. P.F. Kennedy	Comptroller	1300
Mr. F.D. Wallace	Director of Civilian Personnel	1800
CAPT K.P. Hughes, USN	Director of Support Services	2000
Dr. A. Berman	Director of Research	4000

EXECUTIVE ASSISTANT

Basic Responsibilities

The Executive Assistant provides the Director with executive level staff and managerial support in connection with the duties, interests, and activities of the Director.



Mr. S. L. Cohen

DEPUTY EQUAL EMPLOYMENT OPPORTUNITY OFFICER

Basic Responsibilities

The Deputy Equal Employment Opportunity Officer serves as an advisor to the Director on EEO matters; conducts surveys and studies relating to NRL's Affirmative Action Plan and recommends methods for achieving its goals of a fully integrated work force; acts as ex officio member of the EEO Committee; and assists the EEO counselors in settling initial complaints of alleged discrimination.

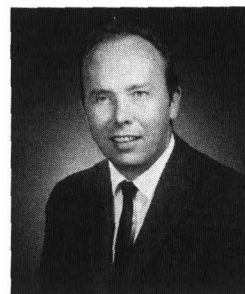


Mr. W. H. Webster

PUBLIC AFFAIRS OFFICER

Basic Responsibilities

The Public Affairs Officer advises the Director and staff on all matters concerning public information, and he supervises the Laboratory's public affairs programs.



Mr. J. E. Sullivan

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MANAGEMENT OFFICE

Basic Responsibilities

The Management Office provides to the Director, Director of Research, Director of Support Services, and all other managers, analysis and advice on concepts, systems, procedures, and techniques that improve the way broad management functions are carried out at the Laboratory. The Office is further responsible for (1) interpreting directives from higher authorities and preparing documentation or recommending appropriate action for responses, (2) ensuring that Laboratory directives are consistent with the policies of NRL and higher authorities, and that they are written to convey the meanings intended, and (3) conducting programs such as Cost Reduction, Space Management, and Commercial/ Industrial Activities.

Key Personnel

<u>Name</u>	<u>Title</u>
Mr. A.M. Toscano	Director, Management Office



Mr. A. M. Toscano

Personnel Complement

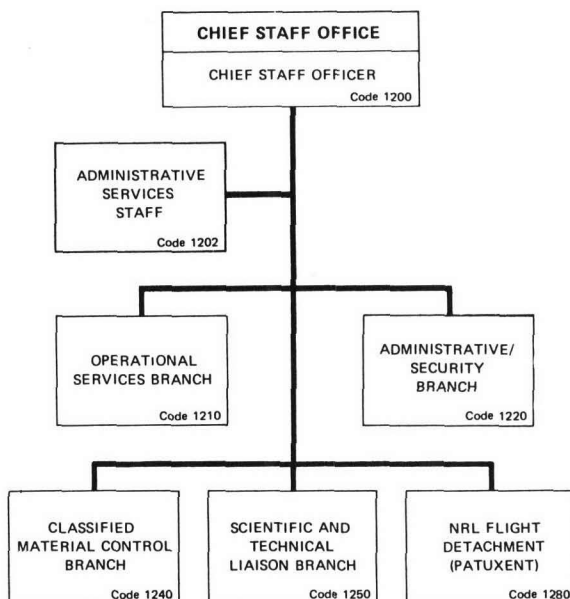
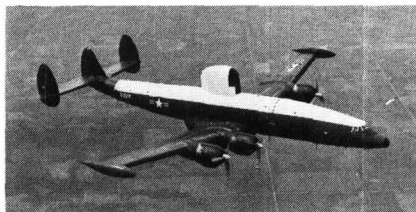
On Board: 10



CAPT E. L. Ebbert, USN

Chief Staff Office

- OPERATIONAL SERVICES
- SECURITY
- CLASSIFIED MATERIAL CONTROL
- SCIENTIFIC AND TECHNICAL LIAISON



Basic Responsibilities

The Chief Staff Officer provides a military staff to the Director, Naval Research Laboratory, for the purpose of assisting the Director in the military aspects of the management of the Laboratory. He conducts liaison with DOD and Navy Commands and activities and the operating forces of the Navy in support of NRL research and development operations and the coordination of the military application of the scientific work of the Laboratory. The staff supports four multi-engine Laboratory aircraft and obtains and coordinates such additional air, surface, and subsurface services as are required. The Military Staff is also responsible for personnel and plant security, communications, and control of classified material.

Key Personnel

<u>Name</u>	<u>Title</u>
CAPT E.L. Ebbert, USN	Chief Staff Officer
Mr. J.R. Gallagher	Administrative Officer
LT M.A. Pica, USN	Communications/Military Personnel Officer
CDR S.E. Kish, USN	Operational Services Officer
LCDR R.S. Kalinowski	Administrative/Security Officer
Mr. W.C. Bryan	Head, Special Activities Office
Mr. R.E. Abercrombie	Head, Security Section
Mr. H.W. Ottenstroer*	Classified Material Control Officer
CDR W. Glickman, USN	Scientific and Technical Liaison Officer
CDR R.F. Carlson, USN	OIC, NRL Flight Detachment (Patuxent)

Personnel Complement

On Board: 146

(83 Civilian, 63 Military)

*Acting _____



Mr. P. F. Kennedy

Office of the Comptroller



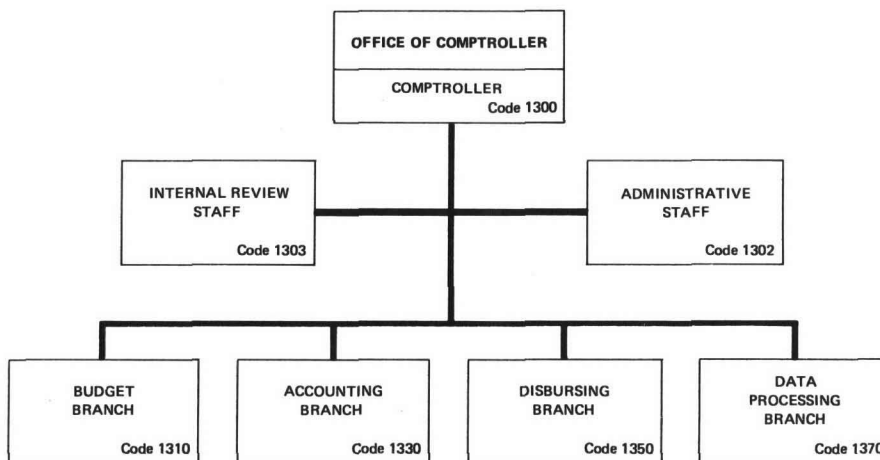
INTERNAL
REVIEW

BUDGET OFFICE



COMPUTER

- BUDGET
- ACCOUNTING
- DISBURSING
- DATA PROCESSING



Basic Responsibilities

The Comptroller is the financial adviser to the Director and other officials of the Laboratory. He administers the financial program of the Laboratory.

Key Personnel

<u>Name</u>	<u>Title</u>
Mr. P.F. Kennedy	Comptroller
Mrs. L.M. Boehlert	Administrative Officer
Mr. D.M. Johnson	Budget Officer
Mr. E.S. York	Accounting Officer
Mr. A.E. Thomas	Disbursing Officer
Mr. R.L. Guest	Data Processing Officer
Mr. R.A. Showman	Head, Internal Review Staff

Personnel Complement

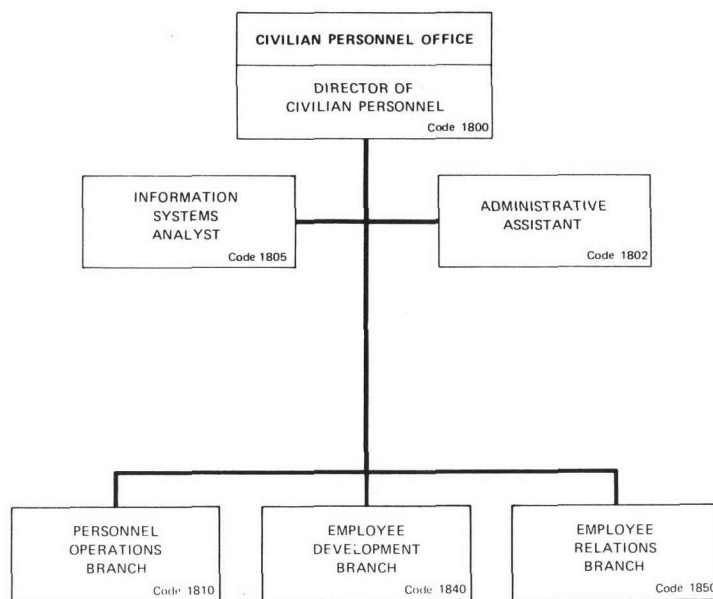
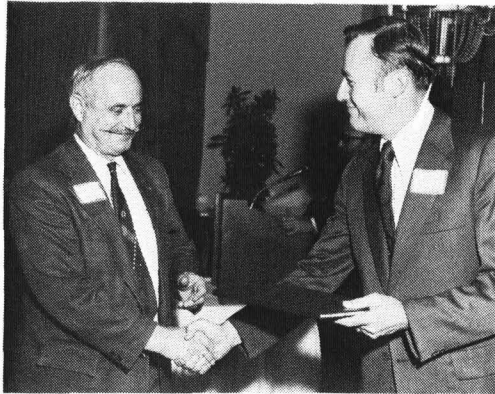
On Board: 93



Mr. F. D. Wallace

Civilian Personnel Office

- PERSONNEL OPERATIONS
- WAGE AND CLASSIFICATION
- EMPLOYEE DEVELOPMENT
- EMPLOYEE RELATIONS



Basic Responsibilities

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

Key Personnel

<u>Name</u>	<u>Title</u>
Mr. F.D. Wallace	Director of Civilian Personnel
Mrs. J. Gandy	Administrative Assistant
Mrs. E.W. Sutton	Information Systems Analyst
Mr. D.J. Blome	Head, Personnel Operations Branch
Dr. O.J. Doty	Head, Employee Development Branch
Mr. H.H. Kay	Head, Employee Relations Branch

Personnel Complement

On Board: 46

The Research Department

The Research Department is headed by a civilian Director of Research who reports to the Director of NRL. The Department is comprised of four organizational areas of research - Electronics, Materials and General Sciences, Space Science and Technology, and Oceanology - each of which is headed by an Associate Director of Research. Encompassed by these four broad areas of research, which correspond to the principal areas of the Navy's interest in the physical and engineering sciences, are 17 divisions and additional special groups. Each division is headed by a civilian scientist and is comprised of an average of about 110 scientific, technical, and administrative personnel. The special groups average about 13 persons each. Three of the special groups (Laboratory for the Structure of Matter, Laboratory for Chemical Physics, and Laboratory for Cosmic Ray Physics) are headed by Chief Scientists who occupy corresponding "Chairs of Science."

The Director of Research is the Chief Scientist for the Laboratory; in this capacity he is responsible for:

the conduct and effectiveness of the research program with direct authority and accountability for the technical work.

long range and broad overall planning and programming.

evaluating and accepting, modifying, or rejecting R&D proposals from NRL'S scientific divisions; and for evaluating and recommending to the Director of NRL the acceptance or rejection of new problems from other activities.

Research Department administration and the budgeting of funds.

hiring, promoting, and effecting other personnel actions for Research Department Personnel.

The Director of Research keeps the Director of Support Services informed at all times of the service needs of the scientific divisions and of any obstacles which may be impeding technical work of the Laboratory; he advises the Comptroller relative to requirements and control of funds; he also is encouraged to advise the Chief of Naval Research directly of the progress of the research program and of the overall climate for research at the Laboratory.

Director of Research



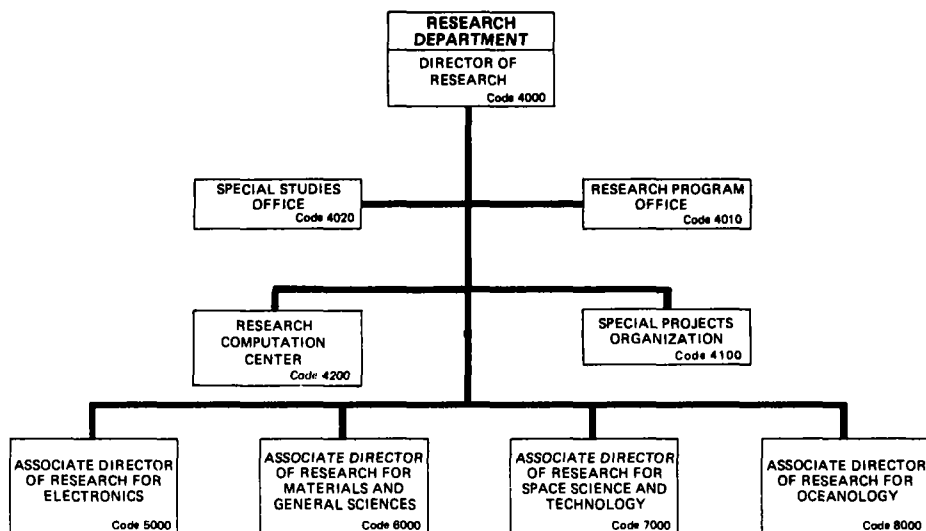
Dr. Alan Berman

Dr. Berman [REDACTED] [REDACTED] [REDACTED] He received the A.B. degree in physics from Columbia College in 1947 and the Ph.D. degree in physics from Columbia University in 1952.

From 1952 to 1955 he was a research scientist at the Hudson Laboratories of Columbia University. He became Assistant Director of Hudson Laboratories in 1955, Associate Director in 1957, and Director in 1963. On May 29, 1967, Dr. Berman became Director of Research for the Naval Research Laboratory.

Dr. Berman's research specialties include the areas of underwater acoustics, oceanography, and signal processing. He has published numerous papers on these and related subjects. At present he is a member of a wide variety of Navy advisory groups. He also provides advisory services for a number of Department of Defense and other Government agencies.

Dr. Berman has on three occasions been visiting scientist to the Admiralty Research Laboratory, Teddington, England (1955, 1957, and 1960), and once at the SACLANC ASW Research Center, La Spezia, Italy (1960).



Key Personnel

<u>Name</u>	<u>Title</u>	<u>Code</u>
Dr. A. Berman	Director of Research	4000
Miss S.G. O'Riordan	Administrative Assistant	4002
Mr. A.J. Hollings	Head, Research Program Office	4010
Mr. R.E. Ellis	Head, Special Projects Organization	4100
Mr. A.B. Bligh	Head, Research Computation Center	4200
Dr. H.Q. North	Associate Director of Research for Electronics	5000
Dr. A.I. Schindler	Associate Director of Research for Materials and General Sciences	6000
Dr. H. Rabin	Associate Director of Research for Space Science and Technology	7000
Mr. R.R. Rojas*	Associate Director of Research for Oceanology	8000

*Acting

RESEARCH PROGRAM OFFICE

Basic Responsibilities

The Research Program Office serves as staff to the research directorate of the Laboratory. It provides an orderly plan for coordinating NRL research programs with those of ONR and other sponsors or potential sponsors throughout the Departments of the Navy, the Army, and the Air Force, the Defense Advanced Research Projects Agency, and other agencies of the government. It also serves as a focal point for program information, for project managers, and other key personnel of sponsoring activities on work in progress or in various stages of planning. The Research Program Office maintains a management information center which serves as a working tool for the Laboratory directorate, and it maintains appropriate records of the Laboratory's research programs.

Key Personnel

<u>Name</u>	<u>Title</u>
Mr. A.J. Hollings	Head, Research Program Office
Mr. R.C. Spragg	Head, Management Information Center Section
Mr. R. Donley	Head, Short-Range Program Planning and Appraisal Section
Mr. N. Moglen	Staff Assistant -- ADP



Mr. A. J. Hollings

FTP Complement

SPECIAL PROJECTS ORGANIZATION

Basic Responsibilities

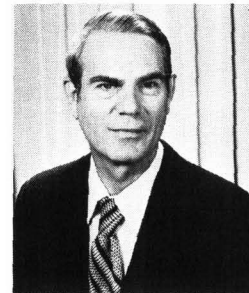
The primary function of the Special Projects Organization is to provide technical support to the Director of Research. This support falls into approximately four general categories. One of these is an individual or small group conducting a special theoretical analysis or study, usually on a short duration basis, that is assigned by the Director of Research. Another category of support is project responsibility for work that does not logically fall within the area of responsibility of one of the Line Divisions. A third category of support involves project responsibility for programs that involve the coordinated efforts of a member of NRL Line Divisions or Branches. The last broad category involves new project starts. This concerns projects which are not currently on-going in the Laboratory but those which management feels may have future potential.

In addition, the Special Projects Organization serves as a facility and basic staff to conduct special highly classified projects.

Key Personnel

<u>Name</u>	<u>Title</u>
Mr. R.E. Ellis	Head, Special Projects Organization
Dr. A.H. Aitken	Associate Head, Special Projects Org.
Mrs. B.A. Maag	Administrative Officer
Dr. P.B. Richards	Fleet Medical Support Project Staff
Mr. E.L. Brancato	Consultant Staff
Dr. S. Teitler	Advanced Concepts Staff
Dr. A.H. Aitken	Laser CM/CCM Program Office
Dr. J.M. MacCallum	EOTPO Head
Dr. H.W. Gandy	Liaison Representative to MAT 03
Mr. D.F. Hemenway	Technology Evaluation
Mr. C.L. Tipton	Special Applications
Mrs. E.E. Wald	Software Systems Development

FTP Complement



Mr. R. E. Ellis

RESEARCH COMPUTATION CENTER

Basic Responsibilities

The Research Computation Center (RCC) provides for the operation and maintenance of the Laboratory's central computer facilities for the benefit of all Divisions of the Laboratory; develops and maintains equipment for data collection purposes and for converting field-collected data to a form suitable for efficient processing; provides system software support services for its computers; and provides a variety of user support and applications programming services. The RCC also provides appropriate ADP technical logistic support services for NRL; identifies ADP requirements and secures and administers contractual ADP support services; and supports the NRL Computation Committee and the Navy Laboratories Computing Committee. The Head of the RCC provides the principal support to the Director of Research in ADP management and planning and is, by additional duty assignment, the ONR Special Assistant for ADP Coordination.

Key Personnel

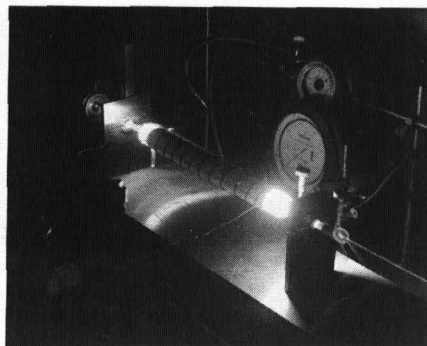
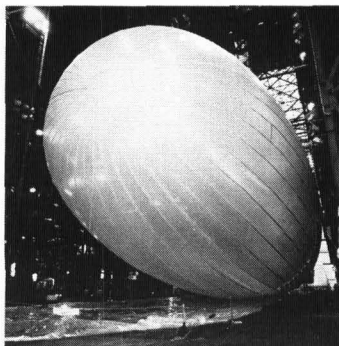
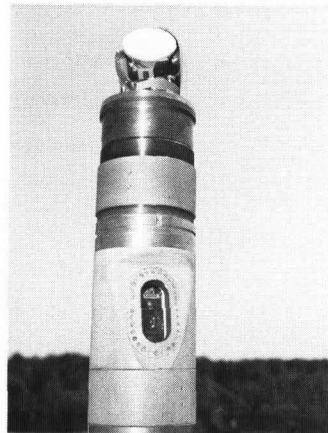
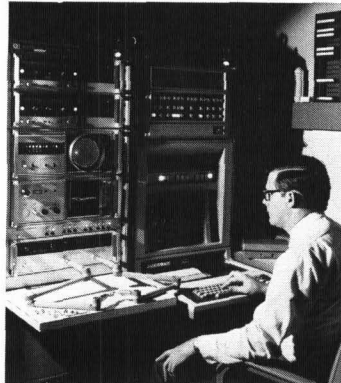
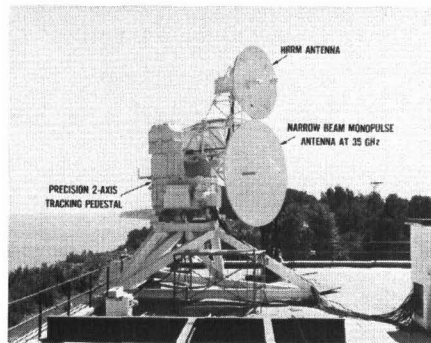
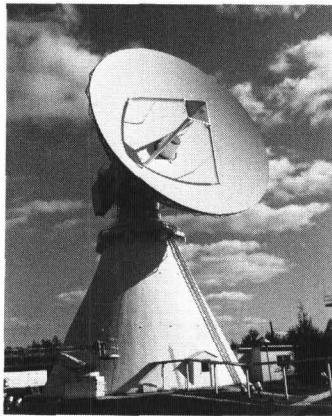
<u>Name</u>	<u>Title</u>
Mr. A.B. Bligh	Research Computation Center
Mrs. D.E. Gossett	Deputy Head
Mrs. L.L. Lewis	Administrative Officer
Mr. J.B. Smith	External Relations Staff
Mr. E.L. Aiken	Timesharing Comp Group
	DEC PDP-10 Computer Operator
Mr. I.J. Levy	Operations and Engineering
	CDC 3800 Work Control Center
	ASC Work Control Center
Mr. G.J. Flenner	Software Systems and Support
	CDC 3800 Programming Consultant
	ASC Programming Consultant



Mr. A. B. Bligh

Electronics Area

The Navy's operational effectiveness depends greatly on its ability to make optimum use of the electromagnetic spectrum ranging from the very low to the extremely high frequencies. Accordingly, most of this Area's work is directed toward extending both the knowledge and the technological applications of the electromagnetic spectrum. The effort includes investigation of electronic devices, the phenomenology and advanced instrumentation associated with radio communications, radar, and related sensors, and digital computation and information-processing. NRL also serves as the lead laboratory for the Navy's exploratory development program in electronic warfare.



Associate Director of Research for Electronics



Dr. Harper Q. North

Dr. North [REDACTED] [REDACTED] [REDACTED] He graduated from the California Institute of Technology in 1938 with a B.S. degree in science. He obtained his M.A. and Ph.D., both in physics, from the University of California at Los Angeles, in 1940 and 1947, respectively. He completed the University of California at Los Angeles Executive Program in Business Management in 1958.

Dr. North joined the Research Department of NRL as the Associate Director of Research for Electronics on 17 March 1975. He came to NRL from the Northrop Corporation where, since 1973, he had been the Consultant to the Division General Manager. From 1969 to 1973, as Head of the Electro Optical Department of Northrop, he was responsible for developing a family of digitally addressed, flat cathode-ray tubes for military applications.

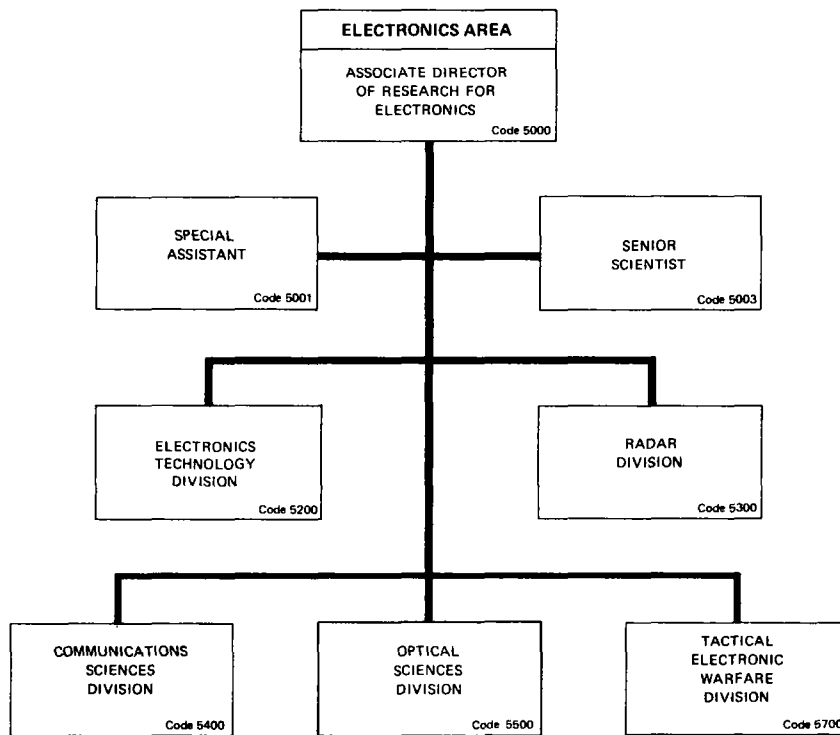
From 1962 to 1969 Dr. North was Corporate Vice President, Research and Development, for TRW, Inc. In 1954 he founded Pacific Semi-Conductors, Inc. (now the TRW Semi-Conductor Division) and was the Company's President from 1954 to 1962.

From 1949 to 1954, he was Director of the Semi-Conductor Division of the Hughes Aircraft Company, and he holds patents on the familiar miniature glass diode which has been manufactured throughout the world.

From 1940 to 1949, Dr. North worked as a Research Associate in the General Electric Research Laboratory, where he was involved in various research and development projects, including the development of radar mixer crystals, and the discovery of the "varactor diode" principle in germanium.

Dr. North served for 2 years as Chairman of the Board of Governors of the Electronic Industries Association, and he received the Organization's Medal of Honor in 1966. He has written numerous articles and papers on a variety of technical subjects, technological forecasting, and management. He also holds a number of patents.

Dr. North is a Fellow of the Institute of Electrical and Electronic Engineers and a Fellow of the American Physical Society. He served for several years as Chairman of the Advisory Group on Electron Devices, Office of the Department of Defense, Research and Engineering.



Key Personnel

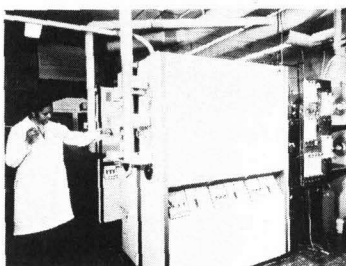
<u><i>Name</i></u>	<u><i>Title</i></u>
Dr. H.Q. North	Associate Director of Research for Electronics
Mr. E.M. Man	Special Assistant
Dr. L.B. Wetzel	Senior Scientist
Mr. H. Bress	Consultant
Mr. A. Brodzinsky	Superintendent, Electronics Technology Division
Dr. M.I. Skolnik	Superintendent, Radar Division
Dr. B. Wald	Superintendent, Communications Science Division
Dr. T.A. Jacobs	Superintendent, Optical Sciences Division
Mr. L.A. Cosby	Superintendent, Tactical Electronic Warfare Division



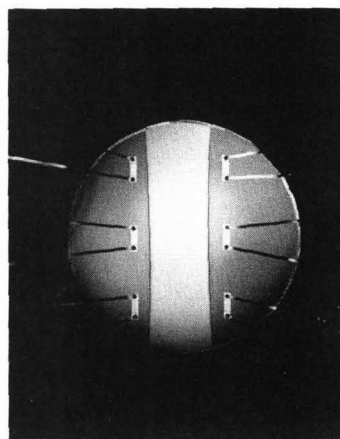
Electronics Technology Division

Mr. A. Brodzinsky

- SOLID STATE DEVICES
- ELECTRON PHYSICS
- ELECTRONIC MATERIAL TECHNOLOGY
- SURFACE PHYSICS
- MICROWAVE TECHNIQUES
- MICROELECTRONICS

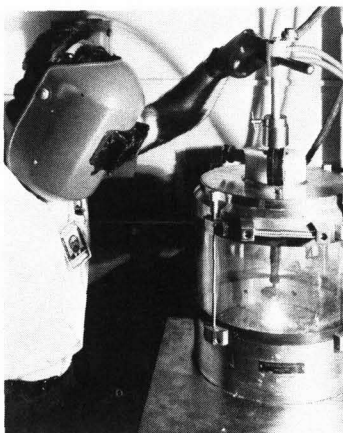
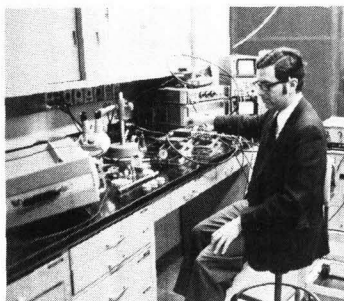


FABRICATION OF SOLID STATE DEVICES

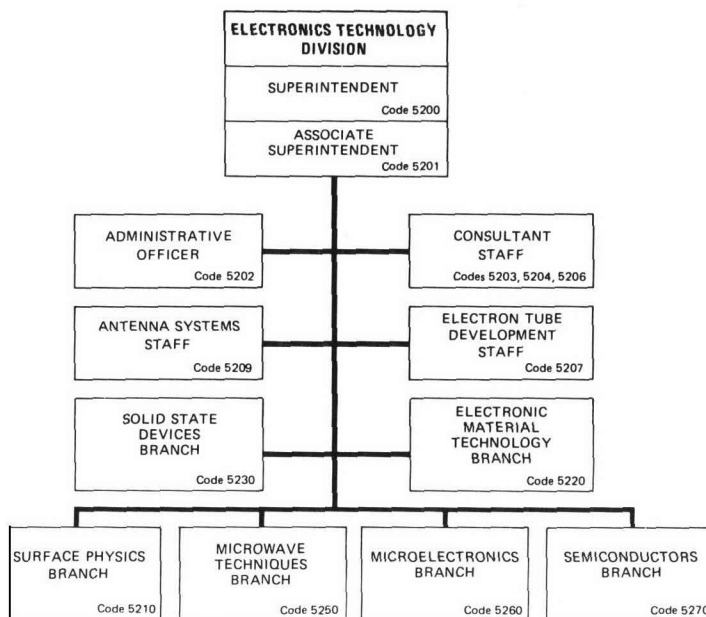


SURFACE ACOUSTIC WAVE DELAY LINES FABRICATED ON SILICON WAFER WITH THE USE OF ZINC OXIDE LAYERS

MICROWAVE DEVICES AND CIRCUITS



ARC PLASMA GROWTH OF MAGNETIC CRYSTALS



Basic Responsibilities

The Electronics Technology Division carries out programs of basic and applied research and development in the fields of electronic properties of solid materials, materials development, surface physics, microwave techniques, microelectronic devices research and fabrication, high power microwave generation, and basic research in electronic materials, especially semiconductors. The activities of the Division couples device research both to basic materials investigations and to systems research and development needs.

Branches

Solid State Devices

Ion Implantation Technology
High and low power devices for energy conversion
Bi-polar device reliability and failure analysis
MIS failure physics; radiation vulnerability and hardening

Electronic Material Technology

Preparation and development of magnetic dielectric, optic, and semiconductor materials
Optical components and coatings, glass blowing, and microwave tube assembly

Surface Physics

Thermionic Energy Conversion
Electron Emitter Research and Fabrication
Bonding and Adhesion Studies
Microwave Tube and Solid State Device Reliability
Growth of Thin Films and Passivating Layers
Surface, Junction and Interface Research

Microwave Techniques

Surface Acoustic Waves
Microwave Integrated Circuits
Surface Magnetostatic Waves
Microwave Solid State Sources
Microwave Modules and Subsystems
Microwave Ferrimagnetic Components
Millimeter Wave Device Research

Microelectronics

Silicon service processing
CCD Technology and Applications
MIS Reliability
Infrared CID Technology
III-V Semiconductor Device Development

Semiconductors

Solid State Theory
Electrical and Optical Characterization of Materials
Impurity and Defect Studies
Structural and Electronic Properties of Amorphous Semiconductors
Optical and Magneto-optical Studies of Surfaces and Interfaces

Key Personnel

<u>Name</u>	<u>Title</u>
Mr. A. Brodzinsky	Superintendent
Dr. John E. Davey*	Associate Superintendent
Mrs. Mary H. Grimes	Administrative Officer
Mr. L.M. Winslow	Consultant
Mr. N. Vanderplaats	Head, Electron Tube Development Staff
Dr. J. E. Davey	Head, Solid State Devices Branch
Mr. H. Lessoff	Head, Electronic Material Technology Branch
Dr. R.F. Greene	Head, Surface Physics Branch
Dr. L.R. Whicker	Head, Microwave Techniques Branch
Dr. D.F. Barbe	Head, Microelectronics Branch
Dr. B.D. McCombe	Head, Semiconductors Branch

Personnel Complement: 119

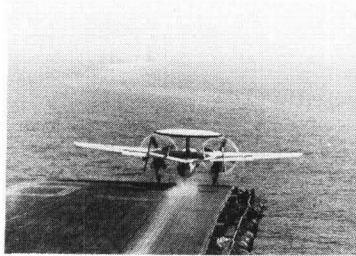
Fiscal Year 1976: \$7,314,000



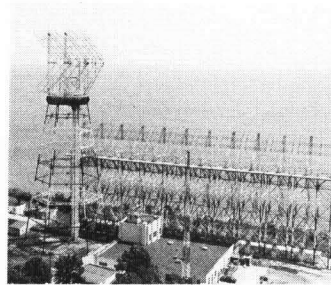
Dr. M. I. Skolnik

Radar Division

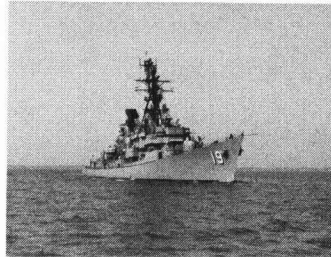
*AIRBORNE EARLY WARNING RADAR
SYNTHETIC APERTURE RADAR*



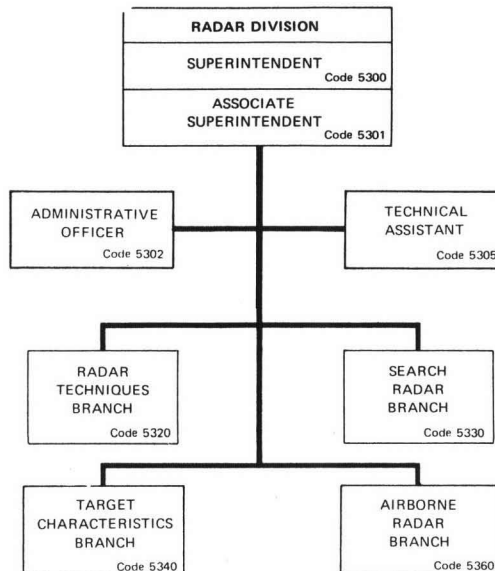
*OVER THE HORIZON RADAR
"MADRE"*



*SHIPBOARD SURVEILLANCE
AND WEAPON CONTROL RADAR*



AIRBORNE-INTERCEPTOR RADAR



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 which are applicable to enhancing the Navy's ability to fulfill its mission.

Radar Techniques Branch

High-frequency radar
Signal processing
Ionospheric Radio wave
transmission

Search Radar Branch

Shipboard and range
instrumentation radar
Phased array techniques
Precision tracking techniques
Low probability of intercept
radar

Radar Analysis Staff

Automatic detection and
tracking
Radar systems simulations

Target Characteristics Branch

Adaptive signal processing
Systems development
Shipboard radar concepts
Target signature analysis
Radar counter-countermeasures

Airborne Radar Branch

Airborne radar
Airborne early warning radar
Moving target indication
Synthetic aperture radar (SAR)

Systems Analysis Staff

Airborne weapon systems
simulation
Anti-air weapons countermeasures
Air combat research

Microwave and Electromechanical Research Staff

Microwave antenna research
Electromechanical design

Key Personnel

<u>Name</u>	<u>Title</u>
Dr. M.I. Skolnik	Superintendent
Mrs. A.G. Dunn	Administrative Officer
Mr. J.M. Headrick	Head, Radar Techniques Branch
Mr. S.K. Meads*	Head, Search Radar Branch
Mr. I.D. Olin	Head, Target Characteristics Branch
Mr. D.L. Ringwalt	Head, Airborne Radar Branch
Mr. S.F. George	Head, Radar Analysis Staff
Mr. C.M. Loughmiller	Head, Systems Analysis Staff
Mr. J.P. Shelton	Head, Microwave and Electromechanical Research Staff

Personnel Complement

On Board: 130

Total Estimated R&D Funding

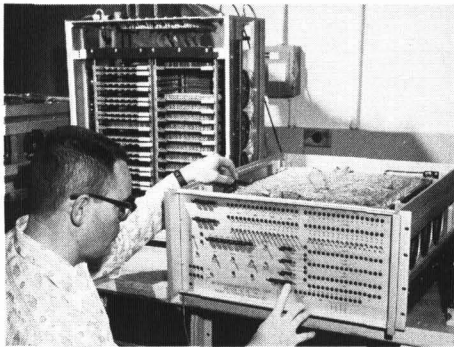
Fiscal Year 1976: \$8,100,000

*Acting



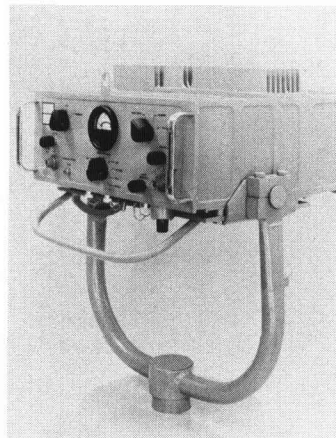
Dr. B. Wald

Communications Sciences Division



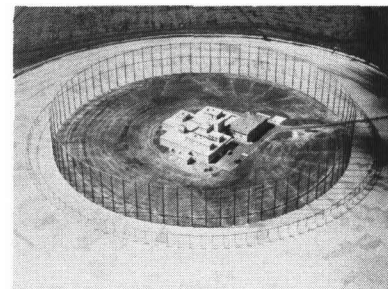
SIGNAL PROCESSING ELEMENT

- INFORMATION SCIENCES AND SYSTEMS
- COMMUNICATION SYSTEMS
- SYSTEMS INTEGRATION AND INSTRUMENTATION
- SATELLITE COMMUNICATION
- ELECTROMAGNETIC PROPAGATION
- SIGNAL EXPLOITATION
- SPECIAL COMMUNICATIONS
- INFORMATION PROCESSING SYSTEMS

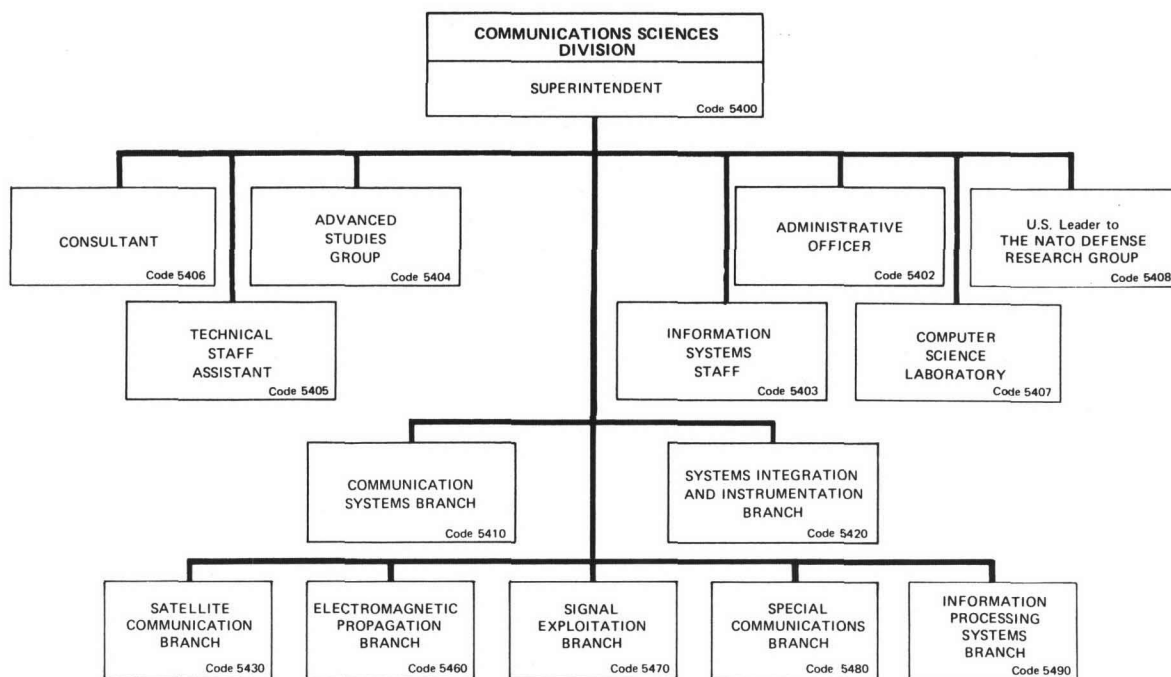


KA-BAND TRANSCEIVER

MICROWAVE SPACE RESEARCH FACILITY



HF ANTENNA



Basic Responsibilities

The Communications Sciences Division conducts research and development in the systems, sensors, techniques, instrumentation and phenomenology of communications, signal exploitation, and information processing. The major emphasis is placed on those new concepts and techniques that will specifically enhance the Navy's capabilities in the collection, processing, transmission, and distribution of information.

Staff Activity

<u>Computer Science Laboratory</u>	<u>Information Systems Staff</u>
Intelligent systems	System architecture
Clustering and pattern recognition	Information management
Heuristics	Software engineering

Branches

<u>Communication Systems</u>	<u>Satellite Communication</u>
Submarine communication systems	Satellite communication systems
Antenna and rf distribution systems	Modem and processor studies
Underwater reception	Anti-jam and LPI systems
<u>Systems Integration and Instrumentation</u>	<u>Electromagnetic Propagation</u>
Precise frequency and time	VLF, LF, and HF propagation research
Secure communication systems	Noise background investigations
Source data and channel encoding	ELF sub-systems
<u>Signal Exploitation</u>	<u>Special Communications</u>
Radio frequency intercept and signal processing	Anti-jam and LPI technology
Direction finding and position location	Advanced communication techniques
Signal storage and display	Synoptic system synthesis
	<u>Information Processing Systems</u>
	High-performance signal processors
	Computer family architecture
	Signal processing language

Key Personnel

<u>Name</u>	<u>Title</u>
Dr. B. Wald	Superintendent
Mrs. C.E. Holt	Administrative Officer
Mr. M.L. Musselman	Technical Staff Assistant
Dr. J.E. Shore*	Head, Information Systems Staff
Dr. J.R. Slagle	Head, Computer Science Laboratory
Mr. C.V. Parker	U.S. Leader to the IFF Panel of the NATO Defense Research Group
Dr. W.S. Ament	Advanced Studies Group
Dr. J.R. Davis*	Head, Communication Systems Branch
Mr. D.I. Himes	Head, Systems Integration and Instrumentation Branch
Mr. W.E. Leavitt*	Head, Satellite Communication Branch
Mr. W.E. Garner	Head, Electromagnetic Propagation Branch
Mr. R.D. Misner	Head, Signal Exploitation Branch
Dr. R.A. LeFande	Head, Special Communications Branch
Mr. Y.S. Wu	Head, Information Processing Systems Branch

Personnel Complement

On Board: 169

Total Estimated R&D Funding

Fiscal Year 1976: \$16,000,000

*Acting

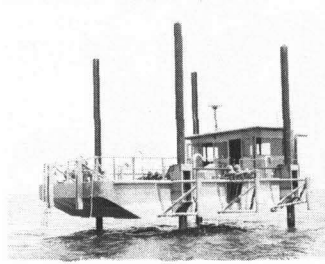


Dr. T. A. Jacobs

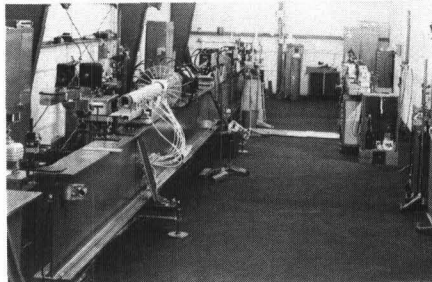
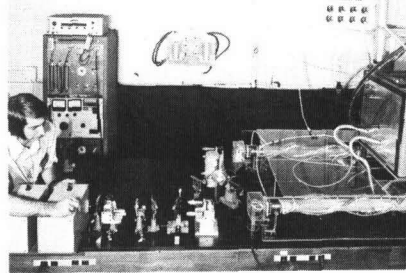
Optical Sciences Division

- OPTICAL PHYSICS
- INTERACTION PHYSICS
- APPLIED OPTICS
- LASER PHYSICS
- OPTICAL WARFARE
- OPTICAL RADIATION

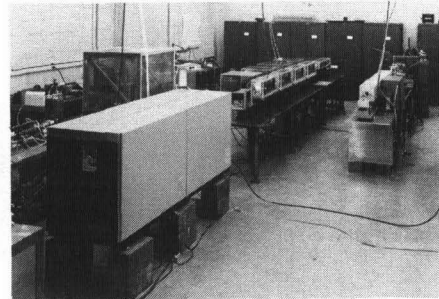
JACK-UP BARGE AT CBD



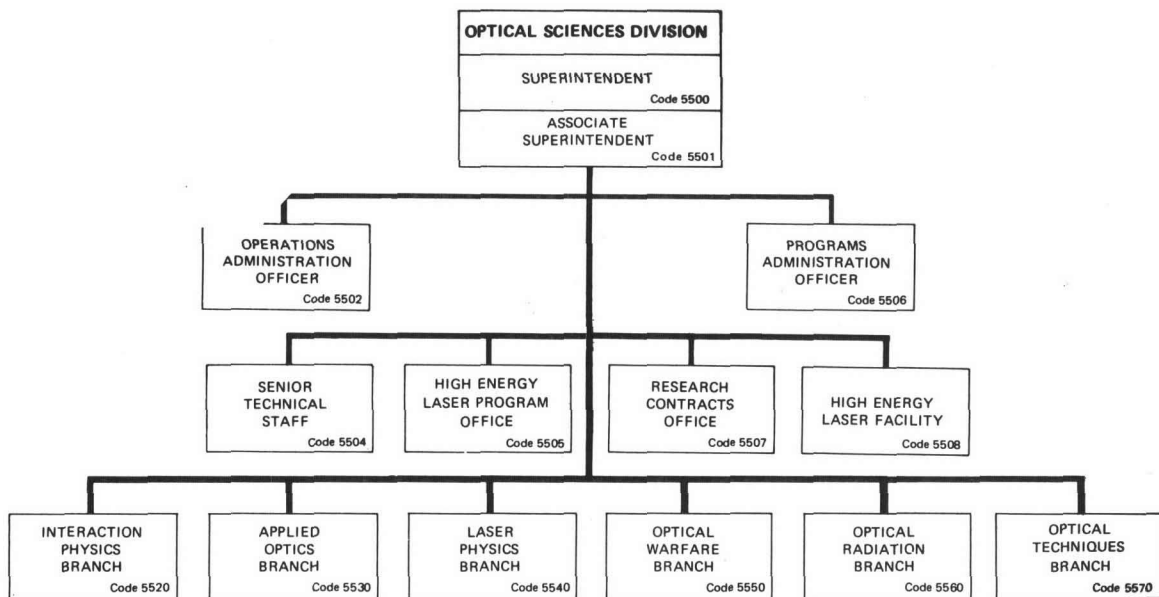
FOUR-WAVE INFRARED MIXING EXPERIMENT



GLASS LASER



CO₂ PULSE LASER



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. The research, both theoretical and experimental, is concerned with discovering and understanding the basic physical principles and mechanisms involved in optical devices and phenomena. The development effort is aimed at extending this understanding in the direction of device engineering and advanced operation techniques. The applications activities include systems analysis and prototype system development and exploitation of research and development 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, laser-matter interactions, atmospheric propagation, optical technology, holography, optical warfare, optical radar, and optical systems. A variety of field measurement programs on optical problems of specific interest are also conducted.

Staff Activities

High Energy Laser Facility

Senior Scientific
and Consultant Staff
Special systems analysis
Technical study groups
Technical contract monitoring

Branches

Optical Techniques

Nonlinear optical phenomena
Picosecond light pulses
Light scattering in solids
Nonlinear effects in materials
Optical waveguides
Liquid crystals

Interaction Physics

Laser controlled fusion
Laser x-ray generation
X-ray lasers
Laser-matter interactions
High-power glass laser development

Optical Warfare

Optical and IR countermeasures
Optical intelligence
Optical and electro-optical techniques

Optical Radiation

Laser system engineering
Electro-optic applications
Optical instrumentation
Interferometry
Systems operation
Atmospheric optics
Propagation studies

Laser Physics

Molecular laser physics
Chemical laser physics
Electrically driven lasers

Applied Optics

Optical intelligence
Optical characteristics of
military targets
Optical technology

Key Personnel

<u>Name</u>	<u>Title</u>
Dr. T. A. Jacobs	Superintendent
Dr. L.F. Drummeter, Jr.	Associate Superintendent
Mrs. T. Garber	Administrative Officer
Dr. R.C. Elton	Senior Technical Staff
Dr. A.F. Milton	Senior Technical Staff
Dr. W.L. Faust	Senior Technical Staff
Dr. P.M. Livingston	Senior Technical Staff
Dr. H. Shenker	Senior Technical Staff
Mr. O.C. Barr	Senior Technical Staff
Dr. A.J. Skalafuris	Senior Technical Staff
Mr. J. Giuliani	Senior Technical Staff
Mr. F.R. Fluhr	Head, High Energy Laser Facility
Dr. R.A. Andrews	Head, Interaction Physics Branch
Dr. R.A. Patten	Head, Applied Optics Branch
Dr. J.R. Airey	Head, Laser Physics Branch
Mr. J.R. Anderson	Head, Optical Warfare Branch
Dr. P.M. Livingston	Head, Optical Radiation Branch
Dr. T.G. Giallorenzi	Head, Optical Techniques Branch

Personnel Complement

On Board: 140

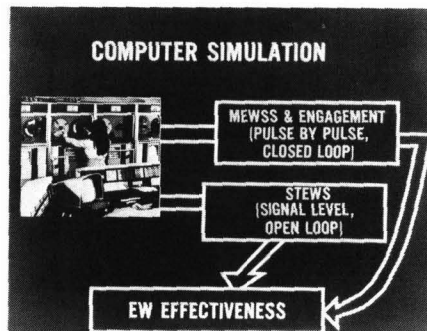
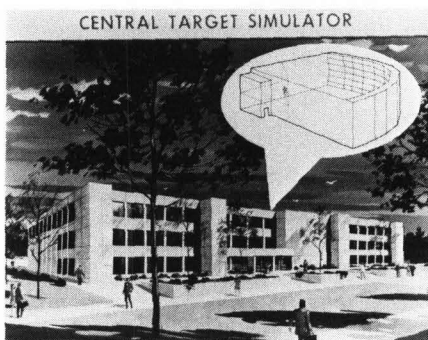
Total Estimated R&D Funding

Fiscal Year 1976: \$13,100,000

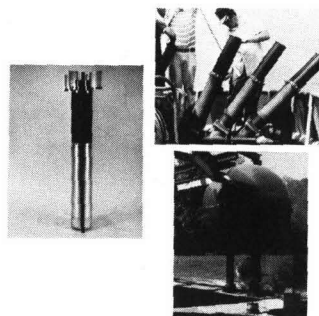


Mr. L. A. Cosby

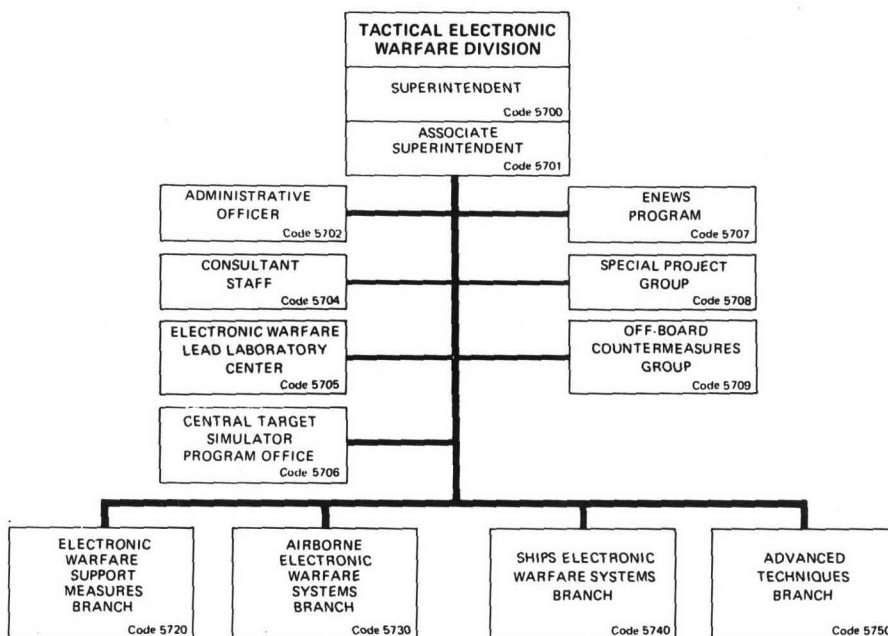
Tactical Electronic Warfare Division



- LEAD LABORATORY CENTER
- CENTRAL TARGET SIMULATOR PROGRAM
- EFFECTIVENESS OF NAVAL EW SYSTEM (ENEWS)
- SPECIAL PROJECT
- OFF-BOARD COUNTERMEASURES
- AIRBORNE ELECTRONIC WARFARE SYSTEMS
- SHIPS ELECTRONIC WARFARE SYSTEMS
- ADVANCED TECHNIQUES



OFF-BOARD COUNTERMEASURES



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, supporting counter-countermeasures, as well as study, analyses, and simulations for the determination and improvement of the effectiveness of these systems.

Staff Activities

Lead Laboratory Coordinating Staff
Navy in house exploratory development
Program reference center
Advanced Technical Objectives Working Group
Analyses and liaison

Off-Board Countermeasures Group
Expendable technology
Expendable devices

Central Target Simulator Program
Design, Construct, Operate CTS Facility

ENEWS
EW effectiveness
Simulation analysis and measurement

Special Project Group
Vulnerability analysis
Special countermeasures

Branches

AIRBORNE Electronic Warfare Systems
Air systems development
Penetration aids
Power source development

Ships Electronic Warfare Systems
Ships systems development
Jamming technology
Deception techniques
EW antennas
Simulators

Electronic Warfare Support Measures
Intercept systems
Direction finding
Systems integration
Command and control interfaces

Advanced Techniques
Analysis and modeling simulation
New EW Techniques
Experimental systems
EW concepts

Key Personnel

<u>Name</u>	<u>Title</u>
Mr. L.A. Cosby	Superintendent
Dr. G.P. Ohman	Associate Superintendent
Miss G. Batchelder	Administrative Officer
Mr. M.J. Sheets	Lead Laboratory Coordinator and Head, Electronic Warfare Lead Laboratory Center
Mr. A.A. DiMattesa	Manager, Central Target Simulator Program
Mr. D.F. Grady	Manager, ENEWS Program
Mr. L.A. Cosby	Program Manager, Special Project
Mr. N.J. Lesko*	Deputy Program Manager, Special Project
Mr. J.A. Montgomery	Head, Off-Board Countermeasures Group
Mr. H.W. Zwack	Head, Electronic Warfare Support Measures Branch
Mr. E.E. Koos	Head, Airborne Electronic Warfare Systems Branch
Mr. L.O. Sweet	Head, Ships Electronic Warfare Systems Branch
Dr. G.E. Freidman	Head, Advanced Techniques Branch

Personnel Complement

On Board: 167

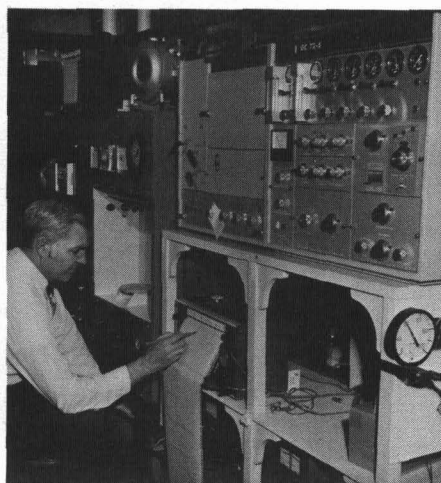
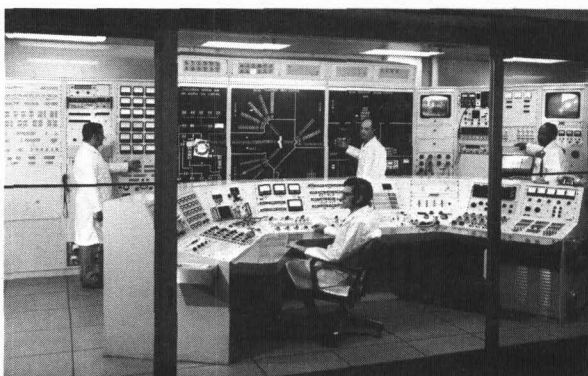
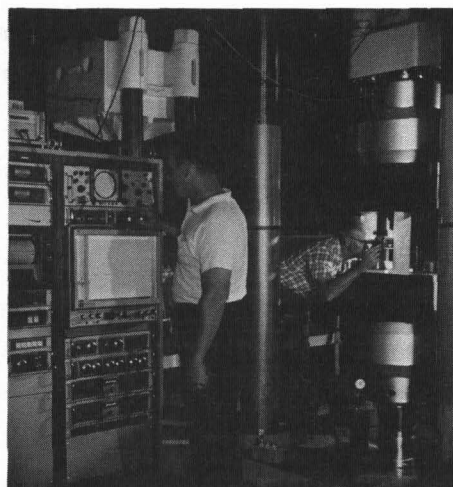
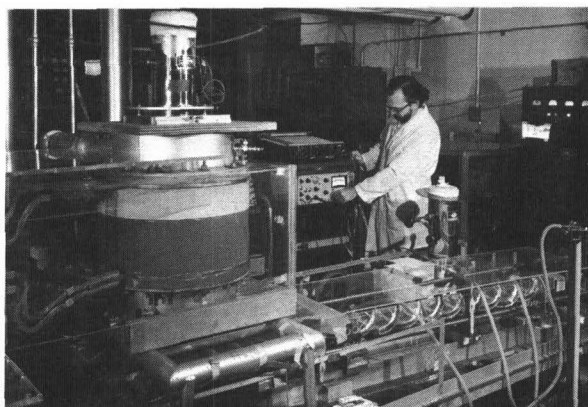
Total Estimated R&D Funding

Fiscal Year 1976: \$17,000,000

*Acting

Materials and General Sciences Area

The Materials and General Sciences Area is an administrative grouping of chemists, metallurgists, and solid-state, optical, and nuclear scientists who (a) carry on interdisciplinary basic and applied research on the mechanical, electrical, thermal, magnetic, optical, and nuclear properties of matter, and (b) develop components, devices, and systems based on the phenomena and principles of the several disciplines involved.



Associate Director of Research for Materials and General Sciences



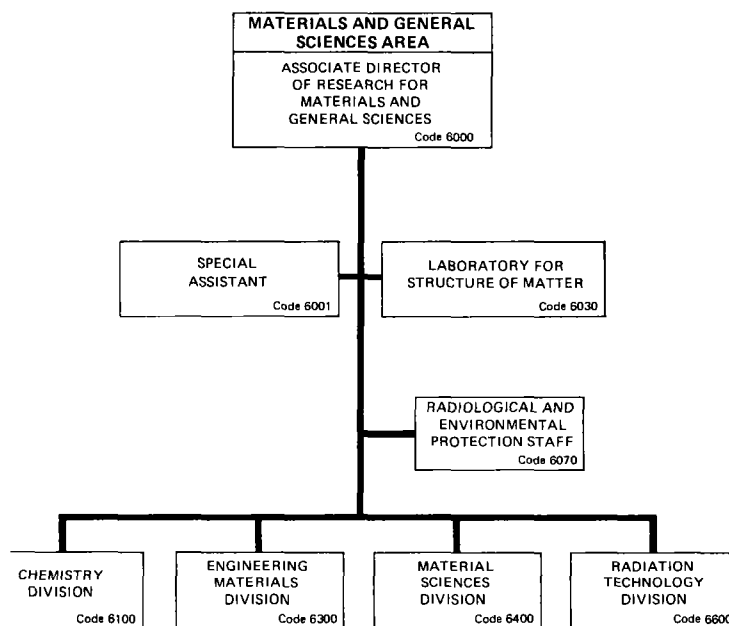
Dr. Albert I. Schindler

Dr. Schindler [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED]. He received the degrees of B.S. (1947), M.S. (1948), and D.Sc. (1950), all in physics, from Carnegie Institute of Technology.

He came to the Naval Research Laboratory in 1951 and has, as Head, Metal Physics Branch, Material Sciences Division, conducted and directed research on the physical properties of metallic alloys. Dr. Schindler has authored or co-authored over 90 papers in solid state physics on topics including galvanomagnetic effects in alloys, electronic specific heat of transition metals, and irradiation effects in magnetic materials. In this latter area, he holds several patents. He is an Adjunct Professor of Physics at Howard University, and has supervised thesis research there as well as at Catholic University, the University of Maryland, and American University. During a sabbatical year, Dr. Schindler was a visiting scientist at Imperial College of Science and Technology in London, England.

For his distinguished research Dr. Schindler has received numerous awards including the E.O. Hulburt Science Award for 1956, the National Capital Award in Applied Science for 1962, the 1965 Pure Science Award of the NRL Branch of the Scientific Research Society of America and the 1966 Award for Scientific Achievement presented by the Washington Academy of Science, and the Distinguished Achievement in Science Award, April 1975.

Dr. Schindler is a fellow of the American Physical Society and of the Washington Academy of Sciences. He also is a member of the Philosophical Society of Washington and Sigma Xi, the Scientific Research Society of North America. In this latter organization, Dr. Schindler has been a member of the Board of Directors since 1974.



Key Personnel

<u>Name</u>	<u>Title</u>
Dr. A.I. Schindler	Associate Director of Research for Materials and General Sciences
Mr. C.A. Carosella	Special Assistant
Dr. J. Karle	Chief Scientist, Laboratory for Structure of Matter
Mr. L.A. Brauch	Head, Radiological and Environmental Protection Staff
Dr. F.E. Saalfeld*	Superintendent, Chemistry Division
Dr. L.R. Hettche	Superintendent, Engineering Materials Division
Dr. C.C. Klick	Superintendent, Material Sciences Division
Dr. J. McElhinney	Superintendent, Radiation Technology Division

*Acting

LABORATORY FOR STRUCTURE OF MATTER

Basic Responsibilities

The Laboratory for Structure of Matter carries out experimental and theoretical investigation 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 structure studies which can form the basis for understanding and interpreting the results of research investigation in a wide variety of scientific disciplines.

Key Personnel

<u>Name</u>	<u>Title</u>
Dr. J. Karle	Chief Scientist, Laboratory for Structure of Matter



Dr. J. Karle

Personnel Complement

On Board: 11

Total Estimated R&D Funding

Fiscal Year 1976: \$520,000

RADIOLOGICAL AND ENVIRONMENTAL PROTECTION STAFF

Basic Responsibilities

The Radiological & Environmental Protection Staff is assigned the responsibility for radiological safety and the overall minimization of pollution from all sources at NRL and its field stations. The NRL radiological protection program has three primary purposes: (1) to assure that all operations using ionizing and microwave radiation are safe and in compliance with Federal Regulations; (2) to provide employees with instruments, instructions, and assistance to assure radiological safety in the performance of methodology. The environmental control responsibilities are to: (1) review programs to identify sources of pollution at NRL; (2) recommend preventative or corrective measures necessary to reduce or eliminate pollution; (3) monitor the air and water to determine compliance with pertinent Federal or Navy Rules and Regulations.

Key Personnel

<u>Name</u>	<u>Title</u>
Mr. L.A. Brauch	Head, Radiological & Environmental Protection Staff
Mr. T.L. Johnson	Head, Research Section
Mr. R.B. Luersen	Head, Accelerators & Analysis Section
Mr. J.N. Stone	Head, Pollution Control Section



Mr. L. A. Brauch

Personnel Complement

On Board: 17

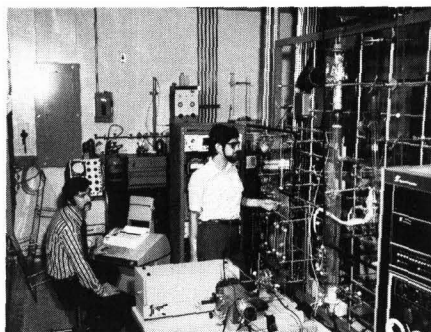
Total Estimated Funding

Fiscal Year 1976: \$485,000

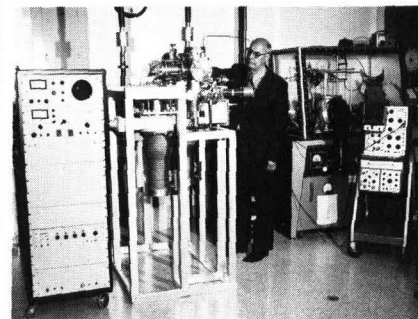


Dr. F. E. Saalfeld*

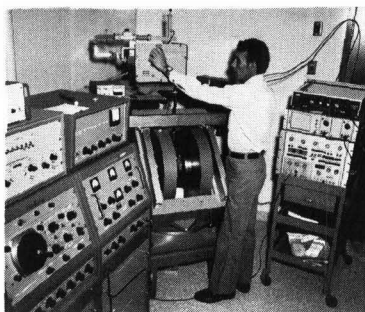
Chemistry Division



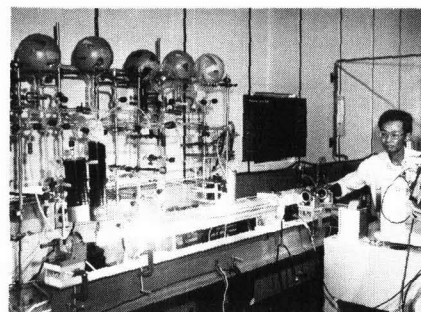
STUDY OF "COOL FLAMES"



HIGH-TEMPERATURE MASS SPECTROMETER

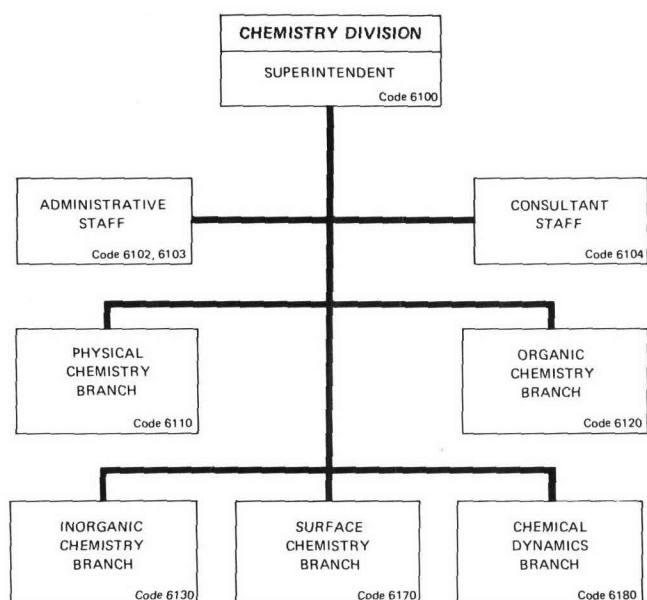


FAST SCAN ELECTRON SPIN RESONANCES



CHEMICAL LASER

- PHYSICAL CHEMISTRY
- ORGANIC CHEMISTRY
- INORGANIC CHEMISTRY
- SURFACE CHEMISTRY
- CHEMICAL DYNAMICS



*Acting

Basic Responsibilities

The Chemistry Division conducts a diversified research and development program in the general areas of the physical, organic, inorganic and analytical chemistry. Specialized technological programs within these fields include polymeric materials (protective coatings, composites, drag reducing agents, adhesives, and high temperature lubricants), advanced inorganic fluids, fuel technology, combustion, fire suppression, chemical lasers, electrochemical power sources, and atmosphere analysis and control (mainly in nuclear submarines).

Branches

Physical Chemistry

Optical diagnostics of chemical reactions
Kinetics of gas phase reactions
Chemical lasers and energy transfer
Trace analysis
Atmosphere analysis and control

Organic Chemistry

Synthesis of unique polymers
Functional organic coatings
High strength composites
Photophysical processes in polymers
Polymer characterization

Inorganic Chemistry

Solid state chemistry
Synthesis of novel inorganic compounds
Solution chemistry

Inorganic Chemistry (continued)

Characterization of novel inorganic compounds

Surface Chemistry

Lubricants
Surface properties of fibers
Adhesion and structural adhesives
Fundamental electrode reactions
Electrochemical power sources
Corrosion prevention

Chemical Dynamics

Distillate fuels research
Autoxidation and combustion dynamics
Fire suppression
Personnel protection in fires
Modeling and scaling of combustion systems

Key Personnel

<u>Name</u>	<u>Title</u>
Dr. F.E. Saalfeld*	Superintendent
Dr. L.B. Lockhart, Jr.	Associate Superintendent
Mrs. B.C. Gibbs	Administrative Officer
Dr. F.E. Saalfeld	Head, Physical Chemistry Branch
Dr. L.B. Lockhart, Jr.	Head, Organic Chemistry Branch
Dr. W.B. Fox	Head, Inorganic Chemistry Branch
Dr. N.L. Jarvis	Head, Surface Chemistry Branch
Dr. H.W. Carhart	Head, Chemical Dynamics Branch

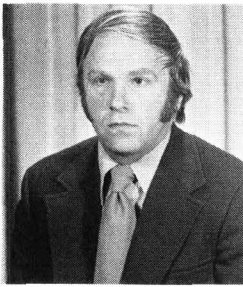
Personnel Complement

On Board: 102

Total Estimated R&D Funding

Fiscal Year 1976: \$6,900,000

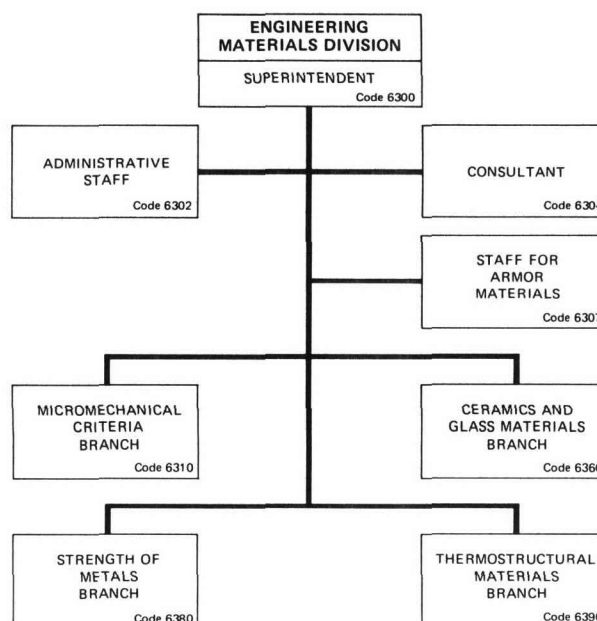
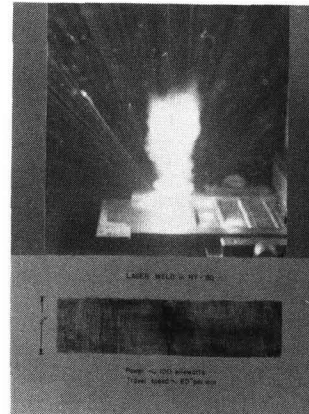
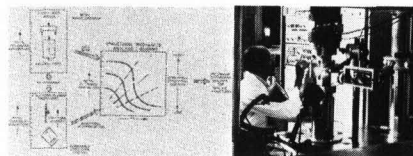
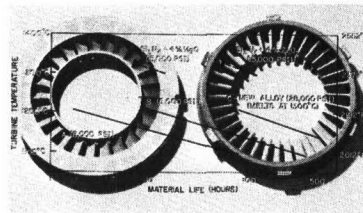
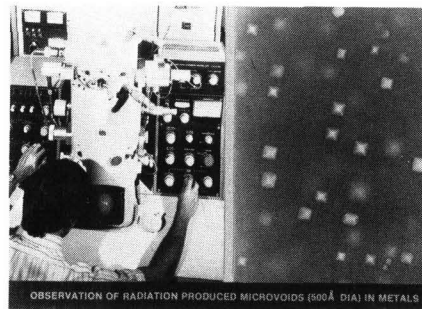
*Acting



Engineering Materials Division

Dr. L. R. Hettche

- COMPOSITE MATERIALS
- MICROMECHANICAL CRITERIA
- CERAMICS AND GLASS MATERIALS
- STRENGTH OF METALS
- THERMOSTRUCTURAL MATERIALS



Basic Responsibilities

The Engineering Materials Division is concerned with basic and applied research in the advanced characterization and development of materials for Naval structures and devices. Emphasis is given to the effects of composition, processing, and microstructure on the service performance of metals, alloys, ceramics, and composites, particularly the strength and fracture behaviors of these materials in benign, corrosive and radiation environments. Analytical considerations range from engineering reliability procedures to mechanistic modeling of microseparation processes. Other interests include thermomechanical shock response, high-temperature effects and equation-of-state, ballistic phenomena, and piezoelectric applications. This diversity of activities is carried out by an interdisciplinary staff of material scientists, metallurgists, ceramists, physicists, chemists and engineers, utilizing the most advanced testing and diagnostic facilities.

Branches

Armor Materials

- Develops ballistic assessment techniques
- Penetration mechanisms
- Fragment simulation
- Materials development

Micromechanical Criteria

- Microstructural characterization
- Weldability of advanced alloys
- Thermomechanical effects
- Micromechanisms of crack growth
- Multiphase equation-of-state

Ceramic and Glass Materials

- Processing and fabrication
- Microstructural development and characterization
- Strength and fracture behavior
- Plastic deformation; study and application
- Ceramics for electronic piezoelectric optical and other nonmechanical applications

Strength of Metals

- Sub-Critical crack growth and fracture
- Failure-safe design parameters
- Metallurgical optimization for high-strength metals
- Corrosion science related to advanced alloys
- Marine corrosion and cathodic protection

Thermostructural Materials

- Elevated temperature behavior of materials
- Influence of environment on high temperature materials
- Basic mechanisms of radiation damage
- Criteria for improved structural design using high temperature materials

Composite Materials

- Engineering Characterization
- High-temperature composite development
- Hybrid composition evaluation

Key Personnel

<u>Name</u>	<u>Title</u>
Dr. L.R. Hettche	Superintendent
Mr. L.E. Steele	Associate Superintendent
Mrs. E.J. Elwell	Administrative Officer
Mr. C.D. Beachem	Head, Micromechanical Criteria Branch
Mr. R.W. Rice	Head, Ceramic and Glass Materials Branch
Mr. R.J. Goode	Head, Strength of Metal Branch
Mr. L.E. Steele	Head, Thermostructural Materials Branch

Personnel Complement

On Board: 85

Total Estimated R&D Funding

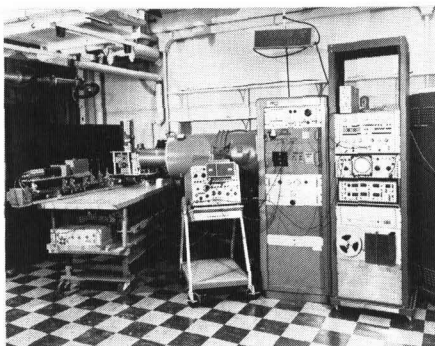
Fiscal Year 1976: \$4,300,000



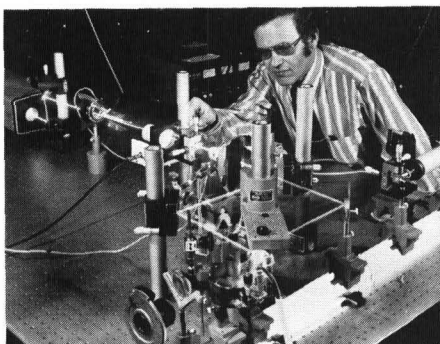
Dr. C. C. Klick

Material Sciences Division

*EXPERIMENT FOR
NANOSECOND IRRADIATION
OF MATERIALS AND TRANSIENT
OPTICAL MEASUREMENTS*

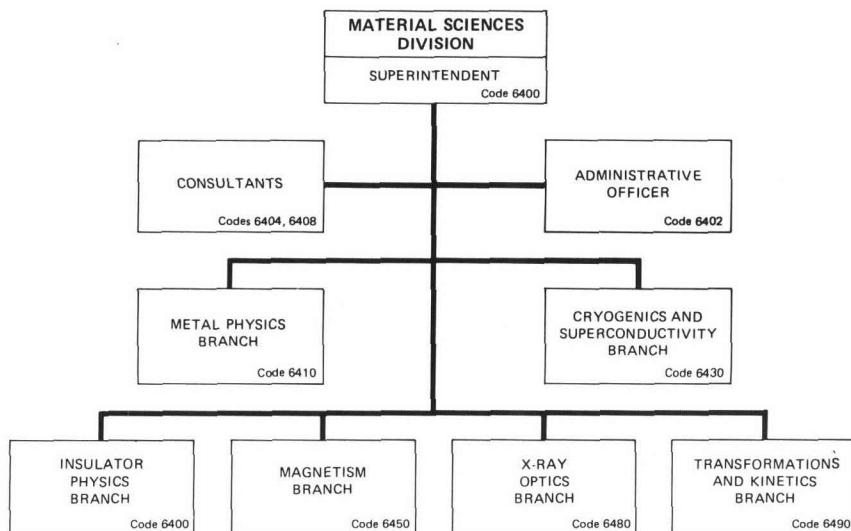
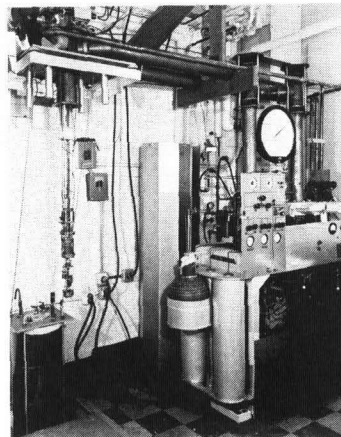


- METAL PHYSICS
- CRYOGENICS AND SUPERCONDUCTIVITY
- INSULAR PHYSICS
- MAGNETISM
- X-RAY OPTICS
- PHASE TRANSFORMATIONS
- ELASTICITY AND PLASTICITY



*DILUTION REFRIGERATOR
WITH DIAMOND ANVIL
PRESSURE CELL*

*HOLOGRAPHY SET-UP
WITH PHOTODICHROIC
MATERIALS*



Basic Responsibilities

The Material Sciences Division conducts basic and applied research and engages in exploratory and advanced development of broad categories of materials having substantive scientific and/or technological interest to the Navy. R&D programs encompass the full range of materials, i.e., from metallics to insulators, from simple crystalline solids to complex polymeric substances. Program objectives include achieving enhanced fundamental understanding of the physical properties and phenomena displayed by materials pursuant to improved control and application in advanced naval systems, and thereby provide a corps of scientific materials experts for the Laboratory and the Navy. Programs are pursued on interesting and important resistive, superconducting, insulating, and magnetic materials, with investigations on all levels from the quantum mechanical to the microstructural. Exploitable phenomena in materials such as phase transformations, lattice defects, x-ray production, and interactions with magnetic, electromagnetic, thermal, and radiation fields are of interest and under investigation by various groups within the Division Representative of current divisional programs are: laser/ materials interactions and responses, magnetic and photochromic memories in solids, glass-fiber optical materials, ultra-sensitive magnetic detectors and low frequency radio detectors, submarine magnetization, x-rays for environmental monitoring and development of practical high temperature-high field superconductors for motors and generators. Application areas of these and other divisional programs cover immense areas of naval technology and underscore the unique expertise and broad purview of the Division.

Branches and Facilities

Metal Physics

Electronic and magnetic properties
Thermal and optical properties
Laser material interactions
Optical radiation vulnerability
Magnetostriiction
Advanced structural materials

Cryogenics and Superconductivity

High-pressure effects
Superconducting materials
Superconducting electronics

Insulator Physics

Electronic properties of nonmetallic crystals and glasses
Radiation induced defects, color centers
Optical properties: fibers, windows, data processing materials

Magnetism

Resonance in magnetic materials
Spin-ordered magnetic phenomena
Rare earth - transition metal magnetic materials
Magnetic properties of amorphous materials

X-Ray Optics

X-ray spectrochemical analysis
X-ray diffraction
Band structure and superconductivity
Plasma diagnostics

Alloy Transformations and Kinetics

Phase transformations
Crystalline defect states
Microstructural effects in superconductors
Diffusion theory
Solid-liquid interfaces and transitions
Elasticity, plasticity, mechanical phenomena

Key Personnel

<u>Name</u>	<u>Title</u>
Dr. C.C. Klick	Superintendent
Mrs. A.K. Hayden	Administrative Officer
Dr. H.B. Rosenstock	Consultant Staff: Theory
Dr. M. Hass	Consultant Staff: Experiment
Dr. F.W. Patten	Consultant Staff
Dr. J.T. Schriempf	Head, Metal Physics Branch
Dr. M. Nisenoff*	Head Cryogenics and Superconductivity Branch
Dr. M.N. Kabler	Head, Insulator Physics Branch
Dr. G.T. Rado	Head, Magnetism Branch
Mr. L.S. Birks	Head, X-Ray Optics Branch
Dr. R.A. Meussner*	Head, Alloy Transformations and Kinetic Branch

Personnel Complement

On Board: 107

Total Estimated R&D Funding

Fiscal Year 1976: \$6,867,500

*Acting

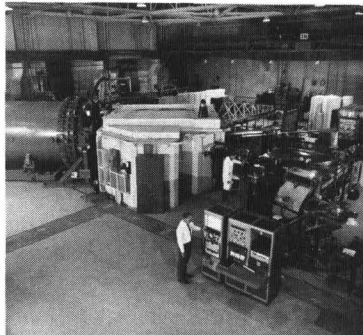


Dr. J. McElhinney

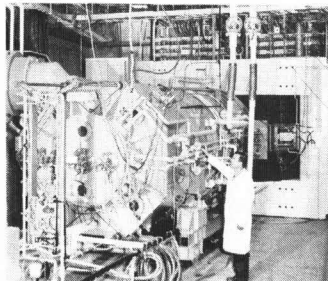
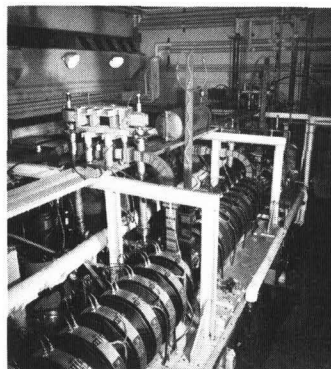
Radiation Technology Division

- CYCLOTRON APPLICATIONS
- RADIATION EFFECTS
- ELECTRON RADIATIONS
- RADIATION THEORY
- ION BEAM APPLICATIONS

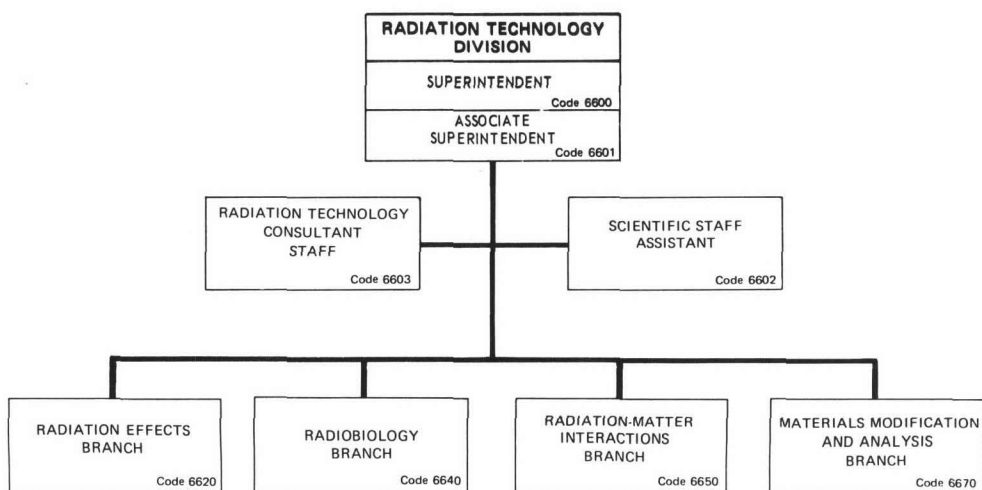
VAN DE GRAAFF



LINAC



CYCLOTRON



Basic Responsibilities

The Radiation Technology Division conducts a broad program of basic and applied research in radiation technology and related areas. Both theoretical and experimental research are performed in areas such as: radiation sources, accelerators, radiation detection and analysis, radiation dosimetry, interaction of radiations with materials and devices, vulnerability of military equipment to radiations, modification of materials by radiations, analysis of materials by radiations, bio-medical applications of radiations, and advanced nuclear power sources. Major facilities include: a 75-MeV sector-focusing cyclotron, a 60-MeV electron linac, a 5-MV Van de Graaff, and several smaller radiation sources.

Staff Activities

Consultant Staff

Radiation instrumentation
Ion. solid interactions
Radiation detection
Radiation theory

Branches

Radiation Effects

Radiation effects on infrared
detectors, optical and electronic
materials, and satellite components
Solar cells
Radiation belts
Hardening satellite components
against laser beams
Radiation vulnerability
Radiation curing of polymers
2-MV-electron Van de Graaff
Cobalt-60 source

Radiobiology

Radiations for biological and
medical purposes
Neutron beams for cancer therapy
Radiation damage in reactor materials
Radioisotope production
Ion-induced x-rays
75 MeV cyclotron

Radiation - Matter Interactions

Transient radiation effects on
electronics
Measurements on targets bombarded by
MeV electron beams
Deposition of energy by charged
particles
High-intensity laser beam propagation
Neutron transport
Coherent bremsstrahlung
Neutron reactions in tissue resident
elements

Materials Modification and Analysis

Materials analysis by means of
charged particle beams
Implantation of ions into solids
Radiation effects caused by high
energy charged particle beams
Crystal studies by means of particle
channeling techniques
Ion-induced x-rays
Modification of surface and
sub-surface properties by
ion-implantation
5 MV Van de Graaff

Key Personnel

<u>Name</u>	<u>Title</u>
Dr. J. McElhinney	Superintendent
Dr. E.A. Wolicki	Liaison Representative and Associate Superintendent
Mr. H.J. Quinn	Scientific Staff Assistant
Mr. D.C. Cook	Consultant (Radiation Instrumentation)
Dr. K.L. Dunning	Consultant (Ion-Solid Interactions)
Dr. K.W. Marlow	Consultant (Radiation Detection)
Dr. A.W. Saenz	Consultant (Radiation Theory)
Dr. B.J. Faraday	Head, Radiation Effects Branch
Dr. R.O. Bondelid	Head, Radiobiology Branch
Dr. I. Manning*	Head, Radiation-Matter Interaction Branch
Dr. J.W. Butler	Head, Materials Modification and Analysis Branch

Personnel Complement

On Board: 90

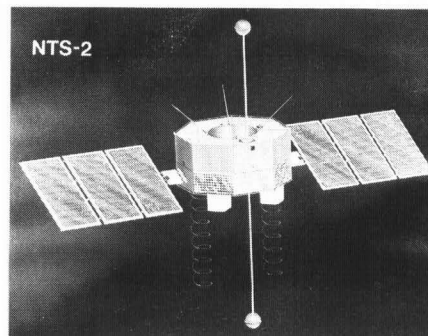
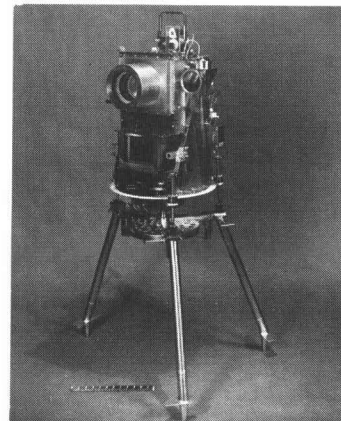
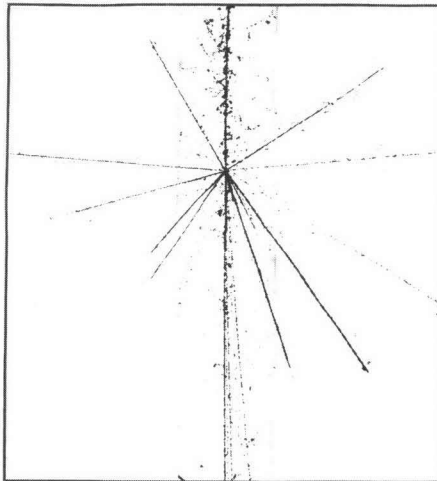
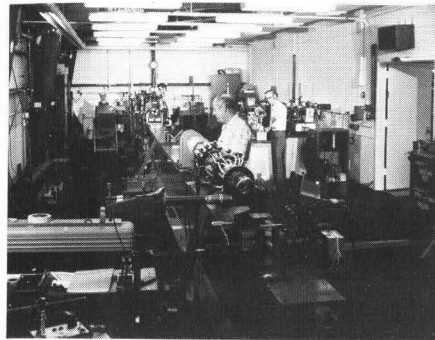
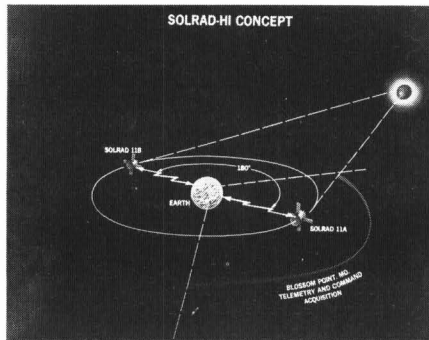
Total Estimated R&D Funding

Fiscal Year 1976: \$4,900,000

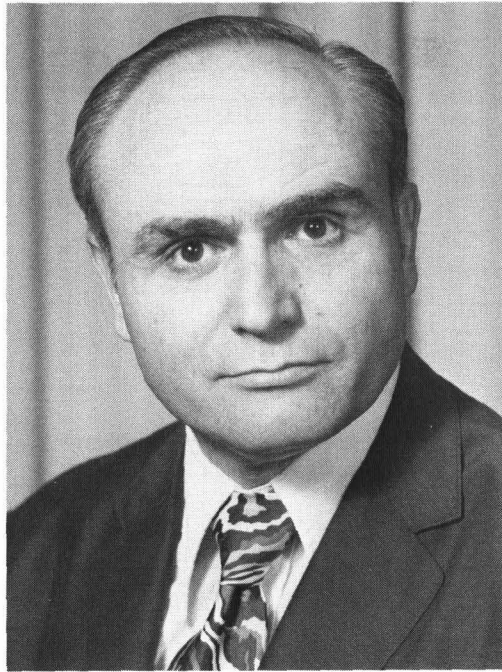
*Acting

Space Science and Technology Area

The Naval Research Laboratory conducts basic and applied research in upper air physics, astronomy, and astrophysics to improve naval capabilities in communications, navigation, detection, surveillance, and other fields; the investigations are made by means of several radio telescopes and a wide variety of space probes. Both experimental and theoretical techniques are used to conduct plasma research, to understand more fully natural and man-made plasma phenomena, and to develop controlled thermo-nuclear power sources. The area is involved also in the study and application of advanced mathematical techniques and in the many approaches afforded by the computer sciences.



Associate Director of Research for Space Science and Technology



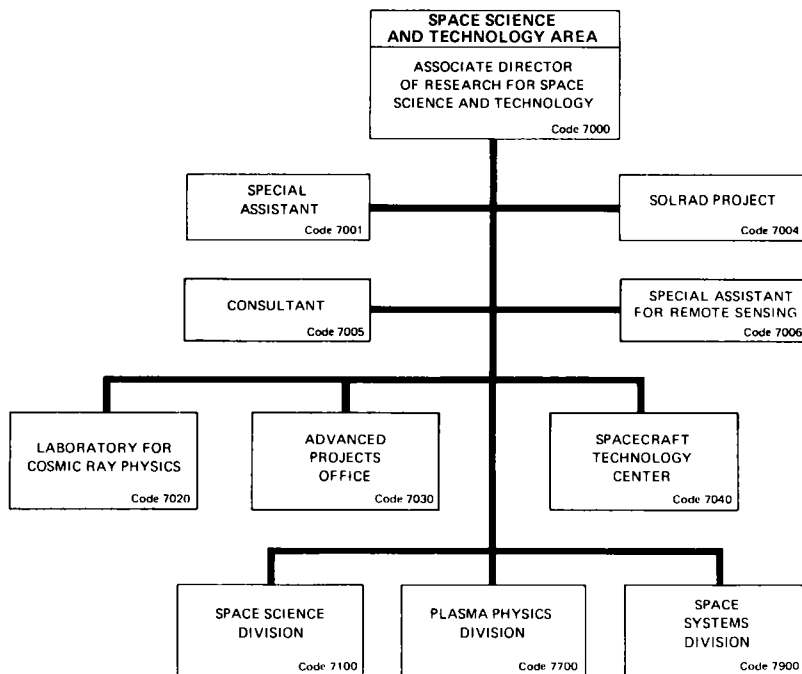
Dr. Herbert Rabin

Dr. Rabin was born in Milwaukee, Wisconsin, on November 14, 1928. He received a B.S. degree in physics from the University of Wisconsin in 1950, an M.S. degree in physics from the University of Illinois in 1951, and a Ph.D. degree in physics from the University of Maryland in 1959.

He has been employed at the Naval Research Laboratory since 1952, working in the fields of high-energy gamma ray and electron facilities, radiation dosimetry, solid state studies of lattice defects, and nonlinear optics and laser physics. In these research areas Dr. Rabin has authored or coauthored well over a hundred papers and conference presentations. In addition, Dr. Rabin holds five patents.

Prior to his present appointment Dr. Rabin held several supervisory positions at NRL, the most recent being Head, Quantum Optics Branch, Optical Sciences Division. He has taught courses in the Physics Department at George Washington University; he was a visiting scientist at the Technische Hochschule in Stuttgart, Germany; and he was a consultant to the school of Engineering of the University of Sao Paulo, Sao Carlos, Brazil, under sponsorship of the Pan American Union.

Dr. Rabin is a Fellow of the American Physical Society and holds membership in the Optical Society of America, the Philosophical Society of Washington, the American Association for the Advancement of Science, the American Institute of Aeronautics and Astronautics, and several honorary societies. He is also a corresponding member of the Brazilian Academy of Sciences. Dr. Rabin received the Navy Meritorious Civilian Service Award in 1969 and the E.O. Hulburt Annual Science Award for 1970.



Key Personnel

<u>Name</u>	<u>Title</u>
Dr. H. Rabin	Associate Director of Research for Space Science and Technology
Mr. J.M. Shaw, Jr.	Special Assistant
Mr. E.W. Peterkin	Technical Project Manager
Dr. J.W. Schwartz	Consultant
Dr. V.E. Noble	Special Assistant for Navy Environmental Remote Sensing
Dr. M.M. Shapiro	Head, Laboratory for Cosmic Ray Physics
Mr. R.D. Mayo	Head, Advanced Projects Office
Mr. P.G. Wilhelm	Head, Spacecraft Technology Center
Dr. H. Friedman	Superintendent, Space Science Division
Dr. T. Coffey	Superintendent, Plasma Physics Division
Mr. N.W. Guinard	Superintendent, Space Systems Division

LABORATORY FOR COSMIC RAY PHYSICS

Basic Responsibilities

The Laboratory for Cosmic Ray Physics conducts an interrelated set of programs of (a) investigating the high-energy radiation environment at satellite orbits and at altitudes of high-flying airplanes, and (b) determining radiation damage to men, electronic components and materials, using high-energy heavy-ion accelerators. Program (a) includes studies of the nature and interactions of both solar-flare and galactic high-energy particles. In Program (b) the nuclear fragmentations and energy deposition in biological tissue-like materials are investigated; this work also yields data required for exploratory heavy-ion cancer therapy. The same energetic heavy ions are used to simulate neutron damage to components and materials of future high-flux reactors. The program is designed to be responsive to anticipated technical requirements of the Navy and the general research and development program of the Department of Defense.

Key Personnel

<u>Name</u>	<u>Title</u>
Dr. M.M. Shapiro	Chief Scientist, Laboratory for Cosmic Ray Physics
Mr. N. Seeman	Senior Scientist
Dr. R. Silberberg	Senior Scientist
Mr. F.W. O'Dell	Senior Scientist



Dr. M. M. Shapiro

Personnel Complement

On Board: 12

Total Estimated R&D Funding

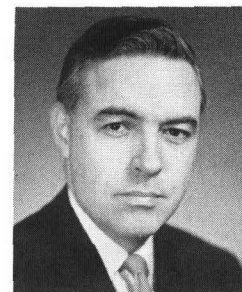
Fiscal Year 1976: \$525,000

SOLRAD PROJECT

The SOLRAD Project was established to support NAVELEX advanced development tasks in solar x-ray monitoring and specifically to (1) develop, construct, test, evaluate, and provide launch support of SOLRAD satellites; (2) track, command, and acquire satellite telemetry; and (3) reduce, analyze, and transmit solar emission data for scientific and application purposes.

Key Personnel

<u>Name</u>	<u>Title</u>
Mr. E.W. Peterkin	Technical Project Manager
Mr. R.W. Kreplin	Scientific Program Manager
Dr. J.M. Goodman	Assistant Manager for Data Processing
Mr. P.G. Wilhelm	Assistant Manager for Spacecraft
Mr. G.E. Leavitt	Technical Assistant, Experiments, Electronics
Mrs. M.A. Schmidt	Secretary to Project Manager



Mr. E. W. Peterkin

Manpower Support: 13 man-years

Total Estimated R&D Funding

Fiscal Year 1976: \$1,300,000

ADVANCED PROJECTS OFFICE

Basic Responsibilities

The Advanced Projects Office is responsible for all management functions of the entire NRL effort in an advanced space project and provides the NRL external interface for the program. This involves the design, design implementation, fabrication, testing and deployment of overseas data collection systems, as well as system analysis, mathematical modeling, system integration, configuration management, integrated logistics support, training development, and operation evaluation of advanced space/ground systems. Included is a prototype ground station requirement at Blossom Point, Maryland, where the test and evaluation efforts are conducted.

Systems Development Branch
System Studies Section
Systems Design Section
Systems Implementation Section
Flight Systems Section

Systems Engineering & Integration Branch
Management & Liaison Section
System Engineering Management Section
Advanced Analysis Section



Mr. R. D. Mayo

Personnel Complement

On Board: 56

Total Estimated R&D Funding

Fiscal Year 1976: \$13,500,000

Key Personnel

<u>Name</u>	<u>Title</u>
Mr. R.D. Mayo	Manager, Advanced Projects Office
Ms. L.P. Harding	Administrative Officer
Mr. F.V. Hellrich	Head, Systems Development Branch
Mr. L.M. Hammarstrom	Head, Systems Engineering & Integration Branch

SPACECRAFT TECHNOLOGY CENTER

Basic Responsibilities

The Spacecraft Technology Center is responsible for providing complete spacecraft systems for purposes of conducting research and development in the space environment. This involves a broad and complete spectrum of activities ranging from system concept formulation, preliminary and detailed design, prototype development through to complete flight systems. The Center maintains all of the necessary special facilities for aerospace type fabrication and environmental testing and the expertise which is generally required in the spacecraft system. The Center also maintains dedicated ground stations for the purpose of transmitting command/control signals to, and receiving and analyzing telemetered data from, those of its spacecraft which have been placed into orbit.

Key Personnel

<u>Name</u>	<u>Title</u>
Mr. P.G. Wilhelm	Head, Spacecraft Technology Center
Mr. A.C. Salvato	Product Design Section
Mr. R.T. Beal	Mechanical Systems Section
Mr. R.S. Rovinski	Satellite Structures Design Section
Mr. F.W. Raymond	Engineering Physics Section
Mr. J.G. Winkler	Power Systems Section
Mr. L.E. Hearton	R. F. Systems Section
Mr. R.E. Eisenhauer	Satellite Digital Systems Section



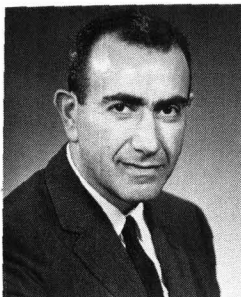
Mr. P. G. Wilhelm

Personnel Complement

On Board: 70

Total Estimated R&D Funding

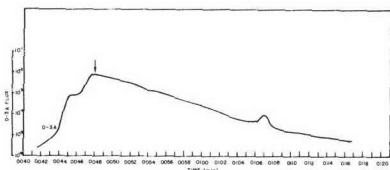
Fiscal Year 1976: \$20,483,000



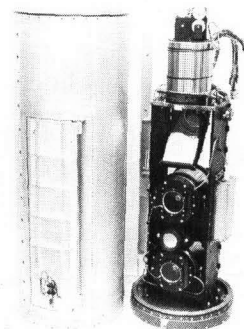
Dr. H. Friedman

Space Science Division

ADVANCED SPACE SENSING
APPLICATIONS
UPPER AIR PHYSICS
RADIO ASTRONOMY
ROCKET SPECTROSCOPY
.....
E. O. HULBURT CENTER FOR
SPACE RESEARCH



GROWTH AND DECAY OF X-RAYS
FROM A SOLAR FLARE

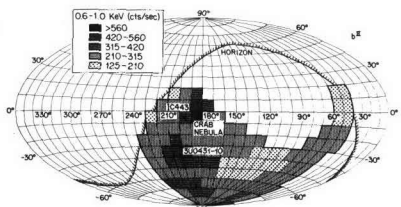


ROCKET PAYLOAD
FOR UV OBSERVATION
OF COMET

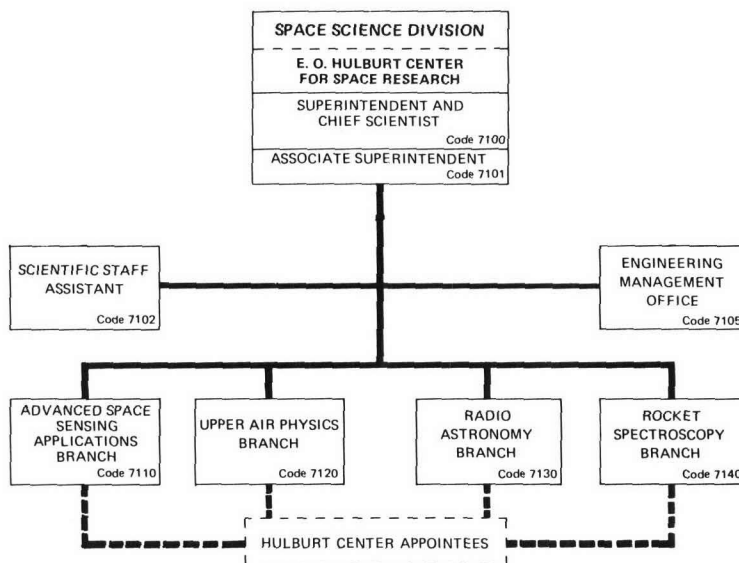
RADIO
TELESCOPE
MARYLAND
POINT



FAR-ULTRAVIOLET PHOTOGRAPH OF EARTH



X-RAY INTENSITY MAP
OF THE OBSERVED SKY



Basic Responsibilities

The Space Science Division conducts research, development, and tests in the fields of upper air physics, astronomy, astrophysics, and remote geo-sensing. Satellites and rockets are used to obtain information on radiation from the sun and celestial sources, to study the composition and behavior of the ionosphere, and to sense remotely the terrestrial environment. Radio telescopes are used for astronomical observations. Results are of importance to radio communications, to utilization of the space environment, and to the fundamental understanding of natural radiation phenomena.

Branches

Advanced Space Sensing Applications

- Active and passive sensor development for remote sensing
- Satellite radar altimetry
- Remote sensing of ocean environment and surface properties
- Remote sensing of arctic conditions
- Determining volume of oil spills at sea

Upper Air Physics

- Gamma-ray, x-ray, ultraviolet, and infrared astronomy
- Aeronomy
- Solar x-ray monitoring satellites
- Electronic imaging studies
- Meteor astronomy

Radio Astronomy

- Galactic and extragalactic radio astronomy
- VLBI (very long basic interferometry)

Radio Astronomy (continued)

- Intergalactic gases
- Atmospheric radiation
- Extraterrestrial radio radiation

Rocket Spectroscopy

- X-ray and ultraviolet solar spectroscopy
- Spectroheliographic and coronagraphic research
- Laboratory astrophysics
- XUV spectroradiometry
- Apollo telescope mission solar research

E.O. Hulburt Center for Space Research

The program is that of the combined Upper Air Physics, Rocket Spectroscopy, and Radio Astronomy Branches. It allows graduate and postgraduate students visiting faculty members to cooperate with NRL in space research.

Key Personnel

<u>Name</u>	<u>Title</u>
Dr. H. Friedman	Superintendent
Dr. P. Mange	Associate Superintendent
Mr. B. Snider	Scientific Staff Assistant
Mr. B. Yaplee	Head, Advanced Space Sensing Application Branch
Dr. T.A. Chubb	Head, Upper Air Physics Branch
Mr. C.H. Mayer	Head, Radio Astronomy Branch
Dr. R. Tousey	Head, Rocket Spectroscopy Branch
Dr. H. Friedman	Chief Scientist, Hulburt Center

Personnel Complement

On Board: 144

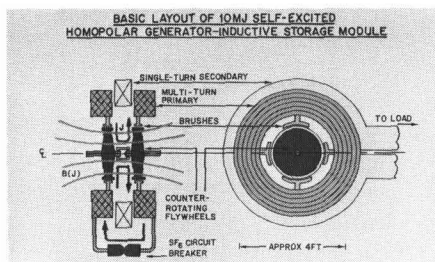
Total Estimated R&D Funding

Fiscal Year 1976: \$10,600,000



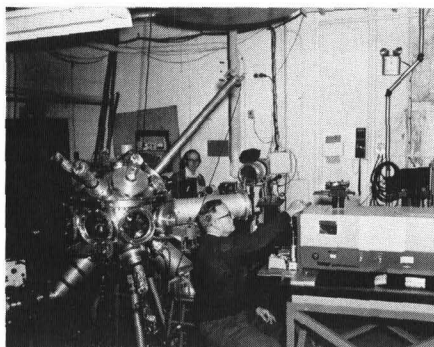
Dr. Timothy Coffey

Plasma Physics Division

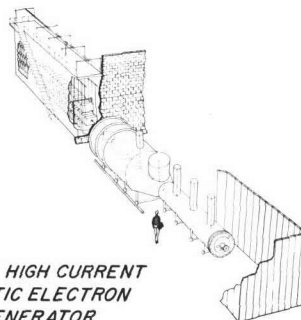


HOMOPOLAR GENERATOR-INDUCTIVE STORAGE MODULE

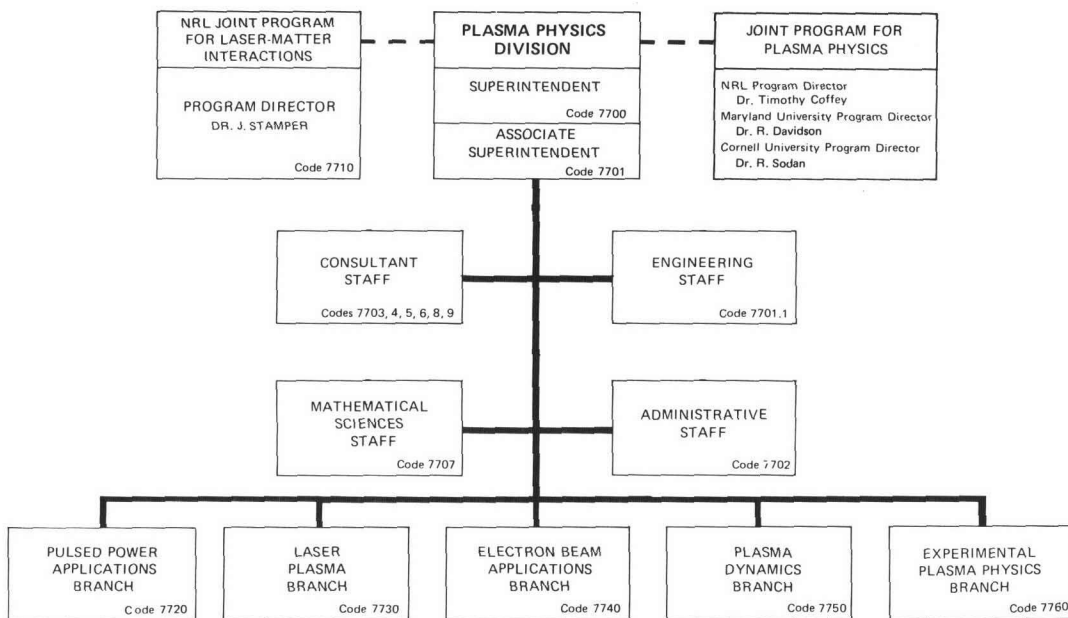
- PULSED POWER APPLICATIONS
- LASER PLASMA INTERACTION
- ELECTRON BEAM APPLICATIONS
- PLASMA DYNAMICS
- EXPERIMENTAL PLASMA PHYSICS



LASER PLASMA EXPERIMENT



GAMBLE II HIGH CURRENT RELATIVISTIC ELECTRON BEAM GENERATOR



Basic Responsibilities

The Plasma Physics Division conducts both basic and applied experimental and theoretical research. Examples of effort underway include: fusion physics and the generation and containment of high temperature plasmas, laser produced plasmas, the behavior of the ionosphere as a partial plasma, electron and ion beam experiment, simulation of high altitude nuclear weapons effects by pulsed radiation devices and numerical simulation techniques using the NRL Advanced Scientific Computer.

Branches

Pulsed Power Applications

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

Electron Beam

- Application of high current relativistic electron beams to microwave and millimeter wave generation
- Development of Autoacceleration techniques
- Exploratory electron beam research

Experimental Plasma Physics

- Seven-ohm beam plasma experiment
- SEEBIE electron beam plasma

Experimental Plasma Physics (continued)

- CUSP plasma preheating experiment
- SUZY II
- Inductive energy storage
- Theory/system modeling
- LINUS
- Experimental study of plasma chemistry

Laser Plasma

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

Plasma Dynamics

- Theoretical and numerical simulation studies of problems in nonlinear plasma dynamics
- Global ionospheric modelling
- Numerical simulation of high density plasmas
- Geophysical fluid dynamics

Key Personnel

<u>Name</u>	<u>Title</u>
Dr. T. Coffey	Superintendent
Mr. J.D. Brown	Associate Superintendent
Ms. B.D. Bassford	Administrative Officer
Dr. W. Ali	Consultant
Dr. J. Boris	Consultant
Dr. K. Hain	Consultant
Dr. K. Papadopoulos	Consultant
Dr. A. Robson	Consultant
Dr. J. Shipman	Consultant
Dr. G. Cooperstein*	Head, Pulsed Power Applications Branch
Dr. S. Bodner	Head, Laser Plasma Branch
Dr. T. Godlove	Head, Electron Beam Applications Branch
Dr. T. Coffey*	Head, Plasma Dynamics Branch
Dr. A. Robson	Head, Experimental Plasma Physics Branch

Personnel Complement

On Board: 112

Total Estimated R&D Funding

Fiscal Year 1976: \$8,490,000

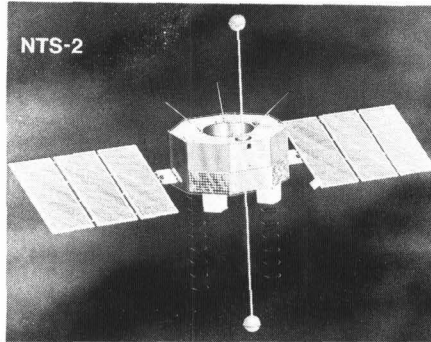
*Acting



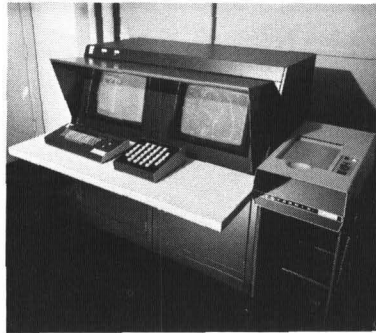
Mr. N. W. Guinard

Space Systems Division

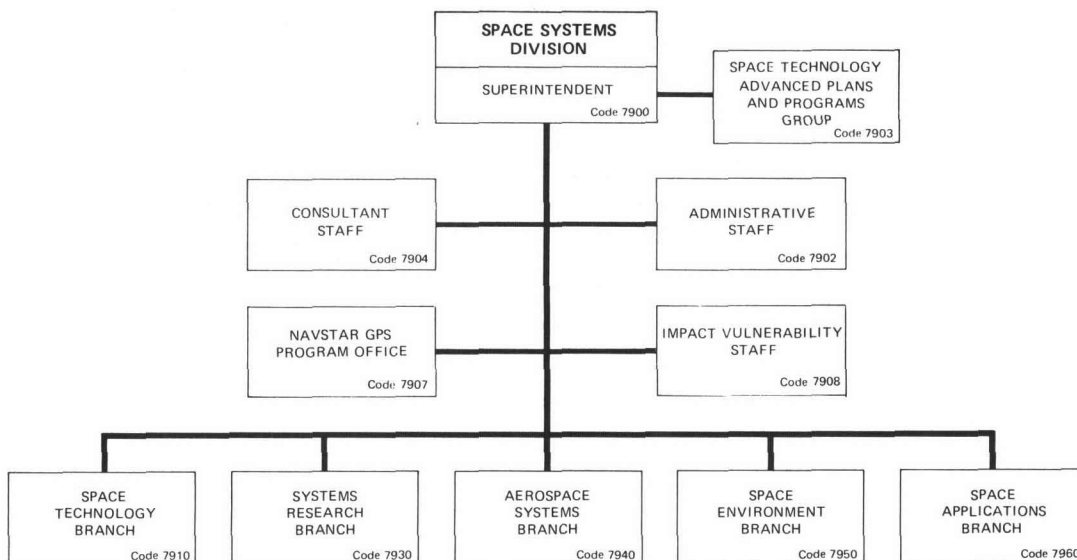
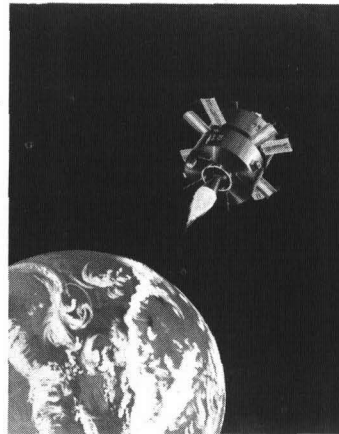
- SPACE TECHNOLOGY
- AEROSPACE SYSTEMS
- SPACE APPLICATIONS
- SPACE ENVIRONMENT
- SYSTEMS RESEARCH
- ADVANCED PLANS AND PROGRAMS
- NAVSTAR GPS PROGRAM
- IMPACT VULNERABILITY



GACT



SOLRAD HI



Basic Responsibilities

The Space Systems Division is responsible for research and development leading to the design, fabrication, launch, operation, and support of space systems for the Navy. The application of space technology to the naval mission extends through all of the R&D spectrum from concept formulation to launch techniques of the completed spacecraft and interface with boosters. Both active and passive sensor technology are developed for space use. The Division is also responsible for R&D in environmental problem areas which affect the operation and performance of these space vehicles and for sharing the results with other related activities.

Staff Activity

Impact
Vulnerability
Vulnerability Mechanics
Hypervelocity Kill Machine
Hypervelocity Impact Mechanics

Advanced Plans
and Programs Group
Project support
Systems engineering
Systems analyses
Data processing

NAVSTAR GPS
Program Office
Navigation
Geodesy
Time Synchronization

Branches

Space Technology
Large parabolic antenna systems
Electromagnetic radiation observations
Special media propagation
Electromagnetic exosphere phenomena
National radio quiet zone

Operations Research
Image processing research
Radiative transfer
Potential theory applications
Space mission analysis
Military OR methods
Formula manipulation on computers

Aerospace Systems
Ocean surveillance
Electromagnetic scatter research
Propagation research
O/S display systems

Aerospace Systems (continued)
Satellite system research
Data systems
Automatic computations

Space Environment
Space environment
Ionospheric predictions
Radiowave propagation
Data processing
Computer simulation
Solar-terrestrial relationships

Space Applications
Navigation systems
Satellite tracking
Geodesy systems
Time synchronization
System analysis
Hydrogen maser

Key Personnel

<u>Name</u>	<u>Title</u>
Mr. N.W. Guinard	Superintendent
Mr. E.L. Dix*	Associate Superintendent
Mrs. S.M. Randleman	Administrative Officer
Mr. E.L. Dix	Head, Advanced Plans and Programs Group
Mr. R.L. Easton	Manager, NAVSTAR GPS Program
Mr. W.W. Atkins	Head, Impact Vulnerability Staff
Dr. K.T. Alfriend	Consultant
Dr. J.G. Foreman	Consultant
Mr. J.H. Trexler	Head, Space Technology Branch
Dr. A.F. Petty	Head, Systems Research Branch
Mr. H.O. Ankenbruck	Head, Aerospace Systems Branch
Dr. J.M. Goodman	Head, Space Environment Branch
Mr. R.L. Easton	Head, Space Applications Branch

Personnel Complement

On Board: 125

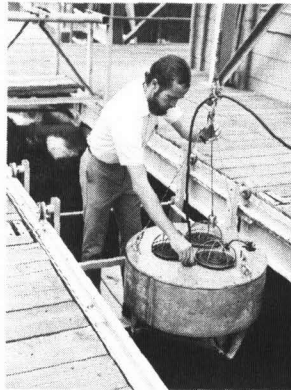
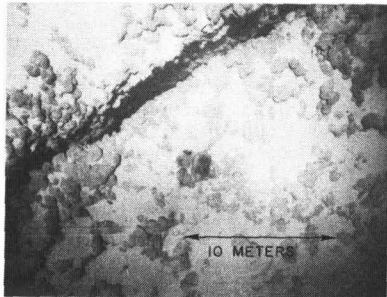
Total Estimated R&D Funding

Fiscal Year 1976: \$9,650,000

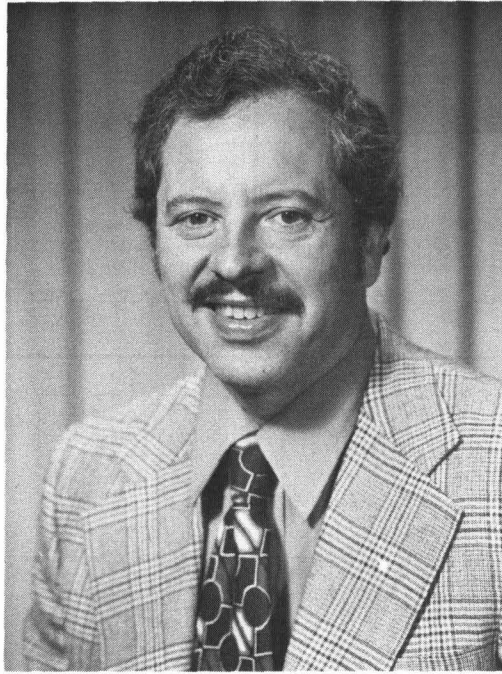
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Oceanology Area

The Naval Research Laboratory conducts research at sea and in the Laboratory in the fields of underwater acoustics, oceanography marine geophysics, atmospheric physics and ocean engineering and technology. Subjects of investigation include antisubmarine warfare, acoustic propagation and scattering, ambient noise in the ocean, signal processing, marine and atmospheric pollution, instrumentation systems for deep ocean search and inspection, and methods of design and installation of structures and apparatus for use in the ocean. NRL also serves as a focal point in the Navy for standardization of underwater sound measurements, and it holds a major responsibility for research and development in undersea acoustic surveillance.



Associate Director of Research for Oceanology



Mr. Richard R. Rojas*

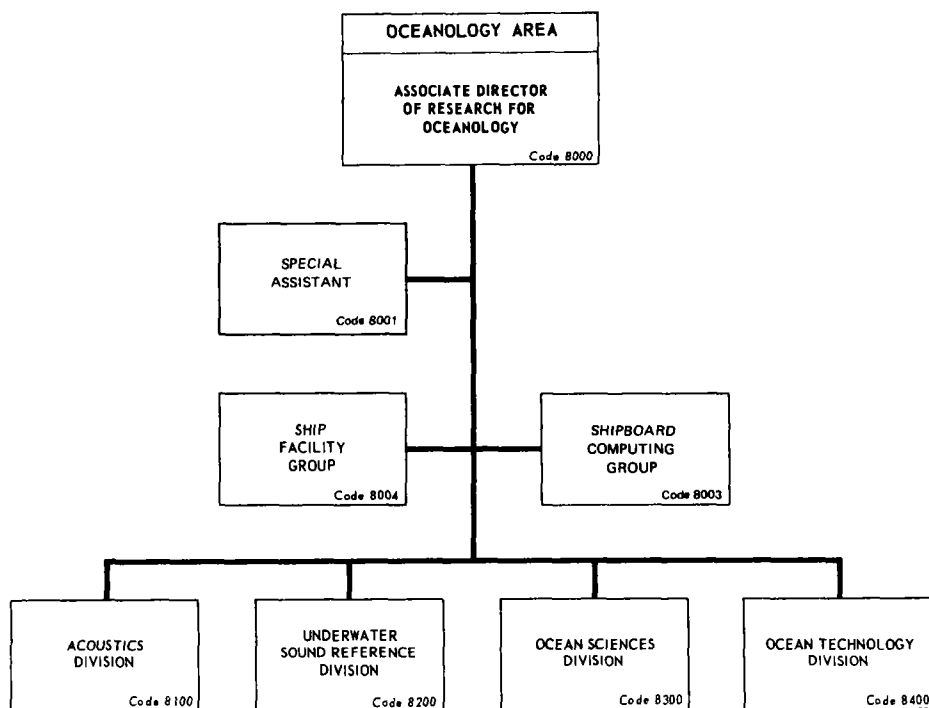
Mr. Rojas was born in New York City on September 25, 1931. He attended the College of the City of New York, where in 1952 he received a BEE degree. In 1961 he received a MEE degree from Drexel Institute of Technology, Philadelphia. Further graduate studies in mathematics and engineering were taken at 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 Magnovox 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 has the responsibility for directing an experimental and theoretical program whose purpose was to evaluate and develop advanced surveillance systems for the Navy. 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 Acoustical Society of America, Sigma Xi, the Institute of Electrical and Electronics Engineers, and a charter member of the Marine Technology Society.

*Acting



Key Personnel

<u>Name</u>	<u>Title</u>
Mr. R.R. Rojas*	Associate Director of Research for Oceanology
Mr. W.L. Brundage	Special Assistant
Mr. D. Steiger	Head, Shipboard Computing Group
Mr. A.L. Gotthardt	Head, Ship Facility Group
Dr. J.C. Munson	Superintendent, Acoustics Division
Mr. R.J. Bobber	Superintendent, Underwater Sound Reference Division
Dr. V.J. Linnenbom	Superintendent, Ocean Sciences Division
Dr. J.P. Walsh	Superintendent, Ocean Technology Division

*Acting

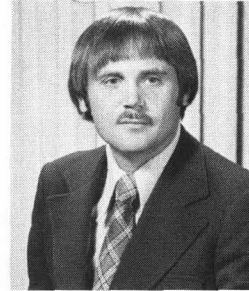
SHIPBOARD COMPUTING GROUP

Basic Responsibilities

The Shipboard Computing Group develops, operates and maintains computer facilities on NRL's research ship, NRL aircraft and at the Laboratory. The Group assists experimenters in the use of their measuring equipment and the utilization of the computer system in the automatic acquisition, reduction and processing of their data. The Group performs this work under the Associate Director of Research for Oceanology.

Key Personnel

<u>Name</u>	<u>Title</u>
Mr. D. Steiger	Head, Shipboard Computing Group



Mr. D. Steiger

Personnel Complement

On Board: 7

Total Estimated R&D Funding

Fiscal Year 1976: \$190,000

SHIP FACILITY GROUP

Basic Responsibilities

The Ship Facility Group is responsible for coordinating, maintaining, and providing ship services, sea-going facilities, and specialized expertise in the area of navigation, communication, explosives, and deck handling common to and required by the at-sea experiments of Research Divisions under the Associate Director of Research for Oceanology.

Key Personnel

<u>Name</u>	<u>Title</u>
Mr. A.L. Gotthardt	Head, Ship Facility Group



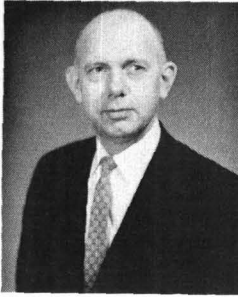
Mr. A. L. Gotthardt

Personnel Complement

On Board: 18

Total Estimated R&D Funding

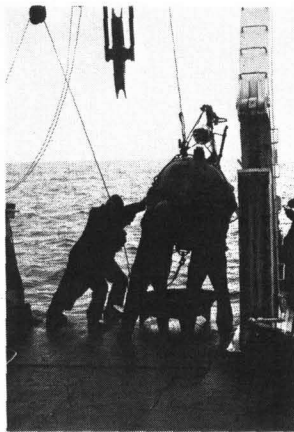
Fiscal Year 1976: \$3,000,000



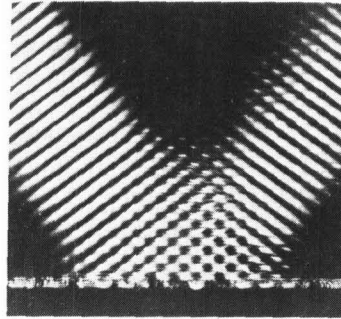
Dr. J. C. Munson

Acoustics Division

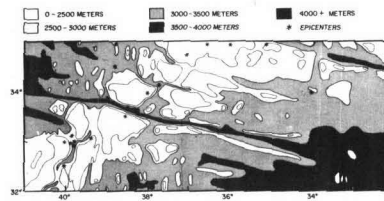
- LARGE APERTURE SYSTEMS
- PHYSICAL ACOUSTICS
- TRANSDUCERS
- PROPAGATION
- SHALLOW WATER SURVEILLANCE



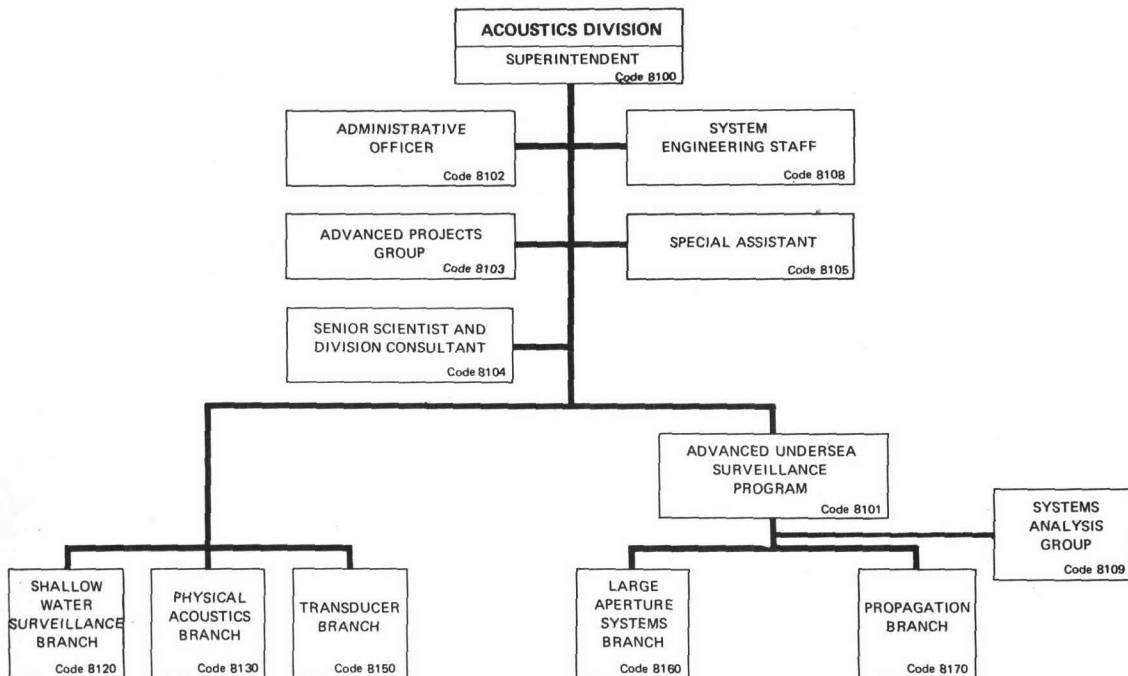
LAUNCHING
EXPERIMENTAL BUOYS



ACOUSTIC FIELD VISUALIZATION
WITH SCHLIEREN TECHNIQUES



MAP OF HAYES FRACTURE ZONE



Basic Responsibilities

The Acoustics Division has major responsibilities for basic and applied research and development in the Navy's undersea warfare programs. The spectrum of work covered in the program includes acoustic radiation and transduction, propagation and scattering, environmental prediction, surveillance system concepts, and system analysis. The Division conducts theoretical and experimental research programs in physical acoustics and ocean acoustics; it develops models of the interaction of acoustic energy with the ocean environment and with structures; it conducts experiments in the deep ocean, in acoustically shallow water and in the Arctic. The Division program is heavily oriented toward research and development in support of the undersea surveillance mission, but also includes other missions. The Division is supported by an Engineering Staff in the conduct of at sea experiments aboard the USNS HAYES and often uses other ships and aircraft in multiplatform experiments. The Division interacts with research programs outside the Division in areas such as oceanography, deep ocean technology, systems analysis, and Fleet operations.

Staff Activities

System Engineering
Support and ship facility
Acoustic sources
Engineering research

System Analysis
Systems studies
Surveillance systems
planning and evaluation

Advanced Projects
Advanced surveillance systems
Information processes for
underwater acoustics

Branches

Shallow Water Surveillance
Mode analysis
Model the signal, noise and
reverberation fields
Source and receiving array
configurations
Signal design and processing
requirements

Physical Acoustics
Ultrasonic investigation of
liquids and amorphous solids
Reflection, diffraction,
scattering by bodies
Target strength modeling
Light-sound interaction
Bulk and interface wave
properties

Transducer
Basic radiation theory
Electroacoustic modeling
Transducer physical models

Transducer (continued)
Calibration of large transducer
arrays
Acoustic array calculations

Large Aperture Systems
Active target detection and
classification
Propagation, coherency, and wave
front behavior
Low frequency monostatic and
bistatic reverberation studies
Propagation models
Natural and man-made noise
Microstructure

Propagation
Long-range propagation models
Application of long-range low-
frequency propagation
Scattering from ocean bottom,
surface, and volume
Arctic underwater acoustics
Very low frequency propagation
Acoustic fluctuations

Key Personnel

<u>Name</u>	<u>Title</u>
Dr. J.C. Munson	Superintendent
Mrs. J.L. Williams	Administrative Officer
Dr. S. Hanish	Senior Scientist and Division Consultant
Dr. J.C. Munson*	Head, Advanced Undersea Surveillance Program
Mr. F.C. Titcomb	Special Assistant to Superintendent
Mr. W.J. Finney	Head, Advanced Projects Group
Mr. R.C. Swenson	Head, System Engineering Staff
Mr. C.R. Rollins*	Head, Systems Analysis Group
Mr. R.H. Ferris	Head, Shallow Water Surveillance Branch
Dr. C.M. Davis, Jr.	Head, Physical Acoustics Branch
Mr. W.J. Trott	Head, Transducer Branch
Dr. B.B. Adams	Head, Large Aperture Systems Branch
Mr. B.G. Hurdle	Head, Propagation Branch

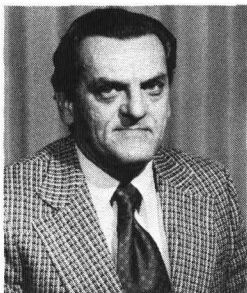
Personnel Complement

On Board: 139

Total Estimated R&D Funding

Fiscal Year 1976: \$8,047,000

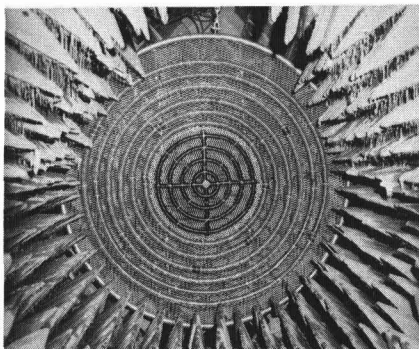
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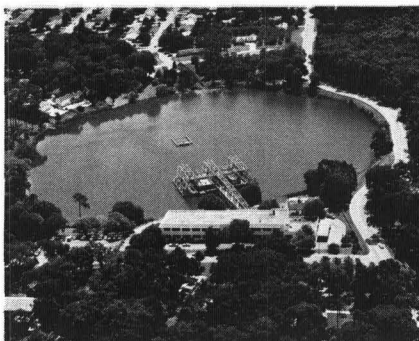
Mr. R. J. Bobber

Underwater Sound Reference Division

- UNDERWATER ELECTROACOUSTIC MEASUREMENT METHODS
- UNDER ELECTROACOUSTIC STANDARDS
- UNDERWATER ELECTROACOUSTIC MEASUREMENT SERVICES



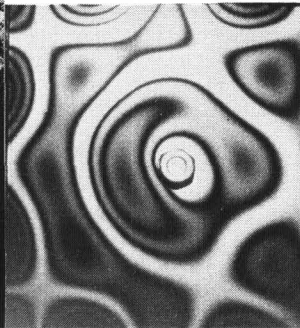
NEAR-FIELD TRANSDUCER
ARRAY IN ANECHOIC
TANK FACILITY



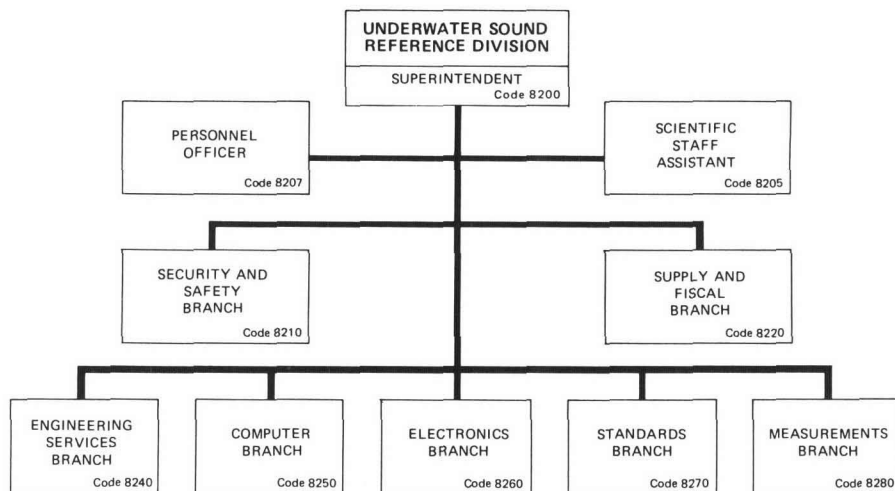
UNDERWATER SOUND REFERENCE DIVISION,
ORLANDO, FLORIDA



LEESBURG FACILITY-
CALIBRATION BARGE



HOLOGRAM OF VIBRATING
TRANSDUCER DIAPHRAGM



Basic Responsibilities

The Underwater Sound Reference Division is a focal point in the Navy for standardization in the science and technology of underwater sound measurements. Its research and development program is aimed at expanding the state of the art and providing Navy in-house expertise. Reference calibration measurements in a large complex of specialized facilities and calibrated standard transducers are available to all naval activities and contractors in support of undersea warfare programs.

Research and Development Branches

Measurements

Calibration theory and accuracy
Measurement methods
Standard calibration services
Sonar transducer test and evaluation
Measurements on acoustic materials
Measurement facility development

Computer

Computerized data reduction
Computation services

Standards

Acoustic materials
Electroacoustic standards
Acoustic sources
Specialized electroacoustic transducers
Vibration analysis techniques
Standard loan services

Electronics

Digital systems
Analog
Signal analysis

Key Personnel

<u>Name</u>	<u>Title</u>
Mr. R.J. Bobber	Superintendent
Mr. I.D. Groves	Associate Superintendent
Ms. D.P. Estridge	Technical Information Assistant
Mr. V.A. Lombardo	Personnel Officer
Mr. J.C. Michael	Head, Supply and Fiscal Branch
Mr. L.C. Voyles	Head, Security and Safety Branch
Mr. W.W. Carlson	Head, Engineering Services Branch
Mr. J.D. George	Head, Computer Branch
Mr. M.O. Rhue	Head, Electronics Branch
Mr. I.D. Groves	Head, Standards Branch
Dr. J.E. Blue	Head, Measurements Branch

Personnel Complement

On Board: 95

(Graded 76, Ungraded 19)

Total Estimated R&D Funding

Fiscal Year 1976: \$2,300,000

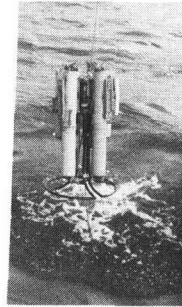


Dr. V. J. Linnenbom

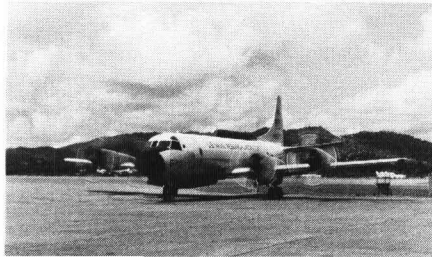
Ocean Sciences Division

- APPLIED OCEANOGRAPHY
- ATMOSPHERIC PHYSICS
- CHEMICAL OCEANOGRAPHY
- PHYSICAL OCEANOGRAPHY
- MARINE BIOLOGY & BIOCHEMISTRY
- NONACOUSTIC ASW

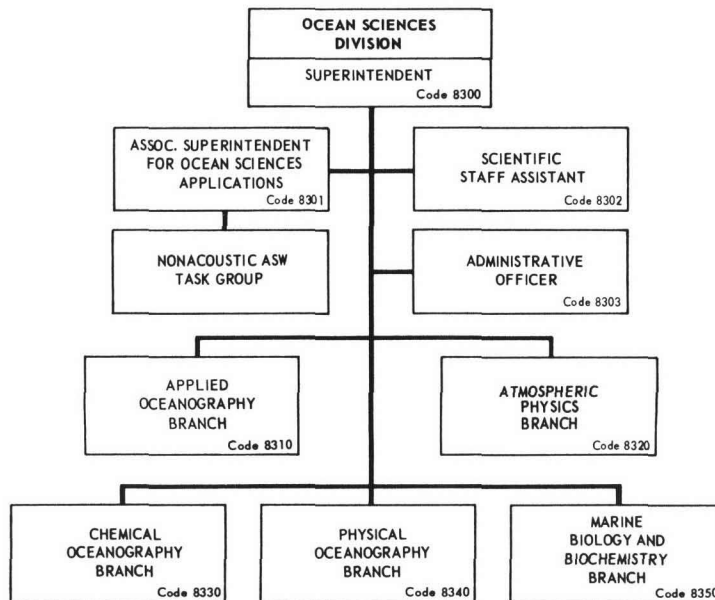
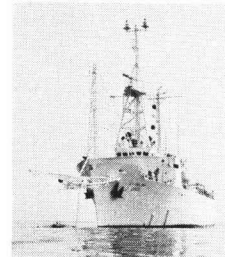
OCEANOGRAPHY



ATMOSPHERIC PHYSICS AND CHEMISTRY



AIR-SEA INTERACTIONS



Basic Responsibilities

The primary responsibility of the Ocean Sciences Division is research on fundamental problems in oceanography and the atmospheric sciences. At present, the Division studies problems in physical, chemical, and biological oceanography and in atmospheric physics to gain a better understanding of the Navy's operational environment. This knowledge is applied to various Navy programs in anti-submarine warfare, protection of the marine environment, protection against biodegradation of Naval materials, and prediction of oceanic and atmospheric phenomena affecting Naval operations.

Staff Activity

Nonacoustic ASW (R&D) Task Group

Branches

Applied Oceanography

Antisubmarine warfare
Hydrodynamics of submerged bodies
Radiometric characteristics of the ocean

Atmospheric Physics

Marine boundary layer meteorology
Aerosol and cloud physics
Atmospheric electricity
Weather instrumentation

Chemical Oceanography

Physical chemistry of seawater
Dissolved gases in seawater
Marine atmospheric chemistry

Physical Oceanography

Ocean hydrodynamics and turbulence
Wave interactions
Air-sea interactions

Marine Biology & Biochemistry

Marine biodegradation of materials
Marine biochemistry
Biological oceanography
Bioluminescence
Chemosensing

Key Personnel

<u>Name</u>	<u>Title</u>
Dr. V.J. Linnenbom	Superintendent
Dr. J.O. Elliot	Associate Superintendent for Ocean Science Applications Director, Nonacoustic ASW (R&D) Task Group
Mr. R. Nekritz	Scientific Staff Assistant
Mrs. R.M. Baltzell	Administrative Officer
Dr. A.H. Schooley	Senior Research Scientist
Dr. J.O. Elliot*	Head, Applied Oceanography Branch
Dr. L.H. Ruhnke	Head, Atmospheric Physics Branch
Dr. C.H. Cheek	Head, Chemical Oceanography Branch
Dr. J.M. Witting	Head, Physical Oceanography Branch
Dr. D.W. Strasburg	Head, Marine Biology and Biochemistry Branch

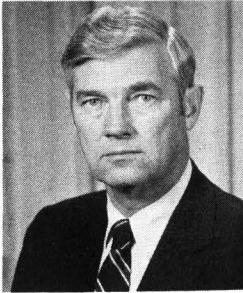
Personnel Complement

On Board: 78

Total Estimated R&D Funding

Fiscal Year 1976: \$4,300,000

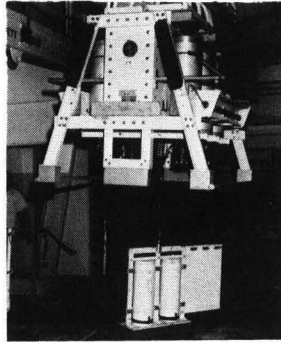
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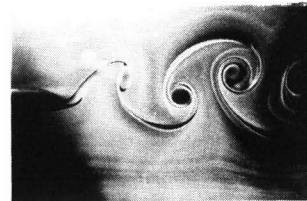
Dr. J. P. Walsh

Ocean Technology Division

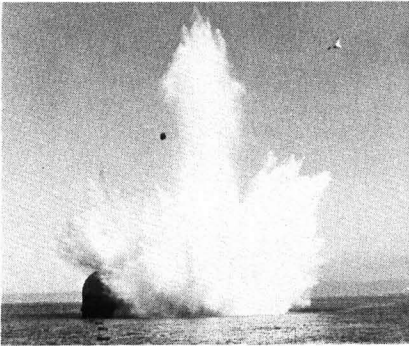
- OCEAN ENGINEERING
- MECHANICS OF MATERIALS
- OCEAN INSTRUMENTATION
- APPLIED MECHANICS
- SHOCK AND VIBRATION INFORMATION CENTER



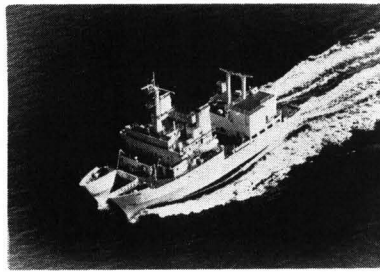
LIBEC



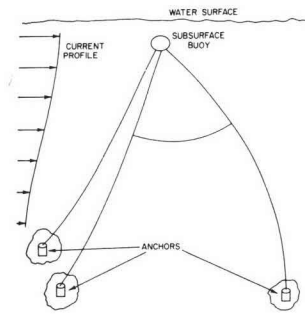
VORTEX SHEDDING FROM A VIBRATING CYLINDER



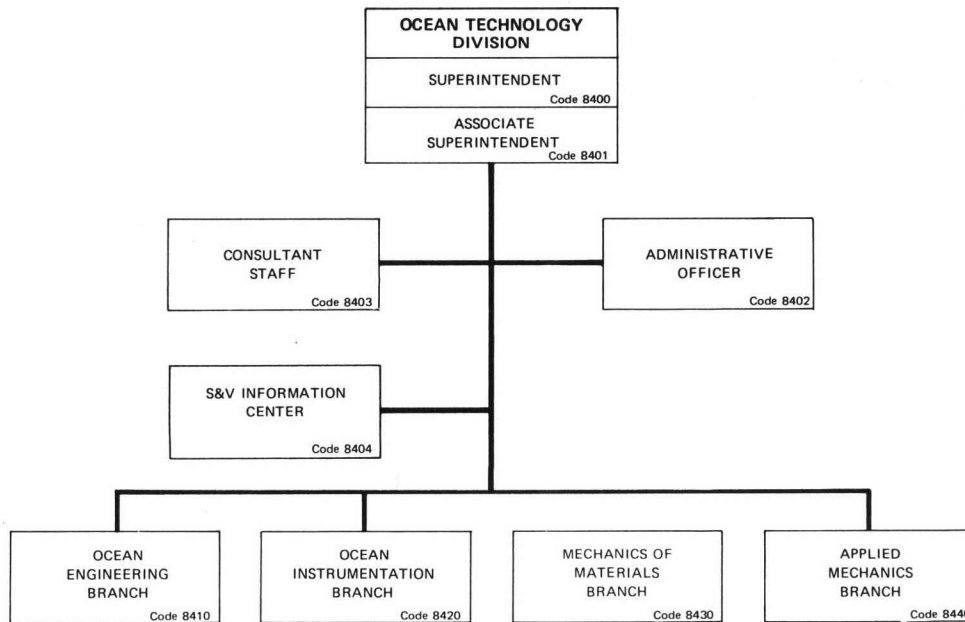
UNDERWATER SHOCK TESTS



USNS HAYES



CABLE ARRAYS



Basic Responsibilities

The Oceanology Technology Division research, develops, and applied specialized equipment, instrumentation, and techniques for conducting ocean and ocean-floor operations, and it evolves operational technology for advanced systems. The division utilizes advanced materials and design technology for engineering optimization of required equipment, instrumentation, and techniques for conducting ocean and ocean-floor operations, and it evolves operational technology for advanced systems. The division utilizes advanced materials and design technology for engineering optimization of required equipment. It also conducts research activities in select areas of ocean technology with coupling and support activities related to other ongoing research and development in these and other fields of interest. The DoD Shock and Vibration Information Center is included in the Division; this Center provides a single source for up-to-date information on shock and vibration for scientists and engineers. This Division, in conjunction with other Divisions of NRL and out-of-house agencies, brings the collective expertise to bear on crucial problems.

Staff Activity

S&V Information Center

Branches

Ocean Engineering

Research and development on ocean systems, subsystems, and components
Systems engineering
Design
Conduct at-sea operations

Mechanics of Materials

Fracture mechanics and fracture strength
Plastic flowing
Compression failure mechanisms
Armor research and development
Deep submergence materials-structures
Missile component failure
Nondestructive testing

Applied Mechanics

Shipboard shock fundamentals
Shock protection for weapons systems
Methods for design against shock
Fracture mechanics design studies
Developmental studies of prototypes
Shock strength of materials
Hydromechanic studies

Ocean Instrumentation

Instrumentation analysis, research and development
Sensors, detectors
Data and signal processing
Stress and kinematic quantities measurement

Key Personnel

<u>Name</u>	<u>Title</u>
Dr. J.P. Walsh	Superintendent
Mrs. A.G. Branham	Administrative Officer
Dr. R.O. Belsheim	Consultant
Mr. H.C. Pusey	Head, S&V Information Center
Mr. G.O. Thomas	Head, Ocean Engineering Branch
Mr. H.A. Johnson	Head, Ocean Instrumentation Branch
Dr. J.M. Krafft	Head, Mechanics of Materials Branch
Dr. F. Rosenthal	Head, Applied Mechanics Branch

Personnel Complement

On Board: 84

Total Estimated R&D Funding

Fiscal Year 1976: \$4,200,000

The Support Services Department

The Director of Support Services is a Navy Captain with appropriate training and experience; he reports to the Director of NRL. His primary responsibility is the supervision, coordination, and control of the administrative and service operations required in support of the work of the Research Department. Usually, he is the next senior officer to the Director and assumes the responsibilities of and acts for the Director in his absence.

The Director of Support Services is responsible for:

guiding and coordinating the service divisions of the Laboratory (Engineering Services, Supply, Public Works, Technical Information, and Chesapeake Bay) and also his staff functions (Safety Office and Patent Counsel) so that services rendered are adequate, prompt, accurate, and economical in the use of men and money.

implementing, for the Director of NRL, the orders and instructions of higher authority in a manner appropriate to the research environment as manifested in the policies and the organization of the Laboratory.

being familiar with the scientific program and for following the progress of the scientific efforts of the Laboratory in sufficient detail to ensure that administrative decisions are made which support the scientific program.

assisting the Director of NRL in maintaining an overall plan of organization for the best direction and control of the Laboratory.

keeping the Director of NRL advised of matters requiring his attention, decision, or other action; acting for the Director of NRL in the approval of usual or routine matters; for assisting the Director of NRL generally with administrative detail, correspondence, reports, and similar matters.

formulating, amending, and issuing instructions, policy statements, and procedures approved by the Director of NRL.

The Director of Support Services keeps in constant touch with the Director of Research to ensure that the service units of the Laboratory are providing complete support to the scientific divisions. He coordinates with the Director of Research in the planning and carrying out of administrative actions affecting Research Department organization and personnel; and he maintains a close working relationship with the Chief Staff Officer and officers assigned to him to assure provision of support services in operations conducted by the Chief Staff Officer. He also has direct "line" authority over the heads of special staff and service divisions.

Director, Support Services

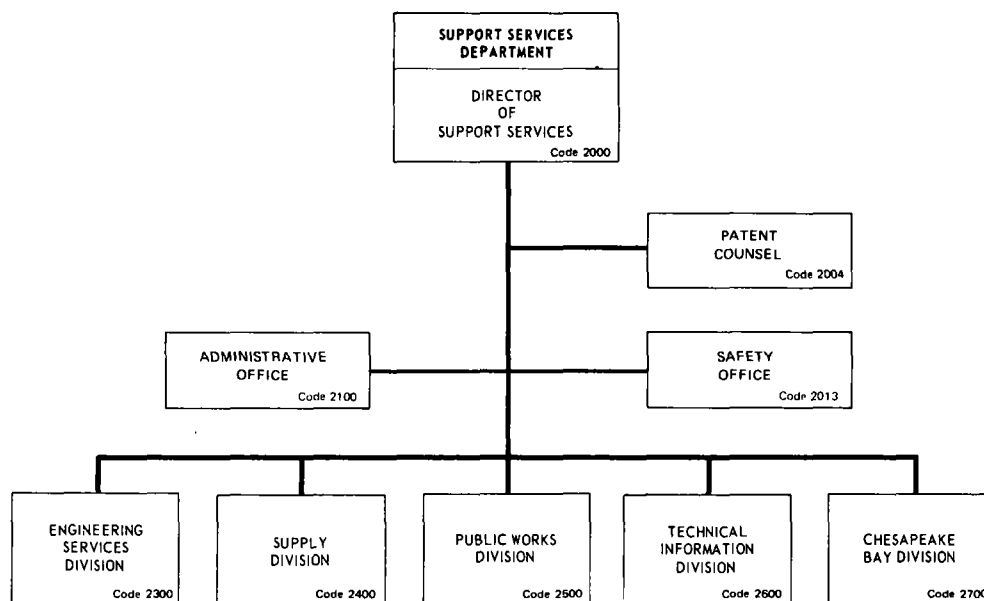


Captain Kenneth P. Hughes

CAPTAIN KENNETH P. HUGHES, [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] graduate of the U.S. Naval Academy. He was also graduated from the U.S. Naval Postgraduate School, Ordnance Engineering Curriculum. In addition, he is a graduate of the Industrial College of the Armed Forces, Class of 1976.

CAPTAIN HUGHES served successive tours on the USS O'HARE (DDR-889), USS DONNER (LSD-20), and as Aide and Flag Lieutenant to Commander Amphibious Group Four. After Postgraduate School he served as Commanding Officer, USS LUISENO (AFT-156), and as Executive Officer on the USS STAINAKER (DD-863). His other assignments included a tour with the Undersea Directorate, Naval Ordnance Systems Command; as Commander, Task Group 115, as Senior Advisor, Third Coastal Zone, Vung Tau, Vietnam; and as Assistant to Commander, Anti-Submarine Warfare Projects for Test and Evaluation. CAPTAIN HUGHES was designated for Ordnance Engineering Duty in 1970 and for Engineering Duty in 1974.

CAPTAIN HUGHES is married to the former Peggy J. Seawell of Norfolk, Virginia; they have one daughter.



Key Personnel

<u>Name</u>	<u>Title</u>	<u>Code</u>
CAPT K.P. Hughes, USN	Director of Support Services	2000
Dr. P. Schneider	Patent Counsel	2004
Mr. H.C. Kennedy, Jr.	Safety Officer	2013
Mr. J. Cooper	Head Administrative Office	2100
CDR H.D. Swanson, Jr., USN	Engineering Services Officer	2300
CDR R.W. Gunther, SC, USN	Supply Officer	2400
CDR A.E. Church, Jr., CEC, USN	Public Works Officer	2500
Mr. E.E. Kirkbride	Head, Technical Information Division	2600
CDR B.A. Bauer	Chesapeake Bay Division Officer	2700

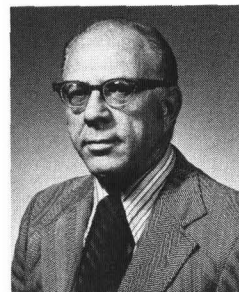
OFFICE OF PATENT COUNSEL

Basic Responsibilities

The Office of Patent Counsel provides services concerning inventions, patents, trademarks, copyrights, and other related matters. Patent applications are prepared, filed, and prosecuted on NRL inventions of significance to the Government. The Patent Counsel serves as consultant and adviser on patent and data clauses in R&D and procurement contracts, claims of patent or copyright infringement involving NRL, and the provisions in interagency agreements relating to inventions, patents, trademarks, copyrights, and related matters. Assistance is provided the Research Department through state-of-the-art searches in the patent literature pertinent to particular research problems.

Key Personnel

<u>Name</u>	<u>Title</u>
Dr. P. Schneider	Patent Counsel



Dr. P. Schneider

Personnel Complement

On Board: 8

ADMINISTRATIVE OFFICE

Basic Responsibilities

Basic responsibilities for the Administrative Office are to provide staff support to administrative officials of the Laboratory in the areas of Travel, Records and Correspondence Management, Files Management, Mail and Messenger service, Forms Management, Design and Analysis, Report Analysis and Control and Directives Management for all components of the Laboratory, updating the NRL Code Directory, and the administration of the Laboratory Parking Facilities. In addition, the office conducts routine administrative correspondence with other units of the Navy, DOD, and other governmental agencies.

Key Personnel

<u>Name</u>	<u>Title</u>
Mr. J. Cooper	Head, Administrative Office
Mrs. C. Schmitt	Administrative Officer
Mrs. T.R. Wilder	Head, Travel Branch
Mrs. L.V. Dabney	Head, Records and Correspondence Management Branch
Mr. O.L. Scott	Head, Mail and Messenger Branch



Mr. J. Cooper

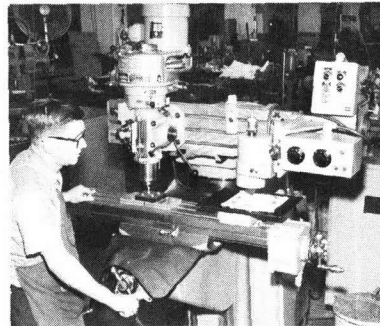
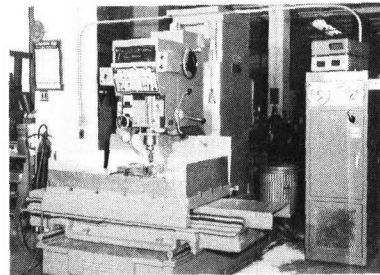
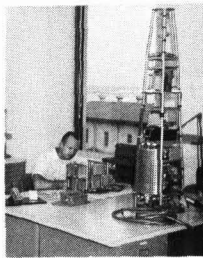
Personnel Complement

On Board: 34

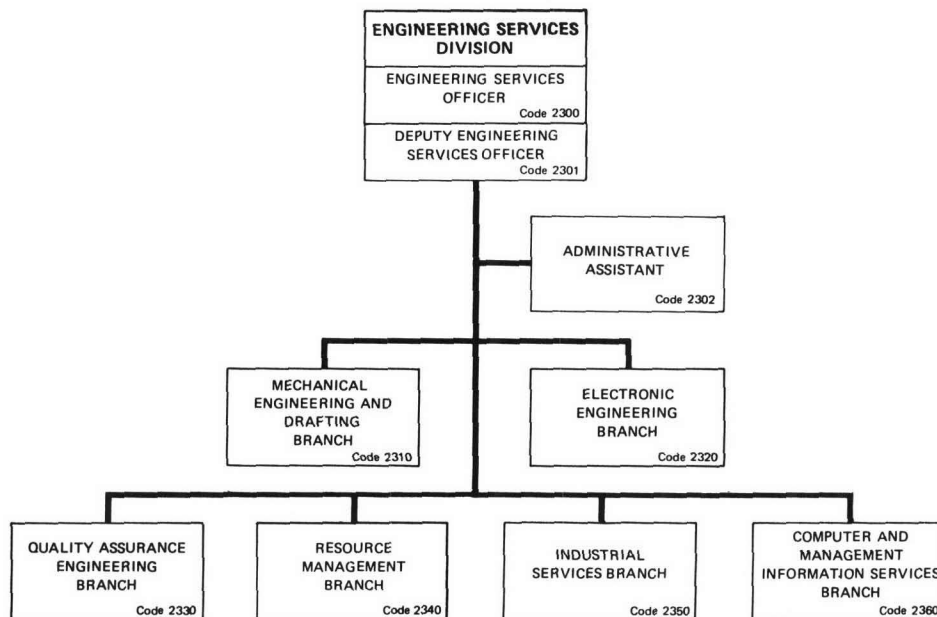


CDR H. D. Swanson, Jr. USN

Engineering Services Division



- MECHANICAL ENGINEERING AND DRAFTING
- ELECTRONIC ENGINEERING
- QUALITY ASSURANCE ENGINEERING
- RESOURCE MANAGEMENT
- INDUSTRIAL SERVICES
- COMPUTER AND MANAGEMENT INFORMATION SERVICES



Basic Responsibilities

The Engineering Services Division provides the engineering, design, fabrication, assembly, and test of experimental research equipment in support of the Laboratory's research efforts.

Key Personnel

<u>Name</u>	<u>Title</u>
CDR H.D. Swanson, Jr., USN	Engineering Services Officer
Mr. P.R. Shifflett	Deputy Engineering Services Officer
Mrs. D.A. Chiplock	Administrative Officer
Mr. M.A. Shimkus	Head, Mechanical Engineering and Drafting Branch
Mr. J.J. Brotzman	Head, Electronic Engineering Branch
Mr. P.C. Buck	Head, Quality Assurance Engineering Branch
Mr. I.F. Long	Head, Resource Management Branch
Mr. J.L. Leizear	Head, Industrial Services Branch
Mr. L.G. Murphy	Head, Computer and Management Information Services Branch

Personnel Complement

On Board: 432

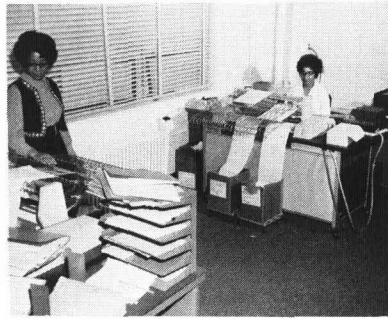
(Graded 155, Ungraded 276, Military 1)

Management & Staff	46
Engineers	21
Technicians	100
Journeyman	216
Machine Operators and Helpers	11
Apprentices	19
Clerical	19

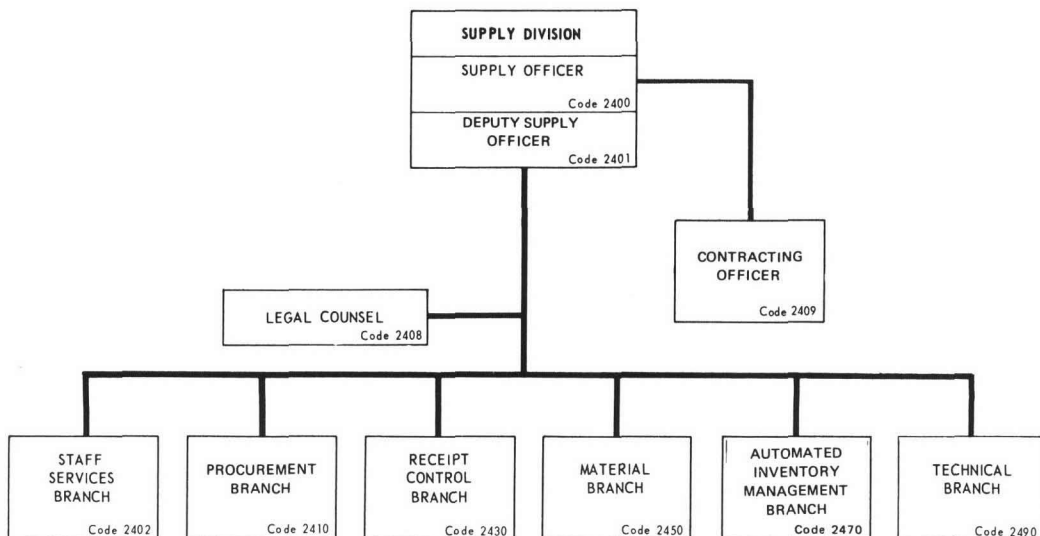


CDR R. W. Gunther

Supply Division



- STAFF SERVICES
- PROCUREMENT
- RECEIPT CONTROL
- MATERIAL
- MANAGEMENT
- TECHNICAL



Basic Responsibilities

The Supply Division provides service functions to the Laboratory and its field activities, including the operation of Supply issue stores, procurement of equipment, material, and contractual services, receipt, inspection and delivery of material and equipment; packing, shipping, and traffic management; and survey and disposal of excess and unusable property.

In addition, Supply offers technical and counseling services to the Research Departments, in the development of specifications for a complete procurement package; consultation as needed in the handling of claims against the Laboratory, guidance in the performance stages of contractual services, and transportation and storage problems.

During FY 1975 the Supply Division occupied 169,788 sq. ft. of building space; its stores (six retail and one bulk warehouse) inventory averaged \$1,538,287.00; stores issues totalled \$4,121,554.00; and the Procurement Branch processed 37,337 procurement documents totaling \$32,396,000.00 on the open-market with an additional 7,524 documents totaling \$58,017,432.00 to other Government organizations for a grand total of 44,861 documents totaling \$90,413,432.00.

Key Personnel

<u>Name</u>	<u>Title</u>
CDR R.W. Gunther, SC, USN	Supply Officer
Mr. R.S. Sylvest	Deputy Supply Officer
Atty. A.S. Horton	Legal Counsel
LCDR D.A. Tarantino	Contracting Officer
Mr. A.W. Medley, Sr.	Head, Staff Services Branch
LCDR D.A. Tarantino*	Head, Procurement Branch
Mrs. V.S. Thomas	Head, Receipt Control Branch
Mr. D.A. Turney*	Head, Material Branch
Mr. J.W. Altman	Head, Automated Inventory Management Branch
Mr. R.R. Black	Head, Technical Branch

Personnel Complement

On Board: 158

(Graded 108, Ungraded 48, Military 2)

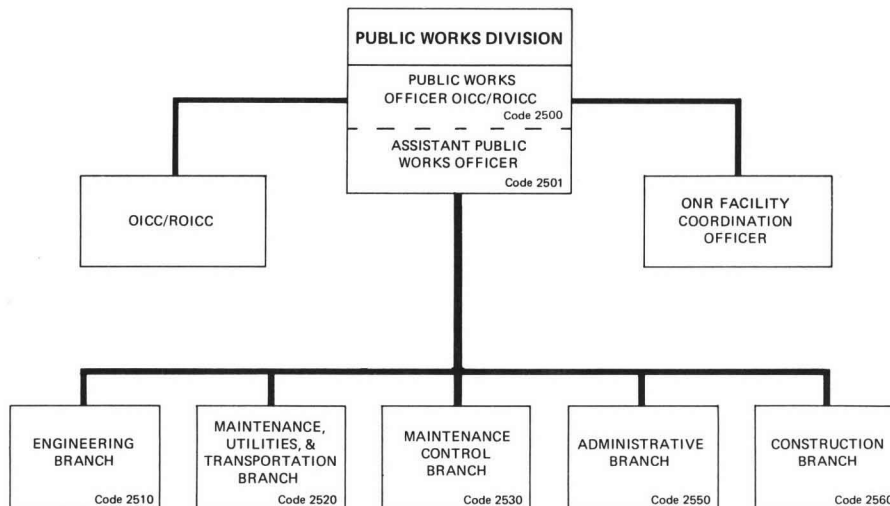
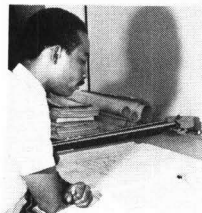
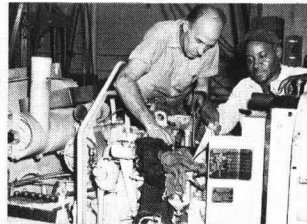
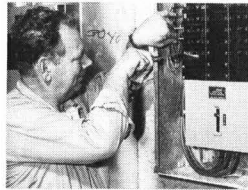
*Acting



CDR A. E. Church, Jr., CEC, USN

Public Works Division

- ENGINEERING
- MAINTENANCE, UTILITIES, & TRANSPORTATION
- MAINTENANCE CONTROL
- ADMINISTRATION
- CONSTRUCTION



Basic Responsibilities

The Public Works Division is responsible for the physical plant of NRL. This includes responsibility for the design, construction, operation, maintenance, and repair of all buildings, grounds, roads, utilities, and other structures and activities. Also included are transportation; weight handling and heavy-construction equipment; heating and refrigeration plants; electric, water, steam, air, and gas supply distribution; telephone communication systems; and sewage disposal.

The Public Works Division provides professional consulting services to the scientific divisions on facilities planning and engineering.

Key Personnel

<u>Name</u>	<u>Title</u>
CDR A.E. Church, Jr., CEC, USN	Public Works Officer/Officer in Charge of Construction/ROICC
LT. J.C. Haug	Assistant Public Works Officer
Mr. J.R. Lescault	Head, Administrative Branch
Mr. R.A. Jacques	Head, Engineering Branch
Mr. L.P. Carpenter	Head, Maintenance, Utilities, & Transportation Branch
Mr. R.O. Weidman	Head, Maintenance Control Branch
Mr. J.B. Canha	Head, Construction Branch

Personnel Complement

On Board: 386

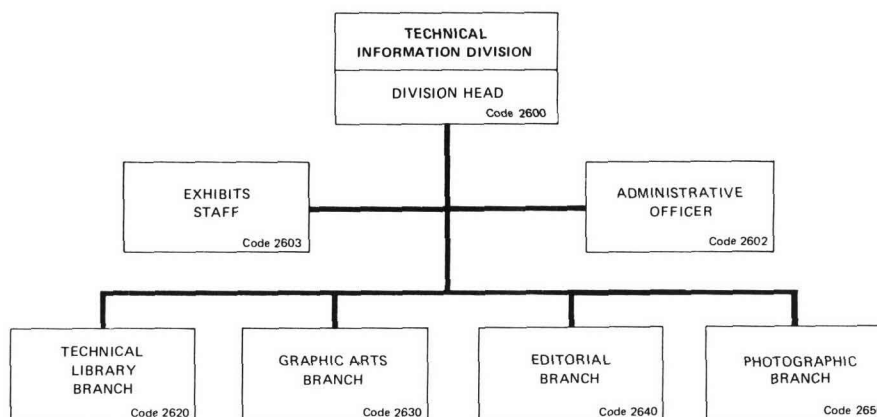
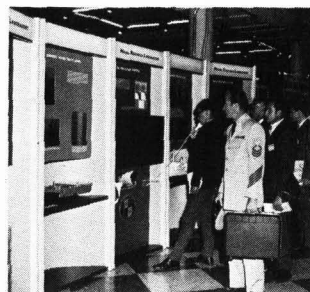
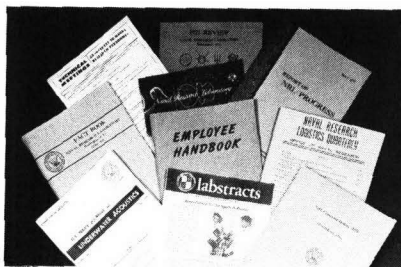
(Graded 50, Ungraded 334, Military 2)



Mr. E. E. Kirkbride

Technical Information Division

- EDITORIAL
- LIBRARY
- GRAPHIC ARTS
- EXHIBITS
- PHOTOGRAPHIC



Basic Responsibilities

The Technical Information Division plans and administers the Laboratory's program of preparing and disseminating the results of scientific research through official publications, scientific journals, presentations, films, and exhibits. It provides centralized professional services to both NRL and ONR in writing, editing, printing, exhibits, photography, graphic arts, documentation, and language-translations. It operates one of the Navy's largest integrated technical libraries with holdings of 202,000 bound volumes and 400,000 technical reports.

Key Personnel

<u>Name</u>	<u>Title</u>
Mr. E.E. Kirkbride	Head, Technical Information Division
Mrs. D.E. Cameron	Administrative Officer
Mr. H. Poole	Exhibits Officer
Mrs. D.P. Baster	Librarian
Mr. D. Darr	Head, Graphic Arts Branch
Mr. S.R. Smith*	Head, Editorial Branch
Mr. J. Otto	Head, Photographic Branch

Personnel Complement

On Board: 129

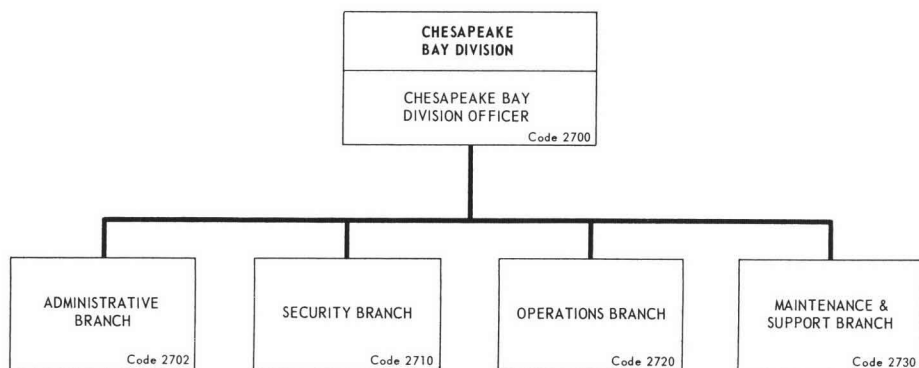
(Graded 115, Ungraded 19)

*Acting



CDR Bruce Bauer

Chesapeake Bay Division



Basic Responsibilities

The Chesapeake Bay Division provides and maintains facilities and services for test development and evaluation of radar, optical radiation, and communications equipment. It also services and supports all research projects conducted at the Chesapeake Beach and Tilghman Island complexes of NRL.

The Physical Plant

Located in a relatively clear area away from any congestion or industrial interference, the main site, at Chesapeake Beach, covers 174.9 acres containing 200 structures of various sizes and construction, 6 of which are major laboratory buildings. There is over 200 feet of usable dock space with a water depth of 4 to 7 feet, located 2 miles north of the main site. Off-site facilities include the Tilghman Island Facility, located directly across the Bay from CBD at a distance of about 10 miles; the Theodolite House, at North Beach; and the Off-Shore Platform, approximately 2 miles southeast of CBD in the Bay.

Research watercraft available at CBD include one 60-foot catamaran, a self-propelled Jack-up-Barge, and two 36-foot motor boats. These are used in support of research projects and for transportation between off-site facilities. Housing includes 24 public quarters.

Key Personnel

<u>Name</u>	<u>Title</u>
CDR B.A. Bauer, USN	Division Officer
Mrs. M.J. Hamor	Administrative Officer
	Security Officer
BMCN G. Dewey, USN	Operations Officer
Mr. R.M. Conlyn	Station Engineer

Research Division Representatives

Optical Sciences Division

Mr. F.R. Fluhr, Optical Science Division Representative
Mr. T.H. Cosden, Field Experiments Representative

Radar Division

Mr. M.W. Lehman, Radar Division Representative
Mr. P.D. Ward, Target Characteristics Branch
Mr. M.C. Licitra, Search Radar Branch

Plasma Physics Division

Mr. L.T. Humphreys, Space Systems Division Representative

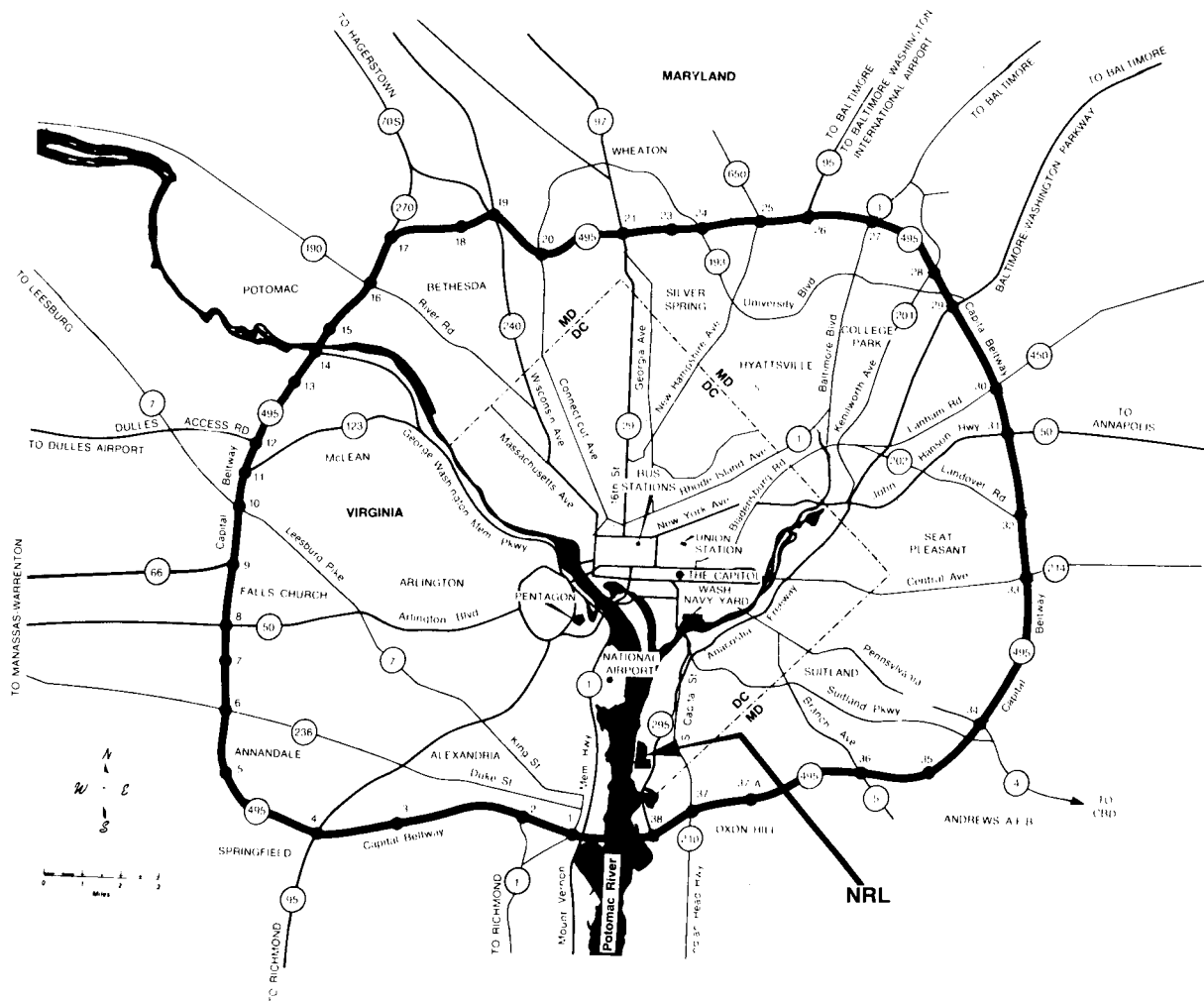
Awards Received by Civilian Employees

As of June 30, 1976

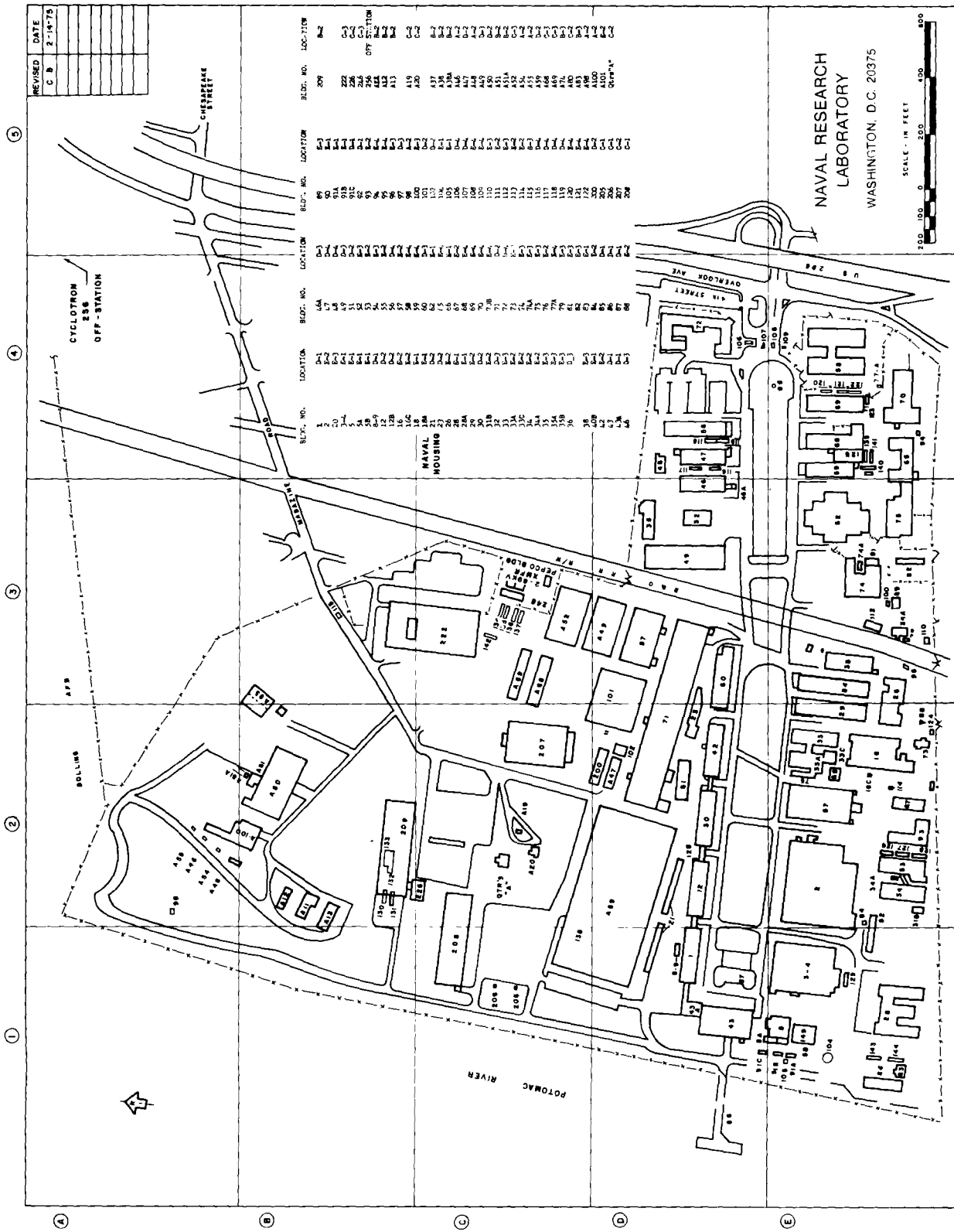
<u>Government Awards</u>	<u>Number</u>
Chair of Science Award (local NRL Award)	4
Department of Defense Certificate of Merit	1
Department of Defense Distinguished Civilian Service Award	6
E.O. Hulburt Annual Science Award (local NRL Award)	21
Federal Woman's Award	1
NASA Scientific Achievement Medal	1
National Medal of Science from the President of the United States	1
Navy Award for Distinguished Achievement in Science	5
Navy Captain Robert Dexter Conrad Award	7
Navy Distinguished Civilian Service Award	63
Navy Meritorious Civilian Service Award	212
Navy Superior Civilian Service Award	41
The Certificate of Merit from the President of the United States	11
The Medal of Merit from the President of the United States	1
The President's Award for Distinguished Federal Civilian Service	2
 <u>Non-Government Awards</u>	
A.G. Bissell Memorial Award	1
A.K. Doolittle Award	1
Albert A. Michelson Award of the Franklin Institute	1
Albert Sauveur Achievement Award	1
American Nuclear Society Special Award	1
Ancel Prize of the French Photographic Society	1
Annual Award of the Society for Applied Spectroscopy	2
Applied Science Award of Sigma Xi	25
Arthur S. Fleming Award of the Washington Chamber of Commerce	4
Award in the Mathematical Sciences of the Washington Academy of Sciences	1
Award for Technical Achievement of the American Society of Mechanical Engineers	1
Award in the Physical Science of the Washington Academy of Sciences	4
Award of Merit of the American Society for Testing and Materials	3
Brazilian Legion of Naval Merit	1
Burgess Memorial Award of the American Society for Metals	3
Burgess Memorial Lecture of the American Society for Metals (Washington Section)	1
Burgess Prize Award of the American Society for Metals	2
Charles B. Dudley Medal of the American Society for Testing Materials	4
District Meritorious Certificate Award of the American Welding Society	1
Dryden Research Award of the American Institute of Aeronautics and Astronautics	1
E. Edward Pendray Award of the American Rocket Society	1
Eddington Medal of the Royal Astronomical Society (Great Britain)	2
Engineers and Architects Day Award	4
Engineering Science Award of the Washington Academy of Sciences	2
Frank Booth Award - International Power Sources Symposium	1
Frederic Ives Award of the Optical Society of America	2
Garvan Medal of the American Chemical Society (Dr. Isabella Karle, 4/76)	1
George Kimball Burgess Memorial Award	1
Gold Medal Award of the American Society of Naval Engineers	2
Harry Diamond Award of the Institute of Radio Engineers	4
Henry Draper Medal of the National Academy of Sciences	1
Hillebrand Prize of the American Chemical Society	4
Irwin Vigness Award by the Institute of Environmental Sciences	1
James H. Wyld Memorial Award of the American Rocket Society	1
John Adam Fleming Award by the American Geophysical Union of the National Academy of Sciences - National Research Council	1
John A. Penton Gold Medal of the American Foundrymen's Society	1
Joseph S. Seaman Gold Medal Award of the American Foundrymen's Society	1
Kendall Company Award of the American Chemical Society	1
Kratel Award of the Eurocontamination Foundation	1
Janssen Medal of the French Photographic Society	1
John Scott Medal of the City of Philadelphia	1
M. Barry Carlton Award Institute of Electrical & Electronics Engineers	1
Marcus A. Grossman Award - American Society of Metals	2
Mayo D. Hersey Award of the American Society of Mechanical Engineers	1
Medal of Honor Award of the Institute of Radio Engineers	2

<u>Non-Government Awards (Continued)</u>	<u>Number</u>
Morris Liebman Memorial Prize of the Institute of Radio Engineers	1
National Academy of Sciences, elected members	3
National Service League Career Service Award	1
National Award of the American Society of Lubrication Engineers	1
Notre Dame Centennial Award	2
Outstanding Americans Foundation Award	1
Patrons Award of the Institute of Radio Engineers	2
Pittsburgh Spectroscopy Award of the Spectroscopy Society of Pittsburgh	1
Professional Achievement Award of the D.C. Council of Engineering and Architectural Societies	1
Progress Award of the Photographic Society of America	1
Pure Science Award of Sigma Xi	25
Reliability and Quality Control Award of the Radio Engineers Professional Group	2
Rockefeller Public Service Award	1
Sam Tour Award	2
Service Award of the Chemical Society of Washington	1
Service to Mankind Award of the Washington Sertoma Award	1
Society of Technical Writers & Publishers - Washington, D.C. Chapter	1
Society of Women Engineers Achievement Award	1
Space Science Award of the American Institute of Aeronautics & Astronautics	1
Stuart Ballantine Medal of the Franklin Institute of Pennsylvania	2
Trent - Credo Award - Acoustical Society of America	1
United Negro College Fund Distinguished Service Citation	1
Victor K. LaMer Award for Outstanding Graduate Research in Colloid and Surface Chemistry	1
Washington Academy of Science Annual Award for Achievement in Physical Sciences (Dr. David L. Griscom, 3/20/75)	1
William Blum Award of the Washington-Baltimore Electrochemical Society	5
William Hunt Eisenman Medal	1

Location of NRL



Location of Buildings at Main Site



[illegible]

Listing of NRL Sites and Facilities

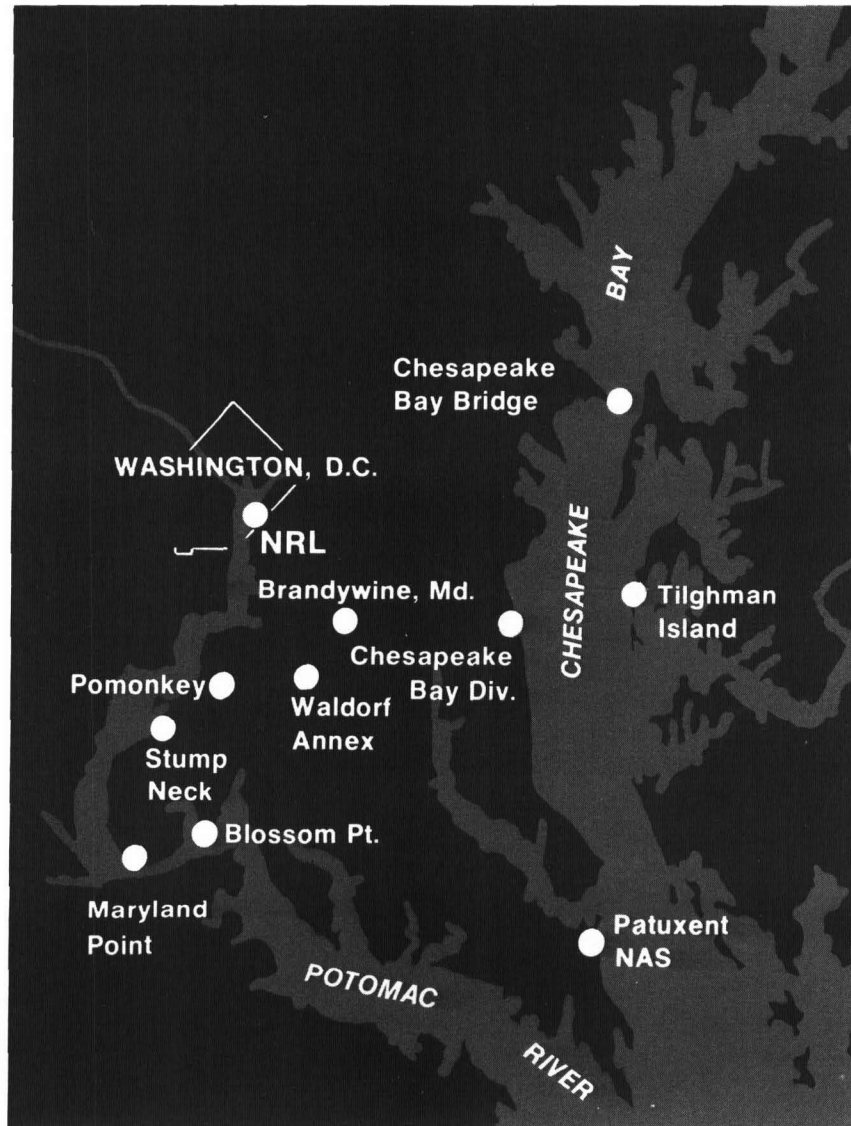
January 1, 1976

Station and Location	Acreage		Class I & II Plant Account		
	Fee Title	Easement or Purchase	Permit or Lease	Buildings and Structures	
Naval Research Laboratory, Wash., D.C.	129.23		1.29	63,360,819	156
Cyclotron Building Site					
Bolling Air Force Base, Wash., D.C.			5.24	3,869,189	1
Radio Research Site					
Coast Guard Radio Station, Alex., Va.			55.40		
A&A Test Site, Shenandoah National Park, Luray, Va.			NA		
Coast Guard Station, Va. Beach			NA		
NRL Flight Support Detachment, Naval Air Station, Patuxent River, Md.			NA		
Chesapeake Bay Division, Ches. Beach, Md.	174.90			10,526,929	174
Multiple Research Site, Tilghman Is., Md.	2.00			110,662	9
Dock Facility, Chesapeake Bay, Md.			0.60	18,533	5
Theodolite Station, North Beach, Md.			0.29	800	1
Tunnel under Maryland State Road 261			NA		
Optics Research Platform in the Chesapeake Bay, Md.			0.23	1,500	2
Research Platform, Ches. Bay Bridge, Md.				21,400	1
2 Foghorn Platforms, Chesapeake Bay Bridge, Md.			NA		
Research Gondola, Ches. Bay Bridge, Md.			NA		
NRL Waldorf Annex, Md.	23.94	35.16		1,291,301	35
Radio Astronomy Observatory, Md. Pt., Md.	24.30		197.88	265,988	12
Radio Antenna Range, USAF Receiver Site Brandywine, Md.			22.98		
Radio Research Site, Stump Neck Annex, Naval Ordnance Station, Indian Head, Md.			5.90		1
Free Space Antenna Range, Pomonkey, Md.	14.12	28.40		811,768	13
Navy Radio Research Station, Sugar Grove, West Va.				74,091	2
Satellite Tracking Facility, Blossom Point, Md.			23.00		
Edgewood Arsenal, Md.			NA		
Underwater Sound Reference Division, Orlando, Fla.	10.46			1,242,389	32
USRD, Leesburg Facility, Bugg Spring, Fla.			6.92	198,267	11
Marine Corrosion Lab., Key West, Fla.			NA		
*Underwater Track Facility					
Argus Island (near Bermuda)			NA		
Research Site, Wayne County, West Va.			NA		
Berthing for USNS HAYES and GSA Pier, Alexandria, Va.			NA		
Totals:	1,812.96	66.41	319.73	77,550,969	

*Now being screened for disposal

Location of Principal Field Stations

Another station is located at Sugar Grove, W.Va.
The Underwater Sound Reference Division is
located at Orlando, Fla.



Research Platforms

Aircraft

1. The S2D (BUNO 149240) contains specially installed equipment and wing-mounted pods for cloud physics research. It is also used in chaff research and for short-term experiments compatible with space limitations of the aircraft.
2. The EC-121K (BUNO 141297) is used mainly by the Tactical Electronic Warfare Division to experiment, evaluate, and improve Fleet electronic warfare capabilities.
3. The EP3A (BUNO 149670) is primarily used for airborne radiometric studies and to a lesser degree for cloud physics and acoustic research.
4. EP-3A (BUNO 149674) is used for research in atmospheric physics studies, electronic radar, and various projects requiring minimal aircraft conversion.

Available Ships

1. USNS HAYES (T-AGOR-16)
(Will use the inherent catamaran design to accomplish oceanographic and acoustics research at sea)
2. Fleet units are regularly scheduled for NRL in support of CNO assigned projects by OPTEVFOR.

<u>Code</u>	<u>Office and Incumbent</u>	<u>Ext.</u>
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OFFICE OF DIRECTOR

1000	Director	CAPT L.M. Noel	73403
1001	Executive Assistant	Mr. S.L. Cohen	73231
1003	DEEO Officer	Mr. W.H. Webster	72486
1005	Public Affairs Officer	Mr. J.E. Sullivan	72541
1100	Director of Management Office	Mr. A.M. Toscano	72030
1200	Chief Staff Officer	CAPT E.L. Ebbert	73621
1226	Security Section	Mr. R.E. Abercrombie	73711
1300	Comptroller	Mr. P.F. Kennedy	73405
1800	Director of Civ. Pers.	Mr. F.D. Wallace	73421
1810	Personnel Operations	Mr. D.J. Blome	73030

SUPPORT SERVICES DEPARTMENT

2000	Director of Support Services	CAPT K.P. Hughes	72879
2300	Engineering Services Officer	CDR H.D. Swanson, Jr.	72300
2400	Supply Officer	CDR R.W. Gunther	73446
2500	Public Works Officer	CDR A.E. Church, Jr.	73371
2600	Head Tech.Info.Div.	Mr. E.E. Kirkbride	73388
2700	Chesapeake Bay Div. Officer	CDR B.A. Bauer	
	(CBD Interdepartmental Dial System Tel. No. is 1220-201, Outside Tel. No. is Area Code 301-257-2111)		

RESEARCH DEPARTMENT

4000	Director of Research	Dr. A. Berman	73301
4010	Research Program Office	Mr. A. Hollings	73081
5000	Assoc. Director of Research for Electronics	Dr. H.Q. North	73324
5200	Electronics Div. Supt.	Mr. A. Brodzinsky	73525
5300	Radar Division Supt.	Dr. M.I. Skolnik	72936
5400	Commun. Science Div. Supt.	Dr. B. Wald	72903
5500	Optical Sciences Div. Supt.	Dr. T.A. Jacobs	73171
5700	Tactical Elec. Warfare Division Supt.	Mr. L.A. Cosby	72191
6000	Assoc. Dir. of Research for Mat. and Gen. Sciences	Dr. A.I. Schindler	73566
6030	Lab for Structure of Matter	Dr. J. Karle	72665
6100	Chemistry Div. Supt.	Dr. F.E. Saalfeld*	73026
6300	Engineering Materials Division Supt.	Dr. L.R. Hettche	72926
6400	Mat. Science Div. Supt..	Dr. C.C. Klick	73351
6600	Radiation Tech. Div. Supt.	Dr. J. McElhinney	72931
7000	Assoc. Dir. of Research for Space Sci. and Tech.	Dr. H. Rabin	72964
7020	Lab for Cosmic Ray Physics	Dr. M.M. Shapiro	72965
7030	Advanced Projects Office Manager	Mr. R.D. Mayo	72043
7040	Spacecraft Technology Center	Mr. P.G. Wilhelm	72073
7100	Space Science Div. Supt.	Dr. H. Friedman	73363
7700	Plasma Physics Div. Supt.	Dr. T.P. Coffey	72723
7900	Space Systems Div. Supt.	Mr. N.W. Guinard	73468
8000	Assoc. Director of Research for Oceanology	Mr. R.R. Rojas*	73294
8100	Acoustics Div. Supt.	Dr. J.C. Munson	73482
8200	Underwater Sound Reference Division Supt.	Mr. R.J. Bobber	
	(Area Code 305-859-5120 or via AUTOVON NTC 791-4111)		
8300	Ocean Sciences Div. Supt.	Dr. V.J. Linnenbom	72974
8400	Ocean Technology Div. Supt.	Dr. J.P. Walsh	73314

*Indicates acting

MISCELLANEOUS

Emergency, Officer on Duty (outside working hours)	73523
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