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# United States Naval Postgraduate School Annual Report, 1961

Monterey, California: Naval Postgraduate School

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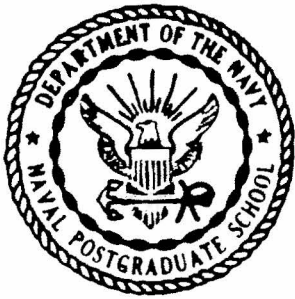


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R. F. RINEHART  
Academic Dean



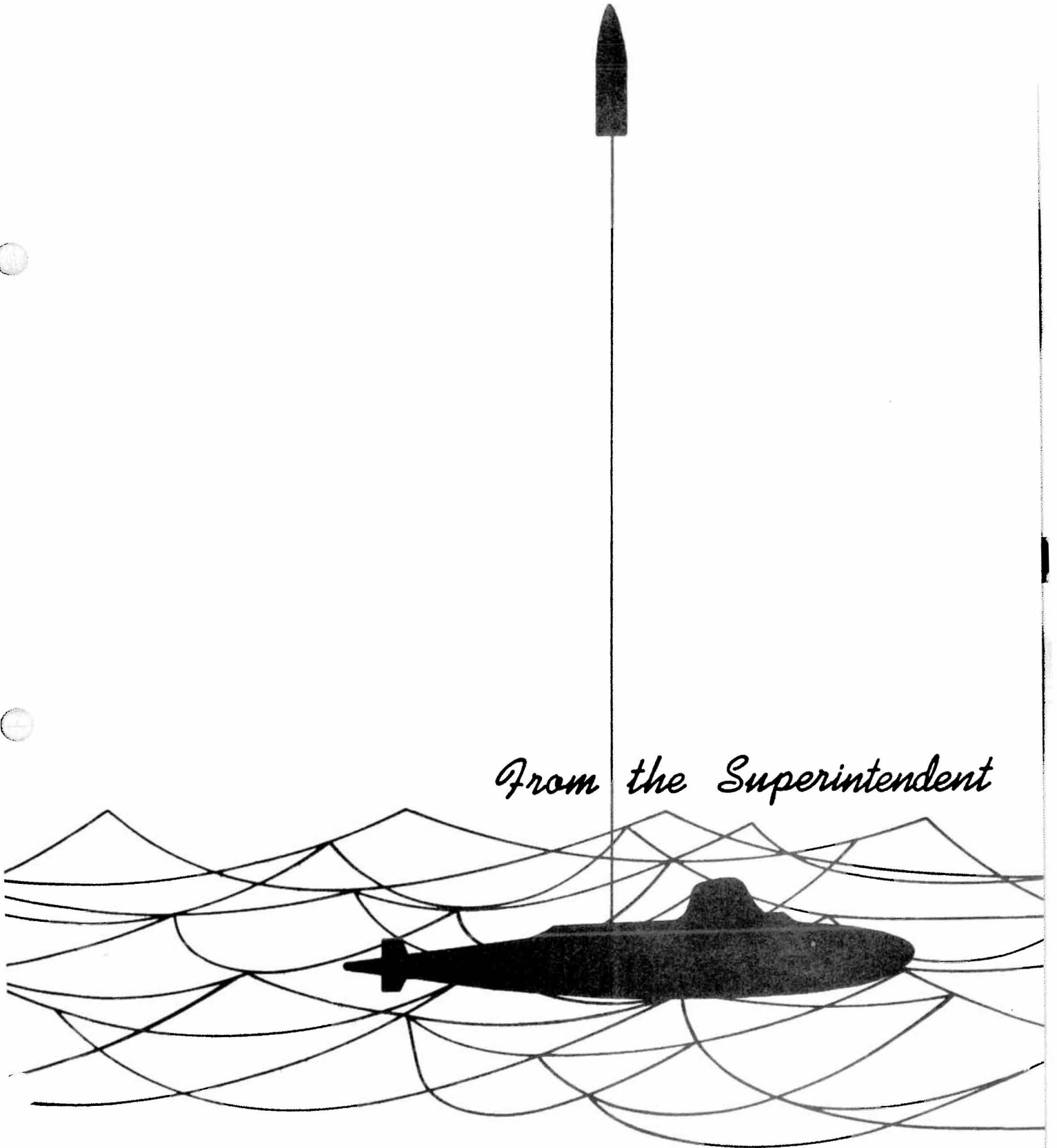
*United States Naval Postgraduate School Annual Report*  
*Fiscal Year 1961*



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*From the Superintendent*



December 1961

From the Superintendent:

This is my first report as Superintendent of the U. S. Naval Postgraduate School. The period since my arrival in March 1961 has been one of stimulation, challenge, and pride. The Postgraduate School has for many years served the distinctive need of the Navy to extend and broaden the professional and technical competence of officers who will be called upon to equip, manage, and operate a great Navy in a time of expanding technology. In recent years, in response to its challenge, the School has become an impressive naval university in a true sense, with a distinguished faculty and plant facilities to be proud of.

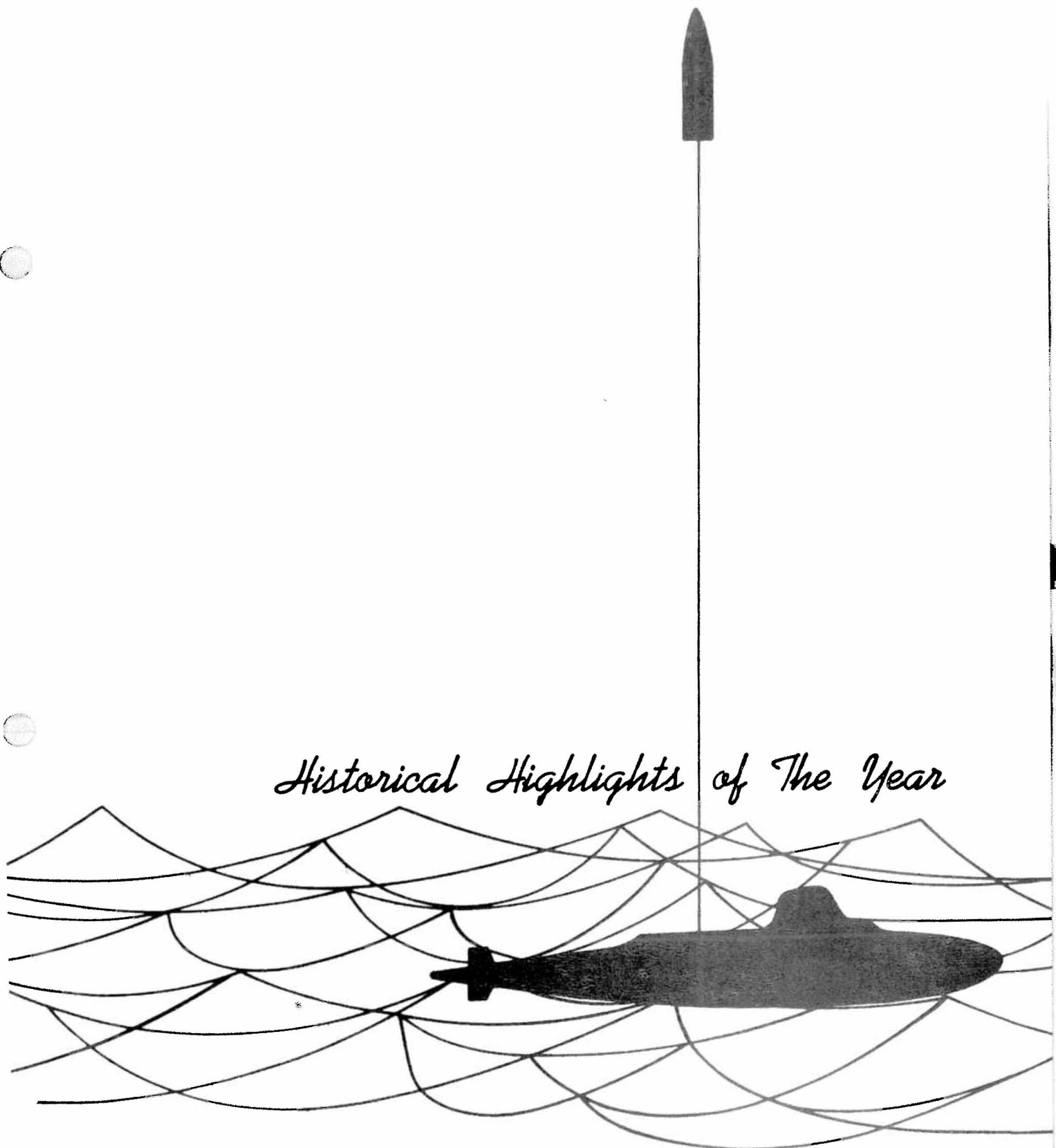
The remaining ingredient - the prime ingredient - is a select, motivated, and dedicated student body. Young naval officers must be aroused to an enthusiastic awareness of their opportunity for advanced education, and of the Navy's need for the cultivation and development of their maximum potential. Eligible officers must be informed of the advanced education which is offered, in order that they may be moved to seek postgraduate studies. Then, students must be selected with discrimination.

The report which follows describes briefly the operation of the Naval Postgraduate School during Fiscal Year 1961, with changes and developments which have occurred. Aligned with the two annual reports which have preceded it, it serves as an historical record of the School. Mindful that the School is the Navy's own custodian of advanced technical learning, I invite your questions, your comments, and your interest.



MARSHALL E. DORNIN  
Rear Admiral, U. S. Navy

*Historical Highlights of The Year*



## HISTORICAL HIGHLIGHTS OF THE YEAR

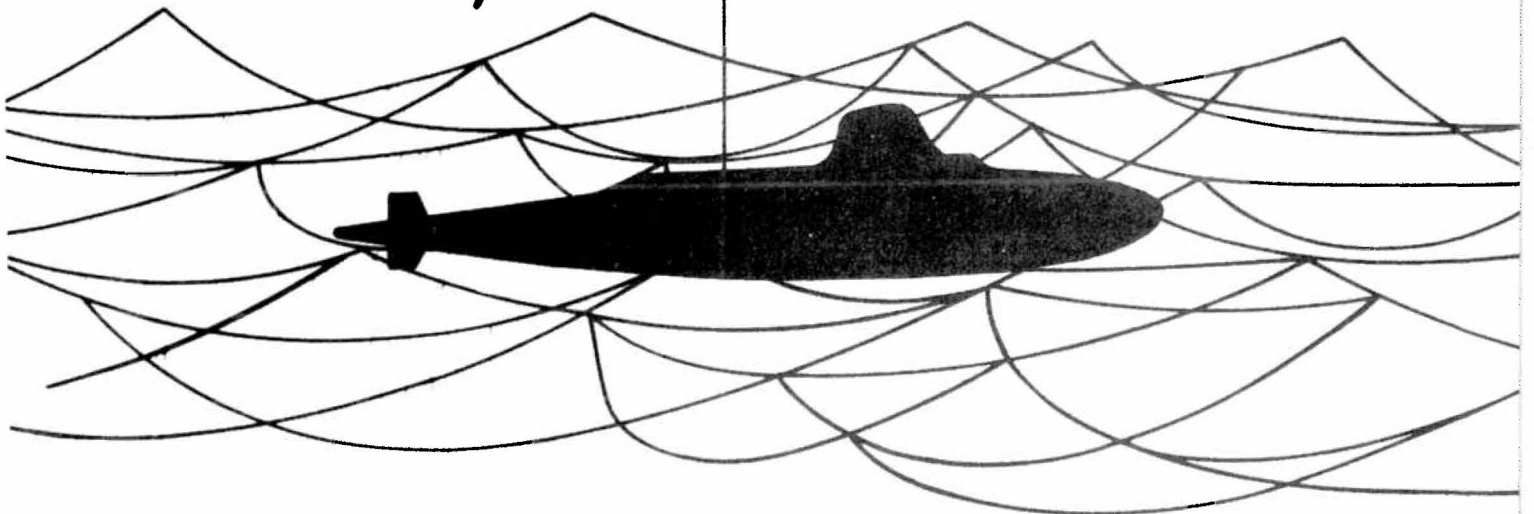
### 1960

- July 1 Bureau of Yards and Docks assumed the financial responsibility for Public Quarters in "La Mesa Village".
- 1 Dr. Allen Edgar Vivell appointed Academic Dean.
- 28 Graduation of Bachelor of Science curriculum students, General Line and Naval Science School.  
Speaker - RADM E. E. Yeomans.
- August 3 Secretary of the Navy approved the change in mission of the School to read: "To conduct and direct the Advanced Education of commissioned officers, to broaden the professional knowledge of general line officers, and to provide such other indoctrination, technical and professional instruction as may be prescribed to meet the needs of the Naval Service. In support of the foregoing, to foster and encourage a program of research in order to sustain academic excellence."
- October 2-5 International Science Foundation "Brainpower Forum".
- 5 Letter from Engineer's Council for Professional Development re-accrediting for a 3-year period certain curricula in the Engineering School.
- 6-8 Federal Bar Association Meeting.
- 7 Captain Ralph W. Arndt relieved Commander Douglas K. English as Commanding Officer, Administrative Command.
- 12-15 Thirteenth Annual Gaseous Electronics Conference -- Sponsored jointly by Division of Electron Physics of the American Physical Society, the Office of Naval Research, and the U. S. Naval Postgraduate School.
- 25-27 18th Navy Symposium on Underwater Acoustics -- Sponsored jointly by the Office of Naval Research and the U. S. Naval Postgraduate School.
- 28 Mine Warfare Conference.
- November 2 Annual Postgraduate Conference -- Bureau of Naval Personnel and Postgraduate School representatives together with those from Bureaus and Offices sponsoring specific curricula.
- 3-4 SABER (Secretary's Advisory Board on Education Requirements) Meeting.

|             |       |   |
|-------------|-------|---|
| November    | 3-4   | American Rocket Society Conference on Electrostatic Propulsion -- Sponsored by the Ion and Plasma Propulsion Committee of the American Rocket Society and the U. S. Naval Postgraduate School. Local arrangements committee: Professors Faulkner (Chairman), Sheingold, Bleick, P. E. Cooper, and Oleson. |
| December    | 14    | General Line and Naval Science School Graduation - General Line Class 1960B and 8 students from the Naval Science Curriculum. Speaker: VADM Charles L. Melson, USN, Commander First Fleet.  |
| <u>1961</u> |       |   |
| January     | 13    | Captain Lowell W. Williams, USN, Chief of Staff, relieved RADM Elmer E. Yeomans, USN as Superintendent.   |
| February    | 1     | FLEET NUMERICAL WEATHER FACILITY established this date - under military command of the Superintendent, management control of the Bureau of Naval Weapons.   |
| March       | 10    | Professor Carl E. Menneken assigned duty as Director, Computer Center.  |
|             | 10    | General Line and Naval Science School Graduation - Naval Science Curriculum, Class #2. Speaker: RADM Frank Akers, USN, Commander Naval Air Bases Twelfth Naval District.  |
|             | 15    | RADM Marshall E. Dornin, USN, relieved Captain Lowell W. Williams, USN, as Superintendent.  |
|             | 20-23 | American Physical Society Meeting.  |
| April       | 14-15 | Academy of Management (Western Chapter) Meeting.  |
|             | 20-21 | Society for Industrial and Applied Mathematics Meeting.   |
|             | 26-28 | Scientific Advisory Board to C/S USAF Meeting.  |
|             | 29    | American Society of Metals  |
| May         | 14    | Captain Ralph W. Arndt, USN, Commanding Officer, Administrative Command, relieved Captain Lowell W. Williams as Chief of Staff as an interim assignment.  |
| June        | 1     | Combined Graduation - Engineering, Management, General Line and Naval Science Schools. Speaker: The Honorable Paul B. Fay, Under Secretary of the Navy.   |



*Naval  
Postgraduate Education - An overview*



## NAVAL POSTGRADUATE EDUCATION -- AN OVERVIEW

None of us needs to be reminded that we are living in a time of rapid change. The acceleration of science and technology in our mid-century is all too evident, as is the social upheaval which accompanies it. Conflict and competition intensify, and the world is split politically and ideologically. Our national interest and the interest of the free world demand that we apply our best brains, our best talents, and our best devotion to the survival of freedom. Our Navy, as a key arm of national defense and thus a ready instrument of national policy, must be the best Navy that these brains, talents, and devotion can devise. The Navy must make full use of advancing science and technology in order to meet its challenge.

It is not enough that the Navy be able to draw upon the capabilities of the nation's science and industry from civilian sources. Naval officers who are in responsible positions must themselves be technically knowledgeable to the extent that they may make sound evaluations and judgments in programming, procurement, planning, and management, as well as in operations and maintenance. Naval officers must be educated in fields of advanced knowledge.

In the early years of the U. S. Navy, education of the officers required to operate the ships and to administer the Navy was conducted primarily at sea under the tutelage of "schoolmasters" and through on-the-job training. The establishment of the Naval Academy in 1845 indicated final recognition of a need which had been felt for years for a more formal and standardized system of educating officers. For a time this new method of education sufficed; but as early as 1899 it became apparent to some men of vision that the education provided was not sufficient to answer the Navy's needs in certain specialized fields, and the establishment of the postgraduate department of the Academy with 10 students in 1909 was the beginning of the Navy's creation of some technical specialists of its own. As the requirements of the Navy grew and changed, the department became a school in its own right. In 1951 the Postgraduate School moved to its own separate location in Monterey. In the past decade it has expanded in size, its offerings have increased, it has acquired extensive new facilities plus new equipments. Today's educational policy in the Navy has also changed, so that it embraces not just the advanced education of a few specialists, but some post-graduate education for every officer of the Navy who is qualified.

The Naval Postgraduate School exists to serve the needs of the Navy. Its components, the Engineering School, the General Line and Naval

Science School, and the Management School, have come into being to fulfill certain stated requirements for the operation of the Navy to enable it to meet its commitments in support of our national policy. The School does not house ivory towers. Curricular offerings are realistic, based on known and anticipated needs of the sponsors of the various areas of study. Courses and curricula come into being, are revised - or discarded - on the basis of continuing careful scrutiny and study in constant year-round liaison with sponsors, as well as an annual conference of representatives of sponsors, Bureau of Naval Personnel and School. At the same time, the curricula are kept consistent with scholarly requirements set forth and approved by higher education accreditation authorities; and our faculty can be matched with the finest to be found anywhere. We believe a tremendous forward step for the School has been achieved in the approval given by the Secretary of the Navy in August 1960 to include research in support of our educational program as an integral part of the School's mission.

Where the needs of the Navy can best be served by curricula already in existence in recognized civilian educational institutions, or where the Navy requires only a minimal number educated in a particular discipline, the civilian institutions are used, with gratifying cooperation on the part of the college officials. But where coverage of material must be specifically tailored to Navy requirements and where operational and career demands limit the time available for education, then we can provide an education superior to that which can be obtained elsewhere.

How are the needs for postgraduate educated officers determined? The Bureaus and Offices of the Navy specify the particular billets in their purview which they consider call for postgraduate education. In order to match the demands with the supply, and to assure that the distribution of officers with advanced education will be equitable among the various activities, the Assistant Chief for Plans in the Bureau of Naval Personnel each year establishes quotas for each school and each curriculum, thus arriving at a total planning figure for the fiscal year. This figure, however, is a goal only. The final numbers actually ordered to school will depend on the numbers available and qualified, and on the approved budget figures.

Today the numbers of officers with postgraduate education are running far behind the requirements for their knowledge and services. The Bureau of Weapons and the Bureau of Ships, with a combined current requirement of 60 per year for graduates of specific 3-year curricula, are faced with the realization that there were only 12 such graduates

in 1961 and that the present 3rd year group numbers only 20 from an original input of 90 students. The billets approved in the Bureau of Naval Weapons for officers with postgraduate education are only 50.8% manned by officers with the requisite education. Part of the difficulty is that everyone, in the Navy as elsewhere, wants the top 10%, and the top 10% just does not stretch far enough; part of the difficulty has been in the availability of total numbers of qualified candidates; and as always part has been the inadequacy of funds earmarked for education in the face of other vital needs. But a large part of the difficulty has also been lack of knowledge and appreciation of what the Postgraduate School has to offer.

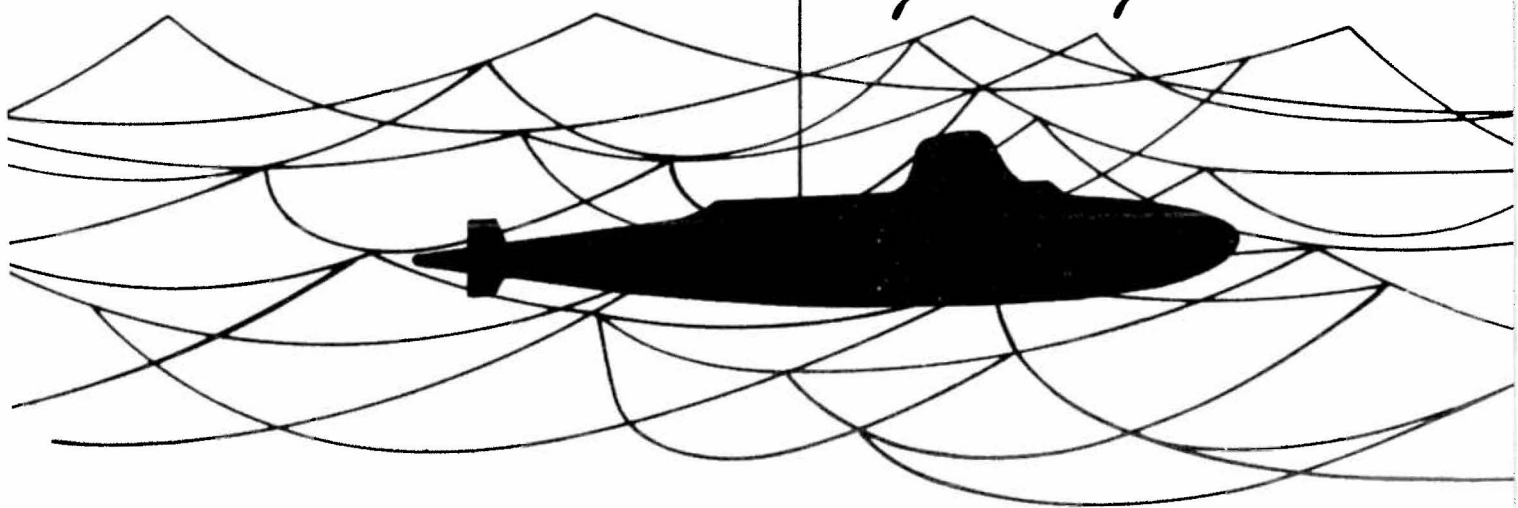
Steps were taken last year to eliminate selection for postgraduate education on the basis of individual applications, in the hope that such action would make larger numbers of qualified student material available to the selection board. This year an additional measure, the forming of an Educational Year Group, assures that every officer's record comes before a postgraduate selection board at the earliest possible time. This new concept appears to have genuine merit which will work to the advantage of both the individual officer and the Navy.

However, the selection process is not the whole story. Somewhere along the line, many young officers have been discouraged, not only from actively seeking postgraduate education but from accepting it when it has been offered to them. They have been counseled, or have themselves concluded erroneously, that the time spent in postgraduate education and away from operational type duty works against their chance of promotion. Facts will not bear out such a conclusion. A study of the selections to Flag rank and to the rank of Captain during the past two years reveals just the opposite trend. In Fiscal Year 1961 80% of those selected to Flag rank had advanced education of some kind, 33% in other than service colleges; in Fiscal Year 1962 the corresponding figures were 94% and 31%. In the selection to Captain in Fiscal Year 1961, 71% had had advanced education in General Line School, in specialized postgraduate education, or in a combination of categories. In Fiscal Year 1962 the corresponding figure was 64.4%. Had service colleges been included the figures would increase to 89% and 82.5% for the respective years. It is recognized that completion of postgraduate education of itself is not going to insure promotion. On the other hand it is equally evident that additional education is no handicap when it comes to selection for higher rank. It serves as an anchor to windward; it adds an extra level of competence based on knowledge that is bound to show in later assignments.

The young officers of the Navy need the education that is offered; the Navy needs now, and will have an increasing need for, the graduates of our postgraduate system of education. As we go to press there is in preparation at the School a "Road Show" - a presentation by means of which, in personal appearances, we hope to whet the appetites of our Navy's junior officers for the advanced education we offer. This is your School. We ask your support in advertising the wide range of selection of postgraduate study that is available, and in encouraging these young men who will be the Navy's senior officers of the future to avail themselves of this unsurpassed opportunity which is theirs.



*Engineering School*



## ENGINEERING SCHOOL

The enrollment figure for the academic year is suggestive of the busy year experienced by the Engineering School. Two new groups of students, a pilot group in the One-Year Science program, and the first input into a U. S. Naval Academy instructor preparation program, added to the five regular curricular areas already in being brought the total enrollment of the school to an unprecedented number of 799. Entering students in the two- and three-year curricula also reached a new high of 392 (323 USN, 48 other services, and 21 foreign). (See chart on page 13)

The problems associated with the ever growing diversity of academic preparation which we have been forced to face for several years were intensified by the rise in enrollment. The impact on scheduling, classroom sizes, and section composition brought problems of increasing complexity of administration as well as in the design of curricula and modification of course content. The anticipated input for the 2 and 3-year curricula for 1961 is 265 (190 USN, 48 other services and 27 foreign). The Science input will be about 30 and an additional 12 will be enrolled in the USNA instructor preparation program. Although the input figures are down significantly from those of 1960, the total student population will remain at a high level and the sum total of the problems mentioned will increase.

Some changes in concepts and methods appear mandatory. In anticipation of a sizable Science input in March of 1962 and a very significant increase in the regular input in August of that year, followed by a March 1963 Science input of nearly 500, significant changes are being planned.

Three lecture series were held during the last two academic terms: one on International Affairs, another on Space, and the third on Naval Affairs. The Naval Affairs series was an innovation this year and featured the VCNO and most of the DCNOs. This was an excellent opportunity for these senior officers to address a very sizable group of eager young juniors. The Wednesday afternoon change-of-pace lectures proved so popular and rewarding that it is planned to continue them.

It was a difficult year for funds. The percentage of funds going to pay and benefits for the civilian faculty and staff has been increasing steadily over the years. With total funding remaining almost level there was little left for equipment and materials. Some relief is

expected during the coming year. The cutback in travel monies also was severe and necessitated elimination of a good portion of planned field trips. We were able to fund the industrial experience tours by placing most of these students at West Coast activities and making maximum use of government air transportation and housing facilities. We are determined to retain this valuable part of our curricula if at all possible.

Highlights in specific curricular areas are listed by curricula.

### AERONAUTICAL ENGINEERING

A footnote in our school catalog informs the reader that the third year of this curriculum is normally taken at a civilian university. This practice makes necessary an especially close tie-in between our course offerings, standards of instruction, etc., and the requirements for admission to graduate standing at the civilian universities involved.

The year has brought notable improvement in the curricula liaison between the Postgraduate School and the leading civilian universities in graduate aeronautics. Our third year students going to these universities - MIT, University of Michigan, Stanford - have been accepted in the Engineer's program for the first time. The Aeronautical Engineer's degree, sometimes classed as a Professional degree, is relatively new at MIT and Michigan, but has been in existence at Stanford and Cal Tech for a number of years. It is a degree which covers the course work of the PhD, but does not require the original and extensive thesis or dissertation.

Our curricula liaison with civilian universities has also resulted in an updating and strengthening of our own curricula to meet the advancing technological requirements in the field of Flight Vehicles. We are continuing to give a broad coverage in aeronautics for the first year and a half of study. This coverage includes basic study in aerodynamics, structural components, flight propulsion, and avionics for both the two-year and the three-year student. The two-year student terminates his studies in this broad curriculum with a designated BS degree, Bachelor of Science in Aeronautical Engineering. The three-year student goes on to specialize in options which follow from the broad study of aeronautics, i.e., Aerophysics, Astronautics, Guidance and Control, Instrumentation, Jet Propulsion, Nuclear Propulsion, Space Mechanics, etc. At the end of three years' study, the student with B average grades can qualify for the degree - Aeronautical Engineer.



The officer who enters the curriculum with a good college background, a designated BS degree in an engineering subject, and B average grades will have the opportunity to complete work for the senior academic degrees in less time than described above. Efforts are now being made to schedule officers individually in order to build on their academic background to the maximum extent possible. For instance, if the officer in question has majored in Physics as an undergraduate, he will be scheduled into the Aerophysics curriculum, if so motivated. In like manner, the Chemistry undergraduate will be assigned to Propulsion, the Electrical student to Avionics, etc.

#### ENGINEERING ELECTRONICS AND COMMUNICATIONS ENGINEERING

The six-term common core Electronics and Communications Engineering curricula currently being followed was started in 1959. It has proved successful to the point that no significant changes have been made during this fiscal year. The system of providing elective courses in the last two terms of the second year and during the third year is particularly adaptable to curricula changes made to meet the many technological advances in the field.

#### METEOROLOGY AND OCEANOGRAPHY

The two-year Meteorology and Oceanography curricula which were started in 1957 remain essentially unchanged except for modifications in course content made necessary by the continuing technological advances in the field. However, some experimentation was conducted which will lead to a more radical change next year. Laboratory courses will be spread over seven instead of six terms. This will effect some change in course sequence and permit the addition of a term of tropical and southern hemisphere analysis. In another trial, a few students were permitted to take extra courses related to Numerical Forecasting. Based on the results, a subspecialization in this field will be commenced next year for those students capable and interested. The basic Master's degree curriculum will remain the same, but some students will take more courses in dynamical prediction, computer operation and programming to provide for the subspecialization. Since Numerical Weather Prediction is becoming an increasingly important part of Meteorology, this subspecialization is an important curriculum modification.

#### NAVAL ENGINEERING

The Naval Engineering curricula include the basic first year Naval

Engineering (General) curriculum, the 2-year Mechanical Engineering, Electrical Engineering, and Nuclear Power curricula, and the 3-year Mechanical Engineering (Advanced) and Electrical Engineering (Advanced) curricula. Officers are selected from the Naval Engineering (General) curriculum, based on personal choice, academic performance, and available quotas, for the 2 and 3-year curricula. All of the foregoing curricula are given entirely at the Postgraduate School in Monterey and are designed to give broad coverage to the theory and application of mathematics, thermodynamics, mechanics, electricity, physics, and metallurgy in the designated engineering fields. A Mechanical Engineering (Gas Turbine) curriculum, which was offered previously, was discontinued in August 1960 since there was an ample inventory of qualified officers in the Navy to fill billet requirements.

### WEAPONS SYSTEMS

Experience with the first classes in the Weapons Systems curricula which were instituted in FY 1960 has indicated that the curricula are generally sound and properly oriented. Certain minor changes have been made to adjust workloads, up-date course content, and to incorporate appropriate prerequisite courses.

Academic background of the input group in August 1960 was generally poorer than that of any group in recent years. As a result four of the entering group were disenrolled and approximately 20% of the Navy students were below established academic standards at the end of the first year. Additionally, in nominating students for the 3-year Advanced Weapons Systems curricula there were insufficient numbers with acceptable scholastic standing to permit filling quotas in all advanced curricula. Naval students from the August 1960 input were allocated to advanced curricula as follows:

|   |    |
|---|----|
| Weapons Systems (General) . . . . .                         | 48 |
| Advanced Weapons Systems (Physics) . . . . .                | 14 |
| Advanced Weapons Systems (Electrical Engineering) . . . . . | 12 |
| Advanced Weapons Systems (Chemistry) . . . . .              | 3  |

In addition to the foregoing, one student was authorized to undertake a PhD program in the field of Weapons Systems, and four students were transferred to the Advanced Science Program.

The reaction of the first graduating class in the revised curriculum in Nuclear Engineering (Effects) was generally favorable. Minor changes were recommended to the Defense Atomic Support Agency, but the basic

concept of emphasis on Biology and Physics was retained.

The Operations Analysis curriculum had the largest input in its history this year. In addition to the regular instruction in this area, a one-year introductory course was given to five of the prospective USNA instructors in preparation for their instruction duty. Approval by the Chief of Naval Personnel of a recommendation made by the Curriculum Board has led to the planning for a pilot course in Advanced Operations Analysis. This will consist of a third year of study for outstanding students in application of the Techniques of Operations Research to problems in Naval Warfare, Logistics, Management, and Personnel Administration.

Because of the limitations on travel funds, the summer field trip for first year students in the Weapons Systems curriculum was cancelled. In lieu thereof, students were given an orientation course in Space and Aeronautics by a team from the Pacific Missile Range, Pt. Mugu, and courses in Management and Art of Presentation. This procedure provides the student with a much needed leave period and allows for release of graduating students for transfer to next duty station approximately five weeks earlier than was previously possible. Students in the Operations Analysis curriculum and in Advanced Weapons Systems curricula were provided six to eight weeks of industrial experience during the summer term by arrangement with various government laboratories and industrial organizations.

#### One-Year Science Curriculum

A pilot group of twenty officers was selected for the first Science course, which was completed during FY 1961. This first input was selected in such a way as to provide a typical cross-section of the academic background of future selectees for this curriculum. The general purpose of the pilot group was to test the adequacy and academic philosophy of the proposed Science curriculum. As a result of experience with this group, curriculum modifications were made both during the first course and in making up the curriculum for the 1961-62 input. The basic philosophy remains the same, with a 75/25 ratio of mathematics and physics to humanities. The mathematics courses include military applications of computers. Physics courses carry through atomic and nuclear fields.

One of the objectives of the Science curriculum is to build upon an officer's previous background, to "take him as far and as fast as he can go" during the course. With a small group, it was not feasible

to vary the curriculum enough to meet this objective, nor will it be until the group is large enough to divide into several sections. However, the subjects offered in the pilot course appeared to meet the general objective of bringing the students up to date in mathematics and physics, and of giving them a more solid background in such areas as Operational Planning, Administration, International Relations and Management.

Another of the objectives of the Science curriculum - stimulation of the desire of officer students to extend their professional knowledge by subsequent specialized study - was met. Over half of the 1960-61 Science students were selected to continue their studies in technical curricula.

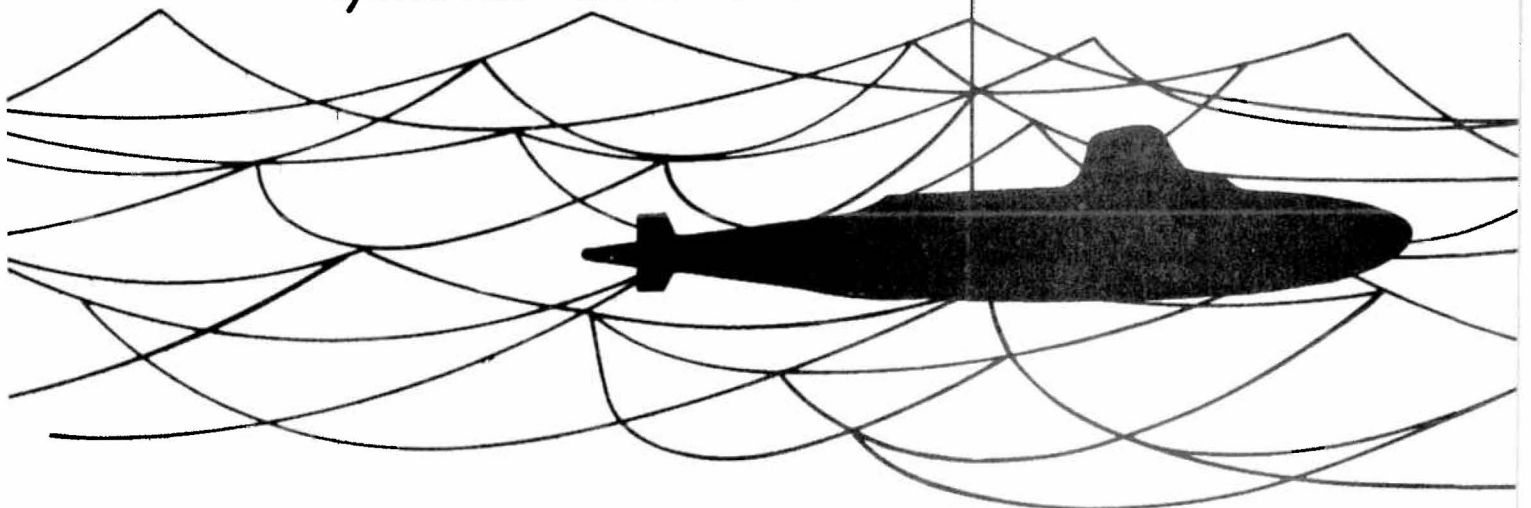
\* \* \* \* \*

#### ENGINEERING SCHOOL ENROLLMENT BY CURRICULA

| Curriculum                   | 1st Yr. | 2nd Yr. | 3rd Yr. | 4th Yr. | Total |
|------------------------------|---------|---------|---------|---------|-------|
| Aeronautical Engineering     | 50      | 59      | 6       |         | 115   |
| Electronics & Communications |         |         |         |         |       |
| Advanced Science             | 12      | 1       |         |         | 13    |
| Communications               | 26*     | 12      |         |         | 38    |
| Electronics                  | 67      | 39      | 13      | 1       | 120   |
| Meteorology                  | 45      | 40      |         |         | 85    |
| Naval Engineering            | 53      | 70      | 16      | 1       | 140   |
| Weapons Systems              |         |         |         |         |       |
| General                      | 92      | 61      | 17**    |         | 170   |
| Operations Analysis          | 19      | 14      |         |         | 33    |
| Nuclear Engineering Effects  | 28      | 25      |         |         | 53    |
| One-year Science             | 20      |         |         |         | 20    |
| USNA Instructors             | 12      |         |         |         | 12    |
| Totals                       | 424***  | 321**** | 52      | 2       | 799   |

- \* Includes 4 CEC students reported in January 1961
- \*\* Graduated January 1961
- \*\*\* 4 attritions during year, 1 Electronics, 1 Meteorology, 2 Weapons (G)
- \*\*\*\* 1 attrition, Electronics.

*General Line & Naval Science School*



## GENERAL LINE AND NAVAL SCIENCE SCHOOL

The General Line and Naval Science School is particularly adapted to meeting the educational needs of two groups of officers: those who have been augmented and integrated into the regular Navy, and those officers of the Naval Reserve who are considering the Navy as a career. It might well be called the undergraduate division of the Postgraduate School, corresponding essentially to the like division in any of the major civilian institutions of higher learning. The one real and significant difference between our programs and those of the civilian institutions is that the advanced education offered in the General Line and Naval Science School is particularly tailored to benefit the students as professional naval officers.

The offerings of this segment of the School have particular value for those officers of the ranks of junior lieutenant through lieutenant commander who have not come from the Naval Academy or the NROTC program. Based essentially on the concept of the original General Line curriculum, established in 1927, to unify and confirm previous instruction and experience in the preparation for duties of greater responsibility, the core of the programs is devoted to professional naval subjects, covering those areas which are essential for every naval officer.

The 9-1/2 months General Line program, which may be a separate course for the officer who has his baccalaureate degree or a component of the Bachelor of Science program, is a sound program, comprehensive, thorough, and current. This program will equip the officer to understand more fully and use more effectively the men, the weapons, and the weapons systems for which he will be responsible in his next tour at sea. Intensive efforts were continued during the past year to raise the level of the various courses to the maximum extent possible in keeping with the maturity and academic backgrounds of the students. The individual programming is sufficiently flexible to permit each student to select, with the concurrence of his faculty advisor, the courses which best round out his experience, and which are most closely related to his present interests and ambitions. In each major field, students are first brought up to date, then introduced to advanced studies. In this way they are prepared for the new developments and ideas they will encounter upon rejoining the Fleet.

Enrollment in the General Line curriculum during the fiscal year 1961 was 198 as compared with 300 during the previous fiscal year. The decrease was due in part to the assignment of training line numbers from the General Line to the Bachelor of Arts program which is having

its first input in August 1961. Enrollment of foreign students in this curriculum continued to be high, with an entering number of 47. A liaison officer was appointed to coordinate efforts to acquaint these students with the U. S. Navy, our country and its traditions.

The General Line program also provides a means of qualifying for the baccalaureate programs those officers of the Navy without any college background. During the 1961 fiscal year, 15 such students were transferred to the Baccalaureate Degree program upon completion of the General Line program.

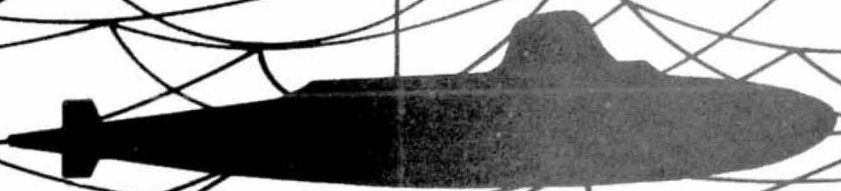
The 1-2 year Bachelor of Science degree program offers to the students not only the foundation courses in the naval professional subjects which make up the basic General Line program but the courses in the science and art fundamentals which every naval officer should know. The program allocates its time as follows: 25% naval-professional; 55% Science and Mathematics; 20% Humanities. Numerous reports received from the 1960 graduates of the program attributed their success in their subsequent duty assignments to the thorough and broad education they had obtained. Those who went on to postgraduate programs in technical fields noted particularly the competence they had attained in science and mathematics.

During FY 1961, a total of 79 officer students and 2 staff members enrolled in this program received Bachelor of Science degrees. Forty additional students graduate in August 1961. Five of those completing their undergraduate studies graduated with distinction, 5 with majors in mathematics. Two officers were ordered to further postgraduate study in technical areas, and 12 of the August graduates will enter the Engineering School immediately. With the numbers of graduates from this program now having passed the hundred mark, an appraisal of the curriculum reveals its basic soundness and its effectiveness as a means for providing well-rounded, broadly educated naval officers. A particularly striking feature of the baccalaureate program is the opportunity it affords an officer to complete both the Five-Term Program and the General Line curriculum simultaneously. The saving of training line numbers realized from this program is believed to be of immense significance in the Navy's over-all officer education program.

The curriculum for the Bachelor of Arts degree program was completed and approved in anticipation of the August 1961 input. In essence this program reverses the emphasis in coverage found in the BS program, assigning 55% to the Humanities and 20% to Science and Mathematics while the 25% naval-professional remains the same.



*Management School*





## NAVY MANAGEMENT SCHOOL

With the close of the 1961 fiscal year, the Navy Management School completed its fifth full year of operation. The current year witnessed the inauguration of the new ten-month course in Navy Management. Since inception in 1956, the school has undergone continuing expansion in student body and curricular offerings. Graduates of the school now total 387. Three hundred and one of these are accounted for in the five-month courses given in previous years.

The new ten-month curriculum approved in June 1960 by the Chief of Naval Personnel integrates the functional fields of management into a "core" of required courses comprising approximately 80% of the curriculum credit hours. Elective courses stem from the "core" courses and provide moderate flexibility to adapt to individual interests of the officers, as well as offering limited specialization in fields of interest to various supporting agencies. A sequence of courses in Management Statistics, Electronic Data Processing and Management Control, and Operations Analysis for Navy Management has been incorporated into the curriculum for elective option, in recognition of the importance in management decision making of high speed data processing and the mathematical techniques.

The ten-month curriculum offers the degree of Master of Science in Management to officers who qualify under approved standards. In the first class of 86 officers graduating from the new course, 74 Master of Science degrees, 9 Bachelor of Science degrees, and 3 Certificates of Completion were awarded. The following officer designators were included in the class of 1961: 1100 - 23; 1310 - 15; 1610 - 1; 2300 - 3; 5100 - 10; 3100 - 23; 6200 - 2; USMC - 5; USCG - 4; Total - 86. In August 1961 the enrollment in Navy Management will number 95 officers of the Navy, Marine Corps and Coast Guard.

The faculty of the Management School provides instruction in Economics for the students of the Bachelor of Science and Bachelor of Arts curricula of the General Line and Naval Science School, and in Economics, and Organization and Management for students of the One-year Science curriculum in the Engineering School, in addition to the instruction of its own full-time students.

The summer course in Elements of Management and Industrial Engineering planned originally for students of the Engineering School to replace the course previously given by the University of Minnesota, and then opened to selected officers of various Bureaus and Offices of the

Department of the Navy, was conducted for six-weeks periods during the summers of 1958 and 1959. In 1960 the summer course was re-titled "Elements of Management" and reduced to five and four weeks respectively for the Engineering School and TAD students. The Bureau of Ships and the Bureau of Yards and Docks conducted afternoon seminar sessions for the discussion of management problem areas of special interest to these bureaus. As of 30 June 1961, 451 officers from the Engineering School and 190 officers sponsored by the various Bureaus and Offices on TAD have completed the summer sessions.

The practice of directing a periodic letter to graduates to enable us to evaluate their progress and the service value of our curriculum, and the requirement introduced in 1958 for research projects by individual students on problems of moment facing naval executives, have been continued. Twenty-five of the papers submitted this year were considered of such quality that they merited forwarding to the naval activities for which they would hold particular interest.

During the academic year the student body visited on field trips Lockheed Missile and Space Division, Sunnyvale, California; Food Machinery Corporation and International Business Machines of San Jose, California; and United Airlines Maintenance Base, San Francisco, California. The companies gave unstintingly of their time and hospitality in furtherance of our educational goals.

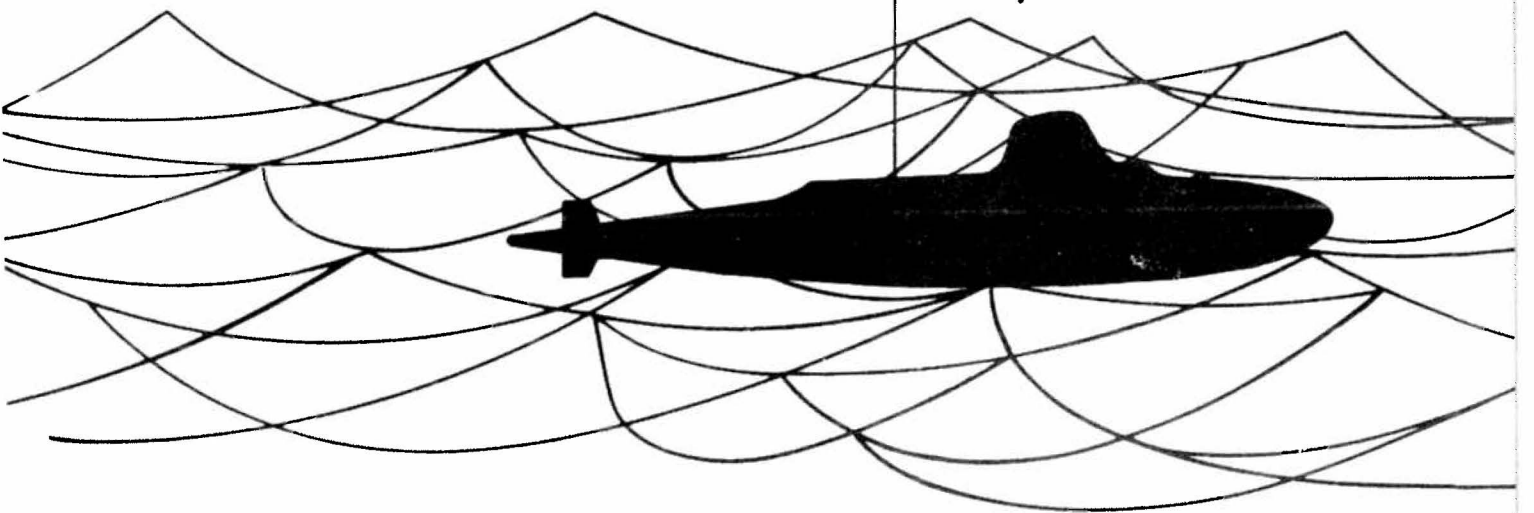
Additionally, the school was host to many speakers from the military services, as well as from the fields of education and industry, in lecture and seminar sessions throughout the academic year. We have been most fortunate in the generous assistance and good will of the many people and activities who contributed their services over the year.

The Navy Management School reached another milestone in this academic year when the school was host to the annual meeting of the Western Division of the Academy of Management on 14 and 15 April 1961. Over 90 college and university professors in the field of management and business administration participated, including the National President, Dr. George H. Terry, Northwestern University. Associate Professor Waino W. Suojanen of the Navy Management School staff participated as panel discussant and member of the arrangements committee.

The school continues in urgent need of factual management situations which lend themselves to write-up as case study problems, and therefore solicits the cooperation of all naval activities in the submission of their "solutions" for possible use as instructional materials.



*Computer Center*



## COMPUTER CENTER

The rapidly increasing utilization by the Navy of high-speed digital computers in its tactical and strategic functions has emphasized the importance of a strong program in this area at the U. S. Naval Postgraduate School. This is being expressed by the increasing number of courses being offered in the various curricula on the principles of computers, their operation, programming and applications. The availability of a large high-speed computing facility has had a strong impact on other courses, particularly in the fields of operation analysis, meteorology, aeronautics, and control systems. In addition, attention is being directed in a number of departments to the specific problems presented by the use of digital computers in NTDS and operational control centers. In the Electronics Department, a laboratory, capable of communicating with the CDC 1604 computer in the Computer Center, is being established to study the problems associated with input and display in these systems.

The Bureau of Ships for the past eight years has demonstrated an outstanding awareness of the need for officer education in modern high-speed digital computers, particularly for instruction supporting the application of these computers to Naval operational problems. The Bureau has implemented this awareness by providing for the U. S. Naval Postgraduate School all of the permanent equipment at present in the Computer Center. This includes the original NCR 102-A general purpose digital computer and its peripheral equipment and the Control Data Corporation solid state 1604 computer and its peripheral equipment. During the current year a CDC 160 computer has been provided and installed for use as an independent smaller scale computer or to be operated in the satellite mode with the CDC 1604. An IBM 1401 high-speed printer system, under lease to the Fleet Numerical Weather Facility, is available for use by the School.

The functions of the Computer Center in support of the academic program at the U. S. Naval Postgraduate School can be summarized as follows:

1. To provide an operating laboratory facility for instruction in the principles and operating procedures of high-speed digital computers.
2. To provide and operate a facility on which students may obtain experience in solving complex problems associated with class instruction or thesis projects, and to make it possible for faculty members to obtain solutions to instructional and research problems which require high-speed digital computation.

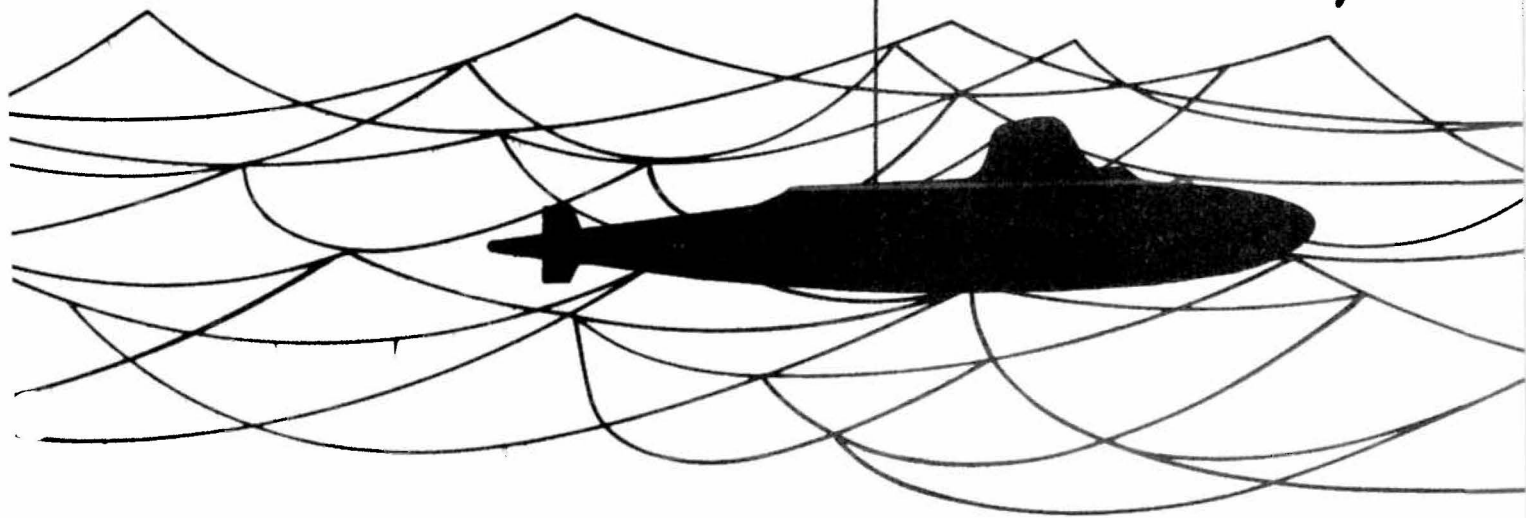
3. To develop and maintain routines and other programming aids required for the operations referred to above, as well as to engage in experimental programming which may result in the development of programs particularly adapted to Naval problems.

4. To provide consulting service to faculty and students who encounter programming difficulties.

5. To provide non-credit training courses in programming and operation.

The use of the basic computer by both the Fleet Numerical Weather Facility and the School has increased throughout the year. Under the final arrangement of equal division of time between the two user groups, the fourth quarter of the academic year saw a saturated use of this time, with priority being given to students whose thesis work required the use of the CDC 1604 computer.

*Fleet Numerical Weather Facility*



FLEET NUMERICAL WEATHER FACILITY  
(FLENUMWEAFAC)

The Fleet Numerical Weather Facility (formerly Project NANWEP) was established on 1 February 1961 under an officer-in-charge by SecNav Notice 5450 of 29 November 1960. The activity is under the military command of the Superintendent and under the management control of the Bureau of Naval Weapons.

The mission of the Fleet Numerical Weather Facility, as assigned by the above SecNav Notice, is:

1. To provide numerical weather products on an operational basis peculiar to the needs of the Naval Establishment.
2. To continue to develop and test numerical techniques in meteorology and oceanography applicable to Naval Weather Service analyses and forecasting problems.

The tasks assigned to accomplish the mission are:

1. Disseminate operational products to the Pacific Missile Range and such Weather Centrals and Facilities as may be designated by the Chief of Naval Operations.
2. Develop numerical models of the atmosphere to yield timely short range forecasts (36 hours) of surface weather.
3. Develop operational numerical techniques for improved sea and swell conditions and forecasts.
4. Develop operational numerical techniques for optimum ship routing tracks.
5. Develop operational numerical techniques for ice condition analysis and prediction.
6. Develop efficient forms for transmission and operational use of existing and planned numerical weather prediction products.
7. Develop operational numerical techniques for specifying and forecasting refractive index conditions of the atmosphere.
8. Develop operational numerical techniques for specifying and forecasting oceanographic conditions which affect sonar propagation.
9. Improve the usefulness of the Joint Numerical Weather Prediction Unit products to the Navy by evaluation with regard to typical or systematic errors.
10. Investigate methods for the rapid and economical dissemination of Numerical Weather Products to operational commands.

The past year has been characterized by rapid expansion of the Facility,

particularly in the operational area. Operational dissemination of numerically produced meteorological charts commenced on 3 January 1961, when the first of a daily series of hemispheric surface pressure analyses was transmitted to the Pacific Missile Range via high speed computer-to-computer data link. Since that date, the production of operational meteorological and oceanographic products and their transmission to Pacific Missile Range has increased to 20 charts per day, including surface pressure analyses and forecasts, upper air analyses and forecasts, and sea and swell analyses and forecasts. All of these charts cover the area of the entire northern hemisphere. The transmission of each chart is accomplished in approximately one minute.

In addition to the transmissions to Point Mugu, a daily chart of ocean-wave analyses for the Pacific area is sent to Fleet Weather Central, Alameda, via teletype to aid in their optimum track ship routing program. Also, a daily forecast of sea temperature analysis and depth of the mixed layer for the San Diego operating area have been sent to Destroyer Flotilla Three since 5 July 1961 via addressed message.

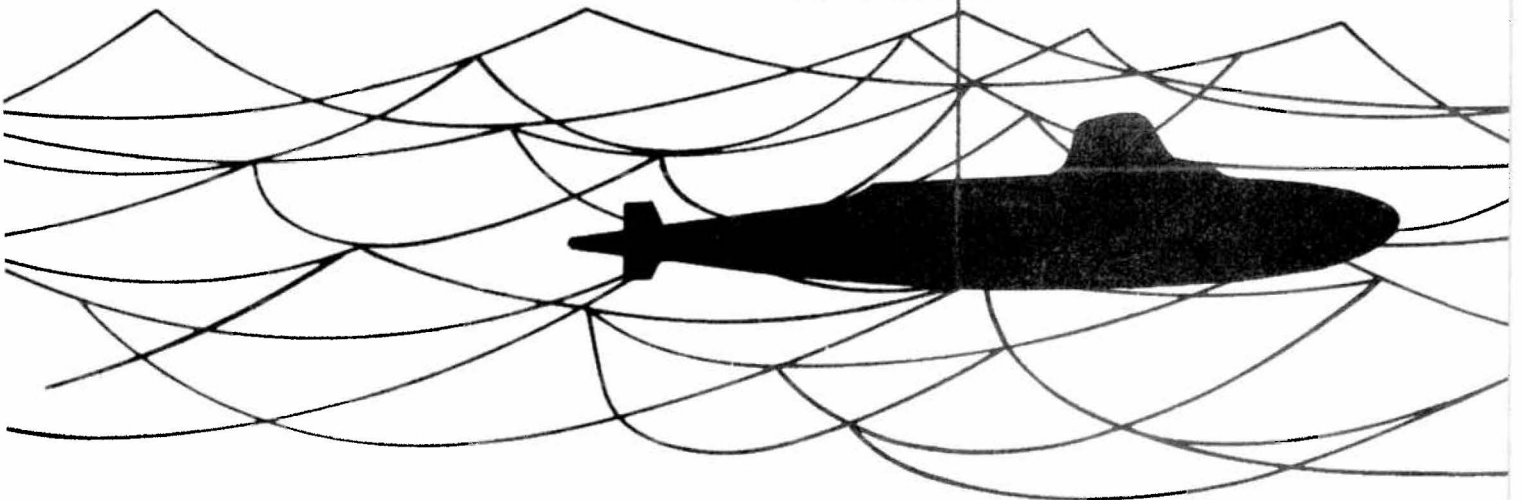
Future plans for operational dissemination of products include computer-to-computer links to various Fleet Weather Centrals. The first of these links will be with Fleet Weather Central, Washington, and will be in operation about 1 December 1961. Equipment to implement this link (including the small computer) is either on purchase order or in the process of fabrication at Fleet Numerical Weather Facility.

Concurrently with the expanding operations of Fleet Numerical Weather Facility, research efforts continue for development of meteorological and oceanographic analysis and forecasting techniques to meet the needs of the operating forces, and to improve the quality of present products.

Personnel on board as of 1 July 1961 numbered 10 officers, 17 civilians, and 15 enlisted.



*Vital Statistics  
Population  
Certificates & Degrees Awarded  
Civilian Universities*



POPULATION

| <u>STUDENTS</u>           | <u>FY'60</u> | <u>FY'61</u> | <u>FY'62</u>  | <u>FY'63</u> |
|---------------------------|--------------|--------------|---------------|--------------|
| <u>Engineering School</u> |              |              | --(Planned)-- |              |
| Engineering Curricula     | 685          | 767*         | 745**         | 840***       |
| One-year Science          |              | 20           | 181           | 468          |
| USNA Instructors          |              | <u>12</u>    | <u>12</u>     | <u>12</u>    |
|                           | <u>685</u>   | <u>799</u>   | <u>938</u>    | <u>1320</u>  |

\* Includes 609 Navy; 97 other U.S.; 61 allied navies

\*\* 579 Navy; 166 other sources

\*\*\* 680 Navy; 160 other sources

|  |              |              |            |            |
|--|--------------|--------------|------------|------------|
| <u>General Line and Naval Science School</u> |              |              |            |            |
| General Line Program                         | 360          | 254          | 193*       | 215*       |
| Bachelor of Science and Bachelor of Arts     | <u>192**</u> | <u>196**</u> | <u>225</u> | <u>225</u> |
|  | 552          | 450          | 418        | 440        |

\* Includes 40 officers of allied navies

\*\* BS program only

|                                   |             |             |             |             |
|-----------------------------------|-------------|-------------|-------------|-------------|
| <u>Management School</u> (10 mos) | 79          | 88          | 100         | 120         |
| TOTALS                            | <u>1316</u> | <u>1327</u> | <u>1456</u> | <u>1880</u> |

|                              |     |     |     |  |
|------------------------------|-----|-----|-----|--|
| <u>Civilian Universities</u> | 260 | 246 | 268 |  |
|------------------------------|-----|-----|-----|--|

STAFF AND FACULTY

|                                     |     |        |       |       |
|-------------------------------------|-----|--------|-------|-------|
| Officers                            | 120 | 128    | 126   |       |
| Civilian Faculty                    | 133 | 146*   | 160** | 200** |
| Enlisted                            | 266 | 280    | 286   |       |
| Civil Service (graded and ungraded) | 290 | 290*** | 336   |       |

\* Average on board 142

\*\* Includes 10 for Research

\*\*\* On board count; allowance 312

CERTIFICATES AND DEGREES AWARDED

|                                     | <u>Total</u> | <u>Cert.</u> | <u>BS</u>                  | <u>MS</u> | <u>PhD</u> |
|-------------------------------------|--------------|--------------|----------------------------|-----------|------------|
| Engineering School                  | 342          | 44(1)        | 197(2)                     | 100(3)    | 1(4)       |
| General Line & Naval Science School | 386          | 285          | 91 Undes.(5)<br>10 Math(5) |           |            |
| Management School                   | <u>86</u>    | <u>3</u>     | <u>9</u>                   | <u>74</u> | <u>-</u>   |
| Totals                              | 814          | 332          | 307                        | 174       | 1          |

- (1) Includes 36 USN, 1 USMC, 1 USAF, 6 Allied; 10 USN remaining at PGS for further study; 12 special 1-year course prior to reporting to USNA as instructors.
- (2) 10 Undesignated (8 USN; 1 USMC, 1 other)  
 56 Aeronautical Engineering (45 USN, 11 USMC)  
 11 Communications Engineering (9 USN, 1 USMC, 1 USCG)  
 49 Electrical Engineering (41 USN, 8 Allied)  
 18 Engineering Electronics (12 USN, 3 USMC, 3 USCG)  
 22 Mechanical Engineering (19 USN, 3 Allied)  
 25 Meteorology (24 USN, 1 Allied)  
 6 Physics (2 USN, 1 USMC, 2 USA)
- (3) 16 Undesignated (12 USN, 3 USMC, 1 USAF)  
 3 Aeronautical Engineering (all USN)  
 26 Electrical Engineering (18 USN, 3 USMC, 3 Allied, 2 other)  
 11 Engineering Electronics (10 USN, 1 USMC)  
 11 Mechanical Engineering (5 USN, 5 Allied, 1 other)  
 14 Meteorology (9 USN, 4 Allied, 1 other)  
 19 Physics (8 USN, 1 USMC, 9 USA, 1 USAF)
- (4) Faculty member
- (5) All officers receiving BS degrees from the GL&NSS receive certificates of completion of the General Line curriculum as well.

CIVILIAN UNIVERSITIES

| <u>INSTITUTION and Area of Study</u>                                    | <u>Continuing<br/>FY 62</u> | <u>Completed<br/>FY 61</u> | <u>Degree</u>                                    |
|---|-----------------------------|----------------------------|--|
| American U. - International Relations                                   | 5 USN                       |                            |  |
| California Institute of Technology<br>Aeronautical Engineering          | 1 USN                       | 1 USN                      | Aero Eng.  |
| University of California (Berkeley)<br>Advanced Science (Hydrodynamics) | 2 USN                       | 1 USN                      |  |
| Advanced Science (Mathematics)  |                             | 1 USN                      |  |
| Naval Architecture  | 1 USN                       | 1 USN                      |  |
| University of California (LA)<br>Advanced Science (General Physics)     | 1 USN                       |                            |  |
| University of California (San Diego)<br>Weapons (Physics)               | 1 USN                       |                            | MS-Physics<br>USNPGS                             |
| Case - Advanced Science (Metallurgy)                                    |                             | 1 USN                      | MS (Metallurgical<br>Engrg)                      |
| University of Colorado<br>Advanced Science (General Physics)            |                             | 1 USN                      | MS (Physics)                                     |
| Advanced Science (Nuclear Physics)                                      | 1 USN                       |                            |  |
| Cranfield, England<br>Aeronautical Engineering                          | 2 USN                       | 1 USN                      |  |
| Duke University<br>Advanced Science (General Physics)                   |                             | 1 USN                      |  |
| Fordham University - Religion   |                             | 2 USN                      | Certificate                                      |
| Georgetown University   |                             | 1 USN                      | PhD (Int. Rel.)                                  |
| George Washington University<br>Comptrollership                         |                             | 17 USN<br>6 USMC<br>1 USCG | MBA (16 USN,<br>6 USMC,<br>1 USCG)<br>AB (1 USN) |
| Harvard<br>Business Administration                                      | 4 USN                       | 4 USN                      | MA (Bus. Ad.)                                    |
| International Relations   |                             | 5 USN                      | MPA (Pub. Adm.)                                  |
| Religion  |                             | 3 USN                      | Certificate                                      |

CIVILIAN UNIVERSITIES

| <u>INSTITUTION and Area of Study</u>       | <u>Continuing<br/>FY 62</u> | <u>Completed<br/>FY 61</u> | <u>Degree</u>                           |
|--|-----------------------------|----------------------------|---|
| <b>University of Illinois</b>              |                             |                            |   |
| Advanced Civil Engineering                 | 3 USN                       | 2 USN                      | MS (Civ. Eng.)                          |
| Advanced Science (General Physics)         |                             | 1 USN                      | MS (Physics)                            |
| Computer Engineering                       |                             | 1 USN                      | MS (Computer<br>Engrg.)                 |
| <b>State University of Iowa</b>            |                             |                            |   |
| Advanced Science (General Physics)         | 1 USN                       |                            |   |
| <b>Indiana University</b>                  |                             | 1 USN                      | PhD (Math)                              |
| <b>Johns Hopkins University</b>            |                             |                            |   |
| Advanced Science (Nuclear Physics)         | 1 USN                       |                            |   |
| Advanced Science (Mathematics)             |                             | 1 USN                      |   |
| <b>University of Kansas</b>                |                             |                            |   |
| Petroleum Management                       | 1 USN                       |                            |   |
| <b>University of Maryland</b>              |                             |                            |   |
| Advanced Science (Applied Mathematics)     | 1 USN                       |                            |   |
| Advanced Science (Mathematics)             |                             | 1 USN                      | PhD                                     |
| <b>MIT</b>                                 |                             |                            |   |
| Naval Construction and Engineering         | 29 USN<br>5 USCG            | 15 USN<br>55USCG           | 1 DSci<br>19 MS (Nav Arch<br>& Nav Eng) |
| Aeronautical Engineering                   | 1 USMC                      | 7 USN<br>1 USMC            | MS(Aero & Astro)                        |
| Ordnance Engineering (Fire Control)        |                             | 5 USN                      | MS(Aero & Astro)                        |
| Advanced Science (Nuclear Physics)         | 1 USN                       |                            |   |
| <b>University of Michigan</b>              |                             |                            |   |
| Business Administration                    |                             | 3 USN                      | MBA                                     |
| Advanced Civil Engineering(Sanitary Engrg) |                             | 2 USN                      | MS (Engrg.)                             |
| Advanced Science (Applied Mathematics)     |                             | 1 USN                      |   |
| Aeronautical Engineering                   |                             | 3 USN                      | MS (Engrg.)                             |
| Advanced Science (Nuclear Physics)         |                             | 1 USN                      | MS (Physics)                            |
| <b>New York University</b>                 |                             |                            |   |
| Advanced Science (Applied Mathematics)     | 1 USN                       |                            |   |
| <b>North Carolina State University</b>     |                             |                            |   |
| Advanced Science (Nuclear Physics)         |                             | 1 USN                      |   |

CIVILIAN UNIVERSITIES

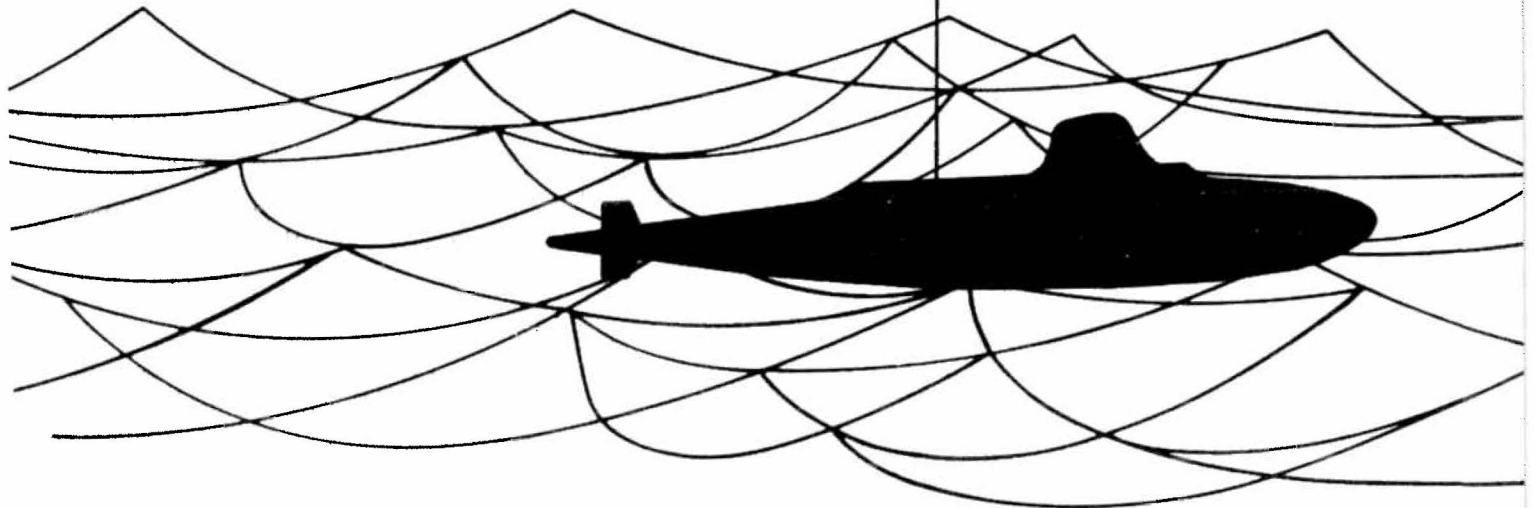
| <u>INSTITUTION and Area of Study</u>                                    | <u>Continuing<br/>FY 62</u> | <u>Completed<br/>FY 61</u> | <u>Degree</u>           |
|---|-----------------------------|----------------------------|-------------------------|
| Northwestern University<br>Transportation Management                    | 2 USN                       | 1 USN                      | MBA with<br>distinction |
| Ohio State University<br>Hydrographic Engineering                       | 3 USN                       | 3 USN                      | Certificate             |
| Pennsylvania State University<br>Fuels and Lubricants                   | 1 USN                       |                            |                         |
| Advanced Science (Nuclear Physics)                                      | 1 USN                       | 1 USN                      | MS                      |
| University of Pennsylvania<br>Advanced Science (Metallurgy)             | 1 USN                       |                            |                         |
| University of Pittsburgh<br>Retailing                                   |                             | 2 USN                      | MBA                     |
| Princeton University<br>Advanced Civil Engineering                      |                             | 2 USN                      | MS (Civ Eng)            |
| Aeronautical Engineering  |                             | 7 USN                      | MS (Eng)                |
| Purdue University<br>Industrial Management                              | 3 USN                       |                            |                         |
| Rensselaer Polytechnic Institute<br>Management & Industrial Engineering |                             | 4 USN<br>2 USMC            | MS (Mgt &<br>Ind Engrg) |
| Civil Engineering (Qualifying)  | 21 USN<br>2 USCG            | 15 USN<br>6 USCG           | BS (Civ Eng)            |
| Advanced Civil Engineering  |                             | 2 USN                      | MS (Civ Eng)            |
| Stanford University<br>Business Administration                          | 3 USN                       | 4 USN                      | MA (Bus Ad)             |
| Personnel Administration & Training                                     |                             | 1 USMC                     | MA (Educ)               |
| Social Science  | 3 USN                       |                            |                         |
| Advanced Science (Special Physics)                                      |                             | 1 USN                      | PhD (Physics)           |
| Advanced Science (General Physics)                                      | 1 USN                       |                            |                         |
| Advanced Science (Mathematics)  |                             | 1 USN                      | PhD (Math)              |
| Advanced Science (Nuclear Physics)                                      |                             | 1 USN                      |                         |
| Aeronautical Engineering  | 3 USN<br>1 USMC             | 2 USN                      |                         |

CIVILIAN UNIVERSITIES

| <u>INSTITUTION and Area of Study</u>                          | <u>Continuing<br/>FY 62</u>                          | <u>Completed<br/>FY 61</u>                             | <u>Degree</u>           |
|---|--|--|-------------------------|
| University of Texas<br>Advanced Science (Applied Mathematics) | 1 USN  |  |                         |
| Tufts<br>Social Science                                       | 3 USN<br>(MA-Und)                                    | 3 USN  | MA (Law &<br>Diplomacy) |
| Union Theological Seminary<br>Religion                        |  | 3 USN  |                         |
| University of Washington<br>Oceanography                      | 5 USN  | 1 USN  | Certificate             |
| Webb Institute<br>Naval Construction & Engineering            | <u>9 USN</u><br>125<br>(116 USN<br>2 USMC<br>7 USCG) | <u>4 USN</u><br>164<br>(142 USN<br>10 USMC<br>12 USCG) | MS (Nav Arch)           |

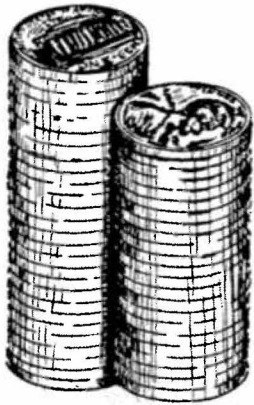


*Fiscal Data*





# OPERATION & MAINTENANCE COSTS



74%

**LABOR**

*GRADED*  
*UNGRADED*

345,398  
625,943

**LABOR  
BENEFITS**  
\$ 83,273

*RETIREMENT*  
*HEALTH*  
*ELIF*  
*FICA*

68,136  
10,597  
3,815  
694

1,054,583



12%

**UTILITIES**

169,446



3%

**CONTRACTS**

43,222



9%

**MATERIALS &  
SUPPLIES**

126,488



2%

**NON-RECURRING  
REPAIRS**

TOTAL

\$1,393,771

27,453

\$1,421,224

## BUDOCKS--FAMILY HOUSING

**LABOR**  
**UTILITIES**  
**CONTRACTS**  
**SUPPLIES, ETC.**

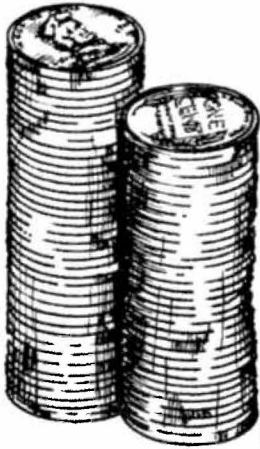
103,730  
150,885  
8,260  
31,585

TOTAL

294,460

# DIRECT TRAINING COSTS

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## LABOR

|                 |           |
|-----------------|-----------|
| <i>FACULTY</i>  | 1,518,512 |
| <i>GRADED</i>   | 286,420   |
| <i>UNGRADED</i> | 117,759   |

## LABOR BENEFITS

\$ 155,281

|                   |           |
|-------------------|-----------|
| <i>RETIREMENT</i> | 124,895   |
| <i>PENSIONS</i>   | 9,639     |
| <i>HEALTH</i>     | 13,471    |
| <i>ELIF</i>       | 6,179     |
| <i>FICA</i>       | 1,097     |
|                   | 2,077,912 |

82%



## TRAVEL

|                         |        |
|-------------------------|--------|
| <i>MGMT SCHOOL</i>      | 3,708  |
| <i>GEN. LINE SCHOOL</i> | 3,796  |
| * <i>ENG. SCHOOL</i>    | 82,290 |

3.5%



## BOOKS

|                         |        |
|-------------------------|--------|
| <i>MGMT SCHOOL</i>      | 6,723  |
| <i>GEN. LINE SCHOOL</i> | 9,686  |
| <i>ENG. SCHOOL</i>      | 25,716 |
| <i>LABOR</i>            | 14,459 |

2%



## EQUIPMENT

|  |         |
|--|---------|
|  | 56,585  |
|  | 109,739 |

4.5%



## MATERIALS & SUPPLIES

204,704

8%

|              |                  |
|--------------|------------------|
| <b>TOTAL</b> | <b>2,539,055</b> |
|--------------|------------------|

\* INCLUDES FACULTY TRAVEL

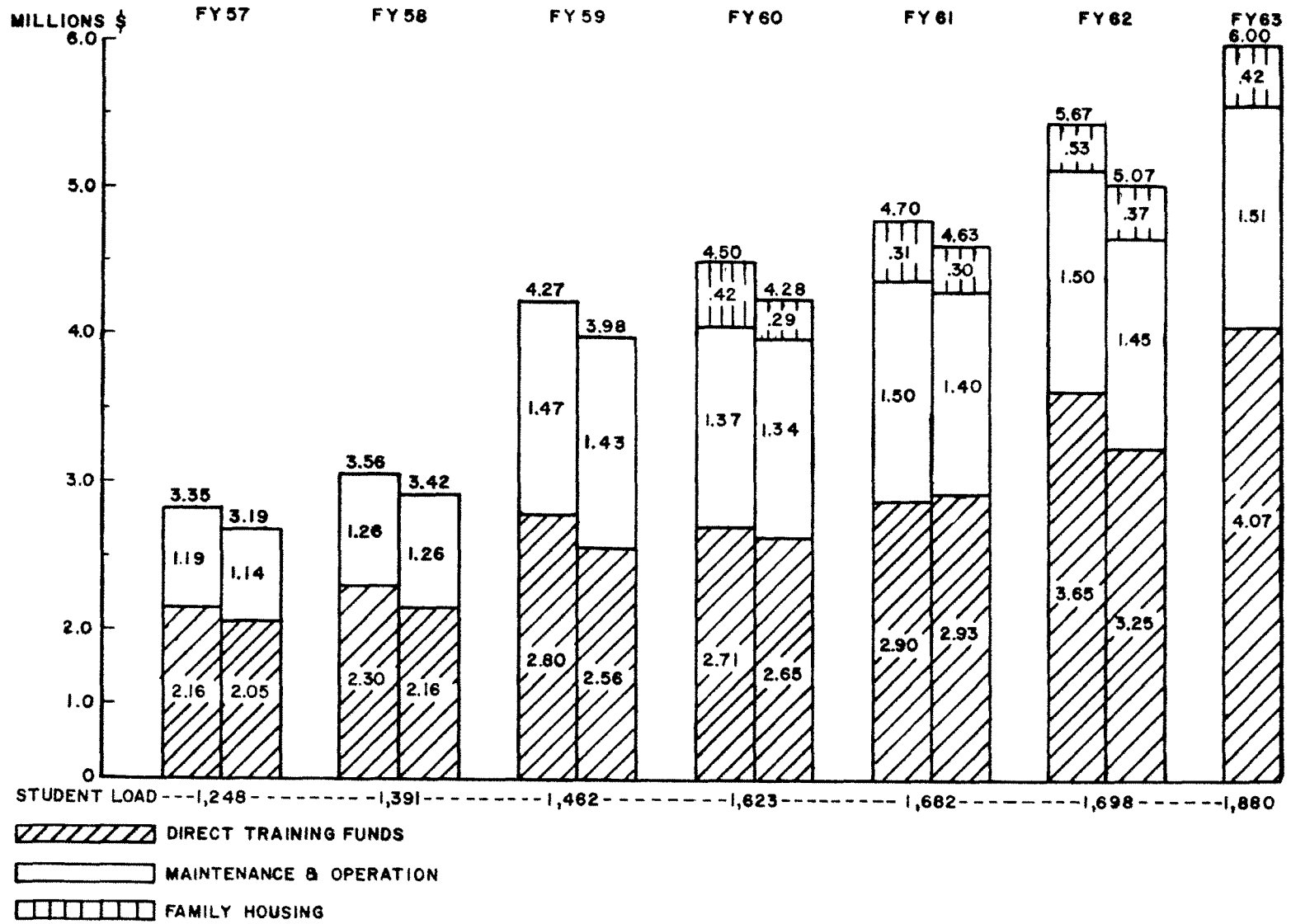
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## CIVILIAN UNIVERSITIES

|                      |         |
|----------------------|---------|
| <i>BOOKS</i>         | 10,373  |
| <i>TUITION</i>       | 355,726 |
| <i>MISCELLANEOUS</i> | 17,521  |
| <i>TRAVEL</i>        | 12,541  |

|              |                |
|--------------|----------------|
| <b>TOTAL</b> | <b>396,161</b> |
|--------------|----------------|

## TOTAL OPERATING FUNDS REQUESTED VERSUS RECEIVED

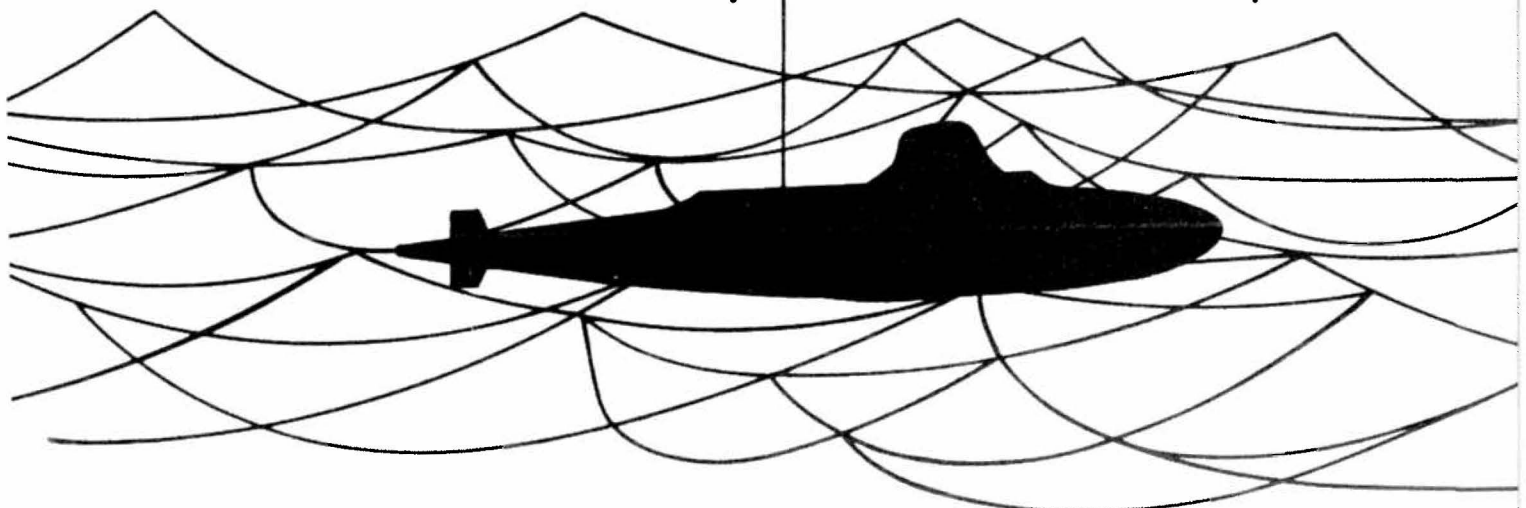


SOURCES OF FUNDS

| <u>BUREAU</u>   | <u>BUDGET<br/>PROJECT</u> | <u>DESCRIPTION</u>                 | <u>ALLOTTED<br/>THRU FY 61</u> | <u>EXPENDED<br/>THRU FY 61</u> |
|---|---------------------------|------------------------------------|--------------------------------|--------------------------------|
| <u>(a) Major Sources of funds of a continuing nature</u>                        |                           |                                    |                                |                                |
| BuPers  | 11046                     | Officer Training                   | 2,576,800                      | 2,574,521                      |
| BuPers  | 36046                     | Operation & Maintenance            | 1,395,960                      | 1,393,771                      |
| BuPers  | 42046                     | Nonrecurring repairs               | 27,500                         | 27,453                         |
| BuPers  | 49046                     | Travel                             | 104,000                        | 102,535                        |
| Reimbursement   | 99046                     | DASA & Coast Guard Reimbursements  | 148,500                        | 148,500                        |
| <u>(b) Funds for equipment</u>  |                           |                                    |                                |                                |
| BuPers  | 11046                     | Training Equipment                 | 110,000                        | 109,739                        |
| BuShips   | 64257                     | Non-electronic repairs             | 4,055                          | 3,994                          |
| <u>(c) Funds for Family Housing</u>   |                           |                                    |                                |                                |
| BuDocks   | 18680                     | Deferred Maintenance               | 6,150                          | 6,085                          |
| BuDocks   | 26680                     | Move, Household effects            | 3,900                          | 3,843                          |
| BuDocks   | 34680                     | Family Housing                     | 278,450                        | 278,417                        |
| Reimbursement   | 98680                     | Coast Guard Housing Reimbursements | 6,115                          | 6,115                          |
| <u>(d) Research Projects</u>  |                           |                                    |                                |                                |
| BuWeps  | 51551                     | Research                           | 25,000                         | 24,980                         |
| BuShips   | 50257                     | Research (Glendora)                | 23,500                         | 23,310                         |
| BuShips   | 51257                     | Research (Glendora) Travel         | 1,500                          | 1,340                          |
|   | Project Order             |                                    |                                |                                |
| ONR   | 1-0012                    | Research                           | 200,000                        | 181,338                        |
| ONR   | 1-0032                    | Research                           | 25,000                         | 15,175                         |
| ONR   | 1-0039                    | Various Research                   | 3,500                          | 3,900                          |
| <u>(e) Funds allotted to Tenant Activity - Fleet Numerical Weather Facility</u> |                           |                                    |                                |                                |
| BuWeps  | 61308                     | Research Funds                     | 90,000                         | 87,665                         |
| BuWeps  | 89308                     | Travel Costs                       | 1,920                          | 1,920                          |
| BuWeps  | 02308                     | O & M Funds - PW costs             | 9,424                          | 9,424                          |
| BuWeps  | 03308                     | O & M Funds - all other            | 99,580                         | 93,980                         |
| BuWeps  | 61551                     | ONR                                | 103,284                        | 100,172                        |
| BuWeps  | 89551                     | ONR                                | 3,275                          | 2,936                          |
| BuWeps  | 03078                     | O & M                              | 80,500                         | 77,680                         |



*Military Construction Projects*



MILITARY CONSTRUCTION PROJECTS

In 1960 the MCON projects for the School of Naval Science (first increment) and for the Astro-Aeronautical Propulsion Laboratory were deferred from the FY 1961 MCON program by higher authority during the review process due to funding limitations.

As a result of these deferrals the Five-Year MCON Program (1962-1966) included the following items:

| <u>Line Items</u>                          | <u>Est Cost</u> | <u>Yrs. Planned<br/>for Sponsorship</u> |
|--|-----------------|---|
| School of Naval Science (First Increment)  | 2,032,000       | FY 1962                                 |
| Astro-Aeronautical Propulsion Lab.         | 2,274,000       | FY 1962                                 |
| Compressible Flow Laboratory               | 2,227,000       | FY 1963                                 |
| School of Naval Science (Second Increment) | 2,882,000       | FY 1963                                 |
| Aero-Thermodynamics Building               | 245,000         | FY 1964                                 |
| Dispensary                                 | 1,000,000       | FY 1964                                 |
| Meteorology & Oceanography Laboratory      | 206,000         | FY 1964                                 |
| Intermediate Power Reactor                 | 183,000         | FY 1965                                 |
| Fire Protection Installation               | 125,000         | FY 1965                                 |
| School of Naval Science (Third Increment)  | 875,000         | FY 1966                                 |
| Chapel                                     | 200,000         | FY 1966                                 |
| Gymnasium                                  | 570,000         | FY 1966                                 |

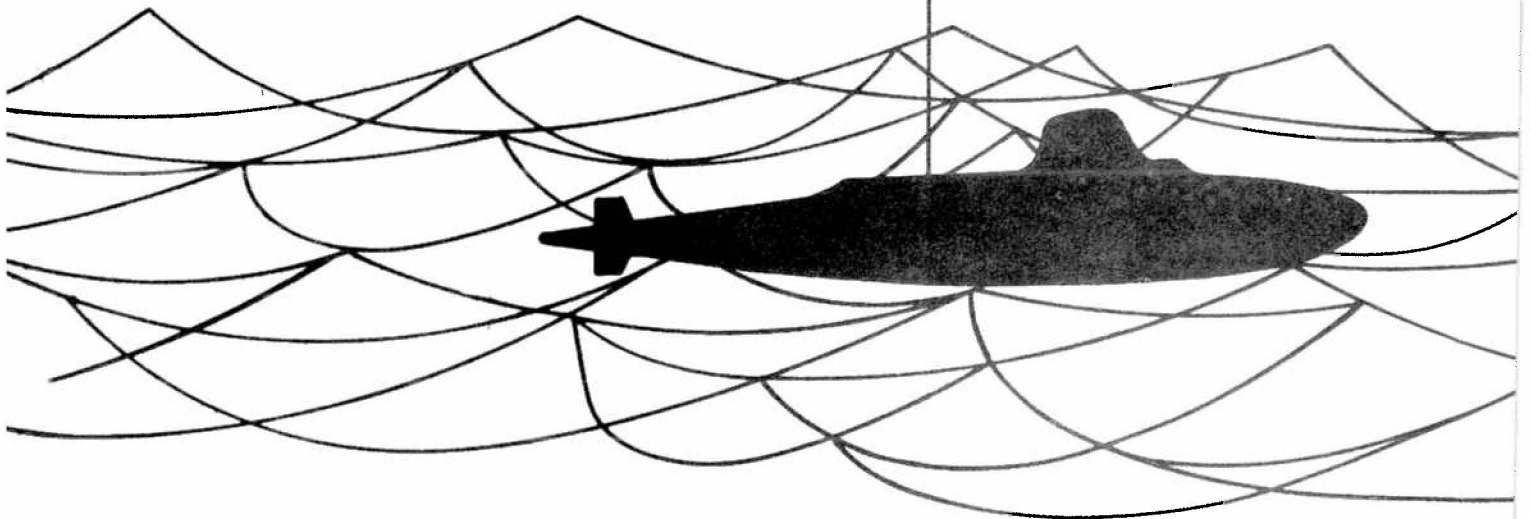
In 1961 the project for the School of Naval Science was again deferred. The Astro-Aeronautical Propulsion Laboratory was retained in the FY 1962 MCON program for presentation to the Congress.\* As a result of this action the Bureau of Naval Personnel Five-Year MCON Program (1963-1967), as approved by the CNO Standing Committee for Shore Facilities appears as follows:

| <u>Line Items</u>                  | <u>Est Cost</u> | <u>Fiscal Year</u> |
|------------------------------------|-----------------|--------------------|
| School of Science                  | 4,539,000       | 1963               |
| Compressible Flow Laboratory       | 2,227,000       | 1963               |
| Dispensary and Dental Clinic       | 680,000         | 1965               |
| Fire Protection Installation       | 125,000         | 1966               |
| Conversion of Facilities to Chapel | 100,000         | 1967               |

\* On 7 September 1961 a Senate-House conference committee approved a compromise MCON appropriation bill including \$2,463,000 for the laboratory. However, the bill signed by President Kennedy on 26 September carried a rider that no funds were to be released for the project until a Congressional committee determined whether requirements could not be fulfilled elsewhere, e.g. in a civilian university, which would make this project unnecessary.



*Lecture Series*



## GENERAL ATTENDANCE

- 4 Jan 1960 Dr. Edward Teller, Lawrence Radiation Laboratory,  
University of California, Berkeley  
"How to be an Optimist in the Atomic Age"
- 11 Jan 1961 Professor Claude A. Buss, Stanford University  
"Our Troubles in Laos"
- 25 Jan 1961 Brigadier General Charles S. D'Orsa, USA, Commanding General,  
U. S. Army Combat Development Experimentation Center, Fort Ord, Calif.  
"Berlin, The Outpost of Democracy"
- 1 Feb 1961 RADM Charles B. Martell, USN, ACNO (Development)  
"Developments in Space Technology"
- 8 Feb 1961 Professor Stephen S. Goodspeed, Vice-Chancellor,  
University of California, Santa Barbara  
"The Realities of American Foreign Policy with Respect to Cuba"
- 15 Feb 1961 Professor J. Cudd Brown, Occidental College, Los Angeles, California  
The Congo - "A State Strives for Nationhood"
- 1 Mar 1961 Mr. Ray Hallet, Asst. to Chief Engineer, Space Systems,  
Douglas Aircraft Inc.  
"Future Military Space Concepts"
- 29 Mar 1961 Dr. John P. Hagen, Chief Vanguard Division,  
National Aeronautics and Space Administration  
"Space Developments"
- 5 Apr 1961 Mr. Roy G. Knutson, Director, Advanced Systems Research & Development  
AUTONETICS Division, North American Aviation Co.  
"Space System Developments"
- 12 Apr 1961 Mr. David A. Young, Director, Corporate Long Range Planning,  
Aerojet-General Corporation  
"Propulsion for Space"
- 19 Apr 1961 VADM U. S. G. Sharp, USN, DCNO (Plans and Policy)  
"Strategic and Military-Political Planning"
- 24 Apr 1961 VADM W. M. Beakley, USN, DCNO (Operations)  
"Naval Policy and Fleet Readiness"
- 3 May 1961 VADM R. B. Pirie, USN, DCNO (Air)  
"Education in the Space Age"
- 10 May 1961 VADM W. R. Smedburg, III, USN, Chief of Naval Personnel  
"The Navy's Primary Weapons System - Personnel"



GENERAL ATTENDANCE (continued)

17 May 1961 ADM J. S. Russell, USN, Vice Chief of Naval Operations  
"The Navy's Concepts of and Contributions to Cold, Limited and General War"

NAVY MANAGEMENT SCHOOL

18 Nov 1960 Dr. George Kozmetsky, Vice President, Litton Industries  
"A Current Problem in Industrial Management"

9 Dec 1960 RADM Lot Ensey, USN, Deputy Comptroller, Navy Department  
"Current and Future Problems Relating to Financial Management in the Navy"

6 Jan 1961 Captain E. D. Stanley, USN, CO, NSD, Seattle Washington  
"Logistics in the 6th Fleet"

13 Jan 1961 Mr. Charles A. Phillips, Director, Data Systems Research Staff  
Office of Asst. Secretary of Defense (Comptroller)  
"Data Processing Systems in the Military Services"

10 Feb 1961 RADM H. E. Eccles, USN (Ret)  
"The Theories of War & the Relationships of Strategy and Logistics"

28 Feb 1961 Mr. C. N. Ostergren, Director, Engineering Economics  
American Telephone and Telegraph  
"Management in American Telephone & Telegraph and Engineering Economics"

24 Mar 1961 Dr. Lillian Gilbreth, Lecturer, Consultant, and Author in  
Industrial Engineering and Personnel Management  
"Management Today and Tomorrow"

7 Apr 1961 Mr. Frank W. Piersol, Manager, Department of Organization  
Standard Oil of California, San Francisco  
"Organizing for Growth and Profit"

12 May 1961 Dean Henry Reining, Jr., School of Public Administration  
University of Southern California, Los Angeles  
"Training of Foreign Nationals in Business Management and  
Public Administration"

AERONAUTICAL ENGINEERING CURRICULUM

19 Oct 1960 Captain W. H. Keen, Director, Naval Applications Group  
Office of Naval Research  
"Research in Aeronautical Sciences and its Relation to Aeronautical  
Engineering"

26 Oct 1960 Mr. K. D. Remington, Manager, Attack Projects,  
North American Aviation, Inc., Columbus Division  
"A3J Weapons System Program"

AERONAUTICAL ENGINEERING CURRICULUM (continued)

- 2 Nov 1960 Captain R. M. Tunnell, USN, Bureau of Naval Weapons  
"Research, Development, Test and Evaluation Programs"
- 9 Nov 1960 Mr. D. D. Clark, McDonnell Aircraft Corporation  
"F4H Program"
- 30 Nov 1960 Captain J. G. Smith, USNMC, Pt. Mugu, California  
"Airborne Missile Systems"
- 7 Dec 1960 Mr. Leo J. Devlin, Chief Engineer, Douglas Aircraft Company  
El Segundo Division  
"Missileer Project"

NPS CHAPTER OF THE SOCIETY OF SIGMA XI

- 21 Sep 1960 Dr. Howard F. McFann, Director of Research, U. S. Army Leadership  
Human Research Unit, Presidio of Monterey  
"Experimental & Statistical Control in Psychological Research"
- 2 Nov 1960 Mr. E. Q. Smith, Technical Consultant to the Director,  
Missile and Astronautics, USNMC, Point Mugu, California  
"Tomorrow's Missiles - Today's Research Challenge"
- 18 Jan 1961 Professor Norman L. Oleson  
U. S. Naval Postgraduate School, Dept. of Physics  
"Recent Experiments on an Old Problem in Plasma Physics -  
Moving Striations"
- 1 Mar 1961 Dr. Robert E. Roberson, Consulting Engineer  
"Satellite Orientation Control, or Which Way is Up in Space"
- 5 Apr 1961 Dr. Donald W. Taylor, Sigma Xi's National Speaker for the Year  
"Psychological Studies in Thinking"
- 17 May 1961 Dr. Herbert A. Simon, Carnegie Institute of Technology  
"Making Computers Think Creatively"

NPS CHAPTER OF THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

- 28 Sep 1960 Mr. E. L. Daman, Director of Research, Foster Wheeler Corporation  
"Pressure Fired Boilers for Marine Application"
- 2 Nov 1960 Professor J. E. Brock  
U. S. Naval Postgraduate School, Dept. of Mechanical Engineering  
"Piping System Analysis"
- 25 Nov 1960 Mr. J. R. Birtle and Mr. B. G. Voorhees, General Electric Corporation  
"Marine Boiling-water Reactors"

NPS CHAPTER OF THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS (continued)

- 10 Feb 1961 Mr. R. P. Dumont, American President Lines  
"Ship Design"
- 28 Feb 1961 Professor R. E. Newton  
U. S. Naval Postgraduate School, Dept. of Mechanical Engineering  
"Shock Mounting"
- 29 Mar 1961 Professor C. B. Oler  
U. S. Naval Postgraduate School, Dept. of Electrical Engineering  
"Peru"
- 17 May 1961 Mr. John Delmonte, Furane Plastics  
"Naval Application of Plastics"
- 18 May 1961 CDR W. M. M. Fowden, USN, U. S. Naval Postgraduate School  
"Gas Turbines"

NPS STUDENT BRANCH OF THE AMERICAN ROCKET SOCIETY

- 26 Oct 1960 Dr. R. M. Head, U. S. Naval Postgraduate School, Dept. of Aeronautics  
"Plasma Propulsion"
- 5 Apr 1961 Dr. F. D. Faulkner, U. S. Naval Postgraduate School, Dept. of Mathematics  
"Some Recent Developments in Control Theory"
- 27 Apr 1961 Dr. Howard Kinsvater  
President, Northern California Section American Rocket Society  
"Propulsion - What Next?"
- 3 May 1961 LCDR Lorne Minogue, RCN  
"Space Ship Communications"

NPS STUDENT BRANCH OF THE INSTITUTE OF AERONAUTICAL SCIENCES

- 16 Nov 1960 Mr. Glenn Sanderson and Mr. George Robinson  
Lockheed Aircraft Corporation, Burbank, California  
"Design and Development of the P3V"
- 17 Jan 1961 CDR Forrest S. Peterson, USN  
Navy Project Pilot for the NASA X-15  
Edwards Air Force Base  
"The Current and Planned X-15 Project"
- 17 May 1961 Mr. R. W. Kuehl, Aerojet General, Solid Rocket Plant, Sacramento, Calif.  
"General Aspects of Propulsion by Large Solid Rocket Engines"

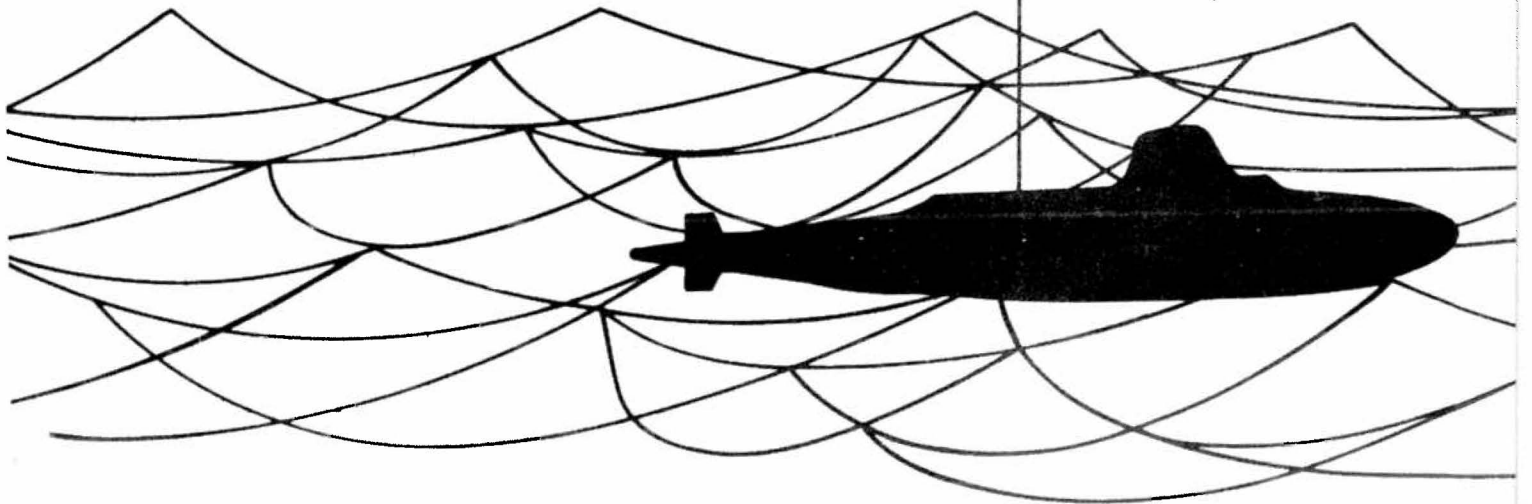
NPS STUDENT BRANCH OF THE AMERICAN INSTITUTE OF ELECTRICAL ENGINEERING

- 3 Nov 1960 Mr. Richard Bird  
Shipboard Engineering Department of Librascope, Inc., Los Angeles  
"Special Techniques in Analog Computer Simulation"
- 2 Mar 1961 Mr. Eugene Parker, Pacific Telephone Co.  
"Progress Through Research"
- 6 Apr 1961 Mr. Robert Smith, Area Sales Manager, IBM Corporation  
"Application of Computers to Engineering Problems,  
Peripheral Computer Equipment, and Computer Language"

NPS STUDENT BRANCH OF THE INSTITUTE OF RADIO ENGINEERS

- 26 Aug 1960 Professor Carl E. Menneken  
U. S. Naval Postgraduate School, Dept. of Electronics  
"Non-Acoustic Detection of Submarines"
- 23 Sep 1960 Mr. Charles Eldon, Hewlett Packard Corporation  
"Quantity Production of High Accuracy Test Equipment"
- 21 Oct 1960 Mr. Michael Anderson, IBM Inc.  
"Scientific Applications of the IBM 1620"
- 21 Apr 1961 Joint Meeting with San Francisco Branch  
Dr. Walter F. Bauer, Manager, Information Systems Dept., Ramo-Wooldridge  
"Computer Design from the User Standpoint"
- 5 May 1961 Dr. George V. Nolde, Supervisor, Advanced Techniques Group,  
West Coast Missile and Surface Radar Division  
Radio Corporation of America  
"Anti-submarine Warfare"

*Research  
Publications - Presentations - Participations*



RESEARCH IN PROGRESS (sponsored)

- \* 1. Study of the surface disturbance and lift force involved in the case of a body moored below the surface of a moving body of water, such as a mine in a tidal estuary.  
BLEICK, W. E.
- \* 2. Investigation of the mechanism and origin of the moving striations in inert gas glow discharges.  
COOPER, A. W.  
OLESON, N. L.  
KELLY, R. L.
- 3. Study of the paramagnetic resonance of ions in crystals with regard to their applicability to MASERS and other devices employing quantum electronics.  
CRITTENDEN, E. C.
- \* 4. The study of transitions from superconductive to resistive phase (and the return to the superconductive phase) in thin films and hollow cylinders of superconducting materials.  
CRITTENDEN, E. C.  
COOPER, J. N.
- 5. Study of the interactions of negative pi mesons at energies near 16 Bev in nuclear emulsion plates exposed to the CERN accelerator.  
DYER, J. N.
- 6. Development of a way to solve various problems in control, particularly optimum control, on the digital computer.  
FAULKNER, F. D.
- \* 7. Exploration of liquid air as a possible lubricant for gears.  
GATCOMBE, E. K.  
PROWELL, R. W.
- 8. Determination of numerical parameters associated with expression for sputtering ratio.  
HARRISON, D. E.
- \* 9. Investigation of the interaction between a magnetic field and a plasma-jet.  
HEAD, R. M.
- \*10. Study of the factors involved in separation from a mixture.  
HERING, C. A.
- 11. Study of the basic phenomena occurring in large-hole (very "leaky pipe") slotted multimode waveguide radiators.  
JOHNSON, R. M.
- 12. Determination of dispersion curves of various gases in the 1-25 micron region of the spectrum.  
KALMBACH, S. H.
- 13. Tabulation of atomic spectrum lines.  
KELLY, R. L.

RESEARCH IN PROGRESS (sponsored)

14. Study of the characteristics of selected surfaces involved in heat transfer radiation.  
KINNEY, G. F.
15. Investigation of: a) Use of "reverberation time" to measure sound absorption characteristics of selected material; b) Near-field sound radiation; c) Possible use of reflection from the surface for calibrating purposes.  
KINSLER, L. E.
16. Investigation of the half-lives and decay schemes of radio-isotopes with half-lives in the 0.1 to 10 second range.  
MILNE, E. A.  
HANDLER, H. E.
17. Study of the radiations emitted by nuclear states formed by the reactions of protons and deuterons on certain light nuclei.  
MILNE, E. A.  
HANDLER, H. E.
- \*18. Study of low temperature mechanical and electrical properties of solids.  
NEIGHBOURS, J. R.
19. Investigation of the part played by electron and ion oscillations in the discharge in the creation of high energy electrons.  
OLESON, N. L.
- \*20. Investigation in a rare gas plasma of the diffusion of charged particles across magnetic fields.  
OLESON, N. L.  
COOPER, A. W.  
KELLY, R. L.
- \*21. Study of current conduction phenomena in insulation oil flowing between electrodes.  
POLK, O. H.
- \*22. Matrix diagonalization by interchanges of rows and of columns only.  
PULLIAM, F. M.
- \*23. Investigation of the chemical equilibria and kinetics involving ammino complexes of palladium.  
REINHARDT, R. A.
24. Investigation of: a) The electron energy distribution resulting from certain interactions of gamma rays with matter; b) measurement of beta ray spectra of appropriate radioactive nuclei.  
RODEBACK, G. W.
25. Study of the shock curvature and the boundary layer of repeated shocks in a tube.  
SANDERS, J. V.

RESEARCH IN PROGRESS (sponsored)

26. Study of standing shock waves in column of gas.  
SANDERS, J. V.
- \*27. Study and interpretation of the infrared absorption spectra of some inorganic compounds.  
SCHULTZ, J. W.
28. Study of the decay rate of pressure as a function of the area/volume ratio of the pressure vessel.  
SINCLAIR, J. E.
29. Investigation of the physical relations between the atmosphere and the oceans including:  
a) horizontal energy transport; b) transport across the air-sea interface; c) empirical relations between the atmosphere and the ocean thermal structure.  
WICKHAM, J. B.  
JUNG, G. H.
30. Study of the propagation of high frequency elastic waves in organic single crystals.  
WILSON, O. B.
- \*31. Development of techniques in measurements with very high frequency elastic waves, including techniques for the generation and detection of these waves and a study of their propagation in materials.  
WILSON, O. B.
- \*A continuing program begun prior to FY 1961.



RESEARCH IN PROGRESS (Other than Sponsored)

1. Mathematical Theory of Communication  
BOMBERGER, R. B.
2. Minimum-time ship routing  
HALTINER, G. J.
3. Determination of Stream Fields for Numerical Forecasting  
HALTINER, G. J.
4. Numerical Prediction of the 100 mb Level  
HALTINER, G. J.
5. Heat Transport by Currents in the North Atlantic Ocean  
JUNG, G. H.
6. Ocean mixed layer variations related to meteorological parameters  
JUNG, G. H.
7. Study of the hardness of iron-nickel alloys  
MARSHALL, G. D.
8. Study of the distribution of work hardening in a simple case of impulsive deformation.  
MARSHALL, G. D.
9. Studies on the wind-profile in the surface layer  
MARTIN, F. L.
10. Spectral studies of the transports of angular momentum and kinetic energy in the general circulation.  
MARTIN, F. L.
11. Spectral studies of the turbulent nature of micrometeorological variables.  
MARTIN, F. L.
12. Phase Span Analysis of Nonlinear and Discontinuous Systems  
THALER, G. J.
13. Techniques for the design of compensation for control systems  
THALER, G. J.
14. Linear and nonlinear models for multiloop systems  
THALER, G. J.
15. Describing function - frequency response of nonlinear systems  
THALER, G. J.

### BOOKS PUBLISHED

Tworzyma Sztuczne, Wlasnosci i przglad nowoczesnych zastosowan (Polish translation of English Monograph on Plastics) - Warsaw - 1960

KINNEY, G. F. (Metallurgy and Chemistry)

Section on "Vibration" - Encyclopedia of Science and Technology - McGraw-Hill Book Co. October 1960

KINSLER, L. E. (Physics)

### PAPERS PUBLISHED

The "Persistor" - A Superconducting Memory Element - Proceedings of the IRE, Vol. 48, No. 7, p. 1233 - July 1960 (Crittenden, Cooper and Schmidlin)

CRITTENDEN, E. C. and COOPER, J. N. (Physics)

Current-Induced Switching of Superconductive Thin Films - Solid State Electronics, Vol. 1, No. 4, p. 323 - September 1960 (Schmidlin, Learn, Crittenden and Cooper)

CRITTENDEN, E. C. and COOPER, J. N.

Superconductive Properties of Thin Tin Films - abstract of paper, Bulletin of American Physical Society, Series II, Vol. 16, p. 64 - 1 Feb 1961 (Cooper, Crittenden and Schmidlin)

CRITTENDEN, E. C. and COOPER, J. N.

Superconductive Properties of Thin Tin Films - technical report - Physical Research Laboratory, Space Technology Laboratories, Inc. - 2 Nov 1960

CRITTENDEN, E. C. and COOPER, J. N.

Limiting Conditions for Moving Striations - Bulletin of American Physical Society, Vol. 5, p. 371 - 15 Jun 1960

COOPER, A. W.; OLESON, N. L. (Physics)

Analysis and Design of Control Systems by Means of Time Domain Matrices, PhD Dissertation - USNPS - May 1961

DORF, R. C. (Electrical Engineering)

A Complete Solution to a Simple Rendezvous Problem

U. S. Naval Postgraduate School Research Paper No. 22 - July 1960

FAULKNER, F. D. (Mathematics and Mechanics)

Optimum Interception of a Ballistic Missile at Moderate Range

U. S. Naval Postgraduate School Research Paper No. 25 - March 1961

FAULKNER, F. D.

Satellite Rendezvous in Minimum Time in a Weak Gravitational Field

U. S. Naval Postgraduate School Research Paper No. 26 - March 1961

FAULKNER, F. D.

Some Further Results on Convective Currents - Tellus, Journal of Geophysics, Volume 12, No. 4 - 1960 (Haltiner and Chase)

HALTINER, G. J. (Meteorology and Oceanography)

### PAPERS PUBLISHED

The Diurnal Wind Variation Associated with a Diurnal Pressure Variation (correspondence section) - *Tellus, Journal of Geophysics*

HALTNER, G. J.

Biassing the Tunnel Diode - *Electronics*, Vol. 2, No. 4 - 3 June 1960

MURRAY, R. P. (Electronics)

Rotating Probe Measurements in the Interior of the P-4 Steady State Plasma - *Bulletin of the American Physical Society*, Vol. 6, p. 190 - 20 March 1961

OLESON, N. L.

A Qualitative Model of P-4, a Steady State Plasma Source - *Bulletin of the American Physical Society*, Vol. 6, p. 201 - 20 March 1961

OLESON, N. L.; KELL, R. L. (Physics)

A Modified Postcast Method of Control with Applications to Higher Order Systems - *Transactions AIEE*, part II - November 1960 (So and Thaler)

THALER, G. J. (Electrical Engineering)

Time Domain Design of Sampled Data Control Systems - *Transactions AIEE*, part II, 1961 (Pastel and Thaler)

THALER, G. J.

Phase Span Analysis and Design of Linear Discontinuously Damped Feedback Control Systems - *Transactions AIEE*, part II, 1961 (Han and Thaler)

THALER, G. J.

s-Plane Design of Compensation for Feedback Systems - *IRE Transactions on Automatic Control* - 1961 (Pollak and Thaler)

THALER, G. J.

Feedback Compensation: A Design Technique - *Transactions AIEE*, part II, 1961

(Thaler, Bronzino, Kirk)

THALER, G. J.

Analytic Models and Intuition - *Asilomar Conference Summary - California Mathematics Council* - 9 December 1960

TORRANCE, C. C. (Mathematics and Mechanics)

Freedom of the Seas - A Logical Analysis - *Proceedings of the 4th Annual Conference on the Naval Minefield (NOL)* - 31 January 1961

TORRANCE, C. C.

### PAPERS PRESENTED

Donald Ogden Stewart and the Humor of the 1920's - *Modern Language Association*, Philadelphia, Pennsylvania - 28 December 1960

BOMBERGER, R. B. (Humanities)

PAPERS PRESENTED

Stresses in Pipes Bent into Circular Arcs - ASME Annual Meeting, New York - December 1960  
BROCK, J. E. (Mechanical Engineering)

The Influence of the Anode on Moving Striations in the Inert Gases - 13th Annual Gaseous Electronics Conference - Monterey - October 1960  
COOPER, A. W. (Physics)

Limiting Conditions for Moving Striations in Inert Gases - submitted for presentation to the International Conference on Ionization Phenomena in Gases  
COOPER, A. W.; OLESON, N. L. (Physics)

Superconductive Properties of Thin Tin Films - American Physical Society, annual meeting in New York, N. Y. - 4 February 1961  
COOPER, J. N.; CRITTENDEN, E. C. (Physics)

Limit Cycles of a Sampled-Data Relay Servo, Using the Z-Transform and Describing Function  
AIEE Summer General Meeting - 22 June 1961  
DEMETRY, J. S. (Electrical Engineering)

Adaptive Sampling Frequency for Sampled Data Control Systems - IRE Seventh Region Conference, Phoenix, Arizona - 26 April 1961  
DORF, R. C. (Electrical Engineering)

An Analog Simulation of a Discrete Compensator for a Sampled Data System - AIEE Summer General Meeting - Ithaca, N. Y. - 22 June 1961  
DORF, R. C.

Optimum Interception of a Ballistic Missile - 5th Navy Science Symposium - Annapolis, Maryland - 18 April 1961 (Faulkner and Ward)  
FAULKNER, F. D. (Mathematics and Mechanics)

Thermal Structure of the Upper Ocean Associated with Meteorological Parameters - American Meteorological Society Meeting (187th National Meeting), Eugene, Oregon - 14-16 June 1960  
JUNG, G. H. (Meteorology and Oceanography)

Modified Rayleigh Refractometer for use in the Infrared - Optical Society of America - Boston, Massachusetts - October 1960  
KALMBACH, S. H. (Physics)

Repeated Shock Waves and their Boundary Layers - U. S. Naval Reserve Research Co. 12-8 meeting - November 1960  
MEDWIN, H. (Physics)

Noise Control in Home and Industry - Bay Chapter of the California Society of Professional Engineers - 21 September 1960  
MEDWIN, H.

### PAPERS PRESENTED

Elastic Properties of Solids - West Coast meeting on Mechanical Properties of Solids, sponsored by Atomics International - October 1960

NEIGHBOURS, J. R. (Physics)

Rotating Probe Measurements in the Interior of the P-4 Steady State Plasma - Gatlinburg (Tennessee) Meeting of the Division of Plasma Physics, 2-5 November 1960

OLESON, N. L. (Physics)

A Qualitative Model of P-4, a Steady State Plasma Source - Gatlinburg Meeting of the Division of Plasma Physics, 2-5 November 1960

OLESON, N. L.; KELLY, R. L. (Physics)

Some Recent Experimental Results on Moving Striations in Rare Gases - Plasma Physics Seminar, Department of Physics, University of California, Berkeley - 15 February 1961

OLESON, N. L.

An Advanced Method for the Determination of Thermal Sensitivity of Priming Materials - 5th Navy Science Symposium - Annapolis, Maryland - 18 April 1961

SINCLAIR, J. E. (Metallurgy and Chemistry)

Feedback Compensation - Seminar, IBM, San Jose, California - 5 April 1961

THALER, G. J. (Electrical Engineering)

The Frequency Response of Nonlinear Systems - 5th Navy Science Symposium - Annapolis, Maryland - 20 April 1961

THALER, G. J.; KIRK, D. E. (Electrical Engineering)

Phase Space Analysis and Design of Linear Discontinuously Damped Feedback Control Systems - AIEE Summer General Meeting, Ithaca, N. Y. - 22 June 1961 (Han, Thaler)

THALER, G. J.

Feedback Compensating: a Design Technique - AIEE Summer General Meeting - Ithaca, N. Y. - 21 June 1961 (Thaler, Bronzino, Kirk)

THALER, G. J.

### OTHER SCHOLARLY ACTIVITIES

Member, Mechanical Design Committee of American-Standards Association Member, Committee A-1 (Steel) of ASTM

BROCK, J. E. (Mechanical Engineering)

Continued to serve as a member of the subcommittee on Penetration of Charged Particles in Matter, Committee on Nuclear Science-National Academy of Sciences. Member of the local committee for the meeting of the American Physical Society at USNPS March 20-24, 1961

COOPER, J. N. (Physics)

PhD Committee - LT Jaregui; Consultant - Microwave Tubes Research Group, Litton, Indiana, - San Carlos

GRAY, G. A. (Electronics)

### OTHER SCHOLARLY ACTIVITIES

Presented a talk on atomic and nuclear physics to 8th grade science students, Sunset School, Carmel.

Developing a complete set of notes for the senior level nuclear physics sequence.

HANDLER, H. E. (Physics)

Referee for Physical Review - International Journal of the Physics and Chemistry of Solids; Directed the March meeting of the APS which was held in Monterey 20-24 March 1961.

NEIGHBOURS, J.R. (Physics)

Research on PhD dissertation.

PARKER, R. N. (Electronics)

Writing of Textual Material for course Ma-120

PULLIAM, F. M. (Mathematics and Mechanics)

In cooperation with the Monterey School Board, experimentation to determine what can be done to promote character development by the concepts and methods of operations research, using two 8th grade English classes.

In conjunction with MPVS, arrangement for conducting a seminar for "gifted" high school students in logic, probability, and then mathematical, physical and philosophical topics. (This will last the entire school year (1961-62) and will extend the course he gave at the Carmel High School this last year.)

TORRANCE, C. C. (Mathematics and Mechanics)

Design of critical speed model for investigation of influence of bearing flexibility and dampening on critical speeds of arbitrary shafts. Tests of shaft deals for nuclear gas turbines; Attendance at 2nd International Congress of Aeronautics, Zurich, Switzerland - September 1960. Visits to universities and research institutes in Europe during summer period 1960.

VAVRA, M. H. (Aeronautics)