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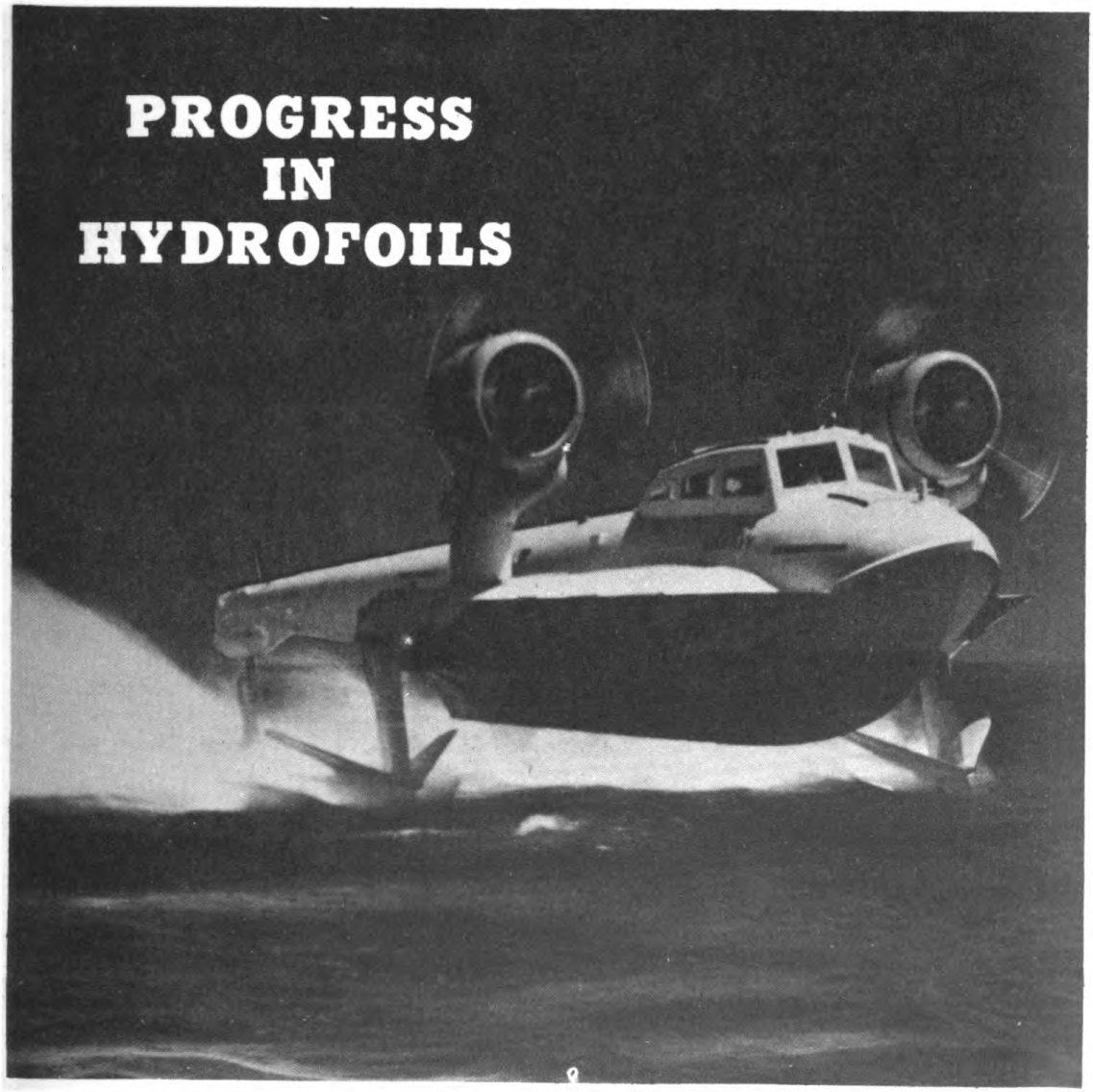
RESEARCH REVIEWS



NAVEXOS P-510

DEPARTMENT OF THE NAVY
WASHINGTON, D. C.

COVER PHOTO: Cargo handling is attracting widespread attention because of the excessive cost of loading ships. For an analysis of the costs of transporting general cargo overseas read the article beginning on page 22.

Research Reviews endeavors to report briefly highlights of technical progress in research by Navy laboratories and contractors and the development of important naval research facilities. Articles which meet these broad criteria and possess a good degree of readability are welcomed. Manuscripts and changes of address should be sent to Code 740, Office of Naval Research, Washington, D. C.

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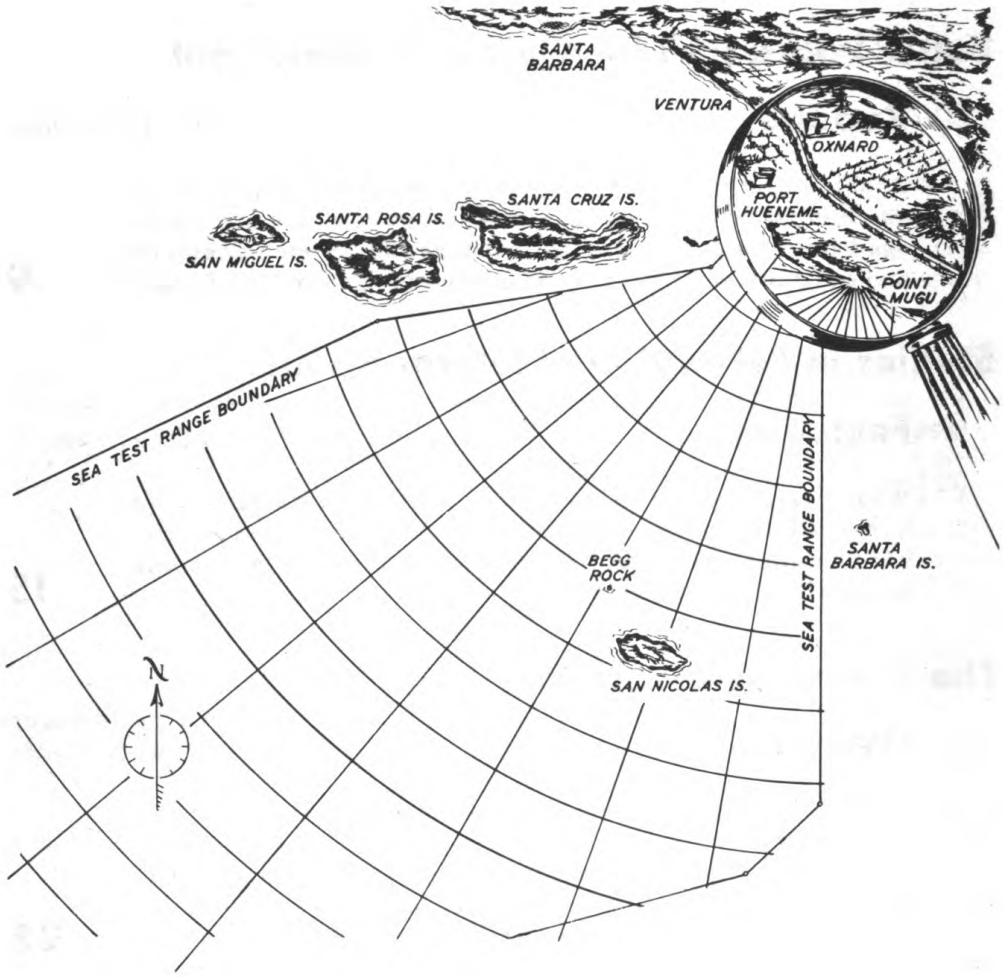


Where the Navy Tests Guided Missiles

In nine years the Navy has developed, from stretches of seashore and swampy land on the California Pacific Coast, a well-organized test center for some of the most advanced missiles in the nation's defense arsenal. Now a $55,000,000 establishment, the U. S. Naval Air Missile Test Center (NAMTC) has clusters of buildings, hangars, and field equipment, and in addition supports an affiliated ship, the 540-foot, 14,800-ton USS NORTON SOUND based at nearby Port Hueneme. During the nine years since NAMTC was officially established, the facility has conducted thousands of experiments and tests on guided missiles and pilotless aircraft.

The work at the Center is a joint undertaking in which a sizable group of non-Navy people play important roles. There are about 1,000 of these employed by various contractors having working space at the Center. The naval personnel in uniform add up to approximately 2,000 enlisted men and 200 officers. Then there are the civilian employees of the Navy—some 2,000 in number—who bend their efforts to the many tasks carried on by the busy facility, some sections working around the clock to come up with badly needed answers to the problems involving guided missiles and pilotless aircraft.

Because the testing conducted by the Center requires vast areas over water (see Frontispiece), some 11,000 square miles of the adjoining Pacific Ocean have become a part of the facility. During the course of this development, NAMTC acquired 14,000 acres of land on San Nicolas Island which is 60 miles Southwest of the Center. The offshore station on this Island has its own air strip and technical facilities (Figure 1). Other smaller parcels of land—all contributing to the testing operations—have become a part of the facility. These include 40 acres on Laguna Peak, 57 acres on Santa Cruz Island, and 5 acres on Santa Rosa Island.

The Point Mugu location (4,234 acres), the main part of the Center, was originally chosen more than nine years ago because it fitted well some rather exacting requirements. First the Navy had to settle on a place with off-shore islands suitable for mounting instruments to track the flight of guided missiles. Nearness to a seaport was a requirement—Port Hueneme is only a few miles up the Pacific Coast from Point Mugu. While the back country had to include a sizable uninhabited tract for safety, it was nonetheless desirable to have population groups located within reasonable driving distance for employees. Oxnard is only seven miles from Point Mugu, and there are other cities including Ventura, the county seat with a population of 22,000, only 17 miles to the northwest.

The fact that the giant and sprawling aircraft industry of Southern California is also fairly close added to the advantages of the Point Mugu location. First developments in 1946 included a $3.6 million launching area, a $1.3 million guided-missile projects building and a $0.5 million missile assembly building. Other Navy facilities were soon to join the Point Mugu official community. In September 1948, a decision of the Secretary of the Navy transferred to this location the Navy Pilotless

Figure 1 - Plotting room underground at San Nicolas Island.

Aircraft Unit and the Naval Air Station from the Mojave desert. These two activities were combined with the Naval Air Facility in the following year to make up the Naval Air Station, Point Mugu.

With aircraft accounting for an increasing portion of the activity, the airstrip facilities at NAMTC were greatly expanded. Exclusive of hangar space, there are now 3,620,000 square feet given over to landing runways and other physical accoutrements of aircraft operations. The mission of the Naval Air Station is to assist and support crews in the testing of missiles and pilotless aircraft.

Other military activities in the area contribute to a situation of cooperation and massed strength to face any emergency. The Naval Construction Battalion Center, home of the Seabees, is at Port Hueneme, seven miles up the coast. Ships and small craft of various kinds are based at this facility. Inland a short distance is the Oxnard Air Force Base, which among other missions, provides jet fighter plane protection for the area.

The Navy's extensive and well organized facilities at NAMTC (Figures 2, 3, 4, and 5), not only serve and advance the work of dozens of military groups engaged in vital defense tasks, they aid and abet perhaps the equally important work of a number of contractors who are involved with military problems. Among these is the Chance Vought Aircraft Company which has built the REGULUS guided missile and the CUTLASS jet aircraft. The Bendix Aviation Corporation has had space at NAMTC

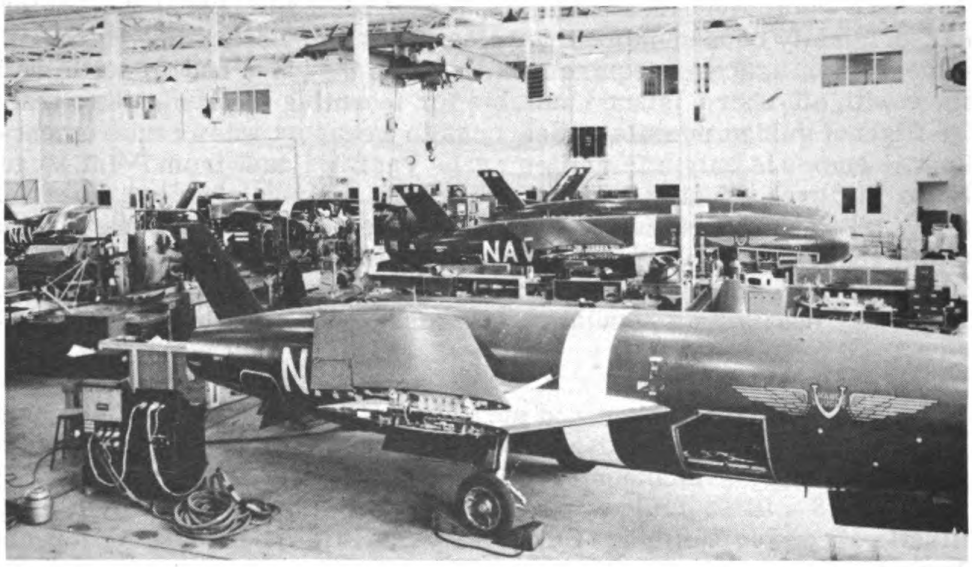


Figure 2 - REGULUS Project Hangar.

since 1952. The White-Rodgers Electric Company of St. Louis has tested products ranging from small components to comprehensive systems for aircraft performance control. Douglas Aircraft Company and the Sperry Gyroscope Company have been major participants in the SPARROW missile projects; both companies are subcontractors on other missiles. In the pilotless aircraft field, the Ryan Aeronautical Company has been the producer of the FIREBEE, the most recent model of which is the KDA-1. Across the highway from NAMTC, in a 12,000-square-foot laboratory and office building of its own, is the Raytheon Manufacturing Company which produces surface-search radar equipment for the Navy. Another organization located at NAMTC is Computer Control, Inc. which is responsible for maintenance on the giant and complex RAYDAC computer. There are 51 Computer Control people at Point Mugu.

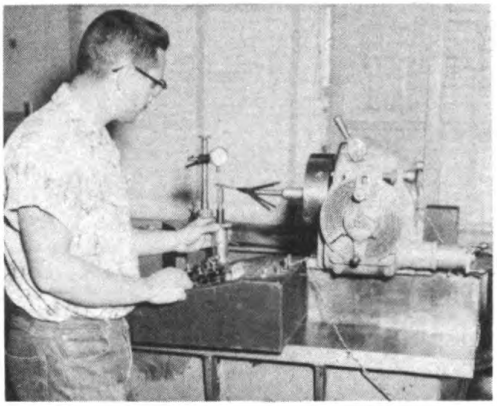


Figure 3 - Calibration of Angle-of-Attack Indicator in Air Frames Laboratory.

In addition to the industrial contractors at NAMTC, there are groups such as the Engineering Center of the University of Southern

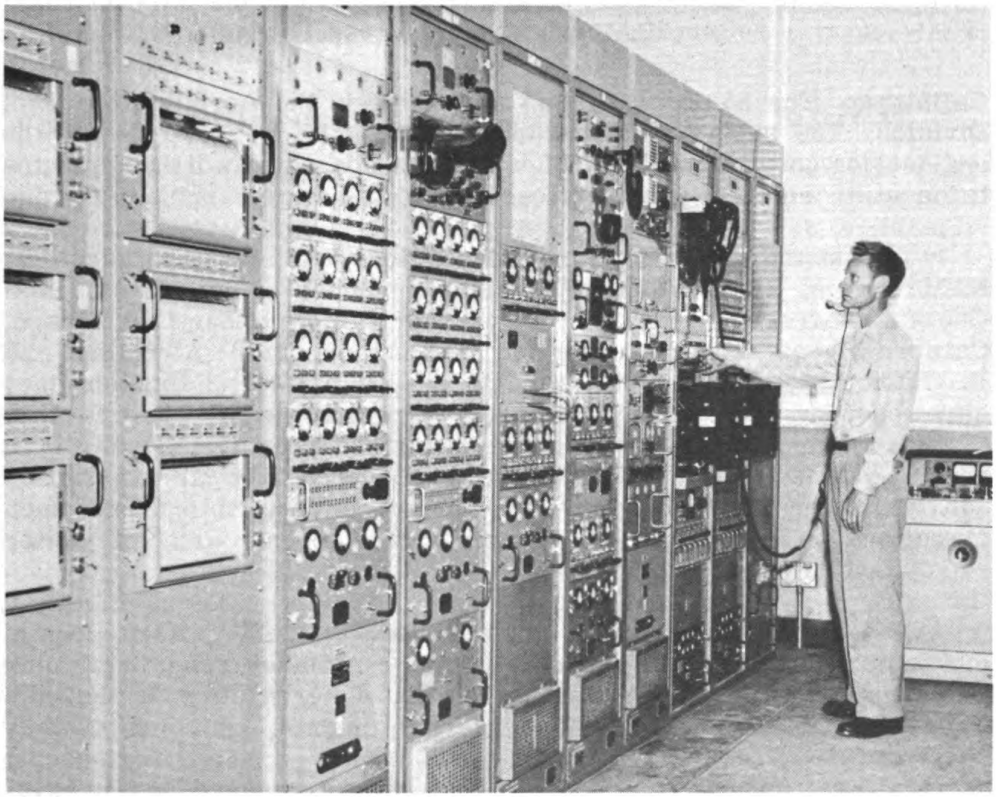


Figure 4 - UNR-5 telemetering receiver.

Figure 5 - Askania theodolite cameras collect optical data during missile flights. Camera at left has no lenses, but uses mirrors, like a telescope, to reflect light and put an enlarged image on film.

California. The 55 people of this unit work in the Aerodynamic Test Division. The supersonic wind tunnel at NAMTC was designed by the engineering unit from USC. Other missile-connected work contributes to the advancement of young professional people who comprise the group.

In common with other Navy installations with scientific missions, NAMTC gives summer employment to a number of college students. One of these from the California Polytechnic College of San Luis Obispo, California, was at work during the past summer in the Airframes and Propulsion Division. He came up with an idea, applicable to emergency situations, for the use of a car-starter system at the Air Blast Facility (Figure 6) for sounding a warning and automatically turning off or on certain valves. It had been standing procedure, when an emergency such as power failure occurs, for engineers to perform manually such operations as shutting the salt-water valves, opening the city water supply, and tripping turbines.

Reserve Officer training goes forward at NAMTC as it does in many another naval facility or organization. A unique reserve training unit, known as BARTU 777 of the Bureau of Aeronautics, trains on a regular schedule. There are 33 officers in the unit, and combined they represent an approximate aggregate of 300 years in formal engineering and technical education as well as 400 years of reserve duty in naval aviation. Some of these members are naval aviators who are authorized to fly aircraft based at the Naval Air Station, Point Mugu.

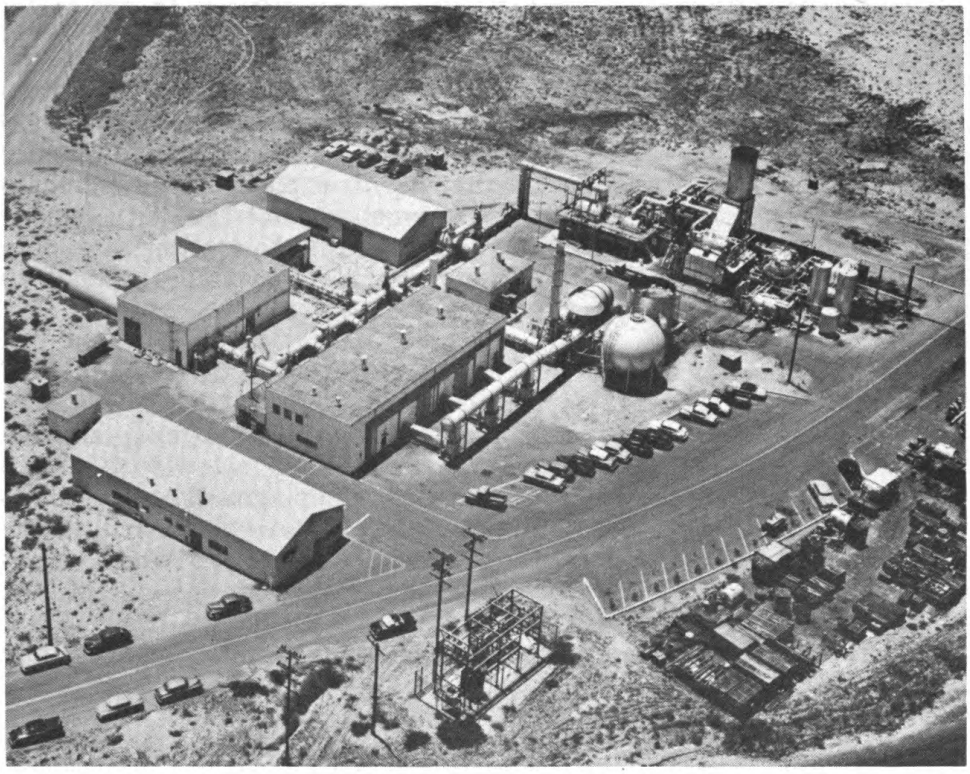


Figure 6 - At the Air Blast Facility, a power plant drives air at supersonic speeds through the wind tunnels in the center of the building where missile models and jet engines are tested.

Technical Information Department at NAMTC

The reporting that is done on the many tasks and projects at Point Mugu gets skilled attention from the Technical Information Department. A report of NAMTC or one of its allied activities may take the form of bulky pamphlet with many complicated drawings and illustrations, or it may be a single page of text. Information is sometimes provided by a series of photographs, or by motion picture film. In highly specialized defense activities, the film report has assumed a new importance.

There are 130 people in the Technical Information Department of NAMTC, and 82 of them are employed in the Photographic Division. The laboratory of this division is well equipped with facilities to process pictures, both black and white and color, in practically every range of film on the market.

The reporting at NAMTC is helped with respect to speed and security by the operation of a publishing plant on the premises. The Technical Information Department has the responsibility for this plant which is equipped for offset printing and lithography. There are technically qualified people on the staff to prepare schematic drawings and other special illustrations.

The library at the Center has 12,000 volumes and 55,000 technical reports. There is much in this storehouse of information that is classified, and more pours in all the time. Scientific periodicals and journals arrive regularly; the subscription list is currently around 450, and includes 175 foreign titles.

The USS NORTON SOUND, Based at Port Hueneme

The Navy effort in the testing and development of guided missiles is highlighted by the operations of a specialized ship, the USS NORTON SOUND (Figure 7). In reality, the ship is an operational guided missile laboratory, equipped with devices that perform hundreds of intricate tasks in checking the performance of the most advanced guided missiles and pilotless aircraft. Of greatest significance is the fact that this ship does its testing and evaluating in an environment that corresponds to actual operating conditions of the Navy.

Originally a seaplane tender, the USS NORTON SOUND is a 14,800-ton ship which participated in the final campaigns of World War II. Then, in 1948, it went into the Philadelphia Naval Shipyard, and for seven months workmen labored to transform space below deck, and to build topside launchers and other specialized equipment. The equipment of the below-decks shops goes far beyond the standard shipboard installation, approaching the status of a precision laboratory. When turned out of the Navy Yard in 1948, the launching equipment was suitable for such contemporary missiles as the V-2 and the REGULUS. Since 1948, modifications and adjustments have been made to accommodate the newer missiles (Figure 8).

In addition to the launchers, the NORTON SOUND has the latest in telemetry facilities. Radar screens on the after deck track the missile

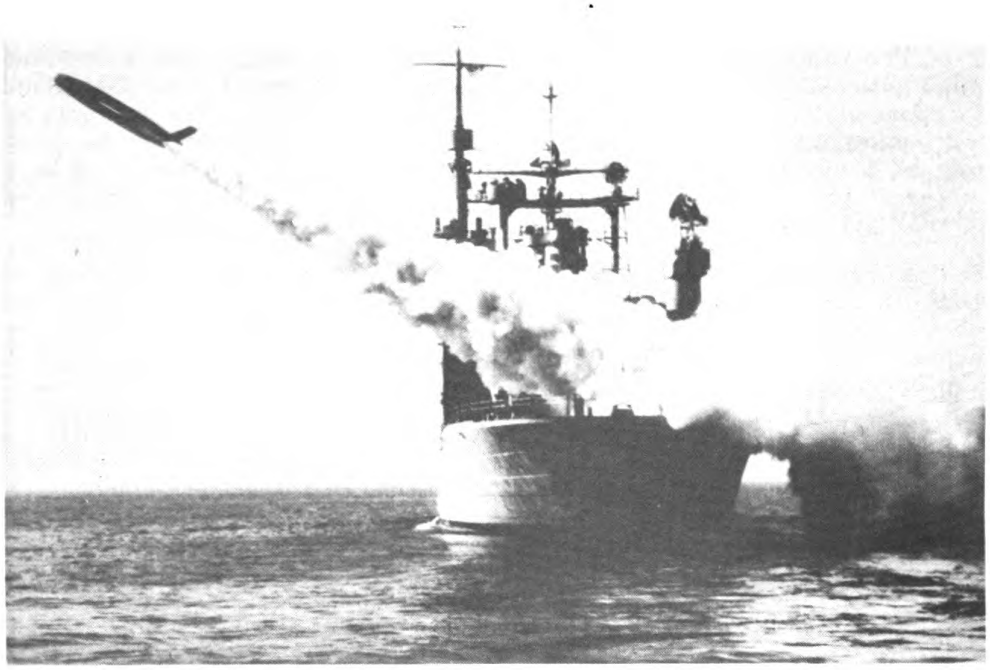


Figure 7 - A REGULUS missile launched from the USS NORTON SOUND.

while the telemetry recorders register data radioed back concerning missile performance. Valuable data are also obtained through the use of theodolite cameras. A photographic laboratory below decks processes still photographs promptly after each test operation.

While the USS NORTON SOUND is assigned to the Commander Air Force, U. S. Pacific Fleet, the ship is under technical control of the Bureau of Ordnance. CDR William D. Harrington, operations officer of the guided missile ship, attends scheduling conferences at NAMTC every Friday morning. It is no accident that CDR Harrington was formerly Island Facilities officer at Point Mugu; thus a thorough understanding permeates these scheduling conferences.

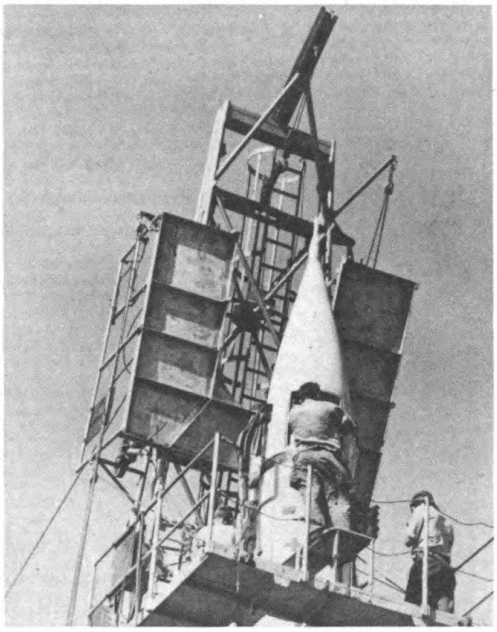


Figure 8 - Men working on instrumentation head section of VIKING No. 4 later launched from USS NORTON SOUND.

When the NORTON SOUND puts out to sea on a testing operation, Point Mugu supplies the necessary aircraft support. Also it designates the sea test range over which the ship will conduct its firing. The Range Instrumentation Department of NAMTC reduces some of the data; other needed reduction work is accomplished at nearby naval installations in Southern California.

The launching of a missile takes on many aspects of a scene on a Navy carrier at sea. The missile hangar is immediately forward of the broad afterdeck. On each side of the hangar are spaces for assembling and testing missiles in preparation for launching. A missile is first rolled out onto the launching deck where a skilled crew goes into action preparatory to firing. As launch-time nears, a huge steel curtain is lowered to shut off the hangar area. The launcher itself is mounted in the middle of the broad expanse of the afterdeck. Extra steel plates help the deck area withstand the rigors and heat of the firing.

The USS NORTON SOUND is under command of CAPT Robert F. Sellers, an officer who has had extensive experience in the guided-missile program. The complement of 542 includes a number of specially trained personnel who are well versed in the exacting, specialized, missile-related jobs to be done on the guided-missile ship.

Island Facilities Department

Two of the major off-shore islands that comprise part of NAMTC are provided logistic support by Island Facilities Department, a branch of the Naval Air Station at Point Mugu. These two islands, San Nicolas and Santa Cruz, may be served by either a multi-engined aircraft or by various types of boats.

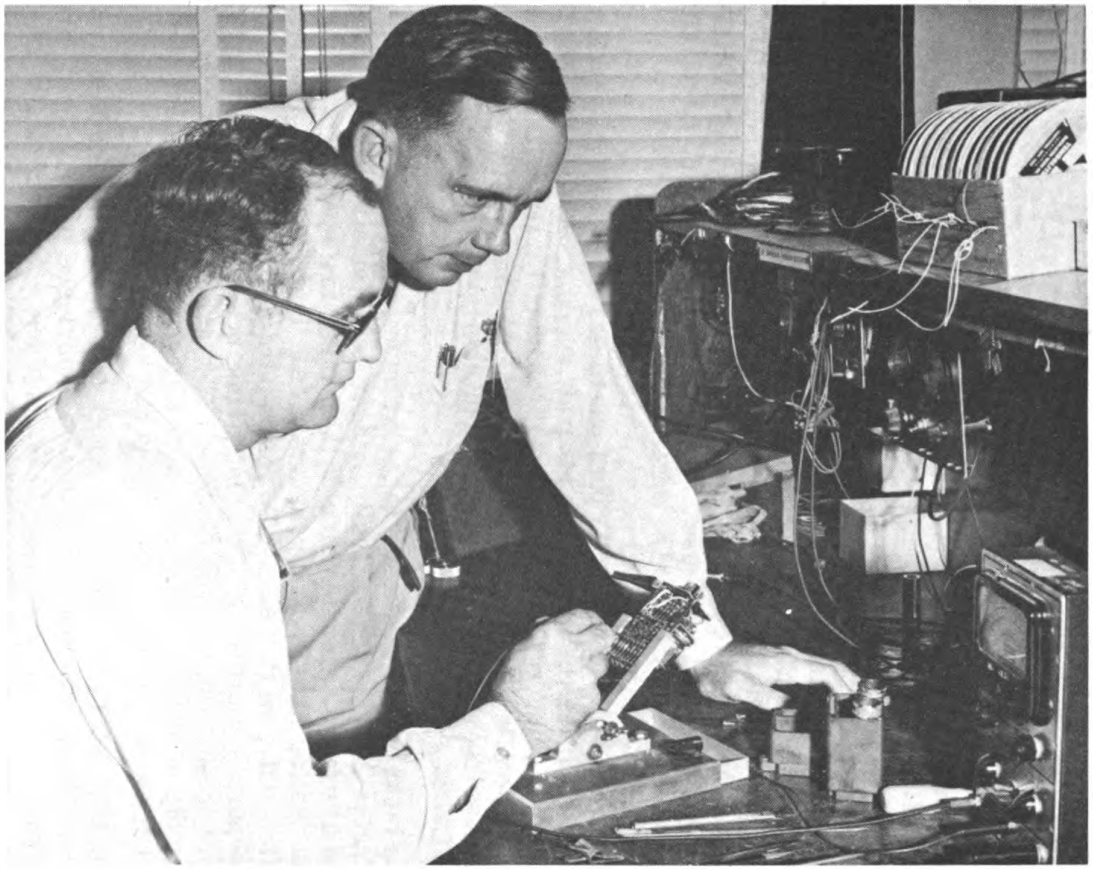


Figure 1 - Checking a circuit of faulty NEL Repairable Plug-in Subassembly Package. The parts board is mounted in a jig that was designed at the Laboratory for construction and testing of the packages.

Better Packaging for Electronic Equipment Repairs

Robert H. Harwood
Special Equipment Branch
U. S. Navy Electronics Laboratory

"Navy gear" is traditionally a catch-all name for all sorts of things important to shipboard operations—such things as anchors, and lines, and marlin spikes—also such things as squawk boxes, radio receivers, loran, and the thousands of items that make up Navy communications and detection.

It is the latter kind of "gear," essentially electronic in nature, that has multiplied again and again to assume increasing importance in the well-being and progress of the Navy. A half-century ago, there was no electronics in the Navy; Marconi and a few other inventors had experimental equipment, that was all. But today's ships, large and small, depend heavily on their eyes (radar and sonar) and on their ears (communication equipment) for successful operations. The Navy has millions of dollars already invested in gear of all kinds that is tabbed "electronic;" many more millions in increasing amounts will be spent in the program to maintain the U. S. Navy at highest levels of efficiency and potential performance.

The growing importance of electronic equipment, not only to the Navy, but to many another establishment and organization, has brought along the companion problem of maintenance. It has been said (Research Reviews, August 1952) that for every 100 million dollars of military electronic equipment procured, a billion dollars worth of maintenance will be spent on it before it wears out.

The idea of "packaging" as a system of repair has fast been gaining acceptance almost everywhere electronic equipment is used. Among the research and development people who have been at work on a better packaging system are scientists (Figure 1) in the Special Equipment Branch of the U. S. Navy Electronics Laboratory, San Diego, California. The design engineers here have concentrated on small subassembly packages of the plug-in repair type. These combine with a system for locating functional failure in electronic equipment, to bring about an effective repair in only a fraction of the accustomed time it would take to make the same repair by conventional methods.

The idea of plug-in repair (Figure 2) goes along with the belief that maintenance men should not be asked to attempt to locate a faulty part while the equipment is inoperative. It is much better to replace a faulty part with a tested plug-in package part involving practically no loss of equipment operating time. Then, the maintenance man can take the faulty subassembly to a bench, locate the trouble, repair it, and put it with other spare operating parts for re-use at a later date.

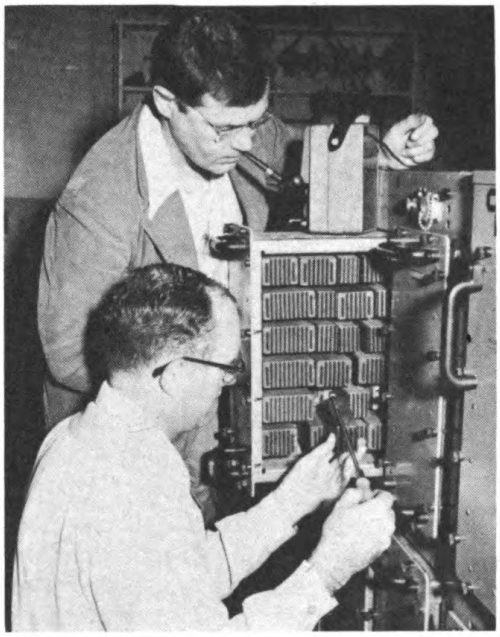


Figure 2 - Removing a single-tube NEL Repairable Plug-In Subassembly Package that contains a faulty function. This function will be replaced with a good one from operating spares to get the equipment operating immediately. The faulty function being removed will be repaired and put into stock for later use.

THE UNIT-SIZE PROBLEM

The design engineers at NEL in their development work had to arrive at a logical size for a subassembly plug-in unit. Here storage was a consideration as bulky units would be inconvenient aboard ship or at other locations where space is at a premium. In particular it would be highly impractical to find room for spare units as large as a receiver or a transmitter.

The problem of unit size was dealt with by getting down to cases on the functional elements to be found in electronic equipment common to the Navy. These equipments were analyzed and block diagrams were made to set forth precisely the elements which are functional. This determination became the starting point for design engineers in getting on the drawing board a practical subassembly in a size small enough to be handled easily and stored readily by Navy personnel ashore or afloat.

Another design problem for the engineers was to determine whether the subassemblies should be repairable or expendable. In the case of front-line communication instruments used by the Marine Corps and by airborne personnel, the expendable type was an obvious answer. On the other hand, quite a few pieces of electronic equipment aboard ship are fairly long-lived, and it was decided, accordingly, to design repairable subassemblies. In both cases, the plug-in feature was applicable.

Two designs have been developed and are known as NEL Repairable Plug-In Subassembly Packages:

Model I is a small package of three essential parts and an 11-pin plug. The length of the package varies to accommodate one, two, three, and four miniature tubes.

Model II comes in eight variations and is called "Minimod" meaning "modular construction for miniature tubes." There are two kinds of covers available for each of four packages which are designed in a series for one, two, three, and four miniature tubes.

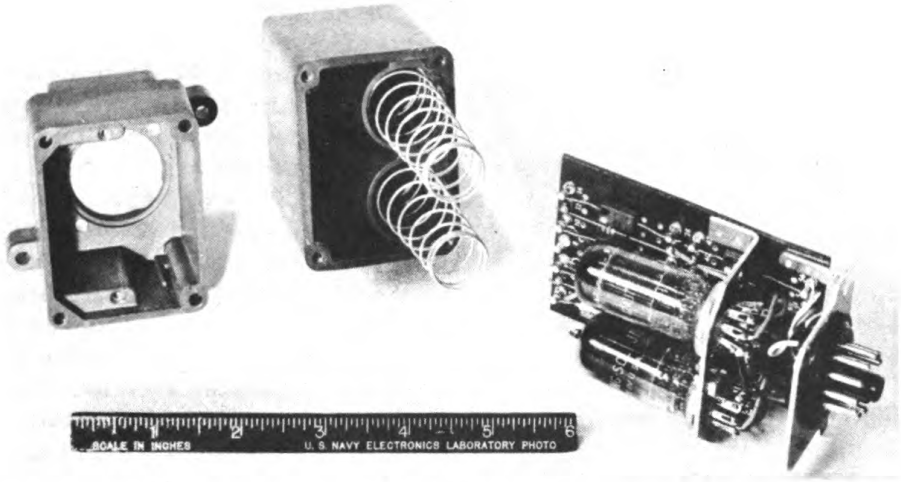


Figure 3 - Internal construction of Model I Series packages. Each package consists of the base, the cover with the tube retaining the springs, and the parts board and brackets. The circuit shown is the two-stage binary flip-flop.

THE MODEL I PACKAGE

The three major parts of the Model I package are the base, the cover, and the parts board with brackets (Figure 3). Each of the series of one up to four is made of die-cast aluminum which is black-anodized internally and externally for efficient heat absorption and radiation. The length of the package varies to accommodate the number of tubes, but the two-inch width is the same for all four in the series. The longest obtainable package (to accommodate four tubes) is five inches.

The packages are designed to allow maximum heat transfer and give environmental protection to the enclosed parts. Because of the excellent heat conduction and radiation, tubes run cooler in the packages than they do in the same circuit in open air or in standard-type shields. As an adjunct of the development work on Model I, the NEL design engineers tried their hand at a new-type shield. The result was a shield of copper braid called

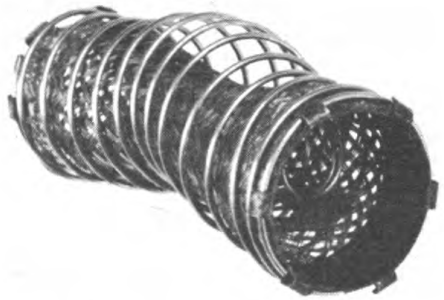


Figure 4 - "Chinese handcuff" shield for Model I Series packages. Formed of soft copper braid blackened for good heat transfer, the shield is held in intimate contact with tube walls by spring action.

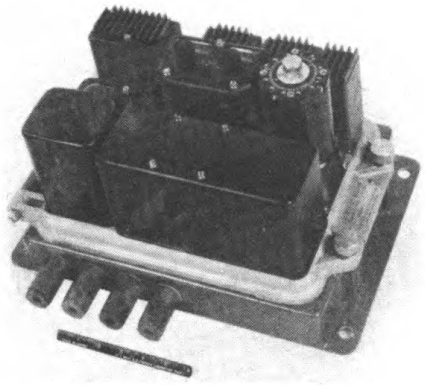


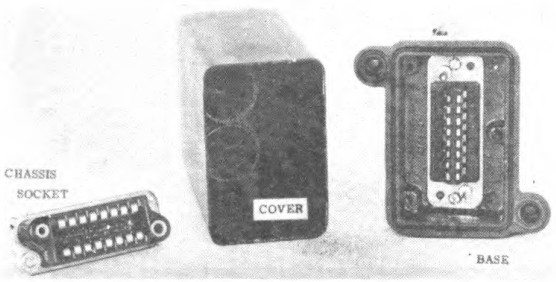
Figure 5 - Model I Series packages used in a shipboard-type "Dynamic PPI Tester."

the "Chinese handcuff" (Figure 4) which serves to make the tubes run even cooler than they had in the package as originally designed. Among the various uses to which the Model I Series packages have been put is in the "Dynamic PPI Tester" (Figure 5), a shipboard-type of equipment that requires no cabinet for environmental protection.

While the Model I Series of packages was a satisfactory method of packaging electronic equipment, the experience gained in the use of approximately 5,000 units indicated need for improvements. The parts board on the Model I Series was a little too close to the side of the cover. If a workman was careless in soldering, there was a chance of a short. The 11-pin interconnection plug did not always have enough contacts for some of the larger size units and, protruding from the base, was subject to damage. Casting the tube wells as an integral part of the cover did not allow sufficient flexibility when it was desirable to use large components. None of these faults was serious, but it was apparent some refinements could be effected in a new Model II Series.

THE MODEL II PACKAGE

The engineers at NEL designed a series of eight for the Minimod or Model II Series. Four of the models have deep-drawn aluminum-alloy covers and four have die-cast, or impact extrusion covers. Both types of cover are considered necessary. The deep-drawn type would be used for most electronic construction



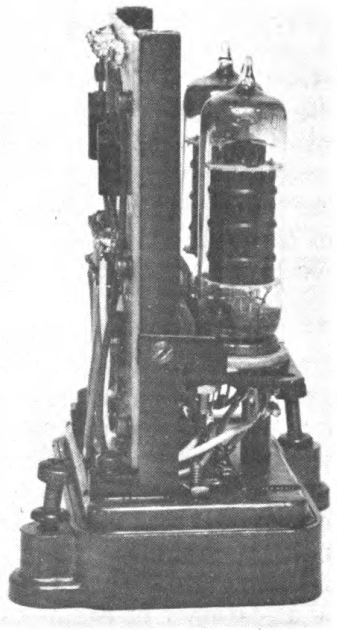


Figure 6 - Internal construction of Minimod II. The three component parts are shown separately above. To the right is a side view of the base with parts board and circuit parts in place.

because of the decrease in weight, but the heavier die-cast cover would be necessary where severe environmental conditions are encountered, or where unusually large amounts of heat are to be dissipated.

The Model II Series of packages accommodates the same number of tubes as the Model I Series. Minimod I is a package with a deep-drawn cover for a subassembly consisting of one tube envelope and the associated parts. Minimod IA is identical to Minimod I with respect to base, connecting plug, parts board, and other internal hardware, but has the die-cast cover.

Figure 6 shows a preproduction model of the Minimod II, with the "heat-test circuit" constructed in it, opened up so that the internal construction can be seen.

- The base is die-cast aluminum-alloy, again black anodized for efficient heat absorption and radiation.
- The parts board is fiberglass with a silicon-resin binder with holes drilled for either single or double-ended turret lugs.
- The cover is deep-drawn aluminum that is black anodized for heat transfer as well as environmental protection.

The tube-shield assembly shown in detail in Figure 7 is unique. The assembly is held in place with heat-treated beryllium-copper spring straps that make a very firm contact with the walls of the cover for heat transfer and electrical connection. The tube shields themselves are formed of flexible copper braid, silver soldered to a cap and a base. An internal conical spring, carefully formed in such a manner as to have no sharp points on the bottom, holds the tube in place. An external spring keeps the braid tight. The entire effect is somewhat similar to the "Chinese handcuff" toy. The braid necks down to make a firm contact with the envelope of the tube for most of its length. This provides the best heat-transfer method yet tested and also provides excellent protection against shock and vibration.

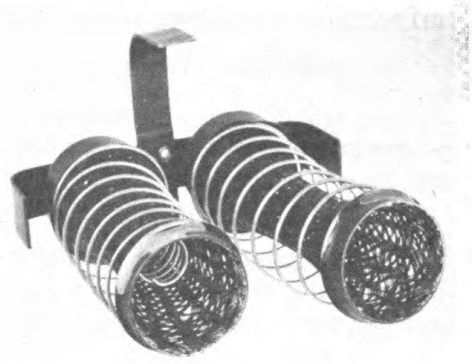


Figure 7 - "Chinese handcuff" shield assembly for Model II Series.

The Model II Series of subassembly packages is completely modular. That is, the same number of tubes occupies the same amount of chassis space regardless of the way they are packaged.

To obtain the maximum efficiency from this or any other method of packaging, the basic circuits of electronic equipment should be standardized as much as possible. When separate circuits perform exactly

the same function in different parts of the same equipment, or in different equipments, they should be exactly the same circuit design and packaged in the same manner so that they are completely interchangeable. It is not possible or desirable, in the opinion of the writer, to standardize all electronic circuits, but there are dozens of circuits throughout the entire military electronic field so nearly alike they could be identical and there would be no noticeable change in performance. There would, however, be a great improvement in logistics and maintenance if these circuits were the same.

The Minimod series is not regarded as the ultimate in packaging. It is, like everything else in the electronics profession, an interim measure that is good until the advance of the art makes it obsolete. There are, however, so many advantages to this method of packaging at the present state of the art, and in the near foreseeable future, that a point-by-point summary has been prepared on the development and the advantages that subassembly packages afford.

1. An equipment is "broken down" into functional subassemblies so that the maintenance man can quickly locate and repair malfunctions.

2. The Repairable Plug-In Subassembly Packages greatly reduce the problems of spare-parts storage and logistics. Repairs can be accomplished from standard stock spares while the equipment is operating.

3. Interconnection is made with an approved method which provides sufficient connections, positive grounding, and high-voltage as well as high-frequency isolation.

4. Excellent shielding is provided for the entire circuit.

5. Good heat dissipation is achieved. The circuits run cooler in the packages than they do in open air because of the good heat-conducting path and the heat-absorption and radiation qualities of the packages.

6. Good environmental protection is provided. The circuits are protected against moisture, salt spray, and corrosive fumes when in the operating equipment or when on the shelf as spares. In some cases, the equipments do not even require a cabinet for protection.

7. The construction is completely modular. Mounting surfaces can be designed when only the number of tubes is known.

8. Subminiature tubes, transistors, or crystal diodes can be accommodated with ease. All that is necessary to use these parts is to make simple, inexpensive changes of internal mounting hardware.

9. The system is flexible. Since the tube-shield subassemblies are removable, many types of circuits, even those including moderately large parts, can be constructed.

10. The subassemblies are inexpensive to manufacture. This method of construction has been found to be one of the least expensive methods of production.

11. The packages are readily available. The Model I Series Packages have been made commercially for about two years by the Technical Development Corporation, 4060 Ince Boulevard, Culver City, California. The Model II Series will probably be available soon.

Studies in Perception of Interpersonal Feelings

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Much of our life is spent in what appears to be well-coordinated interaction with people. This is no accident, of course, for the possible ways in which we may act are many; only a few of these are appropriate to a given interpersonal situation. This relative smoothness of operation reflects the fact that a person knows fairly well what the other person does, feels, and wants. Processes of perception and evaluation of other persons clearly constitute an extremely crucial aspect of our existence, and understanding them becomes very important.

For several years the Group Psychology Branch of ONR has sponsored research projects on interpersonal perception. It may come as a surprise that we need to investigate the nature of a process about which we all must know so much, as evidenced by the generally successful way in which we perform these perceptual functions. The facts of the matter are that while this is indeed one of the many things we seem to do quite well, it is also true that we do so without knowing the "principles" in terms of which we operate. This is one of the more-or-less instinctive skills we develop very early in life and, as adults, we engage in this process most of the time without paying much attention to the fact that we are doing so. Moreover, while we have remarked upon the usual smoothness of the interpersonal behavior, we often have evidence of misperception. Presumably understanding of the basic processes involved might reduce—if this is desirable—such errors.

The question also arises as to whether these processes of perception and cognition should be studied separately, or whether it is better to arrive at an understanding of person perception on the basis of studies of simpler, inanimate events. There is no doubt that as a source of physical energy a person (or animal) is certainly not different from a thing. When dealing with persons, however, we "perceive" not only characteristics such as warmth or firmness, which, if one wants to stretch matters greatly, can be regarded as analogous to properties of objects, but we also "perceive" intentions, purposes, motives. We "perceive," in short, characteristics of a psychological event that has mental representations and strivings of its own. We believe it unlikely, therefore, that we could arrive at an understanding of how we perceive or become aware of this kind of phenomenon by building up from knowledge of perception of events that do not share these specific properties.

The process of person perception has many facets. Depending upon the situation, in order to behave appropriately, we may have to assess a person's traits, his intentions, feelings, attitudes, capacities, or his role-related behavior. We may have to "know about" what a policeman is likely to do in the role of policeman, or we may have to evaluate a temporary state, like fear, or the intention to help.

It must be clear that we do not perceive an event such as "intention to help" or "honesty" in the same direct way in which we perceive, say, a color. Rather, we arrive at such perceptions by evaluating a host of cues, some pertaining to the object person, some inherent in the situation. What is involved, then, is largely a process of inference in which, it must be remembered, the experience of the perceiver plays a major role.

We can distinguish, then, three major sources of determinants of these processes. There is the situation itself in which the person to be judged is embedded. We do not need to "look" at the person who has lost someone loved to make a pretty good guess about how he feels. Then there is the person, considered as separate from the situation. If we did look at him or talked to him, we would probably be able to conclude he is sad even without knowing about the circumstances mentioned above. Usually, however, we have information from both sources, the situation and the person, each pointing, most often, in the same direction in terms of a large variety of cues, thus increasing the chances that our judgment is correct. But there is a third major source of variation in this system; the perceiver himself. He is selectively tuned to perceive certain events in preference to certain others and when the situation is ambiguous enough, as complex events can often be, he will select and interpret the evidence according to his own tendencies.

These components operate over time, a fact that should not be forgotten, for the serial nature of events is very crucial if we are to understand how certain configurations of factors are perceived. Thus our judgment of a person's traits will be quite different if we see him strike someone after being struck himself, or before.

LIKE-DISLIKE INVESTIGATION

Against the background of these general aspects of the problem of person perception we can now place one of the specific studies carried out on this topic under ONR sponsorship, in collaboration with Dr. Jerome S. Bruner, Director of the project. The investigation in question focussed on the relationship between feelings of like and dislike and the perception of such feelings among members of small groups.

It is important to consider first why, of all the conceivable aspects of a person's behavior, we should have selected for study this particular one. Most theories of personality have given a prominent place to both being and feeling accepted as factors in the development of the individual. In addition, studies have shown that the basic perceptual factors for the members of a group are: influence and initiative of members, competence regarding the job to be done, and like-dislike between members. The last factor is, indeed, so basic that where the efficient operation depends upon specifically non-affective relationships, such as in a group highly organized along hierarchical lines like the military, special safeguards have to be built into the system to avoid, as much as possible, interference of affective factors or "favoritism."

Essentially, then, we focussed on like-dislike between members because this is one of the aspects of interpersonal behavior that are highly relevant to a very broad range of social situations.

PROCEDURE

The simple procedure by means of which we obtain the data on interpersonal choice and its perception can be quickly described. It has four parts. First, we ask each individual to indicate those members of the group he likes most. This step defines the stimulus, for a member's choice or non-choice of another member is the object of the perception with which we are concerned. In the second step, we ask each member of the group to identify or guess those members, who, in his opinion like him most. This information specifies the perception of choices directed toward oneself. One can easily see how the second step in the procedure together with the first (the expression of choices) makes it possible to determine how well individuals can distinguish those who like them from those who do not, and to study the errors occurring in this form of judgment.

Thus far we have seen how we obtain information on the perception of feelings directed toward oneself. One may readily go beyond this stage and investigate the perception of feelings existing between others. So, in the third part of the procedure we ask each member of the group to put himself in the shoes of each other member in turn and to attempt to predict whom that other member chooses as his favorite associates. Again this step defines perceptions the stimulus for which was specified in the first part of the procedure. This additional information together with the actual expressions of preference (step one) permits us to study the extent to which each member is accurate—or in what manner inaccurate—in his perception of the choices made by others. Finally, we ask each member of the group to put himself in the shoes of his fellow members, this time requesting that he indicate by whom each other person feels chosen. The information obtained from this last step is not considered in this paper.

To recapitulate briefly, the following four kinds of information are obtained from each member of a face-to-face group:

- Whom he chooses.
- By whom he feels chosen.
- Whom he thinks others choose.
- By whom he thinks others feel chosen.

Corresponding items are used to obtain information about dislikes if the group situation permits it.

All our observations are based upon data collected entirely from genuine, well-established, hierarchically undifferentiated groups of men, women and children. These include small Navy crews, therapeutic groups, summer camp "bunks," and vary in size from 6 to about 30 members. The following discussion will refer only to those results that held in every type of group studied.

Take first the matter of whether people perceive interpersonal choices accurately, where by accuracy we shall refer to the correspondence between stimulus and perception, and not to an ability of the perceiver. Is a person a good judge of who chooses whom in a group? After the operation of certain random factors are allowed for, we find that

accuracy levels are above chance expectancy. And this applies, in general, both when the subject is to identify who chooses him, as well as when the subject is to identify who chooses whom. This is not to say that the same subjects who are particularly good in the one type of judgment excel in the other as well. Indeed, these are very different tasks. In the first instance the self is the focus of the feeling network, in the second the entire network of relationships in the group has to be considered.

The mere fact that group members operate at better than chance accuracy levels is a trivial enough fact. We assumed this to be true on the basis of ordinary experience. What is important is to discover the conditions favoring accuracy and inaccuracy. Let us then turn to this task.

FEELING PERCEIVED VS FEELING HELD

The most basic systematic relationship affecting a member's accuracy is that the persons perceived as choosing one are usually among those chosen by one. This contingency between feeling perceived and feeling held vis-a-vis a certain person is very strong, the overlap exceeding 80 percent. Notice that to choose a person and at the same time to feel chosen by him represents a subjectively defined mutual relationship. It so happens that these perceived reciprocations exceed the number of actually reciprocated choices present in a group. In general, then, people feel more often reciprocated by those they like than they really are.

Consider now the effects upon accuracy of this tendency toward congruency of choice and perception of choice. Since, when groups are large enough and well acquainted, mutuality of feelings is considerably above chance, this strong tendency away from chance and in the direction of reality is not a source of frequent errors, as it would be if mutuality of feelings were not above chance. But, rather, it operates to insure accuracy. This tendency to like and feel liked, or dislike and feel disliked, may well be the result of life-long experience with the fact that relationships, if they last, ripen into mutuality of feelings. The tendency to "see" reciprocation in excess of its actual incidence, however, causes errors of two kinds. First, when a person chooses another he tends to attribute positive feelings to this other, although the latter may not hold such feelings. Second, the positive feelings of members whom one does not choose tend to be overlooked. Only when the unchosen admirer is very "forward" indeed are his signals acknowledged.

In sum, the congruency observed between feeling held and perceived, while broadly fitting reality, represents a simplification of it in the form of an overestimate of mutuality of feeling. Such a tendency bears strongly upon accuracy, mostly as an aid, but, at times, as a cause of error, being based upon an oversimplified conception of the social nexus. This example should serve to show that a perceptual tendency, largely unrelated to perceptual ability, can be seen to affect accuracy in systematic ways.

Let us look, next, at another factor related to accuracy, namely the perceiver's confidence of being accepted by the group. We measure

this by counting the number of members by whom a subject thinks he is chosen. Take a modest man, who feels that only one or two others would choose him but who is actually chosen by several members. Clearly, his accuracy in identifying those who indeed choose him will be low because, feeling chosen by only a few, he will miss recognizing many of them. The opposite is also true: the man who feels more accepted than he is will see people choosing him who really do not choose him, and again his accuracy will, perforce, be low. Since, at the one extreme, very popular subjects tend to underestimate their popularity, while, at the other, very unpopular ones seem to underestimate the extent to which they are neglected, it follows that the highest accuracy will be most often found among subjects in the middle range of popularity. Here, then, we see how accuracy is delimited by an interplay between self-confidence and popularity, neither of which can be regarded, strictly, as a form of perceptual ability.

SELF-REFERENT ACCURACY

In the type of perception just discussed the judge has to assess who chooses him. Here, members of a group receiving different numbers of choices are confronted by somewhat different tasks. Thus self-referent accuracy, as we have called this measure, does not permit comparison of members' accuracy, except where members have exactly the same income of choices. This is not as much a problem, however, with the form of accuracy we have called interpersonal, i.e., the extent to which members of a group identify correctly the choices made by each of the other members. Psychologically this form of accuracy involves a very different task, much less egocentric than self-referent accuracy, and, in many ways, much more complex. But in contrast to the case of self-referent accuracy, here the task is similar, though not completely so, for the various group members and scores constitute a better basis for comparing individuals.

In this perceptual task, too, subjects do much better than if they were guessing blindly. And, again, we can identify sources of systematic accuracy and error. We find, for example, that the extent to which other members reciprocate each others' choices is overestimated. That is, subjects oversimplify the network by consistently perceiving relationships as being better integrated or dovetailed than they really are. This is the same type of phenomenon reported in connection with self-referent accuracy, but now it applies to the perception of relationships between other members rather than to relationships in which the perceiver is directly involved. In the great majority of instances this simple assumption of mutuality fits the actual case and results in accuracy. But, frequently enough, it causes members to perceive choices where they are not, or to miss choices that are there.

INTERPERSONAL ACCURACY

A second factor modifying interpersonal accuracy is that subjects are inclined to overestimate the popularity of the members they themselves choose. As a result, they, again, make certain systematic errors. On the one hand a subject tends to attribute to other members positive feelings for those he himself chooses, and on the other hand, to overlook evidence of friendly feelings held toward those he himself does not choose.

As might be suspected, self-referent and interpersonal accuracies correlate to a negligible extent. Too many circumstances affect accuracy of performance without necessarily reflecting upon the skill of the perceiver. Besides, different skills may well be involved.

All the facts mentioned so far concern, in one form or another, the perceiver, and we discussed our results as if all choices expressed on paper were equivalent as to stimulus value. This is, obviously, an untenable oversimplification. Let us then focus next on what we have taken as the stimulus, that is the "choice" itself. Clearly not all choices declared by the subjects in the questionnaires could be equally visible. What are some of the determinants of choice transparency?

Several personal qualities of the person making the choice, such as expansiveness, self-confidence, popularity and responsiveness all play a part, but the main determinant of choice transparency is reciprocation. That is, when a member's choice is reciprocated it is more transparent than his non-reciprocated choices. This finding suggests that in the process of identifying a member's preferences for others the perceiver attends to the operations of two, or perhaps more, individuals at the same time and combines the information obtained from each person to arrive at his conclusion. Thus it is the interaction between persons that is evaluated and not the behavior of a particular individual toward others. Unreciprocated preferences are very hard to identify.

Another important factor in the visibility of members' preferences is whether he chooses with or without the expectation of being reciprocated. When A chooses B without feeling chosen by him, the visibility of A's choice will be much lower relative to the case in which A chooses and feels chosen by B. This effect is independent of whether the choice is actually reciprocated or not, and confirms the common-sense belief that if we are confident that our friendship is reciprocated we express our positive feelings more openly. The above two effects combine so that a pair in which choice is mutual and both members are aware of each other's choice, is usually known to nearly the entire group. In other words, the closer a pair is to maximum integration (mutual and accurate) the better known it is.

SOCIAL TRANSPARENCY

From the above discussion it may be inferred that group members can be arranged in order of transparency. Clearly the most transparent individual, not being an object of judgment to himself, has the most difficult task in the group. The opposite holds true for the least transparent. We find that the most popular members are the most transparent, a relation mediated by the fact that the popular members' choices are most often reciprocated. Consequently the less popular members have the relatively easier judgments to make, and turn out to be more accurate in judging others' choices than popular members. On the basis of this analysis we hesitate to hypothesize why this is so before correcting for the effects just described, and ascertaining that there are differences left. Only then may be reconsider the problem of whether unpopular members are really the better judges of who chooses whom.

The discussion of results has been limited to choice and perception of choice. We have also studied the perception of negative feelings.

There is no space, however, to consider this matter in detail. I shall simply say that we find clear evidence that negative feelings are not communicated—expressed or perceived—as clearly as positive ones.

This article tries to show that remarkable regularities in the social perceptual processes can be clearly demonstrated. The regularities in question connect the feelings held by one member of a pair, his perception of the feelings held by the other member, and, finally, the latter's own feelings. We have thus related a form of stimulus to its perception under different conditions in the perceiver.

We have reported exclusively those relationships that held in every group studied by us. Given the heterogeneity of our sample, the results may be viewed as fairly generally applicable to hierarchically undifferentiated groups. Within the group, the results apply to individuals in general but not in every case.

The observations reported here confirm the old belief that we tend to behave toward people according to the way they behave toward us. But the terminology has to be modified to accommodate the specific characteristics of the process we studied. What we would have to say now is that we tend to feel toward people the way we perceive them to feel toward us while at the same time we tend to perceive others' feelings for us in accordance with our feelings for them. These two aspects of the process are, of course, fused together. In so far as both accuracy and mutuality are above chance, these relationships reflect good integration between people's feelings, as well as between perception and feelings. However, tendencies that usually lead to accurate judgments and interpersonal integration may occasionally be the very source of errors. For example, when the members of a pair hold opposite feelings for one another, it is very likely that each will misperceive the feelings of the other. Thus some perceptual errors are not random but may be traced to specific conditions.

RELEVANCE OF STUDY

One wonders at this point what the significance of research results such as these may be for applied problems in the Services. The nature of the research just reported seems to be of so general a relevance to interpersonal relations that one is hard put to find situations in the Services where this material is specifically important. It must be clear that the regularities discussed may be useful in understanding certain situations among personnel, and, perhaps, in forestalling some difficulties. The fact that feeling components are important in most situations, however, does not imply that they should always influence the decisions of those in charge. Just exactly when consideration of such factors is relevant to decision-making is a matter of wisdom in leadership and further inquiry.

Directory - Applied Solar Energy

The Institute for the Association for Applied Solar Energy has recently published a 300-page directory of significant literature and world activities in the field of solar energy. There is a listing of the research programs of 120 scientific centers in 27 countries together with short interpretative summaries on programs. The book is available for $5.00 clothbound or $4.00 paperbound from the Association for Applied Solar Energy, Suite 204, Mayer-Heard Bldg., Phoenix, Ariz.

The Cost of Transporting Cargo Overseas

RADM E. G. Fullinwider, USN (Ret.)
Director, Maritime Cargo Transportation Conference
and
Col. R. A. Cliffe
Transportation Corps, U.S. Army

Officials charged with military planning are aware that the transport of cargo overseas is a vital problem that must be solved in times of peace, if it is not going to become a major bottleneck in times of emergency. Steps taken to improve the maritime transportation of general cargo tend to build up the economy of the country as well as the defense organization. In recognition of these facts, the U.S. Departments of Commerce and Defense requested the National Academy of Sciences-National Research Council to undertake a research program in this field. This request was accepted in the Fall of 1953, and the Maritime Transportation Conference, actually a continuing committee, was set up under contract with the Office of Naval Research. Following the usual Academy-Research Council method, a committee, or Board of Advisors as it was called, was appointed to guide the work of a small, full-time professional staff.

In the first year of research some interesting facts were developed. It became apparent that the heaviest costs of transporting general mixed cargo overseas are concentrated in the operations where bulk is broken and additional labor is employed. A detailed analysis of a typical export transportation system clearly illustrated this.

The staff of the Conference made this study as a first step toward carrying out its mission of reducing the turn-around time of ships. Before it could undertake consideration of possible improvements in the conventional system, it was necessary to become familiar with the way an actual system worked. Other objectives of the study were to describe the entire system in operation in terms of its component parts, evaluate each segment of the system in terms of dollar, time, and manpower costs, and lastly to discover, if possible, what segment or segments provided the most fruitful areas for further intensive investigation and corrective action.

The S.S. WARRIOR, a typical modern cargo vessel, was chosen as the vehicle for study because it was to load 5,000 long tons of mixed general cargo at a single United States port for complete discharge at one European port. Thus, it presented a fairly simple field of control for the staff. The cargo was to originate at hundreds of points in the United States and was to be delivered to multiple points in Europe. All phases of movement and handling (Figure 1) were to be accomplished by commercial agencies. Lastly, because the operation was under the control of the Armed Forces, complete cooperation was offered to the staff and it was able to secure all pertinent documentation, an arrangement difficult to achieve in commercial operations.

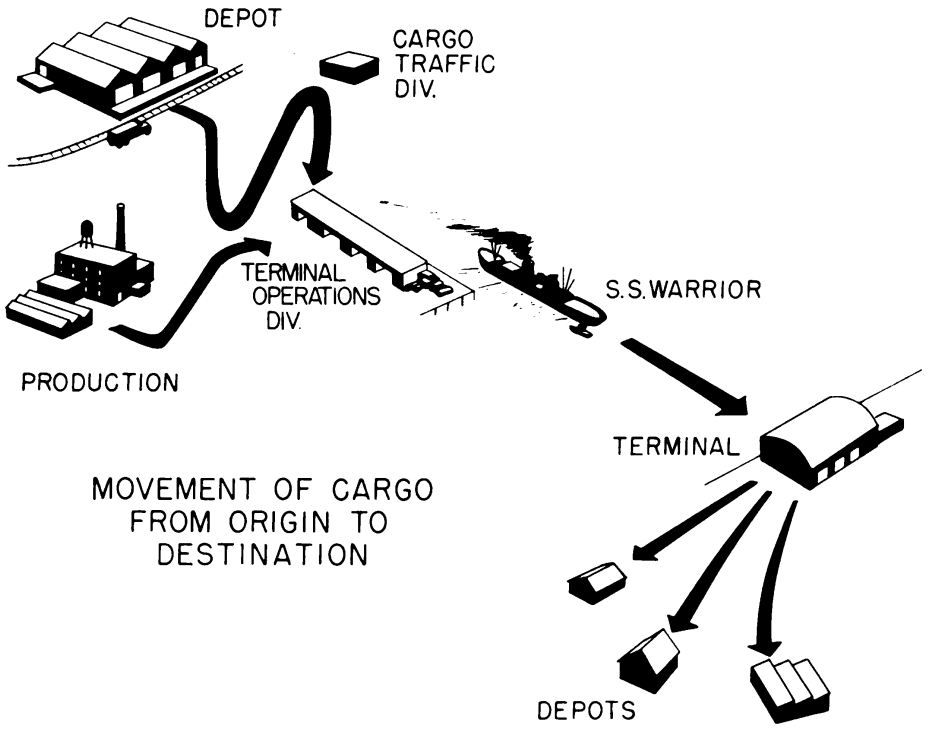

Figure 1 - Origin, movement, and disposition of cargo handled by the S.S. WARRIOR on trip analyzed by staff of Maritime Cargo Transportation Conference.

With the aid of figures, some of the highlights of the S.S. WARRIOR study of the general-cargo export system can be described.

Figure 2 represents the seven segments of the system. Segment I is the movement of the cargo from vendor to domestic port by all modes of transport. Segment II covers the operation of unloading the vehicle in the port, classification of cargo, and palletizing and laying down of cargo at point of rest on the pier. Segment III measures the movement of the palletized cargo from its point of rest on the pier to its being stowed and secured in the hold of the vessel. Segment IV measures the actual voyage from unberthing in New York to berthing in Bremerhaven, Germany. Segment V measures the operation of removing cargo from the hold of the vessel to its deposit on the quay. Segment VI describes the operation of removing cargo from the apron and loading into land transport vehicles. Segment VII is the movement of the loaded vehicle from the port to the unloading dock of the inland consignee.

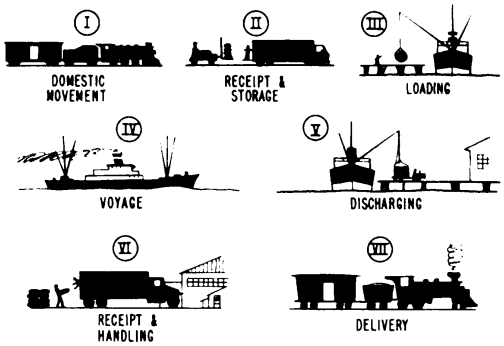

Figure 2 - The seven segments of the transportation system.

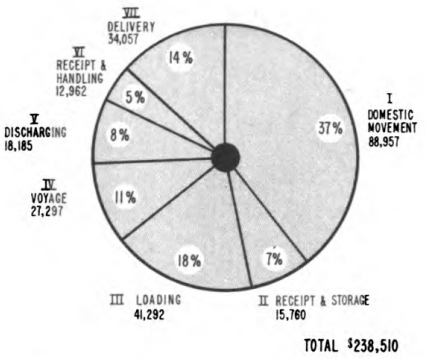

Figure 3 - Summary of dollar costs of transportation by segments.

Although the study was primarily concerned with the maritime features of the system, all seven segments were investigated with the thought that any system changes that might later be recommended in the purely maritime phases might well have repercussions on the purely land-transport phases. Furthermore, the export system must be considered as a whole because it is composed of mutually dependent phases each having some effect on all the others.

The dollar, time, and manpower investments required to move these 5000 long tons of cargo from domestic origins to foreign consignees through the entire system can be shown. The pie chart in Figure 3 shows that the total cost for the movement was $238,000 or almost $50 per long ton. The first and seventh segments, that is domestic transport in the United States and the delivery phase in Europe, comprise 51 percent of the total cost. The other five segments which compose the maritime segments of the system, show that loading makes up 18 percent of the total system costs. Loading plus receipt and in-transit storage at the domestic port comprise a little over one-half of the total maritime-segment dollar costs. So much for money.

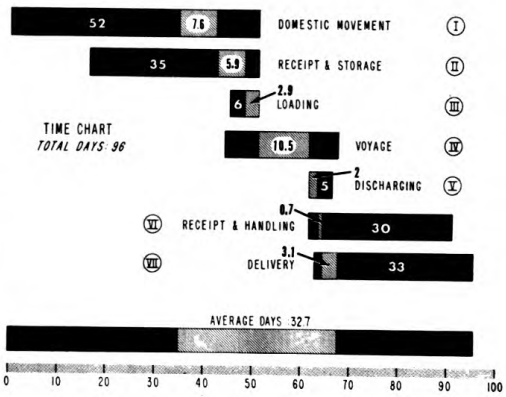

Figure 4 - Time chart showing elapsed time and weighted average times required for each segment.

Next, time factors were analyzed. The total length of each time-bar in Figure 4 represents the total elapsed time required to accomplish the mission of each segment. The shaded portion within each bar represents the weighted average time for the accomplishment of the function involved. The lowest bar shows the elapsed time measured from the day the first shipment left a depot or warehouse for New York until the day the last shipment was delivered to the consignee in Europe. This time added up to 96 days. Looking at the weighted times the voyage took 10.5 days, while the domestic transport took 7.6 days. It is of interest to note that while loading time was only 2.9 days, loading plus receipt and storage time, that is just time consumed within the domestic port, was 8.8 days, or only about two days less than the time required to move the cargo a distance of 4240 statute miles from New York to Bremerhaven.

The manpower investment is presented in Figure 5. This shows that 37,000 manhours of labor were required to move the block of 5000

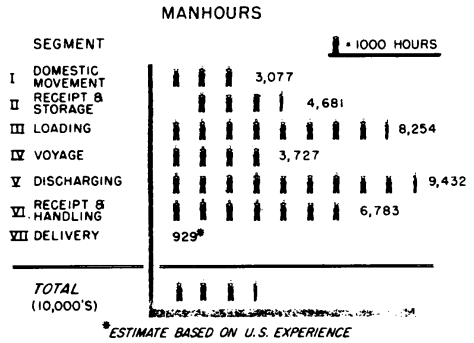

Figure 5 - Manpower investment in each segment.

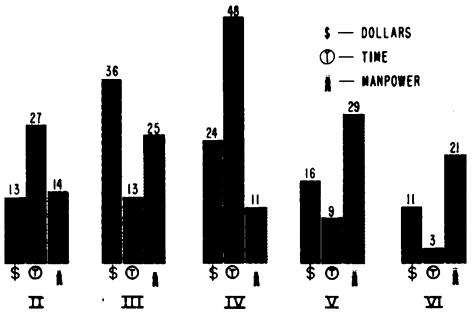

Figure 6 - Comparison of maritime segments by dollars, time, and manpower.

long tons from origin to destination. The greatest investment of labor occurred in Bremerhaven. The impressive point in this chart seems to be that within the domestic and foreign port terminals alone, it took 80 percent of the labor manpower used in moving this block of cargo through the entire transport system.

In Figure 6 the maritime segments of the system are analyzed. This is the staff's special field of interest. Loading is the most costly in dollars, the voyage costs the most in time, and discharging in Germany costs the most in manpower. The labor investment in the New York port runs a close second in manpower requirements.

Figure 7 compares the labor investments among the maritime segments. The bottom of the figure shows that the total labor bill amounted to 48 percent of the total cost of the segment functions. Receipt and storage in the United States port is highest with 74 percent of the segment cost, followed closely by loading with 60 percent of that segment's cost. This shows, at least, that there is a great dependence in the maritime system on human muscle to process and move export cargo.

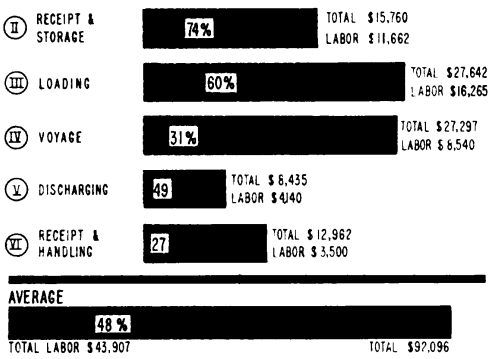

Figure 7 - Comparison of labor costs to total costs of maritime segments.

The various costs in the whole system arise from two types of functions which cannot be logically compared with each other. The first type deals with the significant forward movement of the cargo. The second is concerned with the processes by which cargo is sorted or transferred from one mode of transport to another with no real advance of the cargo toward its destination being accomplished. The staff, therefore, derived comparative measurements of performance for each group separately. The comparative measures of performance, expressed

in dollar-day units using long-ton miles for the movement group and long tons processed for the process group, are as follows:

Movement segments:

	Dollar days per long-ton mile ($ × days ÷ long-ton miles)
I. Domestic movement	0.509
IV. Voyage	0.013
VII. Delivery	0.063

Process segments:

	Dollar days per long ton ($ × days ÷ long ton)
II. Receipt and storage	19.82
III. Loading	23.78
V. Discharging	7.25
VI. Receipt and handling	1.80

It is clear that among the process segments, loading with 23.78 units is by far the most costly phase, followed closely by receipt and storage. These two segments represent the entire activity of the domestic loading port. In the movement group, the voyage appears to be relatively efficient.

As a result of these comparisons it is evident that among the maritime segments in which the staff has primary interest, the receipt and storage segment and the loading segment in the domestic port represent the most fruitful area for significant improvement.

In summary, the S.S. WARRIOR study was designed in part to identify areas susceptible to significant improvement. It appears that a great deal of the investment in men, money, and time arises from activities associated with the frequent breaking of bulk throughout the system. From the analysis, it is evident that the domestic-port activity and particularly the loading function, present the most inviting targets for further research. Accordingly, it is in these areas that future effort is most likely to be successful.

Research Award in Field of Public Health

The application of scientific knowledge to the "public health laboratory" is the basis of an annual award of $1000 and a silver plaque. The fifth annual award on methodology research established by the Kimble Glass Co. of Toledo, Ohio will be presented during the course of a conference held in Atlantic City, N. J., in November 1956.

Nominations for the Kimble Methodology Research Award are being accepted until June 1, 1956. The chairman of the nominating committee is Dr. Thomas S. Hosty, Alabama State Department of Health, Montgomery 4, Ala. Candidates may be from any of the states of the United States, its territories, and Canada. The award is given for a fundamental contribution to public health laboratories, and has the sponsorship of the Conference of State and Provincial Public Health Laboratory Directors. Rules governing nominations may be obtained from the chairman of the nominating committee, Dr. Hosty.

Research Notes

New Study on Ocean Areas in North Pacific

Information on the upper 400 feet of water in certain areas of the North Pacific Ocean is being obtained by a group of scientists with the Scripps Institution of Oceanography. The study is being sponsored by the Office of Naval Research.

From data collected systematically during various voyages of ships with scientific missions in the Pacific, scientists at Scripps have been able to obtain annual time sections of the vertical temperature distribution and to make sound-velocity calculations from the records on temperature and salinity.

The study of the top 400 feet of ocean water has so far included areas that extend hundreds of miles off the West Coast of North America all the way from Southern California to Alaska. In addition, other isolated areas, where necessary basic information had been obtained, were "charted" in a similar manner to build up the record in the Pacific Ocean on vertical temperature distribution and how fast sound travels in the upper 400 feet.

ONR-Sponsored Research in Radio Astronomy

A site has been selected in California for a new radio astronomy facility to be used by the California Institute of Technology under contract with the Office of Naval Research. The facility is designed to measure the intensity and distribution of radiation in the radio portion of the electro-magnetic spectrum which emanates from the sun, stars, and outer space. Radiation will be received by two 90-foot dish antennas of steel with aluminum-mesh surfaces. The instrumentation program is expected to make possible recordings of solar noise as well as galactic noise. Data will be correlated with optical data from the Mt. Wilson and Palomar Observatories.

The location is on the Owens River, about 190 miles northeast of Los Angeles. The water of the river will be used for cooling the equipment associated with the antennas. The 160 acres selected for the California Institute of Technology facility will be leased from the City of Los Angeles, which obtains a large amount of its water from the Owens River Valley. The Institute will have a 25-year lease at a minimum cost. The Pasadena branch of the Office of Naval Research is working on other details of procurement that promise to benefit the project. For example, The Naval Ordnance Test Station at China Lake has a surplus of 9,000 feet of 65-lb rails and some 2-1/4 miles of power lines, including wires, poles and transformers which may be supplied to the California Institute of Technology as Government-furnished equipment.

The DT-60 Dosimeter Now Has an Attachable "Reader"

For some time the DT-60, one of the best of the gamma-radiation dosimeters, has been restricted in its usefulness as it has not been possible to get a dose reading under some conditions. The difficulty has been that the DT-60 dosimeter requires a nearby electrical source such as an outlet plug wired to 115-volt ac current. Such a source is not always at hand—thus no chance to get a reading.

This situation has been changed by the new device which has been developed by scientists at the Naval Research Laboratory. A portable, self-powered "reader" has been built for the DT-60 dosimeter, and as a consequence, the two form a highly useful instrument. The new device is a combination computer-indicator which shows directly the gamma-ray dose in roentgens. The dosimeter itself utilizes the radiophotoluminescent property of silver-activated glass to detect gamma radiation. The reader converts the dosimeter luminescence into a meter reading which the operator can easily see on the indicator.

The new device is operable on its self-contained batteries, or on 115 volts ac, or on a 6-volt storage battery, whichever is desired. The complete reader is housed in a case which measures 7-1/2 inches by 8 inches by 11 inches over-all. Total weight is 20 pounds with the batteries accounting for nine pounds. The development of the reader is at a stage where it is currently being demonstrated.

There is now being developed a smaller and lighter reader which will operate on flashlight batteries.

More Knowledge of Sea Water

A research vessel of the Scripps Institution of Oceanography, the PAOLINA T, has been using a recently developed device to measure and record the amount of dissolved oxygen in sea water.

The device weighs about ten pounds and obtains readings with a dropping mercury electrode enclosed in a fiber-glass and plastic sleeve. The equipment is lowered to as deep as 400 ft and picks up a signal that is transmitted to a Speedomax x-y recorder. The curve produced by the recorder is a direct measure of oxygen concentration versus depth.

On The Naval Research Reserve

CDR F. L. Edmondson Selected for Captain

All members of the Research Reserve will be pleased to know that CDR F. L. Edmondson, USNR, was among the group honored by the recent selection board for Captain. "The Judge" has been a key figure in the Research Reserve from the establishment of the program in 1948 until his transfer to the USS DELTA in 1954, having served as Training Officer and then as Director. Research Reservists will be further interested to know that CDR Edmondson has finished his tour on the USS DELTA and is now attached to the Headquarters, FIFTH Naval District, Norfolk, Va.

"The Judge" now is CAPT Edmondson

Reserve Officers on Staff at Brookhaven Laboratory

It's like old home week for any naval reservist who comes for a visit or training at the Brookhaven National Laboratory at Upton, N.Y. The medical staff at the hospital is about one-third ex-Navy physicians. Many of them are carrying out the peacetime equivalent of research they began at Bikini and carried on through Hiroshima, the Marshall Islands, and the Naval Radiological Defense Laboratory. They are all members of Naval Reserve Research Co. 3-9 which was established at the Laboratory in January 1950.

Brookhaven gets its financial support from the Atomic Energy Commission, but is managed by Associated Universities, Inc., a group of nine eastern universities. Recently AEC has authorized the expenditure of $6,000,000 for a new medical center to include a nuclear reactor (atomic pile) designed specifically for medical research and treatment. The center should be completed in about two years, and will replace the present hospital which dates back to Camp Upton days in the early 1940s.

Many a Navy Reservist has attended the annual atomic seminars which are held at Brookhaven in the spring. At the 1955 sessions, 46 scientific and engineering officers of the Naval Reserve, representing all naval districts east of the Mississippi, attended the lectures and participated in actual on-the-job training. There are highly regarded training opportunities at the Brookhaven reactor, in the medical department, and in connection with other parts of the research program. The fourth Annual Nuclear Science Seminar will convene 3 June 1956.

Twenty-two Research Reservists Promoted to Captain

On 10 February the Chief of Naval Personnel announced the list of Naval Reserve Officers selected for promotion to the grade of Captain by the Fiscal Year 1956 Line Inactive Reserve Selection Board. The Research Reserve was well represented in the group selected by this board. Twenty-two members of Reserve Research Companies throughout the country were honored. Officers selected are listed as follows, along with the companies they represent:

NRRC 1-2	Charles J. Fish
NRRC 1-5	Emerson A. Wiggin
NRRC 3-1	Herman M. Gurin
NRRC 3-5	David S. Rowell
NRRC 3-9	John S. Medd
NRRC 4-1	Elwyn J. Rodee
NRRC 4-1	Frederick J. Trost
NRRC 5-4	Arthur C. Bushey, Jr.
NRRC 6-9	Fran E. Johnstone
NRRC 8-3	Richard H. Ballinger
NRRC 8-4	Robert W. Talley
NRRC 9-2	Charles H. Bowman
NRRC 11-3	Frederic W. Hinrichs
NRRC 11-5	Dayton R. E. Brown
NRRC 11-5	C. G. McIlwraith
NRRC 12-1	Robert M. Fincher
NRRC 12-3	Mario A. Guerrieri
NRRC 12-4	Ralph A. Jack
NRRC 12-5	Clyne F. Garland
NRRC 12-8	Willard E. Bleick
NRRC 12-8	Lawrence E. Kinsler
NRRC W-1	Wm. M. Richardson

Research Reservists Participate in Telecast on Space Satellite

On 22 February CDR John R. Carter, Commanding Officer of NRRC 9-8 and CDR Robert N. Varney of the company participated in a half-hour telecast from Station KETC-TV, St. Louis. CDRs Carter and Varney along with Mr. M. Witunski of Sverdrup & Parcel, formerly associate professor of Aeronautical Engineering at MIT, made up a panel of three which discussed the space satellite and the International Geophysical Year. Members of NRRC 9-8 and guests met in the control room, where they had a good view of the proceedings. After the telecast the discussion was continued at a company meeting held at the site of the telecast. Among the exhibits used in the presentation was a satellite model made available through the courtesy of Popular Science Monthly and the Office of Naval Research.

On the following evening, 23 February, CDR Carter was moderator on a fifteen minute telecast from the same station beginning at 1945. This presentation was on "Engineering as a Career."

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NAVY SPOKESMEN ARE SAYING THIS --

"The development of aircraft and missiles has contributed enormously to sea power's increasing importance—navies are increasing in importance as nations make the revolutionary transition from oil to nuclear energy, from TNT to nuclear warheads, from conventional projectiles to guided and ballistic missiles, from subsonic to supersonic aircraft—navies are more important to our survival as free nations than they have ever been before."

ADM Arleigh A. Burke, USN
Chief of Naval Operations

"Advances in military technology have greatly sharpened the need for large numbers of highly trained technicians in the Armed Forces. Tables of jobs for enlisted men show many changes that reflect this trend. Old jobs have been deleted, new ones added, and training time increased. 'Guided missileman' and 'Aviation fire control technician' are typical of the new enlisted jobs in the Navy.

"Based on an estimate of the size of the Navy and the technological advances that are anticipated, it is estimated that the ratings considered as 'technical' will comprise about 40 percent of the Navy enlisted strength in 1960."

RADM Rawson Bennett, USN
Chief of Naval Research

"A whole new vista of technical requirements is emerging. Just as the invention of the automobile opened up the need for a host of new industries, such as petroleum, glass, rubber, and highway construction, so does the NAUTILUS signify the start of many new technological advances in the Navy and thus, inevitably, throughout industry.

"The Navy maintains its own laboratories to perform development and research peculiar to the Navy's needs. It has aviation test facilities, medical research units, an ordnance laboratory, and a hydrodynamics laboratory. Laboratory research workers are investigating epidemic diseases in Egypt, corrosion resistance in Panama, and Arctic environmental conditions in Alaska. Whatever the Navy's ships and planes may be called upon to do, they can feel reasonably confident that the peculiar needs of place and circumstances have been anticipated and investigated."

RADM Rawson Bennett, USN
Chief of Naval Research

THE NEW ALPHABET

The Navy trades Roger for Romeo

Tare is now Tango

Peter is Papa

Love gives way to Lima

Baker is Bravo

It's not Easy anymore, it's Echo

A new phonetic alphabet for the Navy became effective 1 March 1956. The previous ABLE, BAKER, CHARLIE alphabet had been found to contain words very difficult to pronounce in certain languages. As an aid to further promote efficient operations between the U. S. Services and the Allied Nations, it was determined by the Joint Chiefs of Staff that a standardized phonetic alphabet should be derived which would be suitable in all aspects for joint and allied operations. After many years of linguistic research, in which language difficulty was the primary consideration, the below-listed Phonetic Alphabet was developed and has been accepted for use on a national and international basis by the Military Services of the U. S. and NATO member nations and by the International Communications Aeronautical Organization.

Alphabet Letter	Phonetic Equivalent
A	ALFA
B	BRAVO
C	CHARLIE
D	DELTA
E	ECHO
F	FOXTROT
G	GOLF
H	HOTEL (HŌH TĔLL)
I	INDIA
J	JULIETT (JEW LĒĒ ĔTT)
K	KILO (KĒY LOH)
L	LIMA (LĒĒ MAH)
M	MIKE
N	NOVEMBER
O	OSCAR (ŎSS CAH)
P	PAPA (PĂH PÄH)
Q	QUEBEC (KĒH BĔCK)
R	ROMEO
S	SIERRA
T	TANGO
U	UNIFORM (YOU NĒĒ FÔRM)
V	VICTOR (VĬK TAH)
W	WHISKEY (WĬSS KĒY)
X	XRAY
Y	YANKEE
Z	ZULU (ZŌŌ LŌŌ)