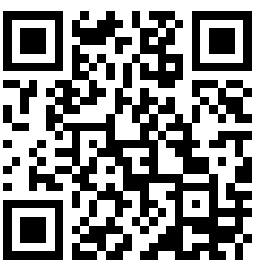

ELECTRONICS ADMINISTRATION AND SUPPLY

Prepared by
BUREAU OF NAVAL PERSONNEL

NAVPERS 10835-A

1956

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PREFACE

The purpose of this publication is to acquaint line officers of the Navy and Naval Reserve with the administrative responsibilities and procedures with which they should be familiar when assigned to billets concerned with electronic material.

In general, the text is confined to those classes of electronic material (less weapon control systems and air applications) normally installed in naval vessels and at shore activities—that is, material under the cognizance of the Bureau of Ships and the Electronics Supply Segment of the Navy Supply System. Electronic material peculiar to ordnance or aeronautics is touched upon only in instances where such reference is necessary to a clearer understanding of the topics discussed, or where the duties of the billet under discussion include responsibilities for such material.

Organizations, procedures, and facilities for supplying naval electronic material are described because an understanding of these phases of logistic support is important for officers whose duties are concerned with such material.

This publication is concerned more with the organizations and functions of naval activities having those billets commonly referred to as "electronic material," with the way in which these billets fit into their respective organizations, with the administrative responsibilities of officers assigned to such billets, and with the principles underlying procedures, than with the details of the procedures themselves. It is to be remembered, however, that organizations, functions, and administrative responsibilities, as well as details of procedure, are subject to change. This publication, therefore, can serve only as a guide. The particular officer involved must by adequate in-service training fit himself into the organization to which he is attached and increase his understanding and proficiency in the performance of his assigned tasks.

In general, only where the billet referred to carries a specific title, such as Electronic Material Officer, is the title used in the text. In other instances, the responsible officer is referred to as the electronics officer.

This text was prepared by the Navy Training Publications Center, a field activity of the Bureau of Naval Personnel, with technical assistance from the Navy Department and cognizant activities afloat and ashore.

THE UNITED STATES NAVY

GUARDIAN OF OUR COUNTRY

The United States Navy is responsible for maintaining control of the sea and is a ready force on watch at home and overseas, capable of strong action to preserve the peace or of instant offensive action to win in war.

It is upon the maintenance of this control that our country's glorious future depends; the United States Navy exists to make it so.

WE SERVE WITH HONOR

Tradition, valor, and victory are the Navy's heritage from the past. To these may be added dedication, discipline, and vigilance as the watchwords of the present and the future.

At home or on distant stations we serve with pride, confident in the respect of our country, our shipmates, and our families.

Our responsibilities sober us; our adversities strengthen us.

Service to God and Country is our special privilege. We serve with honor.

THE FUTURE OF THE NAVY

The Navy will always employ new weapons, new techniques, and greater power to protect and defend the United States on the sea, under the sea, and in the air.

Now and in the future, control of the sea gives the United States her greatest advantage for the maintenance of peace and for victory in war.

Mobility, surprise, dispersal, and offensive power are the keynotes of the new Navy. The roots of the Navy lie in a strong belief in the future, in continued dedication to our tasks, and in reflection on our heritage from the past.

Never have our opportunities and our responsibilities been greater.

CONTENTS

CHAPTER 1

SHIPBOARD ELECTRONICS OFFICER --ADMINISTRATIVE RESPONSIBILITIES

With the introduction of radar, the field of naval electronics expanded greatly. This expansion necessitated the establishment of an organization which differed from the communications organization in effect prior to World War II. As a result, individual organizational units, such as departments, divisions, and groups, were assigned primary responsibility either for electronic material upkeep or for the operational use of such material.

Within the postwar organization for electronics, the assignment of operational and material responsibilities is as follows:

1. Operational responsibilities—that is, operational use, manipulation, operational maintenance, and those portions of preventive maintenance not requiring realignment after accomplishment—are assigned to personnel charged with operating electronic and associated equipment. (See chapter 2 for definitions of terms.)

2. Material responsibilities include technical and tender/yard maintenance and repair of all assigned electronic equipment. Such responsibilities include those portions of preventive maintenance which require realignment after accomplishment. Material responsibilities normally are assigned to technical personnel—that is, personnel of repair or material divisions. Such personnel do not have the foregoing responsibilities, however, in instances where equipment is assigned by competent authority to another department or division. For example, the electronics officer is not responsible for fire control and associated electronic equipment when maintenance of such equipment is assigned to fire control technicians.

Though an organizational unit may be primarily responsible for either operational or material matters, each type of unit must understand the functions of the other and the two must be so fitted together by command that they form a homogeneous whole, supporting each other and command to the best of their abilities. Electronics officers (EOs), therefore, must not lose sight of the responsibilities and problems of the operating personnel whose equipment they service.

Responsibilities Of EOs

Article 0917, *U. S. Navy Regulations (1948)*, states in part that "Assistants to the operations officer may include a communications officer and a combat information center officer, . . . and an electronics material officer who shall be responsible for the technical maintenance and repair of all electronic equipment assigned."

From their inspections of electronic material aboard ships throughout the past several years, inspecting officers have reached the conclusion that the good material condition of shipboard electronic equipment is more often the result of administrative rather than of technical ability. This does not mean that the shipboard electronics officer without an

engineering degree may expect to succeed if he neglects to learn as much as possible about the technical aspects of his work. It does mean, however, that he can be successful without previous electronics training, since his is not the job of personally repairing inoperative equipment but rather of directing and coordinating its repair.

Those phases of the shipboard electronics officer's work which are primarily administrative in nature—that is, those which stem from his responsibilities as a division officer—are discussed in this chapter. Those which deal primarily with electronic material are discussed in the following chapter. The two of course cannot be entirely separated, since, for example, training, discussed here as an administrative responsibility, is also a material responsibility. In other words, the major aim of training in electronics is to achieve better material maintenance. In fact the primary goal of all shipboard electronics administration is proper electronics maintenance.

Other chapters also are of importance to the electronics officer aboard ship, as for example, "Allowances" and "Records, Reports, Publications." These present in more detail matters merely mentioned in the shipboard chapters.

Aboard ship, the electronics officer usually carries the title, Electronics Material Officer, and, although no two ships are identical in detail, the responsibilities of this officer are in general similar to those described in this and the following chapters.

General Administrative Responsibilities

As a division officer, the electronics officer has such general responsibilities as those quoted from *U. S. Navy Regulations (1948)* as follows:

"1. A division officer shall be responsible, under the head of his department, for the proper performance of the duties assigned to his division, and for the conduct and appearance of his subordinates, in accordance with regulations and the orders of the commanding officer and other superiors. He shall keep himself informed of the capabilities and needs of each of his subordinates and, within his authority, he shall take such action as may be necessary for the efficiency of his division and the welfare and morale of his subordinates. He shall train his subordinates in their own duties and in the duties to which they may succeed, and shall encourage them to qualify for advancement and to improve their education. He shall suppress any improper language or unseemly noise or disturbance, and he shall report to the executive officer all infractions of regulations, orders, and instructions which are deserving of disciplinary action.

"2. He shall by personal supervision and frequent inspection insure that the spaces, equipment, and supplies assigned to his division are maintained in a satisfactory state of cleanliness and preservation. He shall report promptly to his head of department any repairs which may be required or other defects which need correction and which he is unable to effect.

"3. He shall carefully instruct his subordinates in all applicable safety precautions and shall require their strict observance.

"4. He shall maintain a corrected copy of the watch, quarter, and station bill and other bills and orders for his division and shall insure that pertinent parts thereof are kept posted where they will be accessible to his subordinates."

Personnel Administration

As indicated above, in his capacity as a division officer, the electronics officer is administratively responsible for the men of his division. Because of the importance of personnel administration to the success of his division, the EO should refer to the latest edition of *Personnel Administration,* NavPers 10848, for information on the philosophy of and procedures for achieving effective administration. He should also acquaint himself with *Shipboard Procedures,* NWP-50, which outlines basic shipboard organization, enumerates the responsibilities of department heads and other key officers, provides sample watch bills, and

gives directions for all sorts of administrative procedures.

ORGANIZATION BILL

Although the foregoing publications indicate the dependence of good administration upon good organization (division of responsibility and authority), they do not discuss organization specifically in terms of shipboard electronics. A sample shipboard electronics organization bill (plan) is therefore given below. Such a bill must of course be adapted to the needs of the individual ship. The one given here is applicable in general to ships having a large complement of electronics technicians.

Sample Electronics Organization Bill

DIVISION MISSION.—The mission of the Electronics Division is to support the mission of the ship by maintaining all assigned electronic equipments at designed standards of performance, taking immediate steps to rectify deficiencies that arise, keeping the Operations and Commanding Officers informed of the current status of all assigned electronic equipments, and, at least 36 hours before getting underway, advising them of any equipments not operating at designed levels of performance.

DIVISION PERSONNEL.—Electronics technicians assigned to this ship are members of the Operations Department and are under the direct administration of the Electronics Officer. Individual personnel are assigned general responsibilities as follows:

1. Electronics Officer, a commissioned or warrant officer assigned by the Commanding Officer: Over-all responsibility for the maintenance, upkeep, and preservation of assigned electronic equipment and spaces, and for the supervision and training of enlisted electronics personnel.

2. Leading Technician, the senior ET on board: Supervisory responsibility for all work of the Division. Reports directly to the Electronics Officer. When circumstances warrant, he may be assigned as one of the following group technicians.

3. Communications Group Technician, an ET assigned by the EO: Responsibility for the maintenance, upkeep, and preservation of communications equipment. Reports to the Leading Technician.

4. Radar Group Technician, an ET assigned by the EO: Responsibility for the maintenance, upkeep, and preservation of radar equipment. Reports to the Leading Technician.

5. Miscellaneous Equipment Group Technician, an ET assigned by the EO: Responsibility for the maintenance, upkeep, and preservation of remaining electronic equipment. Reports to the Leading Technician.

6. Other Technicians and Strikers, assigned by the EO: Responsibility as assistants and helpers to one of the Group Technicians. Reports to the cognizant Group Technician.

Because of the need for personnel qualified in all types of electronic equipments and to meet training needs, Group Technicians, assistants, and helpers will be rotated periodically among the above types of equipments. The Electronics Officer determines the periods of rotation.

ELECTRONICS OFFICER'S DUTIES.—In carrying out his responsibilities for electronic equipment, personnel, and spaces, the electronics officer has the following specific responsibilities:

1. Providing information on the capabilities, limitations, and reliability of installed electronic equipment. (At least 36 hours before time for getting underway, the Operations and Commanding Officers should be advised of the exact condition of readiness of all installed electronic equipments.)

2. Scheduling and assigning tasks to subordinate personnel and prescribing standardized methods and procedures for their guidance to ensure coordination of the technical maintenance program.

3. Supervising personnel engaged in electronics maintenance. This includes making, or causing to be made, frequent inspections and tests of equipment and ensuring timely repairs and adjustments, subject to such authorization as may be required.

4. Collecting and disseminating technical information, including instructions and directives, applicable to electronics maintenance.

5. Providing an effective preventive maintenance program, including implementation of the POMSEE Program. (This program, Performance, Operational, and Maintenance Standards for Electronic Equipment, is discussed in the following chapter.)

6. Coordinating the operational maintenance program, including training as required.

7. Ensuring modification, alteration, and installation of electronic equipments as required by authorized field changes, instructions, and improvement programs.

8. Estimating and justifying funds required for electronics maintenance and repair.

9. Ensuring correct preparation and timely submittal of work requests, reports, and information required for tender/yard work.

10. Ensuring that the repair parts allowance is adequate and on board.

11. Ensuring accurate inventories of electronic equipments.
12. Ensuring correct preparation and prompt submission of required reports.
13. Ensuring proper maintenance of required records.
14. Supervising the training of Division personnel for increased proficiency in their work.
15. Ensuring proper upkeep and cleanliness of all assigned spaces.
16. Performing such other duties as may be assigned.

LEADING TECHNICIAN'S DUTIES.—The Leading Electronics Technician serves as assistant to the Electronics Officer and under the latter's direction he:

1. Directly supervises the preventive maintenance program.
2. Certifies measurements required by the POMSEE Program
3. Instructs electronics personnel in correct preventive maintenance methods.
4. Ensures correct and current entries in such records as Equipment History, Resistance Test Record, etc.
5. Ensures that Electronic Failure Reports (DD-787) are completed and submitted for all failures and that information on failures is entered on the appropriate Equipment History Card.
6. Is responsible for maintaining a library of pertinent publications such as equipment technical manuals, maintenance bulletins, periodicals, and texts for reference use.
7. Ensures that all changes are made in equipment technical manuals, periodicals, and other publications.
8. Has custody of all test equipments and accessories and is responsible for their proper working condition.
9. Ensures the cleanliness and upkeep of all assigned spaces.
10. Supervises the preparation of the annual equipage inventory.
11. Prepares and submits to the EO for forwarding all required reports.
12. Initials appropriate forms to indicate to the EO his approval or disapproval of all special requests.
13. Assists the EO in establishing and carrying out the electronics training program.

GROUP TECHNICIANS' DUTIES

The Communications Group Technician is directly responsible for the proper operating condition of all communication transmitters, receivers, and associated equipment, and of all units of communication remote control systems.

The Radar Group Technician is responsible for the proper operating condition of all air and surface search radars and associated equipments.

The Miscellaneous Equipment Group Technician is responsible for the proper operating condition of all electronic equipment under the cognizance of the EO that is not assigned to one of the other Group Technicians. Such equipments include electronic aids to navigation, electronic countermeasures, test equipment, recreational equipment, etc.

The above technicians carry out their responsibilities under the supervision of the Leading Technician. Except that each is responsible for different types of equipment, a Group Technician performs the following duties:

1. Supervises the accomplishment of all preventive maintenance on the equipment under his cognizance, including preventive maintenance delegated to operational personnel.
2. Supervises all technical maintenance and repair on equipment under his cognizance.
3. Provides on-the-job instruction in preventive and technical maintenance as required.
4. Assists with the electronics training program.
5. Instructs and supervises as necessary to ensure prompt and accurate entries in all records and reports applicable to the equipment under his cognizance.
6. When required, establishes performance standards for equipment under his cognizance.

DIVISIONS POLICIES

The following policies apply to all personnel of the Electronics Division.

1. All technicians will become thoroughly familiar with the operating, tuning, and calibrating procedures for all ship's electronic equipments, and, when necessary, will assist operating personnel in becoming familiar with these procedures.
2. As much time as possible will be devoted to group instruction, but electronics personnel will be individually responsible for further increasing their knowledge by utilizing slack periods to advantage. No nontechnical publications will be read during working hours.
3. All technicians will become thoroughly familiar with the contents of the Electronics Maintenance Book, Electronics Information Bulletins, equipment technical manuals, Electronics sections of the "Bureau of Ships Journal," applicable portions of the Bureau of Ships Manual, and U. S. Navy Safety Precautions.
4. To reduce accidents and breakage to a minimum, all equipments, parts, and tubes will be handled in accordance with established safe handling procedures.

5. All safety precautions shall be strictly followed. All electronics personnel will read the safety precautions bill monthly and be able to demonstrate proper methods of first aid and artificial respiration.

6. All electronics personnel will become thoroughly familiar with all applicable security regulations.

7. Each man in the Electronics Division will be assigned a General Quarters station on the master bill for the Operations Department. When practicable, they will be assigned for electronics casualty control.

OTHER DIVISION BILLS

In addition to the organization bill, the Electronics Officer may prepare such other bills as may be necessary for more effective administration. Bills on preventive maintenance, safety, and security are excellent means of quickly acquainting newcomers with information of immediate importance. They also provide ready references for all personnel. In each instance the bill should cover all important points.

Preventive Maintenance Bill

A preventive maintenance bill should include such information as a brief of the division organization to indicate responsibilities and lines of authority; a summary of the program; lists of the checks and tests to be made, with "how to" references given; inspections to be made by the EO; and any other maintenance items of importance to the particular ship.

Safety Precautions Bill

A safety precautions bill should contain sufficient information to make electronics personnel aware of the hazards inherent in electronics work, should list the safety publications with which electronics personnel must become thoroughly familiar, and should include such information as the location of dangerous voltages, work to be done by authorized persons only, open switch and open ground tagging, location of operating switches and fuses, avoidance of work on energized circuits, maintenance of interlocks and safety devices, precautions to be followed when handling loose metal parts and liquids near electronic equipments, high voltage measurements, capacitor discharge, work aloft, and precautions to be followed when handling cathode ray and radio active tubes.

(All personnel new to work with electronic equipments must be made immediately aware of the necessity for observing all precautions pertaining to such work. In addition, experienced men should frequently review these precautions in order to avoid hazards. To emphasize the need for safe working practices, the potential dangers of electronics work, as well as some of the required precautions, are discussed later as part of the electronics training program.)

Security Bill

A security bill should point up the need for security, list the publications which provide security regulations, and cover such matters as the proper stowage and handling of classified matter, the persons authorized to enter electronics spaces, and the regulations governing the photographing of electronic equipment and spaces.

Watch Bill

Since every electronics officer will post a watch bill, a sample is included here for guidance.

From: Electronics Officer
To: Electronics Division, USS_____

Subj: In port and underway watches

1. For continuous maintenance and to provide for emergencies, personnel of the electronics division are divided into watch sections.

2. The senior technician of each watch section is designated Duty Electronics Technician for the period of his watch. He is responsible for correcting all electronics casualties which may occur during his watch.

3. All technicians who are on board, even though they may be entitled to liberty, may be called upon at any time by the Duty Technician to assist in the correction of an electronics casualty.

4. Underway, a watch list will be prepared by the Leading Electronics Technician, approved by the Electronics Officer, and posted in the Electronics Workshop. All watch standing will be in accordance with this list. The Duty Technician will maintain his station in the Electronics Workshop, except when called away to correct a casualty, supervise preventive maintenance, or make inspections and tests.

5. The hours of underway watches are considered to be working hours, and the men on watch will spend their time in routine maintenance if there are no jobs of an emergency nature. It is directed that the following types of routine maintenance be given priority on underway watches:

a. Repair of test equipment
b. Sensitivity and alignment checks on receiving equipment
c. Replacement of wiring on which insulation has frayed, cracked or burned
d. Cleaning up unskilled repair jobs such as removing excess solder on terminals, jury rigs, etc.

6. The only materials authorized for reading during underway watches are technical publications, such as equipment technical manuals, the EIB, and the like.

7. The Electronics Workshop will not be used as a recreation room by off-duty personnel.

Training

The publication, *Personnel Administration,* also discusses training, an important part of effective administration, as do the *Shipboard Training Manual,* NavPers 90110, and the *Manual for Navy Instructors,* NavPers 16103-B. Although these publications give information that is basic to a good training program, they do not pinpoint training as it applies specifically to electronics. The following brief discussion is therefore included as a suggested guide to setting up such a program.

In carrying out his responsibilities to the Navy and to his men, the electronics officer must keep himself informed of the quotas and entrance requirements for naval schools which offer training in electronics. In order to motivate his men to improve their general education, he must also be alert to programs and courses offered through Information and Education. Above all, however, the EO must assume responsibility for continuous training within his division.

The manner in which training may be accomplished varies with each ship. On small ships, there frequently is only one electronics technician (ET) and no electronics officer. Any training that is done is dependent upon the initiative and energy of the ET and upon his interest and ability in developing technicians out of seamen. The only responsibility an EO can have for training on small ships is to prepare technicians for independent duty prior to their assignment to such duty. While an ET is ashore or is under the command of an EO aboard ship, the EO can instill in him a sense of responsibility toward any future subordinates he may have and give him pointers on how to train them. Thereafter it is up to the ET.

On larger ships where there is an EO, training electronics personnel is his responsibility. He is responsible for deciding who will instruct and for establishing and supervising the training program. He is also responsible for training equipment operators in the types of maintenance specified for operator accomplishment. In providing this training, the EO must be alert to the problems of the operating departments and cooperate with them when establishing training schedules and assignments.

The quantity and kinds of electronic equipment, the number and capabilities of the men on board, and the mission of the ship dictate the training needs of a given ship. Consequently, no set rules can be established for an electronics training program. The program described below has been used successfully aboard some of the larger ships of the Atlantic Fleet. It is offered, therefore, as a pattern to be followed or modified to fit the needs of other ships.

SAMPLE TRAINING PROGRAM

In establishing a training program, the electronics officer must consider the training needs both of his seamen (graduates and nongraduates of class-A schools) and of the petty officers. When a nongraduate is assigned to the division, the EO examines his service record in order to learn something of the man's background. He then interviews him and discusses the possibilities of electronics as a naval career. He is careful to point out both the good and bad points of work in electronics. As a result of this talk, the man knows just what he may expect in the way of additional training and advancement. He knows also what will be required of him in the

way of study, hard work, and the training of subordinates as he himself advances. The man's training in electronics normally begins with his being assigned to work along with an experienced man in the division. The latter is charged with developing the seaman as rapidly as possible into a useful member of the division.

When school graduates report aboard, either as petty officers or strikers, the electronics officer also examines their records and talks with them. In this way he learns something of their backgrounds, their general attitudes about the naval service, and their interest in electronics. He begins to know them as individuals. When possible, he assigns them first to work on the equipment which interests them most. They are told, however, that they will be rotated to other equipment after a period of time, probably 3 months. Though they may be school graduates, strikers reporting aboard are at first assigned to work along with more experienced men in the division.

The electronics officer establishes classes in the fundamentals of electronics and electricity for the men who have not attended class-A school. The purpose of classes in these subjects is to help the men understand the theory behind the practical work they are learning on the job, to increase their judgment of what practices are safe in working with equipment, and to give them sufficient background to obtain greater benefit from the studying they will do when sent to a naval school for further training.

The classes are held wherever space is available. The needs of the ship determine who will attend. On some ships the classes are open to any men who want to attend but are compulsory for those who have not been to a service school. Though battle conditions, maneuvers, the breakdown of equipment, other emergencies, or the normal workload of the division may interfere with attendance, a particular time is set for the classes which are held as regularly as possible even though only one or two men may be able to attend.

It is emphasized that the men's major shipboard training is received on the job. Since the ultimate purpose of classes is to supplement on-the-job training, class work must be tied in as closely as possible with the men's jobs.

To make the training as useful as possible, practical as well as theoretical problems are considered. One of the first practical things taught the men is the correct use and care of the tools they will use in their work. They are taught this both on the job and in classes through discussion, demonstration, and practice. They are taught also the purposes of the various electronics testing equipments and how to use and care for them.

The men are encouraged to bring to class problems they have had on the job. They explain the symptoms of an equipment failure and tell what they did to discover the cause of and to remedy the trouble. The technical manual for the equipment in question is brought out and frequently the group goes to the equipment itself in order better to understand just what caused the failure and the action taken to diagnose and remedy it. In this way, the men as a group learn from each other's individual experiences on the job.

The EO examines supplements and new issues of publications such as those listed in chapter 3. He notes information applicable to the equipment aboard his ship and passes the publications on to his men for study. Material from these publications may also be discussed in class.

In order that the men will appreciate the necessity for conserving maintenance parts and for timely requisitioning of replacements, the electronics officer gives them a brief discussion of the fundamentals of electronics supply. He indicates the publications that assist in identifying material, and the importance of submitting correctly completed requisitions. (These matters are discussed in more detail in later chapters of this text.) He explains electronics allowances and points out the routine established aboard his ship for stowing, accounting for, and requisitioning parts.

As with less experienced men, the service records of experienced technicians reporting aboard are examined by the electronics officer who also talks with each man in order to get a better idea of the man's previous experience and to begin to know him as a person. The training assignment of ETs newly reporting depends upon the EO's knowledge of the men. For instance, the previous experiences of such men may indicate that they are qualified to assist the EO with the training program. Each man is assigned to work on one equipment

for a time and then is rotated to others as feasible. Classes are held for group discussions of problems encountered in their work, and to bring them up to date on matters which the EO considers of importance to them. These classes are particularly helpful in quickly familiarizing the men with types of equipment which may be new to them. The training of technicians is aimed at increasing their ability to maintain electronic equipment in the best possible condition. The major training is practical, although theoretical discussion may grow out of discussions of practical problems.

The electronics officer takes advantage of visits of repair teams and contract field technicians to arrange for as many of his men as possible to observe the work accomplished under the supervision of these skilled men and to talk with them about problems which have arisen on the job.

The EO also explains to the men that before they can be considered eligible for advancement they must satisfactorily complete certain naval training courses and fulfill both the military and practical requirements for advancement. These latter include satisfactory completion of the applicable practical factors listed in the *Manual of Qualifications for Advancement in Rating*, NavPers 10868. They must also pass a Navy-wide competitive examination.

In addition they must complete any required formal schooling. He makes it clear that completion of all of the above does not mean that they will be advanced immediately; they must await openings in the next higher pay grade in accordance with quotas and complements established by the Bureau of Naval Personnel.

Though the electronics officer may do none of the actual instructing, he is responsible for the effectiveness of his training program. He must know what suitable texts and training aids are available. To get this information, he examines the latest edition of the *List of Training Manuals and Correspondence Courses*, NavPers 10061, the latest *USAFI Catalog*, the *U. S. Navy Film Catalog*, NavPers 10,000, and issues of the *U. S. Navy Training Bulletin*, NavPers 14900. When in port and near a Forms and Publications Distribution Point or a training aids activity, he examines the available material in order to make a better selection for his classes. If he does not find training aids suitable for his needs, he should outline the training problem to the appropriate person at the training aids activity and request assistance. When ordering instructional materials he must keep in mind the stowage space available aboard his ship.

He points out to his instructors the necessity for recognizing individual differences among members of the classes and the importance of getting to know each man as an individual. He emphasizes that a man's lack of interest and poor performance may be the result of a personal problem. If the instructor understands the man he may be able to help him solve his problem, though he may find it necessary to refer him to the EO, or to the chaplain for assistance. By knowing the man, the instructor is better able to suggest the right person for additional assistance.

The electronics officer refers his instructors to the *Shipboard Training Manual*, NavPers 90110 and the *Manual for Navy Instructors*, NavPers 16103-B for suggested details on how to instruct. He observes their classes and helps them in every way he can to improve their methods.

The EO makes it clear that he is ready and eager to talk with any of the men about their problems, either professional or personal. He finds that from these talks he can learn additional details about the electronic installation, and about how his division is working as a team, as well as how a particular man is developing. He finds, too, that these talks afford him an opportunity to build toward team work through instilling a right attitude in his men as well as furthering their technical knowledge by discussing specific problems.

In planning his training program, the EO keeps in mind the other shipboard training programs and cooperates with the officers in charge of these in order that his men may receive proper training in the subjects required of all hands, such as damage control and seamanship.

Repair Ship Training

Training as a responsibility of the electronics officer aboard a repair ship is discussed briefly in chapter 2. The establishment and administration of the training program may be patterned after the program described above.

SAFETY

The safety of his men is a major responsibility of the electronics officer. As one officer put it, electronic equipment enforces a stern safety code and violators are likely to be executed on the spot. Because of the dangers inherent in work with electronic equipment, the electronics officer should make safety precautions an important part of his training program, both on the job and during class periods. Basic safety procedures are given in Chapters 60 and 67 of the *Bureau of Ships Manual*, in the *Electronics Maintenance Book*, NavShips 900,000 (EMB) and in *U. S. Navy Safety Precautions*, OpNav 34P1. In the latter, Chapters 16, Portable Tools, and 18, Electricity and Electronics, are especially applicable. The following items indicate the importance of assuring that each man concerned understands and practices all prescribed safety precautions.

High Voltage

An obvious source of danger to electronics technicians is high voltage. For instance, in comparison with an electric chair which operates at 2,200 volts, radar transmitters operate at about 15,000 and repeaters at about 7,000. Although death can be caused by less than 80 volts, high voltage is ordinarily understood to mean 300 or more volts. Chapters 60 and 67 of the *Bureau of Ships Manual* prescribe the method for high voltage measurement. This procedure should be made mandatory for all equipment using over 300 volts.

All meter and megger leads should be carefully checked. Those with damaged probes or jacks should be taken out of service until repaired and any with poor insulation should be discarded.

When a switch is opened to de-energize the circuit and thus permit work to be done safely, the switch or connection should be tagged with a red tag-out card. These cards serve as signals to others that work is underway and that only the man who opened the switch is allowed to close it.

Occasionally it is necessary to work on live circuits. In such cases the procedures prescribed in Chapters 60 and 67 of the *Bureau of Ships Manual* are mandatory. No one is to be permitted to work on a live circuit unless an observer is standing by to pull the power switch if necessary.

It is imperative that all inter locks and battle shorts be checked frequently. A schedule of inspections should be set up for this purpose, and the EO must ensure that it is followed.

Dangerous voltages may exist at capacitor terminals after equipment is de-energized. For this reason each space containing electronic equipment should be provided with shorting probes for capacitors to dissipate the residual charge and thus remove the dangerous voltages.

Stack gas and high voltage warning signs should be posted on the stacks and mast. Warning signs should also be posted near high voltage equipment and on transmitter antenna trunks and feed wires.

The following precautions should be followed when sending a man aloft. Obtain permission from the Officer of the Deck. Personally ensure that all radio transmitters and radar antennas are secured, properly tagged, and remain secured until you give the all clear. Check the wind to see that the man aloft will not be exposed to stack gases, or to high winds. See that the man wears a safety belt and that all tools have safety lines attached.

Since electric shock is one of the causes of stoppage of breathing, every ET should be capable of administering artificial respiration. At least once each quarter a hospitalman should demonstrate to all ETs the correct method for administering artificial respiration. The demonstration should be followed by practice by each man.

Dangerous Tubes

Because of the dangerous nature of cathode ray tubes, rubber gloves and plastic face shields should be worn when handling them.

NANCY units are sealed. They are lethal and not to be tampered with.

Caution must also be used when handling poisonous and radioactive tubes. Each ET should be required to know which tubes used aboard his ship are poisonous or radioactive. The former are listed in the *Electronics Maintenance Book*, NavShips 900,000 (EMB) and the *Electronics Information Bulletin* (EIB). Radioactive tubes manufactured since June 1956 are marked by the manufacturer to indicate that they are radioactive. Such markings are mandatory. To determine which tubes manufactured before June 1956 are radioactive,

reference should be made to the list of tube types given in the *Bureau of Ships Journal*, December 1957, "List 2," pages 27-31.

Disposal of any of the foregoing types of tubes must be accomplished by the methods prescribed in the EMB.

Tubes containing radioactive material are now commonly used in fire control and guided missile systems and in radar equipment. In the latter, they are usually found in the waveguide as ATR or TR tubes and in some models as spark gap tubes.

Radioactive materials are added to tubes to produce a continuous supply of ionized particles, whether the tubes are in storage, transit, the equipment, or in disposal containers. Many people think that ionization occurs only when voltage is applied to the tubes, but the voltage only increases the rate of ionization. It does not affect the rate of decay of the radioactive material.

Radioactive tubes in normal use and storage at stations and aboard ships present no external radiation dangers, but personnel must be constantly aware of the internal radiation potential of broken tubes.

Internal radiation means that radioactive material has entered the body through the mou'h (eating or drinking), nose, (inhalation), or skin (open wounds). These particles injure and may destroy blood-forming organs and other tissue. The degree of injury depends primarily upon the quantity of radiation energy absorbed by the cells. Repeated exposures may lead to cumulative biological damage. Needless exposure to any radiation, no matter how slight, should therefore be avoided.

Danger from unbroken tubes is slight, but a broken tube presents a definite hazard because of the possibility of internal radiation. When a radioactive tube has been broken, the following rules should be followed. These rules apply to any material contaminated by radioactivity.

1. No material contaminated by radioactivity should be allowed to come into contact with any part of the body. Rubber or plastic gloves should be worn at all times when radioactive wastes or broken radioactive parts are handled.

2. No food or drink should be brought into the contaminated area or near any radioactive material.

3. Immediately after leaving the contaminated area, personnel who handled radioactive material in any way should remove any contaminated clothing and wash hands and arms thoroughly with soap and water, especially before smoking, eating, or drinking.

The following first-aid procedure is to be followed if a man sustains a wound from a sharp radioactive particle:

1. Apply a tourniquet if one is required, using approved method of application.

2. Stimulate mild bleeding by pressure about the wound and by the use of a suction cup. Do not suck the wound by mouth.

3. Wash the wound with soap, and flush with plenty of clean water.

4. If the opening is quite small or the wound is of the puncture type, make an incision to promote bleeding and to facilitate cleaning and flushing.

The above procedure refers to first-aid treatment only. Further measures to be taken in each case should be left to the judgment of the responsible medical officer.

Radioactive tubes should not be disposed of individually but should be collected in a suitably marked steel GI can with tight fitting lid until a reasonable quantity has been collected. At present usage rates, normal collections of electron tubes at most stations and on board ships will not approach danger levels. At major supply points, however, tube collections present a potential hazard.

Radioactive waste can be disposed of by burying it in soil or by sinking it in the ocean. The Atomic Energy Commission does not authorize disposal of radioactive material in the ocean unless the proposed burial procedure will assure that the material will be taken to a depth of 1,000 or more fathoms and will not rise to the surface.

Instructions for the disposal of radioactive material at sea are contained in *U. S. Navy Safety Precautions*, OpNav 34P1. Information on radioactive material is also referenced in chapter 67, *Bureau of Ships Manual*, as follows: ". . . Detailed information regarding the handling of radioactive material is contained in BuShips Letter S67/9-11(871C) Serial 871-268 of 11 Sept 1956 . . . In the event of breakage, the broken tubes and waste matter should be removed and disposed of in accordance with . . . BuShips Instruction 5100.5 of 28 Nov 1955; *Radiological Safety Regulations*, NavMed P-1325; and BuShips *Electronics Maintenance Book*, NavShips 900,000, change 9, Section 7,

Chapter 1. See also *Electronics Information Bulletin* No. 271, NavShips 900,023 . . ."

If radioactive material is to be buried in soil, the burial area must be devoid of edible plant life; the soil, because of its topographic and geological characteristics, must not be subject to pronounced leaching or erosion; the area must be suitably marked and protected from unauthorized entry; the burial depth must be 4 or more feet; and the concentration of radioactive material in a cubic foot of soil must not be greater than 0.1 millicurie for strontium 90, plutonium 239, radium 226, or polonium 210. The foregoing numbers represent the mass numbers of the elements. Neither must there be more than 10 millicurie of radioactive materials having a half-life greater than 180 days, nor more than 100 millicuries of radioactive material having a half-life of 180 days or less.

In addition to proper disposal of contaminated debris, all contaminated surfaces must be decontaminated. Either of the following methods is recommended for this purpose:

WET METHOD.—Wear rubber or plastic gloves. Pick up large fragments of contaminated material with forceps and then wipe surfaces with a wet cloth. Make one wipe at a time, fold cloth in half, and use the clean side for each additional wiping. Wipe in one direction only. A back and forth motion will rub radioactive particles into the surface. When cloth becomes too small for use, discard it and start with a clean piece.

DRY METHOD.—Wear rubber or plastic gloves. Pick up large pieces of contaminated material with forceps. Go over the area carefully with a vacuum cleaner, using disposable collecting bags. Dispose of used bags in the manner previously described for disposal of debris.

All tools used in handling radioactive material should be cleaned thoroughly with soap and water and well rinsed with clean water. They should then be monitored by the radiological safety officer. If, when monitored after cleaning, they emit a radiation level of more than 0.05 roentgen per working day (gamma plus beta) or are contaminated with an alpha-emitting material, they should be disposed of in the same way as other radioactive material.

SECURITY

The electronics officer is responsible for seeing that each of his men complies with the regulations pertaining to the security of electronic equipment, spaces, and printed matter. The *U. S. Navy Security Manual,* OpNavInst 5510, is the basic security document. In addition to the information given therein, thorough familiarity with all other applicable security regulations is required. Security should be made a part of the training program because the instructor can determine by testing whether or not the men fully understand such regulations as those applicable to the proper stowage and handling of classified printed matter, the persons authorized to enter electronics spaces, and the photographing of electronic equipment and spaces. Since, however, understanding is not necessarily followed by correct practice, the EO must also provide the supervision necessary to ensure that proper security is practiced on the job.

Conclusion

As indicated in this chapter, if he exercises proper administrative techniques, provides the necessary training and supervision, and diligently pursues the task of learning as much as possible about his equipments, the electronics officer aboard ship who has had no training or previous experience in electronics can expect to succeed in his job.

Of first importance is the establishment of a good division organization, with responsibilities and lines of authority clearly defined.

In addition, division bills covering safety, security, maintenance, and other matters of importance to all division personnel should be drafted and posted or promulgated to ensure that the men become aware of the importance of these matters, the regulations governing them, and the practices to be followed in specific instances.

Because of the shortage of qualified personnel, training is an important part of the EO's job of maintaining all assigned equipments at approved standards of operation. Training is important, too, to the individual men as they seek to become more proficient in their jobs and to qualify for advancement. In addition to

improved performance in maintenance, the training program should include such topics as proper safety and security practices.

The foregoing training is of specific value to the ship. Of wider value is the training provided by naval schools from which the men may be ordered to other ships or activities. To benefit the Navy as a whole, the EO should keep informed on the applicable schooling available, and of the entrance requirements and quotas for these. He also should be sufficiently familiar with the general education available through the Information and Education program to be able to sell his men on this type of training as a profitable way of spending some of their spare time.

The degree of emphasis to be placed upon each of the EO's administrative responsibilities depends upon the ship to which he is attached and upon the experience and abilities of his men. The information presented in this chapter therefore can serve only as a guide.

CHAPTER 2

SHIPBOARD ELECTRONICS OFFICER — MATERIAL RESPONSIBILITIES

Material responsibilities of the electronics officer aboard ship include maintenance of the electronics installation on board. The size and complexity of this installation and the ship type largely determine the size and complexity of the maintenance job. For instance, if aboard a repair ship or tender, the electronics officer's responsibility for installed equipment is minor in comparison with his primary responsibility—that is, his responsibility for repairing electronic equipment assigned to the ships dependent upon the repair ship or tender for this phase of logistic support. Similarly, on a ship attached to the Operational Development Force, maintaining the ship's permanent electronics installation is secondary to the job of maintaining and evaluating equipment temporarily installed for evaluation purposes.

Whether the material to be maintained is aboard his own or another ship, proper accomplishment of maintenance requires knowledge of such matters as past equipment performance, modifications or alterations affecting a specific equipment, and sources providing the detailed technical information necessary for proper maintenance. Certain of these matters are discussed in this chapter. Others are discussed in the chapter on records, reports, and publications.

The electronics officer's material responsibilities further include knowledge of the types and numbers of equipments his ship should carry, the kinds and numbers of parts necessary to support the equipment, and the degree of his responsibility for seeing that these items are on board. These matters are discussed in the chapter on allowances.

The number and ratings of the men on board and their capabilities affect the degree of difficulty of the electronics officer's job. With adequate numbers of well trained men, the job becomes primarily one of assigning and scheduling the work to be done. Because of the shortage of electronics technicians, however, no EO is likely to have enough capable men to make his job that simple. He therefore must, through proper administration, make the best use of the talents at hand while maintaining a continuing program designed to improve the capabilities of his men, as pointed out in this and the preceding chapters.

Combatant Ship EO

Maintaining the electronics installation aboard his ship is the primary responsibility of the electronics officer aboard a combatant ship. Because maintenance is a big job and because it is a major responsibility, this subject is discussed more fully later in the chapter. Although the discussion of maintenance is directed primarily toward the electronics officer aboard a combatant ship, in general the procedures described are applicable to electronics personnel aboard other ships. Major differences are brought out in the separate discussions of the repair ship/tender EO and the Operational Development Force EO.

OTHER MATERIAL RESPONSIBILITIES

In addition to the responsibilities already briefly mentioned, the shipboard electronics officer has such other material responsibilities as the following:

Installation

Installation of additional electronic equipment aboard completed ships is accomplished by naval shipyards, naval stations, or forces afloat, only upon receipt of specific authorization by the Bureau of Ships in each instance. Installation of additional ordnance electronic equipment also requires authorization from the Bureau of Ordnance.

The electronics officer is responsible for all authorized installations which are within the capabilities of the ship's force.

Liaison

In carrying out his responsibilities for electronics maintenance, the EO has official contacts with various departments of his ship. These departments, and the degree of the EO's contacts with them are:

1. The Operations Department, which is responsible for the custody, operation, and operational maintenance of electronic equipment assigned to the department. As an assistant to the operations officer, the electronics officer is responsible for the technical maintenance and repair of all electronic equipment assigned to this department.

2. The Gunnery or Deck Department, which is responsible for the custody, operation, and operational maintenance of electronic equipment assigned to the department. Where fire control technicians or other technical personnel are assigned to the Gunnery Department, preventive and technical maintenance of fire control radar and associated IFF equipment are also their responsibility, although they may call upon technical personnel from the Operations Department for assistance.

3. The Engineering Department, which furnishes wiring, electrical services, and such other engineering assistance as may be required for electronics maintenance.

4. The Navigation Department, which is responsible for the custody, operation, and operational maintenance of electronic equipment assigned to the department; and if appropriate, for the maintenance of required calibration curves and tables, and for performing calibration checks at prescribed intervals.

5. An Air Department aboard an aircraft carrier or seaplane tender. In the Air Department, the air officer's assistant for airborne electronics is responsible for all airborne equipment. The ship's installed electronic equipment however, is the responsibility of the electronics material officer. To ensure continuity of the technical aspects of ship-to-air and air-to-ship electronics applications, the EO must work closely with the assistant for airborne electronics.

6. A Repair Department aboard a repair ship or tender, including aircraft repair ships. The head of the Repair Department on such ships is known as the repair officer. On aircraft repair ships, the repair officer is sometimes referred to as the O-and-R (overhaul and repair) officer as well as the repair officer. The electronics officer aboard a repair ship or tender is assigned to the repair department as an assistant to the repair officer. In this capacity his primary responsibility is the repair of electronic equipment aboard other ships. He is also responsible for the electronic equipment installed aboard his ship. A more detailed discussion of the responsibilities of the electronics officer aboard a repair ship is given later in this chapter.

Because of his responsibility for technical electronics maintenance, the EO is concerned with all of the above departments. In addition to performing technical maintenance, he has responsibility toward personnel of these departments insofar as training in operational and preventive maintenance requires his assistance.

Electronics Literature

To keep himself and his men currently informed, the electronics officer must be familiar with all directives, regulations, and other information pertaining to his work. Certain of these are discussed in more detail in chapter 3.

Test Equipment and Tools

Electronics test equipment and tools for use with BuShips equipment are usually assigned to

the electronics officer for custody, operation, and maintenance.

Although test equipment for airborne electronic sets, as well as the sets themselves, are under the custody of the Air Department or squadrons of an aircraft carrier or seaplane tender, the ship's electronics officer, as stated above, maintains close liaison with the assistant for airborne electronics to achieve continuity in air-to-ship and ship-to-air electronics applications.

Because electronic equipments are instruments of considerable precision, the test equipment used for checking their performance must receive superior care. Haphazard stowage on decks or in crowded lockers is to be avoided, since such stowage ultimately results in maloperation. Instead, suitable racks or shelves should be provided.

Maintenance tools, many of which are of special design, also require superior care. The EO must make every effort to acquire the full allowance of these tools and, having acquired them, must ensure against loss or damage by (1) providing adequate, accessible, centralized stowage and (2) training personnel to use correctly and return each tool to its proper place after use.

Except that recalibration facilities may not be available on some ships, the maintenance of electronic test equipment is similar to the maintenance of other electronic equipment as discussed later under the topic, "Maintenance."

Supply

On board a ship with an officer of the Supply Corps and storekeepers, these personnel perform the supply functions connected with obtaining and accounting for electronic material. Electronics technicians devote their time to the work in which they are specialists. ETs and the EO must work closely with supply personnel, however, for proper identification of items; for appropriate stowage, particularly of components or parts for which bin stowage is not provided; and for correct preparation of requisitions when the required information is not readily available or recognizable to supply personnel, as in cases where technical descriptions of requested items are required.

On ships without Supply Corps officers, the electronics officer may be assigned major responsibility for electronics supply. In this case he becomes responsible for custody, stowage, and maintaining stock levels of electronic material. Other supply functions, such as preparing and forwarding requisitions and checking and filing invoices, are normally performed by a line officer appointed to act as supply officer.

No matter where an electronics officer is stationed, whether within or without the supply system itself, he must be able to speak the language of supply and use stock numbers and descriptions understandable in the supply system. For this reason, chapters 9, 10, and 11 of this text are devoted to a discussion of naval supply.

Definitions

The following terms are defined in the interest of uniform usage and a more accurate understanding of electronics terminology. These definitions are from OpNav Instruction 10380.1 of 5 September 1951 and the *Bureau of Ships Manual*, chapter 67.

ELECTRONICS[1] is the science and technology that is concerned with devices involving the emission, behavior, and effect of electrons in vacuums, gases, and semiconductors. Technically, electronics is a broad term extending into divergent fields of endeavor. To delineate, it is necessary to define the scope covered by electronics in terms of "electronic material."

ELECTRONIC MATERIAL,[1] from a military point of view, generally includes those electronic devices employed in the field of detection and tracking (underwater, sea, land, and air), recognition and identification, communications, aids to navigation, weapons control, and electronic countermeasures.

[1] Approved for interservice use.

Electronic devices are understood to include the nonelectronic components required to complete their individual operational efficiency —such as power supplies, hoist mechanisms, and antennas—but to exclude associated nonelectronic equipment in certain over-all systems.

Electronic material is a general term that may refer to electronic gear as complex as a complete system or as simple as a small part subject to no further disassembly. The following definitions indicate ranges within the area of electronic material.

BUREAU OF SHIPS ELECTRONIC EQUIPMENT generally includes equipment employed in the field of detection and tracking (underwater, sea, land, and air) recognition and identification, communications, aids to navigation, and electronic countermeasures (except when designed for use in aircraft or expendable armament) placed under the cognizance of the Bureau of Ships by competent authority.

AIRBORNE ELECTRONIC EQUIPMENT is electronic equipment designed to be fitted or carried in aircraft.

AIRCRAFT ELECTRONIC EQUIPMENT is airborne electronic equipment, together with additional equipment or accessories specifically required for the installation or maintenance thereof.

AIR-SURFACE ELECTRONIC SYSTEMS consist of airborne and surface (ship or ground) electronic equipment which must be complementary and interdependent for performance of an over-all function; namely, IFF, reconnaissance television, homing, loran, beacons, radio ranges, airborne early warning, radio sonde, and certain communications applications.

ORDNANCE ELECTRONIC EQUIPMENT is electronic equipment that forms an integral part of ordnance equipment, or the functioning of which is essential and peculiar to the operation of such equipment. This includes precision tracking radars, the primary function of which is the control of guns, guided missiles, torpedoes, and rockets; certain target indication systems; identification and recognition devices integral with ordnance equipment; antijamming devices associated with ordnance equipment; influence fuzes; electronic equipment incorporated in missiles under the cognizance of the Bureau of Ordnance, and sonar devices incorporated in such ordnance equipment as mines and torpedoes.

A PART is any item not normally subject to further disassembly, such as a resistor, gear, knob, insulator, or electron tube.

An ASSEMBLY or a SUBASSEMBLY is a commonly mounted group of two or more different parts that are physically or electrically combined to perform a specific function within a unit but that will not perform that function until connected to related subassemblies or parts which comprise the complete unit. This term should not be applied if a more specific name is available. For example, an IF transformer of an IF amplifier is best so named, but the primary of the transformer furnished with its associated capacitor is best termed an IF transformer subassembly.

A UNIT (formerly major unit) is an assembly or any combination of parts, subassemblies, and assemblies mounted together, normally capable of independent operation in a variety of situations. Examples of units are electric motors, electric generators, and radio receivers. (Note: In some cases the size of an item is a consideration in classifying the item as a unit. For instance, an electric motor for a clock may be considered a part inasmuch as it is not normally subject to disassembly.)

An ACCESSORY is a part, subassembly, or assembly designed for use in conjunction with, or to supplement, another assembly, or a unit or set, contributing to the effectiveness thereof without extending or varying the basic function of the assembly, unit, or set. An accessory may be used for testing, adjusting, or calibrating purposes. Test instruments, recording cameras for radar sets, head phones, and emergency power supplies, are examples of accessories.

A GROUP is a collection of units, assemblies, or subassemblies which is a subdivision of a set or system, but which is not capable of performing a complete operational function.

A SET is a unit (or units) and necessary assemblies, subassemblies, and parts connected or associated together to perform an operational function. Radio receiving set, sound measuring set, and radar homing set are examples of electronic sets.

A SYSTEM (electrical-electronic) is a combination of two or more sets, generally physically separated when in operation, and such

other assemblies and parts necessary to perform an operational function or functions, as for example, AEW electronic system and GCA electronic system.

A CENTRAL is a grouping of sets with or without other units which are operated conjunctively in the same location for a common tactical purpose. It may provide facilities for controlling, switching, and monitoring electronic and electrical equipment from one central point.

A REPAIR PART is a part which may be requested for repair or maintenance purposes during the life of the set(s) or units with which the part is used. The term "repair part" supersedes all previous designations such as spare part, replacement part, maintenance part, and maintenance repair part.

A PART COMMON is an item listed in the Electronics Supply Office publication, *Common Electronic Parts in the Electronic Supply System.* Such parts have a high degree of interchangeability.

A PART PECULIAR is a part designed specifically for a particular set. It is distinguished by its basic identification of WHERE IT FITS and its UNIQUENESS. Such parts are designed primarily for use in but one set and are generally obtained from the manufacturer of the basic set into which the parts fit. A part peculiar may eventually become a part common through usage.

Equipment repair parts sets (formerly repair parts kits) are of the following three types:

Type 1 sets are boxed sets of parts peculiar for either permanently installed or portable equipment which are normally supported by an Electronics Repair Parts Allowance List (ERPAL).

Type 2 sets are for support of mobile type equipment.

Type 3 sets are for support of experimental type equipment.

STOCK REPAIR PARTS (formerly stock spares or bulk spares) consist of those repair parts peculiar and common, assemblies, accessories, and complete sets furnished in bulk to the supply system for allowances, load lists, and system stocks.

Maintenance

Shipboard electronics maintenance consists of: (1) regular use and full and complete periodic operational tests to establish readiness; (2) power tests, calibration, nonoperational adjustments, and other prescribed qualitative and quantative performance measurements to establish functional evaluations; (3) replacement or restoration of deteriorated or defective parts, and replenishment of lubricants, coolants, filters, and other consumables; (4) correction incident to parts failures or equipment damage during operations; and (5) policing and protection of insulation or conduction by the removal of dust, lint, conductive or nonconductive deposits or fluids, and the protection of equipment from the accumulation of such substances, or from man-made hazards.

Because of the complexity of electronic equipment, it is imperative that personnel available for its maintenance be used to best advantage. This means that each officer charged with maintenance must assign his men wisely, train them well, establish effective schedules for routine checks and tests, and see that his allowance of parts and tools are maintained and that all pertinent forms and publications are available.

In order to conserve the time of electronics technicians for that type of maintenance which requires advanced technical knowledge and skill, the electronics officer must assist as required in training equipment operators in the performance of their maintenance duties.

To clarify the duties of enlisted personnel, rating responsibilities have been assigned by competent authority as follows:

1. Personnel in operational ratings are charged with the operational use, manipulation, and operational maintenance of electronic equipment associated with the technical specialties of their ratings, and such portions of preventive maintenance as do not require realignment after accomplishment.

2. Personnel in technical ratings are responsible for manipulation, technical and tender/yard maintenance, repair, and those portions of preventive maintenance requiring realignment after accomplishment.

MANIPULATION refers to the manual processes involved in starting, stopping, calibrating, tuning, and the general handling of the equipment's external controls for the purpose of extracting usable data from the equipment. (External costrols include those adjusting mechanisms that can be reached or used without breaking the seal in hermetically sealed equipment or without using special shorting devices, such as "battle short switch.")

In small ships and shore activities, the operational and technical responsibilities outlined above may be assigned to a single organizational unit. In all instances, however, the effect of such combination upon the competency of personnel to perform their electronics duties must not be overlooked.

OPERATIONAL MAINTENANCE

Operational maintenance is the care and minor maintenance of equipment through the performance of those tasks which do not require detailed technical knowledge of equipment functions and design. It is defined by the *Bureau of Ships Manual* as normally consisting of inspection, cleaning, servicing, preservation, lubrication, and adjustment, as required. Such maintenance may also include minor parts replacements not requiring high technical skill or internal alignment.

As the term implies, this type of maintenance is performed by the operators of the equipment. Its purpose is to: (1) make operators more aware of the equipment's state of readiness, (2) reduce the delays which would occur if the making of simple adjustments were dependent upon an ET, and (3) release technicians for work of a more complicated nature.

With reference to preventive maintenance for equipments included in the POMSEE Program[1] (This program is discussed later), Bureau of Ships Instruction 9670.86A states that '" . . . An Operational Maintenance Program shall be established as an integral part of the Preventive Maintenance Program. The Operational Maintenance Program shall be conducted by operational ratings and shall include all items designated as routine or operational in *Maintenance Standard*, Part II, plus increasingly technical items as the training level of the operational personnel increases."

For electronic equipments not yet included in the POMSEE Program, the division of maintenance responsibilities between operational and technical ratings is left up to the individual ship. The technical manuals furnished with these equipments are useful as guides to such division of responsibilities. For example, Section 5 of the *Instruction Book for Sonar Sounding Set AN/UQN-1A, NavShips 91360*, discusses operational maintenance for the AN/UQN-1A. It states that when the operator checks out the equipment before a run he should be satisfied that it will render continuous performance during the anticipated operating interval. He should be prepared to make minor adjustments, replace lamps, tubes, styli, or paper, if necessity warrants and due authorization is obtained. It points out that the operator is best fitted to sense impending trouble, because he is familiar with all the aural and visual manifestations of proper operation. He is responsible for the following factors incident to continued successful operation of the AN/UQN-1A:

1. Routine check to ensure that the equipment is properly powered and in condition to remain operative for the anticipated interval or watch.
2. Routine adjustments, operational checks, and familiarity with the characteristics of a well functioning equipment.
3. Routine maintenance, such as lubrication.
4. Identification and replacement of expendable parts.
5. Maintaining an up-to-date, adequate, and readily accessible group of maintenance parts for instant use if needed.
6. Logging all work done on the equipment, including all measurements made.

To be effective, operational, like any other maintenance, requires that personnel responsible for it be trained in the performance of their duties. The EO assists in this training as necessary.

Usually the electronics officer assigns each equipment to an ET or group of ETs for regular maintenance and for assisting, as required, in training operators in those maintenance tasks that are specified for accomplishment by operators. The EO also sees that schedules for this training are established and that checkoff sheets are devised for regular logging of maintenance items as they are accomplished. In addition,

[1] Performance, Operational, and Maintenance Standards for Electronic Equipment.

he observes the performance of operational maintenance from time to time.

To assist in preventing serious equipment derangement, each operator must be impressed with the importance of reporting promptly to the electronics division equipment defects and irregularities noted. Such defects can then be corrected immediately or noted in the CSMP file for later correction, depending upon the nature of the defect and its effect upon the readiness of the ship.

In carrying out any assigned responsibility for operational maintenance the electronics officer confers with operating division officers in order to avoid interrupting schedules established by those officers and to maintain smooth working relationships among all personnel concerned. The possibility of conflicts between departments or divisions is decreased by a ship's organization which clearly defines areas of responsibility.

PREVENTIVE MAINTENANCE

It is reasonable to assume that many equipment breakdowns were at some time minor faults. Some of these minor faults have detectable manifestations. The detection and correction of these faults before they result in equipment failure is the ultimate objective of preventive maintenance, which is defined as the systematic accomplishment of those maintenance items necessary to reduce or eliminate equipment failures and prolong the useful life of the equipment.

Equipment failures are governed in general by the complexity of the equipment, the demands placed upon it, and the abuse to which it is subjected. Equipment abuse arises from failure to follow proper operational procedures, and from lack of adequate preventive maintenance. Since appropriate technical and maintenance manuals and POMSEE publications indicate the preventive maintanance which is required because of equipment complexity and performance demands, proper use of the information in these publications will prevent equipment abuse and assist in reducing or eliminating equipment failures. The EO therefore must see that his men are thoroughly familiar with the content of the maintenance publications applicable to equipment on which they are assigned to work.

To reduce equipment failures, a well planned and conscientiously supervised preventive maintenance program is mandatory. Since such a program varies with each ship because of differences in electronic installations and differences in complement and abilities of personnel, no set rules can be given regarding details. Each preventive maintenance program should, however, be based upon the general directives given in Chapter 67, *Bureau of Ships Manual*, and should include the specific preventive maintenance requirements for each equipment as set forth in technical manuals, POMSEE, and other pertinent publications.

The *Bureau of Ships Manual* points out that operational or preventive inspections and tests shall not be permitted to interrupt unnecessarily the services provided by a ship or station. No equipment should be dismantled or otherwise made inoperative without proper authorization, nor should "on the air" tests of transmitting equipment be made during scheduled periods of silence or when such tests would interfere with normal service.

The manual states also that tests and inspections shall be made by operating and maintenance personnel of the activity concerned, but that where qualified personnel or suitable testing equipment is not available at the activity, arrangements shall be made through the cognizant unit commander for the temporary services of qualified personnel and proper testing equipment. Current directives and instructions of the cognizant commander should be consulted for the proper method of requesting such assistance.

As stated earlier, those portions of preventive maintenance which require realignment after accomplishment are the responsibility of electronics technicians, while those not requiring realignment are normally the responsibility of equipment operators.

In order to avoid duplication of effort, the electronics officer may be assigned responsibility for the entire preventive maintenance program, although such assignment is a matter to be determined by the individual ship.

Checkoff Lists

Checkoff lists are the heart of the preventive maintenance program. There should be a checkoff list for each piece of electronic equipment on board. This includes test equipment, radiac equipment, antenna systems, and remote systems. As part of the POMSEE

Program (discussed later), the Bureau of Ships provides checkoff sheets for many equipments.

The ship is responsible for preparing preventive maintenance (PM) checkoff sheets for equipment not supported by the POMSEE Program. The maintenance sections of equipment technical manuals (instruction books) indicate the checks that should be made. The electronics officer should use these manuals as guides in preparing the checkoff sheets for his equipments. Care must be taken to ensure that all component parts of each equipment, such as MG sets and antennas, are included. Each check should be so worded that it indicates the exact test or inspection to be performed. None should be vague, general, or all inclusive in nature. Because checkoff lists must be in accord with the type commander's preventive maintenance instructions, these instructions should be consulted during preparation of the lists.

It is suggested that a preventive maintenance file folder be made up for each installed equipment not supported by POMSEE publications. Place the checkoff list on the left, a log form on the right, and keep the folder in the same compartment with the equipment itself.

Chapter 3 discusses required records and reports for electronic equipments. Checkoff sheets, when properly made up and completed, can provide most of the data needed for the permanent records. In addition they are useful for training new men to perform routine maintenance and for ensuring that no important maintenance procedure is overlooked.

Whether using locally prepared checkoff sheets or POMSEE publications, responsibility for each preventive maintenance check should be specifically delegated so that individual personnel may know which maintenance items they must accomplish. Normally, all preventive maintenance checks of teletype equipment; lubrication of motors, generators, and radar antennas; and cleaning of filters should be assigned to equipment operators for accomplishment. After instruction, an RM3 should be able to perform such duties as making quarterly sensitivity measurements on LF, MF, and HF radio receivers.

POMSEE Program

The Bureau of Ships has developed a comprehensive system of preventive maintenance which will ensure peak equipment performance if properly utilized. Known as the Performance, Operational, and Maintenance Standards for Electronic Equipment (POMSEE) Program, it provides performance and maintenance standards publications for all major electronic equipments under the cognizance of the Chief, Bureau of Ships. For each equipment supported by the program, the following publications are provided: *Performance Standard Sheets; Maintenance Standards Book, Part I — Test Procedures and Maintenance References;* and *Maintenance Standards Book, Part II — Preventive Maintenance Checkoff.*

Performance Standard Sheets provide operational performance data and basic technical measurements indicative of the minimum acceptable level of performance for the equipment to which they apply. NavShips 93000, *Binder for Electronic Equipment Performance Standard Sheets,* provides for incorporating under one cover all performance standard sheets on board. The binder is distributed by the Bureau of Ships.

Maintenance Standards Book, Part I — Test Procedures and Maintenance References (formerly *Performance Standards Book)* provides standard methods for determining measurements affecting the performance of a specific equipment. The tests specified in Part I are to be made and the readings recorded when the equipment is operating at peak capacity. These readings then provide the standard of comparison to be used when the regular preventive maintenance checks are made as required by Part II. Part I lists step-by-step procedures to be used in recording performance standards. Upper and lower limits of tolerances (dial readings, voltages, or currents) are given for each step. No attempt is made in this publication to show how to locate the cause of inefficient operation. Reference to the appropriate technical manual is still required for trouble-shooting and corrective maintenance.

Maintenance Standards Book, Part II — Preventive Maintenance Check-off (Formerly *Maintenance Check-off Book)* lists the preventive maintenance checks that should be made on the equipment. The list is broken down into daily, weekly, monthly, and semiannual checks, with the steps for each period itemized, described, and illustrated. Some Part II books indicate for each check whether it should be

accomplished by the equipment operator or a technician. Others do not, and in these instances the electronics officer must determine which tests are to be performed by operators.

As they become available, Performance Standard Sheets and future editions of *Maintenance Standards Books* covering installed equipment will be distributed directly to ships. The Ship Electronic Installation Record, NavShips 4110, is used as a guide for this distribution. The sheets and books for new equipments under production will be distributed with the equipment in the same manner as equipment technical manuals.

Available POMSEE publications are listed in the *Electronics Information Bulletin* (EIB). Additional copies may be ordered from Forms and Publications Supply Distribution Points on requisition form DD1149. Because many POMSEE books are still in short supply, those not available when requisitioned should be reordered at a later date.

Because preventive maintenance under the POMSEE Program is relatively new, it is subject to change and improvement. For instance, many of the tests listed in *Maintenance Standards Books, Parts I and II* require test equipments that are not on ships' allowances. This situation is being remedied by revision of the allowances, and BuShips letter 974-10 of 25 January 1957 provides type commanders with approval to procure commercial test equipment in critically short areas. The fact that all required test equipment is not on board is not to be interpreted as a reason for omitting the POMSEE Program. The proper equipment should be borrowed if possible, but if not possible, all tests possible with available equipment should be accomplished.

In implementing the POMSEE Program, the first step is to establish performance standards for each onboard equipment included in the program. These standards should then be recorded in the applicable publications. Performance standards for many equipments are established by Bureau of Ships industrial activities when these activities install, or perform major repairs on, electronic equipment. Ships are responsible for seeing that performance standards are established for other equipments included in the program. *Maintenance Standards Books, Part I,* indicate that the measurements specified therein are to be accomplished by qualified engineers only. BuShips Instruction 9670.86A, however, says that forces afloat must "complete the remainder of the Maintenance Standards, Part I, measurements . . . when only Performance Standard Sheet measurements are accomplished by the accomplishing activity." This instruction says further that forces afloat must "Record the results of the remainder of . . . Part I measurements on the Summary Sheet provided and forward to the Bureau (Code 975) when only the Performance Standard Sheet measurements are accomplished by the accomplishing activity."

When it is necessary for ship's force to accomplish measurements as indicated above, it is suggested that they obtain the best technical assistance available for the purpose—that is, shipyard personnel during the checkout after shipyard repair, tender personnel, or civilian technicians after they peak up the equipment.

Regardless of the method used to accomplish the measurements prescribed in *Maintenance Standards Books, Part I,* the standards established must be recorded in the appropriate Part II publication.

Maintenance Standards Books, Part II — Preventive Maintenance Check-off Books, consist of tests to be used in the routine preventive maintenance program. The use of Part II publications is required by the Bureau of Ships regardless of whether or not the performance standards have been established in accordance with Part I. The tests in preventive maintenance check-off publications are described in such detail that preventive maintenance with the use of these publications can be accomplished by relatively inexperienced personnel. Actually, following the step-by-step pictured checks is an excellent method of familiarizing inexperienced men with the various equipments. When the results of checks indicate equipment derangement or malfunction, the cause should either be corrected at once or made known to supervisory personnel for later scheduling of the repair.

The electronics officer must determine the frequency of checks listed on locally prepared checkoff sheets. He also must determine whether or not the indicated frequency of POMSEE checks is realistic for his particular ship, for although personnel shortages do not permit the omission of a preventive maintenance program, such shortages must be considered when determining the frequency of

required checks. If adequate numbers of technicians are not on board, some of the daily checks will of necessity have to be scheduled for weekly accomplishment, some of the weekly checks for monthly accomplishment, and so on. Weekly and monthly checks should be so scheduled that some testing is performed each day. This will eliminate attempts to accomplish all tests on the last day of the week or month.

Maintenance Supervision

A successful preventive maintenance program requires proper supervision. Without it, the program may degenerate into nothing more than a series of initials on checkoff sheets. It is emphasized that each item initialed on a checkoff sheet must represent actual accomplishment of that maintenance item. Blank spaces are acceptable as useful information, because they serve as a record of checks that have not been made.

Should an administrative inspection indicate careless completion of preventive maintenance records, the electronics officer is the person who will be held responsible. He therefore should set up the program in such a way that it can be carried out as planned. He then must ensure that it is carried out.

Neglect of items such as lubrication, antenna insulator cleaning, and antenna meggering are easy to spot. Other preventive maintenance should be spot checked periodically, preferably some each week. In addition, the electronics officer should observe the complete preventive maintenance checkout of a different equipment weekly. Such observations will enable him to ascertain that the checks are being performed properly and will increase his knowledge of the equipment.

Inspections of all equipments, to determine material condition and the correctness of completed maintenance, is another important part of maintenance supervision. To prevent the possibility of a man's neglecting his work except when inspection is scheduled, such inspections should be made at random. They should be made in the presence of the man responsible for the equipment.

No inspections, tests, nor maintenance which would interrupt normal service should be permitted.

Another facet of maintenance supervision is that of ensuring that the men become familiar with the content of directives and instructions affecting their work, as for example, BuShips Instruction 9670.89 which requires discontinuance of the wholesale removal of electron tubes for routine testing. This instruction announces the change, explains why the former procedure was unsatisfactory, sets forth the new procedure to be followed as general practice, and indicates the need for informing the Bureau of Ships in cases where extensive tube selection for a particular socket was necessary. The men obviously should be familiar with all of the above matters in order to appreciate fully this change in procedure.

TECHNICAL MAINTENANCE

Technical maintenance is the restoration of equipment to normal operating condition through the elimination of electrical and mechanical faults; replacement of unserviceable parts, subassemblies, or assemblies; and aligning, testing, and adjusting affected equipment. This work in general requires skill and detailed technical knowledge of the equipment and is the direct responsibility of the EO and his electronics technicians.

The knowledge required for technical maintenance can be acquired only through adequate applicable experience, individual study, formal naval schooling, observation of the work of other skilled personnel, and in-service training. The electronics officer is responsible for so administering his division that the men are given opportunities to increase in capabilities through all of the foregoing factors.

Details of technical maintenance (usually referred to in technical manuals as "corrective") are given in equipment technical manuals, maintenance manuals, letters, directives, and periodicals such as the *Electronics Information Bulletin*, NavShips 900,022A. The electronics officer is responsible for seeing that all pertinent literature is readily available to his men.

TENDER/YARD MAINTENANCE AND REPAIR

Tender/Yard maintenance is that maintenance which requires a major overhaul or complete rebuilding of parts, subassemblies, or the end items involved. Such maintenance is

the responsibility of the EO aboard ship to the extent that he establishes the fact that the required work is beyond the capabilities of the ship's force and recommends to the commanding officer that it be accomplished. He also determines whether or not the work is of an emergency nature, recommends the type of availability required, and initiates the repair request to be forwarded by the commanding officer to the appropriate commander. Work beyond the capacity of the ship's force, including types of availabilities and the preparation of work lists and repair requests, is discussed in chapter 5.

Repair Ship And Tender EO

Although the development of repair ships and tenders has reached a certain degree of specialization, they have many characteristics and facilities in common which make them suitable for general work in addition to the specific tasks for which they were designed. In general, the organization, procedures, and responsibilities of the officers and men aboard a tender are similar to those aboard a repair ship. The following discussion of a repair ship, therefore, is applicable also to a tender.

REPAIR OFFICER

A repair ship's organization provides for a repair officer who is primarily responsible for a well organized and efficiently operating repair department. In carrying out this responsibility he keeps himself informed of the current workload of his department and the capacity of his crew and facilities. He also keeps the maintenance representative of the Service Force, or type commander in the case of an AD or AS, informed of the current status of work in order that the appropriate representative may properly schedule and assign ships to be repaired. He is responsible for the review of work requests received from ships assigned for repair and for the acceptance or rejection of the jobs according to the capacity of his department.

In order to obtain first-hand knowledge of conditions and to ensure the maintenance of required standards, the repair officer makes frequent inspections of his department and requires his division officers to make corrections in conditions as necessary.

He is charged with the review of all personnel problems arising within his department in such matters as training, work assignments, and leave.

ASSISTANTS TO REPAIR OFFICERS

A repair ship's organization provides for an assistant repair officer who is charged with the responsibilities of the repair officer in the latter's absence and with carrying out such other responsibilities as may be delegated to him.

Other assistants to the repair officer include:

1. An electrical assistant who is responsible for the proper functioning of the electrical instrument, electrical repair, gyrocompass, and battery shops.
2. An electronics assistant who is charged with all work of the electronics division.
3. An engineering or machinery assistant who is responsible for the proper functioning of the machine shops.
4. A construction or hull assistant charged with the proper functioning of the pattern, carpenter, shipfitter, blacksmith, sheetmetal, pipe and copper, and welding shops.
5. An ordnance assistant who is responsible for the fire control, ordnance repair, canvas, and torpedo shops.

ELECTRONICS ASSISTANT

The repair ship electronics assistant is concerned primarily with testing and repairing equipment from other ships. He also is responsible for the upkeep of the electronic equipment regularly allowed and installed in the repair ship. In carrying out these responsibilities the electronics assistant directs and supervises his officer assistants, enlisted personnel, and any contract field service technicians assigned to his organization. Under the repair officer, he has responsibilities toward the electronics division similar to those of the repair officer toward the repair department.

He makes inspections as required to ensure that the work done by his personnel is effective and complete.

He sees that space and testing equipment are available for bench testing and repairing such equipment as VHF, UHF, loran, IFF, and teletype.

He plans for and supervises the accomplishment of those installations and field changes authorized by the Bureau for accomplishment by forces afloat. In making installations he follows the type plans and instructions issued by the Bureau.

While the priority of work to be undertaken by the electronics division is furnished by other cognizant authority, it is within the province of the electronics assistant to suggest changes in priority schedules. With his knowledge of the capabilities and limitations of the personnel at his disposal he is able to suggest schedule variations which will improve the flow of work.

Repair Ship Training

Training the enlisted personnel under his cognizance is an important responsibility of any electronics officer. For the repair ship's electronics assistant this is a major job. Not only must his men be able to maintain and repair the ship's installed equipment, they must also be able to repair various equipments installed aboard other ships. To accomplish the work of his division the EO must have on board at all times a nucleus of trained men. In addition, he must ensure that electronics school graduates received for duty within the command obtain a minimum of 3 months intensive training in practical electronics repair in order to qualify them for independent duty. He must also arrange for the school graduates thus trained to be exchanged for men requiring training for independent duty. This means that a well organized training program must be in effect at all times and that the program be given sufficiently high priority in the working schedule to ensure its continuance during periods when the repair workload seems excessive. Provision also should be made for temporarily assigned technicians of repair units to impart their specialized knowledge to the ship's force.

Assistance to Other Ships

Upon request the repair ship electronics officer assists commanding officers of other ships in work beyond the capacity of their personnel or facilities. This assistance may be given by (1) sending repair ship personnel and equipment aboard another ship, (2) providing for technicians from other ships to come aboard and use repair ship equipment to test and correct their own equipment under the supervision of repair ship personnel, or (3) receiving equipment from other ships for test and correction by repair ship personnel.

He assists other ships' forces in inspection of electronic material to ensure effective mechanical and electrical operation. As soon as practicable he advises the cognizant commanding officers of the results of such inspections in order that these officers may take appropriate action to have any material requiring tests or repairs removed as necessary for these purposes.

When requested by proper authority, he further assists commanding officers of other ships by providing instruction to the personnel of these ships. Such instruction may include proper use of pertinent publications and information on electronics supply in addition to instruction on the correct performance of maintenance.

Repair EO's Supply Responsibilities

The electronics assistant aboard a repair ship must cooperate with supply personnel on electronics supply matters. While it is the function of associated supply activities to order and stock equipment components and parts, it is necessary that the repair ship electronics assistant have limited authority in the issue of critical items. With his knowledge of the requirements of the ship serviced by the repair ship, he should be able to divert critical items to those having the greatest needs.

He must provide technical assistance as required by supply personnel for the purpose of screening requisitions and identifying electronic material. He must also review other ships' allowances of electronic materials and recommend changes to the commanding officers in order that sufficient stock will be on hand to meet requirements without involving unnecessary purchases or the carrying of excess stock. He must see that adequate and suitable stowage facilities are available and that deterioration

of equipment due to improper care while in storage is avoided.

Equipment Improvement

In accomplishing the above responsibilities the repair ship electronics assistant of necessity acquires detailed knowledge of the equipment installed in units of the fleet. This detailed information enables him to discover modifications which if put into effect would increase the efficiency of equipment. He thus becomes an important source of suggested improvements for electronic equipment. He is responsible for initiating correspondence on proposed improvements and forwarding it via appropriate channels in order that the Navy may benefit from his knowledge.

Operational Development Force EO

The purpose of the Operational Development Force is to evaluate naval tactics and material. This includes operational and material evaluations of electronic systems, equipment, and accessories.

The electronics officer aboard an OpDevFor ship assists in conducting electronics evaluation projects to investigate equipment and system potentialities. When project equipment is received on board, the EO must familiarize himself with its maintenance requirements as soon as practicable, since equipment or systems under evaluation must be maintained at as high a level of operational performance as possible. All available facilities for meeting this requirement must be utilized. ComOpDevFor staff personnel may assist, but the primary responsibility remains with the individual ship. In order that the report of the project will give a true picture of the equipment's potentialities, a complete and detailed maintenance log, including accounts of all casualties, must be kept.

Future electronics planning in the Navy is influenced by the results of evaluation projects; therefore, care must be exercised to eliminate all bias and prejudice from project reports. Though opinion and conjecture are solicited, they must be clearly identified as such. The EO assists in the preparation of these reports by recording the results of his tests of the equipment's material reliability.

Evaluation projects are assigned to a ship by the Commander Operational Development Force through individual project assignment letters.

Generally only a small portion of the electronic equipment installed in OpDevFor ships is peculiar to the requirements of the Force. The equipment regularly allowed and installed in such ships is normally the responsibility of the administrative type commander. The electronics officer's responsibilities for this equipment are specified by the type command and are similar to the responsibilities aboard any ship of the type, that is, similar to the responsibilities already described in this and the preceeding chapters.

Conclusion

The electronics officer aboard ship has important material responsibilities. These include installations authorized for ship's force accomplishment, liaison with other departments of the ship, and knowledge of pertinent literature. They include familiarity with naval supply and may include the performance of such supply functions as maintaining approved stock levels and ensuring proper stowage of electronics items. The major portion of the EO's time will normally, however, be spent in ensuring adequate maintenance of all assigned electronic equipments. In fact, his administrative responsibilities, discussed in chapter 1, and the foregoing material responsibilities are all directed primarily toward his responsibility for electronics maintenance.

The three types of maintenance for which the EO is responsible are operational, preventive, and technical or corrective. Under normal circumstances the greatest emphasis will be placed upon preventing equipment breakdown. An effective preventive maintenance program is therefore imperative. Inherent in such a

program are such actions as assigning the men to work on specific equipments, devising check-off sheets and records as necessary to ensure that all required preventive items are accomplished, scheduling the checks and tests to be performed, supervising to ensure that all items are performed properly, and initiating any necessary requests to tenders or other activities for the assistance of qualified personnel or the use of suitable testing equipment.

The primary responsibility of the electronics assistant to the repair officer aboard a tender or repair ships is the repair of equipment regularly installed in other ships, although maintenance of any electronic equipment permanently installed aboard the repair ship is also his responsibility. Training is another of his major responsibilities as he prepares his men for independent duty or undertakes to improve the technical abilities of crews aboard other ships.

The electronics officer aboard a ship of the Operational Development Force is responsible for all permanently installed equipment aboard the ship, but his primary responsibility is to assist in testing, evaluating, and reporting upon equipments assigned to the ship specifically for test and evaluation.

CHAPTER 3

RECORDS, REPORTS, AND PUBLICATIONS

Efficient administration requires exact and current knowledge of all matters under the cognizance of the administrator. In the case of the electronics material officer, this includes knowledge of the current operating status of all electronic equipment and systems for which he has maintenance responsibility. It includes maintaining proper records and compiling and forwarding to higher administrative levels various reports required to assist these officials in carrying out their responsibilities for naval electronic installations. It also includes ensuring the proper use of publications which present information on electronics maintenance matters.

This chapter discusses various records and reports required of the electronics material officer and indicates the contributions of certain of these to the enforcement of guarantees and to the development of improved equipment. It describes the Reports Program and indicates the part played by this program in eliminating unnecessary reporting. Various publications and the manner in which their proper use contributes to increased equipment efficiency are also discussed.

In some instances only the basic publication number is given for printed matter (manuals, directives, forms, and the like) referred to in this and other chapters. In other instances the number given is that of the edition current at the time the text was prepared. In either case, the EO must determine whether or not he has current information. If he hasn't, he must obtain the latest edition or the changes that will bring his copies up to date. Use of incorrect information can be dangerous.

Records

Because information on material as complex as electronics cannot be carried in the mind, certain records are necessary. To assist electronics personnel in keeping up-to-date information on equipment under their cognizance, the Bureau of Ships has established certain required records. These records and the requirements for maintaining them are discussed in the following paragraphs.

MATERIAL HISTORY

The *Bureau of Ships Manual* states that each activity engaged in the operation of electronic equipment shall maintain suitable cards for recording the results of inspections of equipment as well as any tests and field changes made. The Manual states further that a material history, comprised of cards filed in looseleaf binders, supersedes the Machinery History and Hull Repair Books formerly required aboard ship. Such cards as the Machinery History Card (NavShips 527), the Electrical History Card (NavShips 527A), the Electronic Equipment History Card (NavShips 536), and the Hull History Card (NavShips 539) form the basis of the ship's material history. Their purpose is to provide a comprehensive record or complete history of the items concerned. They are to be kept up to date and available for inspection at all times and are

to be integrated into preventive maintenance programs such as the Current Ship's Maintenance Project (CSMP).

In maintaining the material history an appropriate card is used for each item in the Machinery Index and for each item in the Ship Electronics Installation Record (NavShips 4110). Entries on the cards include descriptions of equipment failures, repairs effected, alterations and field changes made, tests conducted, and any other information necessary to provide a complete material history of the items. Routine cleaning and operation are not recorded. The material history cards for which the electronics material officer is responsible are described as follows.

Electronic Equipment History Card (NavShips 536)

The Electronic Equipment History Card, NavShips 536, is the basic material history card for electronic equipment. It provides for recording failures and other pertinent information on electronic equipments. A separate card is made out for each unit on board. If additional cards are required they are added, and all cards for a particular unit are transferred with the unit when it is removed from the ship.

The heading of the card is so designed that when the card is properly filled in, all the necessary information is readily available for completing the upper part of the Electronic Failure Report (DD-787). The heading of the card should be typed, but entries on the body of the card may be either typed or written in ink or indelible pencil. The following instructions should be followed closely in filling in the form, a sample of which is shown in figure 3-1.

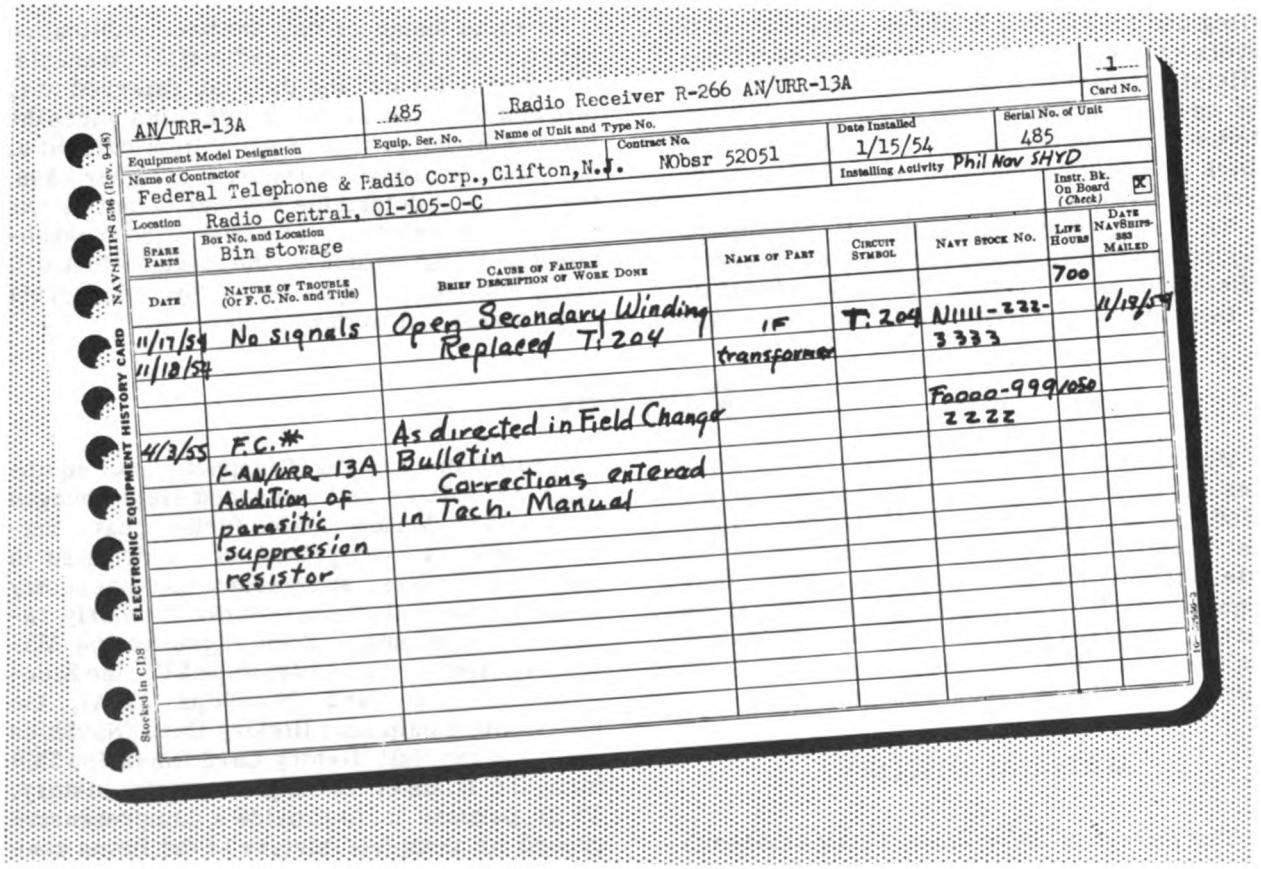


Figure 3-1.—Electronic Equipment History Card (NavShips 536).

Equipment Model Designation: All letters and numbers should be included to indicate the specific model. For instance, AN/ARC-1 should NOT be entered as AN/ARC or ARC-1.

Equipment Serial Number: This refers to the main serial number of the equipment. Do not use the serial number of a unit or part. If in doubt, refer to the publication, *Reporting Electronic Equipment Installations*, NavShips 900,135B, for location of main serial number. (NavShips 900,135B will soon be incorporated in the *Electronics Installation and Maintenance Book.*) Where it is definitely established that an item does not bear a serial number an asterisk (*) is entered in this space.

Card Number: The number in this space is number "1" for the first card on each unit of equipment in the original file. As additional cards for a specific unit are filed, they are numbered consecutively.

Name of Contractor: Enter here the name of the contractor in full as given on the unit nameplate or in the technical manual.

Contract Number: The complete contract number includes all letters and numbers as given on the unit nameplate.

Serial Number of Unit: Enter here the serial number of the unit, taken from the unit nameplate. Do not confuse this number with the equipment serial number.

Location: Enter the name and designation of the space in which the unit is located aboard ship. If the unit is portable, enter the space where it is normally stored.

Date Installed: This refers to the date the unit was installed. If the installation required several days, the date of completion is the date entered.

Installing Activity: This space is for the name of the activity which actually installed the unit.

Box Number and Location: Enter here the numbers and locations of all boxes containing parts peculiar to the unit in question. If parts have been removed from boxes and stowed in bins, so indicate in this space. In ships not converted to the shipboard maintenance parts system, all parts are furnished in boxes. The numbers and locations of these boxes are entered here.

Technical Manual on Board: This space is checked when the final technical manual (formerly instruction book) is received. If only the manuscript form of the manual is on board, the space should not be checked. To indicate the status of the edition that has been received (Manuscript, Preliminary, or Advance) it is recommended that the applicable abbreviation—MS, Pre, or Adv—be inserted here. Promulgating letters in manuscript-form manuals carry notices of the temporary status of these manuals.

Date: This refers to the date of a failure, the correction of a failure, the accomplishment of a field change, and other work involving maintenance or repair.

Nature of Trouble: External evidence of the equipment trouble is entered in this column. The action of the equipment which was symptomatic of trouble should be described in detail. Also, whenever a field change is made the field change number and title are shown in this column. This entry is in addition to the entry required on the Record of Field Changes (NavShips 537).

Cause of Failure: This column is most important. Describe how the trouble was traced and what corrective measures were taken. Give detailed information. Note peculiarities and weaknesses. The clearer the information in this column, the more valuable it will be to the ship, the Bureau, and the manufacturer. It is also of value as a source of information for the technician in correcting similar future trouble. The information in this column, and that reported on the Electronic Failure Report (DD-787), assists in the production of better and more reliable equipment.

Some activities may wish to record in this column such information as the name and rate of the person actually doing or supervising the work, the man-hours consumed, and the signature of the division officer. Such entries are optional.

Name of Part: List here the names of the parts involved in the failure.

Circuit Symbol (Part Ref. Desig.): Record here the reference designations, as shown in the technical manual, of the parts that failed.

Navy Stock Number: This space is for the Federal stock number (formerly standard Navy stock number) including all prefix and suffix letters, exactly as given in the technical manual or Stock Number Identification Tables (SNITs).

Life Hours: Enter here the estimated life of the part. To obtain this figure use the machinery history cards, readings of elapsed time

meters which total the operating time of the part, or any other available data.

Date DD-787 Mailed: Record the date the Electronic Failure Report (DD-787) was mailed to the Bureau. This means that all failures, including those of tubes, should be entered on the history card. The reason for this is that if, for example, the same type tube should fail several times in succession there would be reason to suspect that a circuit component is causing an overload on the tube. With this clue supplied by the history card, the real cause of the failure can be attacked.

Despite the shortage of ETs it is still possible to keep a complete material history by having each man who performs a repair make the entry in the material history as soon as he finishes the job. To ensure that proper entries are being made, the electronics officer should check them once a week for completeness and correctness. Spot checks should suffice to prove whether or not entries are being omitted. Large ships often require that repairs be logged in a work book for checking by a supervisor who then enters them in the material history. This procedure is successful where there are many ETs; however, work books are not required by regulation. It is suggested that small ships log the repairs directly in the material history. Ships often fail to log repairs made by people other than the ship's force; that is, those made by tenders, shipyards, and civilian technicians. These also should be entered in the material history.

Resistance Test Record (NavShips 531)

The Resistance Test Record, NavShips 531, or megger card as it is commonly called, is shown in figure 3-2. It provides for recording the insulation resistance of units and circuits such as radio antennas and power distribution circuits. It is inserted in the material history binder adjacent to the applicable history card.

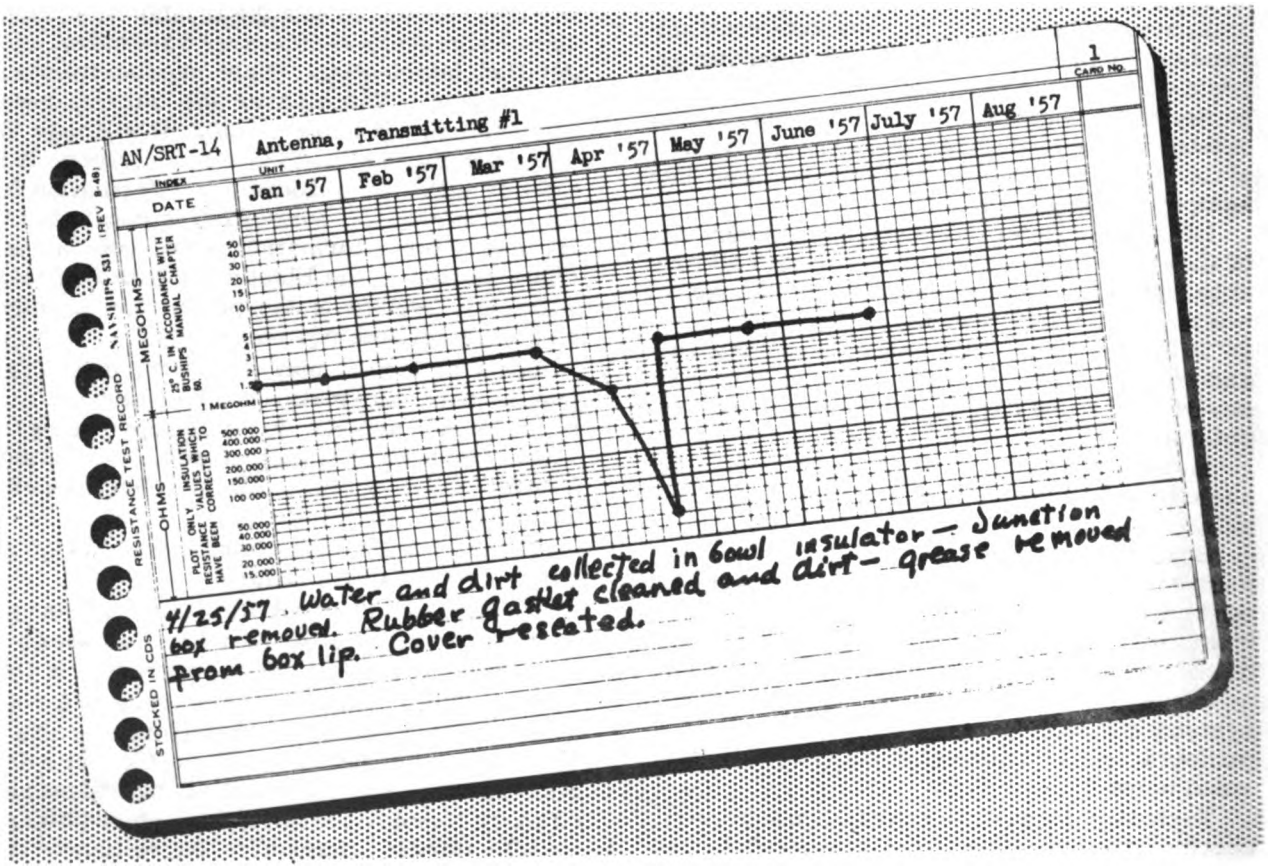


Figure 3-2.—Resistance Test Record (NavShips 531).

Resistance tests indicate when work is required to prevent expensive failures or to maintain equipment at its peak. Responsibility for resistance tests and record entries should be assigned to designated personnel who should be trained in the use of the megger and aware of the importance of accurate readings and entries. Because falling resistance readings may indicate the approach of trouble, the EO should check the records periodically. When a fall is noticed he should have the reason determined and corrective action taken as necessary.

Electron Tube Performance Record (NavShips 538)

The Bureau of Ships no longer requires the use of the Electron Tube Performance Record, NavShips 538. The cards, however, may be used at the ship's discretion for any large or expensive tubes for which it may be desirable to maintain separate records. When used, the cards are inserted in the binder behind the history card for the equipment in which the tube is installed. Upon failure of the tube, the card may be destroyed after an Electronic Failure Report (DD787) has been completed and forwarded to the Bureau of Ships.

Bureau requirements for recording tube performance data are discussed later under Tube Guarantees.

Record of Field Changes (NavShips 537)

Information on field changes for electronic equipment is recorded on the Record of Field Changes NavShips 537. One of these cards is prepared for each equipment and filed in the material history binder adjacent to the history card for the equipment.

This record is of paramount importance. Without modifications an equipment may be dangerously out of date and subject to numerous serious difficulties. Without a record of field changes it is difficult to determine what modifications, it any, have been made. The information recorded on these cards is essential therefore for routine maintenance, for trouble shooting, and for ordering repair parts which belong to the improved equipment.

Figure 3-3 shows a Record of Field Changes (NavShips 537). The spaces for equipment model designation, serial number, date installed, and card number are filled out by typing or writing with ink or indelible pencil. The official name and Navy type number (or other official identification) of each component affected by a field change should be shown parenthetically after the title of a change.

The columns headed Number, Title of Field Change, and Authority for Change are to be completed in numerical order for all changes affecting a specific equipment. Field changes affecting given equipments are listed in the *Electronics Installation and Maintenance Book* (NavShips 900,000) which indicates the instruction bulletin or reference instruction authorizing the change. The authorizing document provides information required in the above columns.

The columns, Change Made By and Date of Change, should be left blank until the change is completed at which time the name of the person making the change and the date should be entered. If the change applies to the model but not to the particular serial number of the equipment, the words, "not applicable," should be entered in these columns.

New field changes are listed in the *Electronics Information Bulletin* (EIB) which also gives the information needed to order the applicable field change kit, or, if a kit is not required, to order the field change bulletin. Kits are ordered on form DD-1145. If printed matter only is required, it is ordered on form DD-1149. Both were formerly ordered on S. and A. Form 43.

When the EIB lists a field change that is applicable to the equipment on board, the required material should be ordered and the change number, title, and authority should be entered on the Record of Field Changes. (A Repair Record Card, NavShips 529, should be completed and filed to indicate that the change is yet to be made.) If within the capacity of the ship's force, the change should be made when the required material arrives. If the change is not within the capacity of the ship's force, the material should be stowed until the next availability.

To determine whether or not the ship's field change cards are up to date, the *Electronics Installation and Maintenance Book* should be consulted. Should the information in this publication be insufficient to make the determination, assistance should be requested from a tender, a shipyard, or civilian technicians. If there is to be an arrival inspection

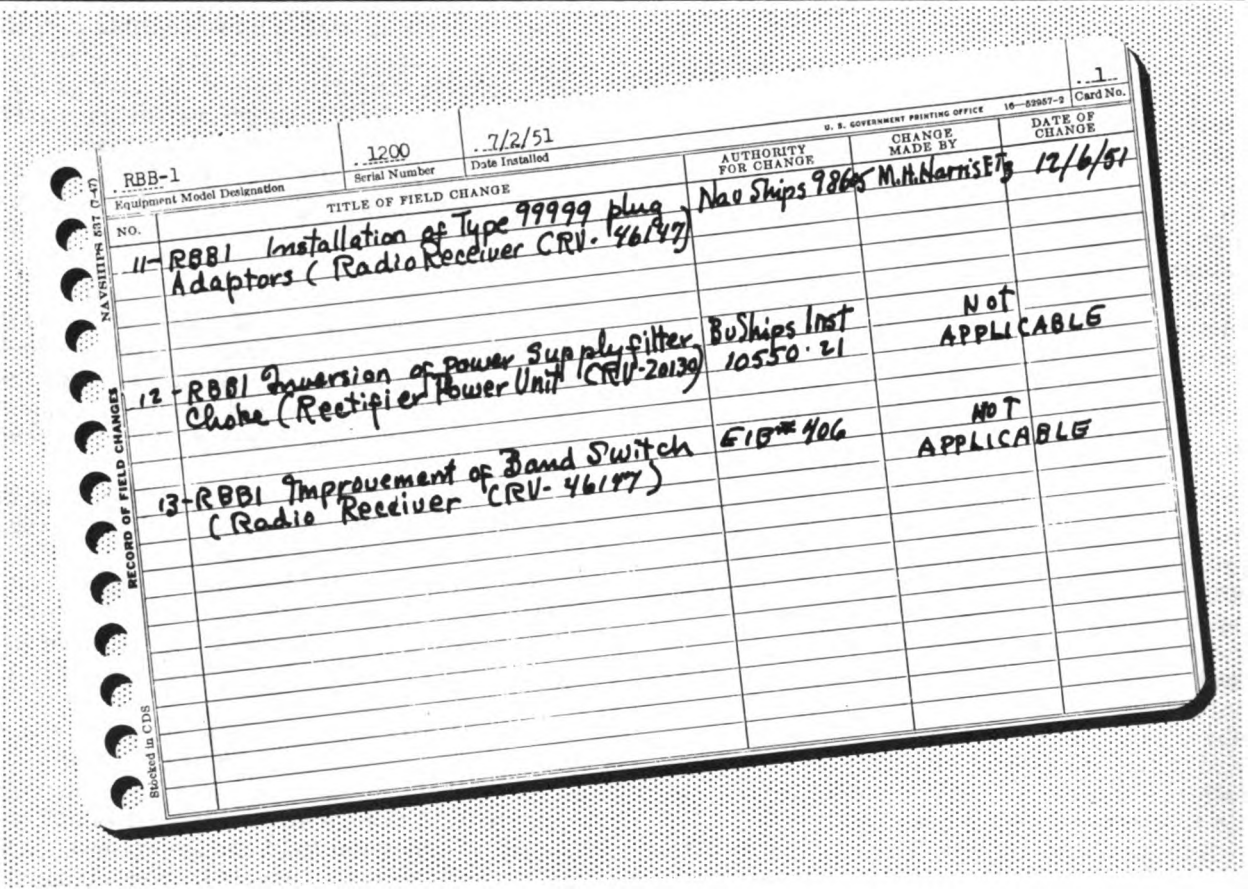


Figure 3-3.–Record of Field Changes (NavShips 537).

before a shipyard overhaul, a field change survey may be made upon request at that time.

Record Card, Plain (NavShips 532)

The purpose of the form NavShips 532 is to provide for recording any desired supplementary information. It is inserted in the binder behind the card it supplements.

CURRENT SHIP'S MAINTENANCE PROJECT

The purpose of the Current Ship's Maintenance Project (CSMP) is to provide a current record of maintenance, modifications, and repairs yet to be accomplished by the ship's personnel or during availabilities. The CSMP is comprised essentially of the following three cards: Repair Record Card, NavShips 529, which is a blue card, Alteration Record Card, NavShips 530, which is pink, and the previously described Record of Field Changes, NavShips 537, which is white. As a repair is required, an alteration approved, or a field change authorized, the applicable card should be filled in and filed in the material history binder behind the appropriate history card. Being of distinctive colors, the cards readily indicate outstanding work.

Repair Record Card (NavShips 529)

When a required repair cannot be accomplished immediately or is beyond the capacity of the ship's force, a Repair Record Card, NavShips 529, should be filled out and filed behind the appropriate history card. The repair cards for work beyond the capacity of the ship's force should contain the information that will later be given on the repair requests for shipyard or tender work. Entering complete information at the time the need for repair becomes evident will do much to guarantee

successful shipyard and tender availabilities.

A note in the upper right corner of each card to indicate whether the work is to be done by ship's force (S.F.), tender (T), or shipyard (Yd) will simplify locating the appropriate cards when ETs have time to undertake jobs awaiting accomplishment. Before tender or yard availabilities, pulling the cards on which to base work requests will also be easier.

Alteration Record (NavShips 530)

When an alteration is approved, an Alteration Record Card, NavShips 530, should be filled out and filed behind the history card for the equipment that the alteration is to modify or replace. If the alteration approves the installation of new equipment, the card should be placed in the binder where the new history card will eventually be inserted. The spaces on the card are generally self-explanatory. The important consideration is that the alteration be adequately described in the Work Required section of the card.

Record Retention Procedures

When CSMP work is completed, notations to this effect should be entered on the material history card and the applicable CSMP cards. The latter, with the exception of the Record of field Changes, should then be removed and placed in a Completed Work file.

Repair Record Cards and Alteration Record Cards are retained for a period of 2 years after the work noted thereon has been completed and entries made in the material history. After the 2-year period these cards may be destroyed at the discretion of the commanding officer. When ships are decommissioned or placed out of service during this period the cards are retained on board.

Electronic Equipment History Cards and Records of Field Changes remain with the equipments referred to on the cards. If the equipment is transferred, these cards are transferred with it. The history card is to remain with the equipment throughout its normal service life. If an equipment is processed through equipment restoration procedures, a new history card will replace the previous card.

LOCAL RECORDS

In addition to the required records, the EMO may establish such local records as he considers desirable for the improved functioning of his division. It is emphasized however that unless the additional records will contribute materially to the efficiency of the division their establishment is not recommended. ETs have a big job to do without being swamped with paperwork.

Reports

To increase the effectiveness of recurring reports and to avoid duplication, a program known as the Reports Program has been put into effect. The major objectives of this program are: (1) to develop the most effective new reports and reporting procedures; (2) to improve existing reports and related procedures in the light of current needs; (3) to ensure economy in paperwork, man-hours, and other costs by analyzing and simplifying reports and reporting procedures; and (4) to eliminate and prevent unnecessary or duplicate reporting.

The Reports Program is installed in the various naval bureaus and offices, in the Marine Corps, in each continental naval district, and in selected major field activities.

Direct responsibility for the Program is vested in the Navy Management Office, Navy Department. Periodically, the bureaus and offices furnish the Navy Management Office with current listings of their required recurring reports. These listings are published in NMOINST 5213.2, *Consolidated List of Recurring Reports Required by the Navy Department From the Naval Shore Activities,* and OpNavInst 5213.7, *Consolidated List of Recurring Reports Required by the Bureaus and Offices, Navy Department, From the Operating Forces.* The foregoing instructions are revised periodically to reflect changes made by the bureaus, offices, and Chief of Naval Operations, in their requirements for recurring reports. The bureaus and offices will furnish

reports information to individuals and other offices upon request.

The latest list should be used as applicable by the operating forces and shore activities to compare the reports required with those actually being submitted. To comply with existing directives and to ensure the elimination of unnecessary reporting, any requests for reports not listed in the instructions should be brought to the attention of the office or bureau making the request.

ELECTRONICS REPORTS

Certain of the reports which are the responsibility of the electronics material officer are discussed in the following paragraphs.

Ship Electronics Installation Record (NavShips 4110)

The Ship Electronics Installation Record, NavShips 4110, is a report of a ship's electronic equipment inventory and is the basis of the ship electronics installation record system. Using form NavShips 4110 the system provides for recording and reporting the current status of electronics installations on naval vessels and for promulgating this information to interested fleet and shore activities. It is applicable to all U. S. Navy commissioned vessels (including Naval Reserve Training and Service Craft, Reserve Fleet, and Military Sea Transportation Service) having electronic equipment on board.

The form NavShips 4110 makes readily available to fleet and type commanders and to commanding officers accurate and current information on the electronic equipment installed in units under their command. It simplifies the determination of which field changes are applicable to the equipment on board and it reduces the time required to prepare equipment installation records.

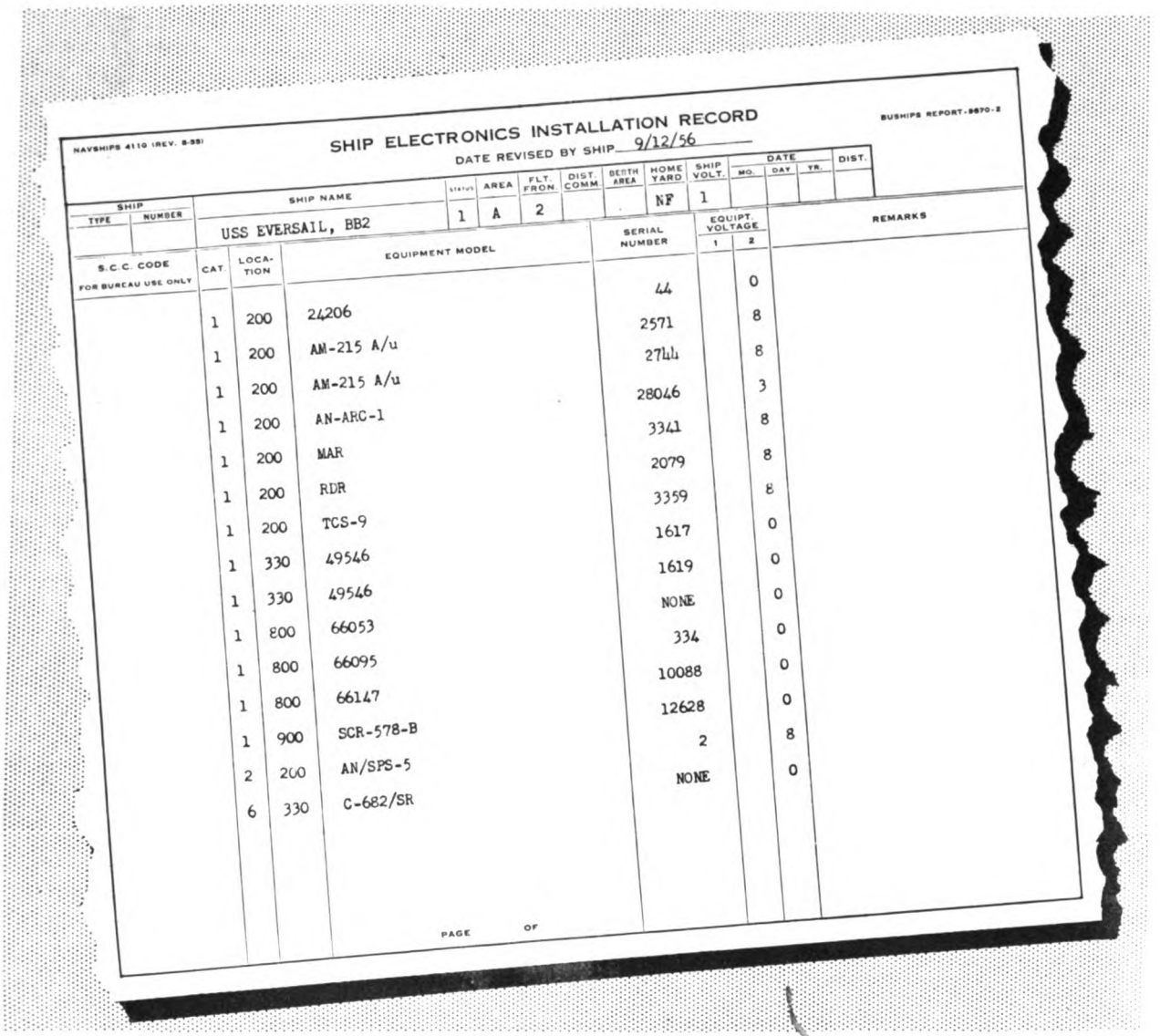
The NavShips 4110 furnishes the Bureau of Ships a complete and current record of shipboard electronic installations and serves as a means of informing the Office of the Chief of Naval Operations, fleet commanders, type commanders, the Electronics Supply Office, and naval shipyards of the electronics installations in the fleet. It serves as a basis for determining Electronics Repair Parts Allowance Lists (ERPAL) and constitutes one of the factors entering into analyses of the fleet's electronic equipment and maintenance requirements. It reduces the time required for maintaining and analyzing records and promulgating essential information to interested activities. It also is used in planning future overhauls; in budgeting for, procuring, and distributing equipment; and in planning the deployment of ships.

The details for recording and reporting the required information are contained in NavShips 900,135B, *Reporting Electronic Equipment Installations*. The system is designed around automatic tabulating machines using punched cards. Briefly, the system functions as follows:

Immediately following the fitting out availability, an initial report, listing the electronic equipment installed on an individual ship, is submitted to the Bureau of Ships on NavShips Form 4110-4 as described in NavShips 900, 135B. (Used only as worksheets on which initial inventories are submitted, forms NavShips 4110-4 are available at the appropriate forms and publications supply distribution point.) The Bureau of Ships then prepares machine tabulating cards from the data appearing in the ship's initial report. Utilizing these tabulating cards, the Bureau prepares printed records (NavShips 4110) of the equipment installed in the ship and distributes varying numbers of copies of the record to interested activities as indicated in NavShips 900,135B. Figure 3-4 illustrates a portion of such a printed record.

Whenever a major change is made in a ship's electronic equipment installation a corrected NavShips 4110 is submitted to the Bureau of Ships. (See fig. 3-5 for examples of corrections.) The Bureau's record for that ship is then corrected and reprinted, and copies are distributed to the recipients of the previous record.

The necessary data for printing the initial machine-tabulated installation record for a given ship are obtained from shipyard material installation lists, shipyard inspection reports, commissioning inspections, or from a combination of these sources. When compiled especially for record purposes, an inspection report or list of equipment must contain all the data required for filling in the ultimate NavShips 4110. Such a list should be typed and arranged in a manner similar to the printed form.



NAVSHIPS 4110 (REV. 8-55) SHIP ELECTRONICS INSTALLATION RECORD BUSHIPS REPORT-9870-2

DATE REVISED BY SHIP 9/12/56

SHIP TYPE	SHIP NUMBER	SHIP NAME	STATUS	AREA	FLT. FRON.	DIST. COMM.	BERTH AREA	HOME YARD	SHIP VOLT.	DATE MO.	DAY	YR.	DIST.
		USS EVERSAIL, BB2	1	A	2			NF	1				

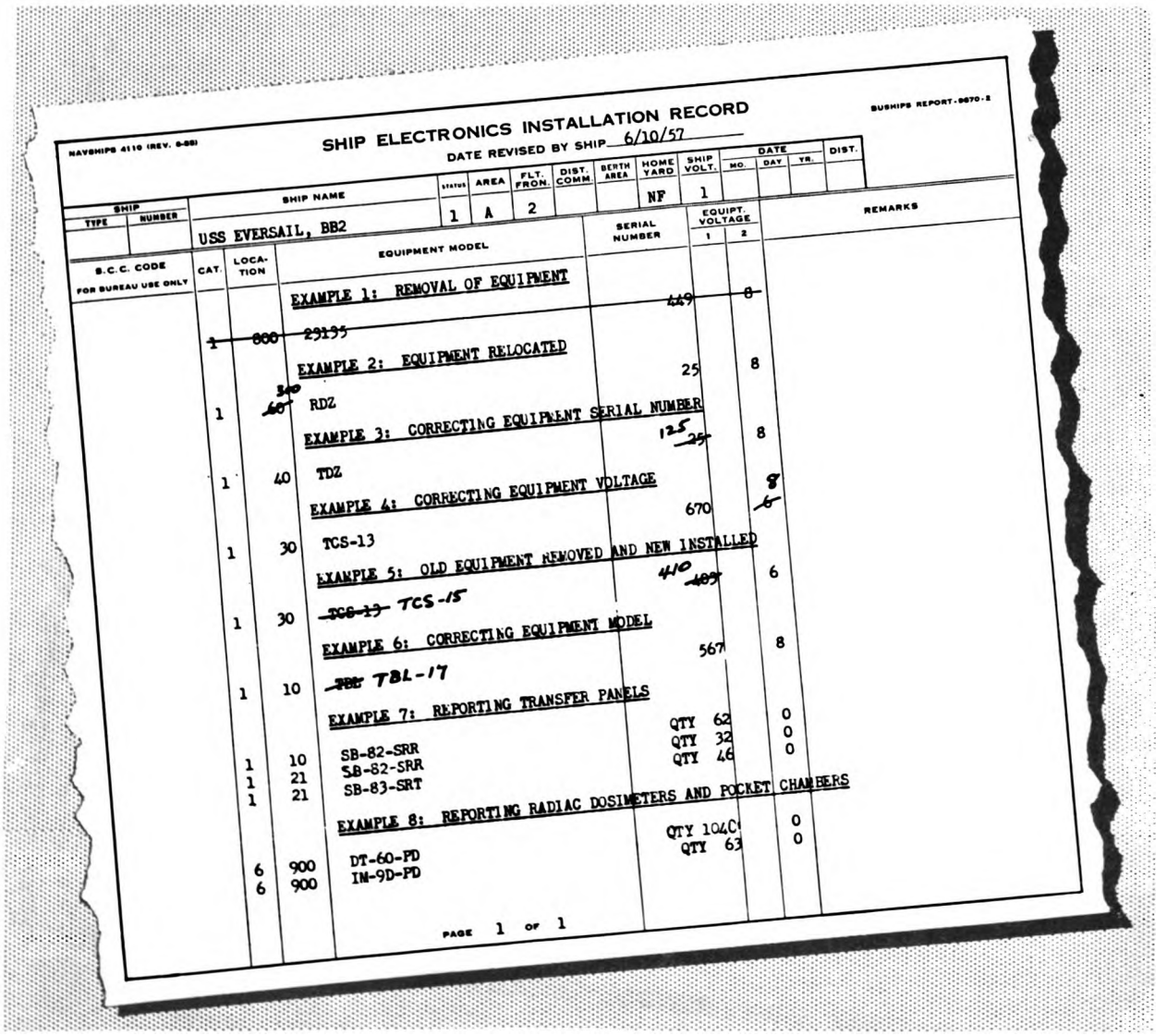
S.C.C. CODE FOR BUREAU USE ONLY	CAT.	LOCATION	EQUIPMENT MODEL	SERIAL NUMBER	EQUIPT. VOLTAGE 1	EQUIPT. VOLTAGE 2	REMARKS
	1	200	24206	44		0	
	1	200	AM-215 A/u	2571		8	
	1	200	AM-215 A/u	2744		8	
	1	200	AN-ARC-1	28046		3	
	1	200	MAR	3341		8	
	1	200	RDR	2079		8	
	1	200	TCS-9	3359		8	
	1	330	49546	1617		0	
	1	330	49546	1619		0	
	1	800	66053	NONE		0	
	1	800	66095	334		0	
	1	800	66147	10088		0	
	1	900	SCR-578-B	12628		0	
	2	200	AN/SPS-5	2		8	
	6	330	C-682/SR	NONE		0	

PAGE OF

Figure 3-4.—Printed Ship Electronics Installation Record (NavShips 4110).

It is necessary that a machine-printed record be compiled as soon as possible for each ship. If a ship has not received a printed NavShips 4110 at any time in the past, a list of the electronic equipment on board should be compiled in accordance with the instructions in NavShips 900,135B, and forwarded to the Bureau for initial processing. Requests for initial records should not be forwarded to the Bureau unless accompanied by such a list of equipment. Upon receipt of this list, the Bureau sees that cards are punched, the initial record printed, and copies distributed to the activities concerned.

Six copies of the record are retained by the Bureau of Ships for administrative use and for reference use by other bureaus, offices, and agencies. When the record covers the installation in a ship which is operating in a special service, such as the Operational Development Force, one of the Bureau copies is furnished to the command of the special force for information and planning purposes. Other copies of the record are distributed in varying



NAVSHIPS 4110 (REV. 9-58)

SHIP ELECTRONICS INSTALLATION RECORD

DATE REVISED BY SHIP 6/10/57

BUSHIPS REPORT-9670-2

SHIP TYPE	SHIP NUMBER	SHIP NAME	STATUS	AREA	FLT. FRON.	DIST. COMM	BERTH AREA	HOME YARD	SHIP VOLT.	DATE MO.	DAY	YR.	DIST.
		USS EVERSAIL, BB2	1	A	2			NF	1				

B.C.C. CODE FOR BUREAU USE ONLY	CAT.	LOCATION	EQUIPMENT MODEL	SERIAL NUMBER	EQUIPT. VOLTAGE 1	EQUIPT. VOLTAGE 2	REMARKS
			EXAMPLE 1: REMOVAL OF EQUIPMENT				
	~~1~~	~~800~~	~~29135~~	449		~~8~~	
			EXAMPLE 2: EQUIPMENT RELOCATED				
	1	~~60~~ 340	RDZ	25		8	
			EXAMPLE 3: CORRECTING EQUIPMENT SERIAL NUMBER				
	1	40	TDZ	~~125~~ 25		8	
			EXAMPLE 4: CORRECTING EQUIPMENT VOLTAGE				
	1	30	TCS-13	670		~~8~~ 6	
			EXAMPLE 5: OLD EQUIPMENT REMOVED AND NEW INSTALLED				
	1	30	~~TCS-13~~ TCS-15	~~410~~ 409		6	
			EXAMPLE 6: CORRECTING EQUIPMENT MODEL				
	1	10	~~TBL~~ TBL-17	567		8	
			EXAMPLE 7: REPORTING TRANSFER PANELS				
	1	10	SB-82-SRR	QTY 62		0	
	1	21	SB-82-SRR	QTY 32		0	
	1	21	SB-83-SRT	QTY 46		0	
			EXAMPLE 8: REPORTING RADIAC DOSIMETERS AND POCKET CHAMBERS				
	6	900	DT-60-PD	QTY 1040		0	
	6	900	IN-9D-PD	QTY 63		0	

PAGE 1 OF 1

Figure 3-5.—Corrected NavShips 4110 showing changes in a ship's electronics installation.

numbers to the type commander, home yards, and so forth, as set forth in NavShips 900,135B.

The copies of primary interest to the ship electronics officer are the five forwarded to the ship. In order that these records may be of value to the holders, they must be correct and up to date at all times. Accordingly, immediately upon receipt of the printed copies, ship's personnel must check the printed list against the electronic equipment on board. If the record is entirely correct and in complete agreement with the shipboard equipment, the copies are filed. If, however, upon checking, the printed record is found to contain errors, omissions, or in any manner does not agree with the ship's equipment, all copies must be corrected with red pencil or red ink and one copy returned immediately to the Bureau for reprinting and redistribution. The other corrected copies are retained in the ship's files for information and record pending receipt of the reprinted copies from the Bureau. In case a change is made in a ship's installation prior to receipt of the reprinted copies from the Bureau, a second corrected copy should be submitted to the Bureau. The third copy then becomes the ship's file copy.

When a change in the electronics installation is made by the ship's force, a tender force, or a shorebased activity, the ship's copies of the installation record should be removed from file and revised to agree with the changed installation. The necessary changes must be noted on all copies, in red pencil or red ink, and the date of revision indicated in the space provided at the top of the form. One revised copy is then mailed to the Bureau for reprinting and redistribution while the other revised copies are returned to the ship's files pending receipt of the reprinted copies from the Bureau. The filed revised copies are destroyed upon receipt of the reprinted copies from the Bureau.

(Minor changes in on board equipment, not accomplished during regular overhaul periods, are reported to the Bureau of Ships on NavShips 4263 as illustrated in figure 3-6. If additional NavShips 4263 forms are required, they may be obtained from the appropriate forms and publications supply distribution point.)

Because the information provided by the NavShips 4110 is essential to the operation of various bureaus and offices of the Navy Department and because the information also is frequently used by other Government offices and agencies in coordinating their activities with those of the Navy, it is imperative that all ships concerned maintain complete, accurate, and current records of their electronics installations.

Errors in an installation record have a direct bearing upon the adequacy of the Electronic Repair Parts Allowance List, because, obviously, an error in the inventory will be reflected as an error in the ERPAL and will thus result in inadequate repair parts support.

Since the NavShips 4110 is initiated by the individual ship, the Bureau of Ships can do little, except during regularly scheduled overhauls, to verify the accuracy of the report. The responsibility therefore rests with the ship and it is to the ship's benefit that she submit changes as soon as they occur.

In summary then, the ship's responsibility is to submit a corrected NavShips 4110 one week before completion of a regularly scheduled overhaul (the post overhaul NavShips 4110), and whenever a major installation or removal is made between overhauls. Minor changes occurring between overhauls must be reported promptly on the postcard form, NavShips 4263.

The Bureau of Ships is responsible for publishing and distributing a revised NavShips 4110 (1) upon receipt of the post overhaul NavShips 4110, (2) upon receipt of reports of major changes made between overhauls, and (3) six months before a regularly scheduled overhaul. (In preparing this preoverhaul issue, the Bureau uses the latest NavShips 4110 on file and consolidates with it all minor changes reported to date. This procedure eliminates the need for the ship to submit a preoverhaul report; therefore such a report from the ship is no longer required.) The Bureau forwards the completed preoverhaul NavShips 4110 to the ship, type commander, overhaul yard, and the Electronics Supply Office.

Electronics Performance and Operational Report (NavShips 3878)

The Bureau of Ships requires monthly Electronics Performance and Operational Reports, NavShips 3878, on certain electronic equipments. To determine those on which reports are required, reference should be made to the appropriate instruction, currently BuShips Instruction 9670.20A. The *Electronics Installation and Maintenance Book,* NavShips 900,000, gives a sample form for the report and detailed instructions for its preparation. Since the reports require information of an operational nature, the appropriate operations officer has a joint responsibility with the EO in their preparation.

These reports are essential to keeping the Bureau informed on equipment performance and operation. Because they provide firsthand information on equipment under actual operating conditions and report the maximum ranges obtained, they are extremely valuable in evaluating the electronics maintenance program, enforcing manufacturers' guarantees, evaluating installation adequacy, improving equipment operation and safety, and improving equipment design.

Figure 3-7 shows a correctly prepared Electronics Performance and Operational Report. The importance of the space allowed for general remarks is emphasized. In this space should be indicated any information not included elsewhere on the form, such as detailed information on any unusual trouble encountered in operation; exceptional maintenance required; types of targets tracked at the maximum

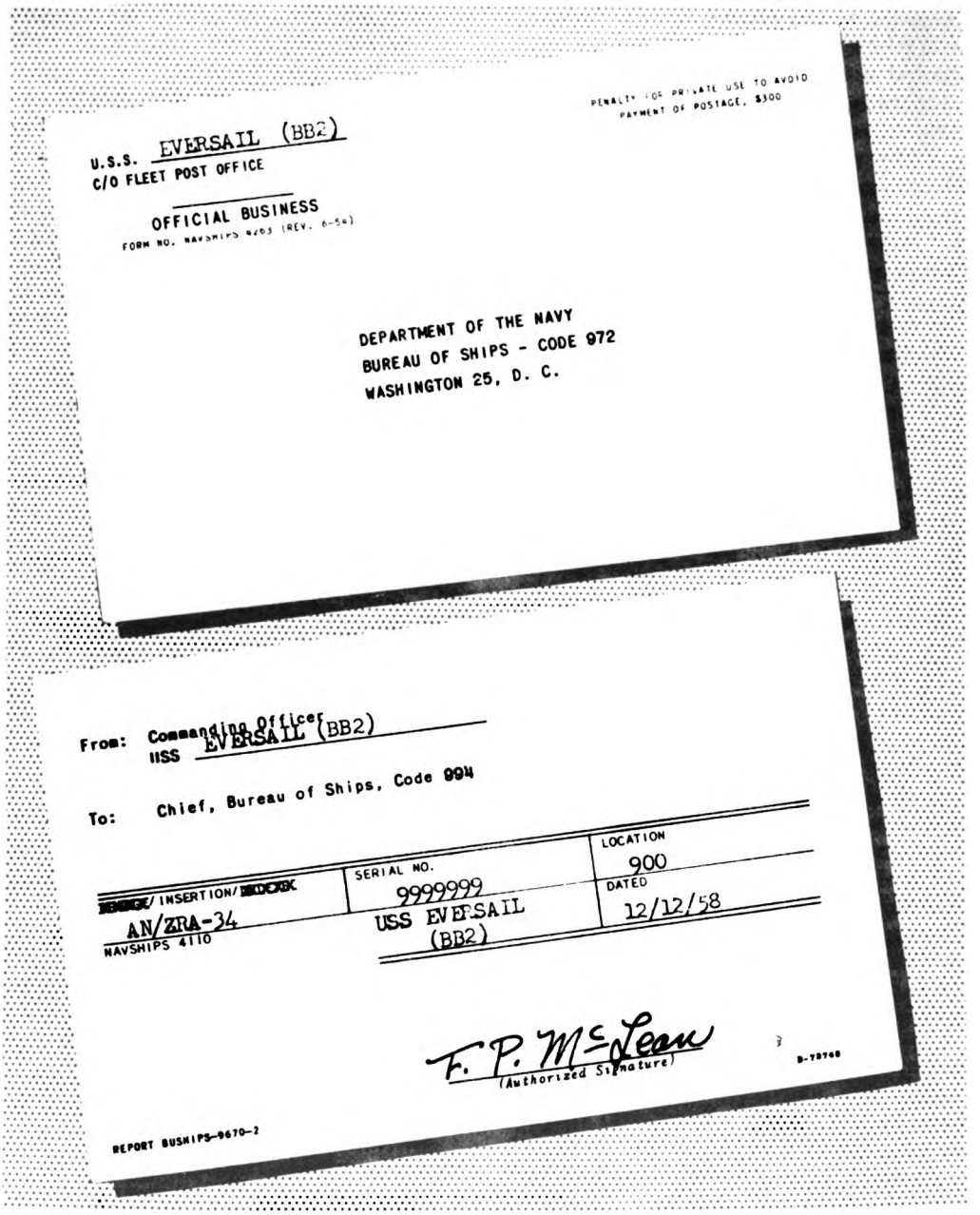


Figure 3-6.—NavShips 4263 indicating minor change in electronic equipment.

ranges reported; and suggestions for improvement in design, tests, and new applications. The forwarding of suggested improvements is not to be construed, however, as authority to modify the equipment in any way. Nor does the forwarding of this report eliminate the requirement for forwarding the Electronic Failure Report (DD 787) for each failure of electronic equipment regardless of whether or not an operational report is submitted.

Electronics Field Change Report (NavShips 2369)

The Electronics Field Change Report, NavShips 2369, has been canceled. If a NavShips

ELECTRONICS PERFORMANCE AND OPERATIONAL REPORT

NAVSHIPS 3878 (REV. 6-52) — *Submit original ONLY to Bureau* — REPORT-SHIPS-192

FROM: USS EVERSAIL, BB2 (Ship's Name, Type and Hull No.) , 6 (FLEET)

TO: Chief, Bureau of Ships

CLASSIFICATION (Confidential, etc.): UNCLASSIFIED — DATE: 5 July 1957

PERIOD OF REPORT: FROM 31 May 1957 TO 5 July 1957

CHECK EQUIPMENT CATEGORY REPORTED ON: [X] RADIO [ ] RADAR [ ] SONAR [ ] OTHER

MODEL OR TYPE OF EQUIPMENT: AN/SRR-13A

SERIAL NUMBER	857	859	861	862	864	865
HOURS OF OPERATION DURING PERIOD OF REPORT	595	595	592	595	595	585
HOURS NOT IN OPERATING CONDITION DURING PERIOD OF REPORT	0	0	3	0	0	10
OVERALL PERFORMANCE POOR 0 - 40% AVERAGE 40 - 70% GOOD 70 - 100%	90 %	90 %	90 %	90 %	90 %	90 %
APPLICABLE FIELD CHANGES NOT ACCOMPLISHED TO DATE	NONE	NONE	NONE	NONE	NONE	NONE
MAXIMUM RELIABLE RANGE (Radio, countermeasures and infra-red)	3000	3000	3000	3000	3000	3000
MAXIMUM RELIABLE RADAR RANGE*	MI / E	MI / E	MI / E	MI / E	MI / E	MI / E
MINIMUM RELIABLE RADAR RANGE*	YDS / E	YDS / E	YDS / E	YDS / E	YDS / E	YDS / E
TYPE OF TARGET **						
ALTITUDE AT MAXIMUM RELIABLE RADAR RANGE						
AVERAGE ECHO BOX RING TIME						
AVERAGE VOLTAGE STANDING WAVE RATIO IN RADAR TRANSMISSION LINE						
MAXIMUM ECHO SONAR RANGE	YDS	YDS	YDS	YDS	YDS	YDS
MAXIMUM LISTENING SONAR RANGE	YDS	YDS	YDS	YDS	YDS	YDS
MAXIMUM SOUNDING SONAR RANGE	FMS	FMS	FMS	FMS	FMS	FMS

INSTRUCTIONS

* *Report Signal to Noise Ratio in "E" Units.*

** *Indicate No. for type.*

1. *Large plane*
2. *Small plane*
3. *Group of planes*
4. *Ship*
5. *Submarine*
6. *Buoy*
7. *Rain squall*
8. *Blimp*
9. *Land*
10. *Iceberg*
11. *Misc. small targets*

NO FORWARDING LETTER WILL BE REQUIRED

GENERAL REMARKS (*Report Ambient and Equipment Temperature in DEGREES if undue heating occurs, interference encountered, voltage fluctuation, major failures, new applications, unusual propogation and oceanographic conditions, inadequacy of test equipment aboard, explanation of unusual performance of operational difficulties, etc.*)

8783.1 Kc day voice — 12957 Kc day RATT
2716.0 Kc " " — 3315.0 " day & night RATT
2836.0 Kc day & night voice — 7975.0 " " " "
4386.2 " " " CW — 3231.0 " " " voice
8212.6 " " " voice — 4630.0 " " "
8233.9 " " " " — 2394.0 " " " "
4500.0 " " " RATT — 4379.3 " " " "
2624.0 " night RATT — 4587.5 " " " RATT
7397.5 " day & night RATT — 4590.0 " " " "
8364,0 " voice & CW distress — 7342.5 " " " "

SIGNATURE: J. P. McSween

CLASSIFICATION: UNCLASSIFIED

C-98304

Figure 3-7.–Electronics Performance and Operational Report (NavShips 3878).

2369 is packed with a field change kit, it may be destroyed.

Alteration Approval Record (NavShips 99 "Pink")

Upon completion of an authorized alteration, the ship's pink copy of NavShips 99, Alteration Approval Record, is to be returned to the Bureau of Ships without delay with an endorsement reporting the completion of the alteration. The endorsement should also include a statement to the effect that the ship's plans and technical manuals have been corrected to record the changes made.

Electronic Failure Report (DD-787)

By informing the Bureau of Ships of failures in electronic equipments, units, parts, and tubes, Electronic Failure Reports, DD-787, serve several excellent purposes. They provide the Bureau with a comprehensive presentation of the over-all performance of electronic material. They point out the weakest circuit positions of any particular equipment. They are useful for calculating load lists and repair parts requirements. As new models (or modifications of old models) are usually in some stage of development, prompt receipt of failure reports enables the Bureau to initiate immediate corrective action to eliminate similar or related deficiencies in subsequent production.

Reported failures are tabulated and regular summaries made to show at a glance the number and types of failures of any part of any equipment. These summaries are forwarded to the cognizant design and maintenance engineers in the Bureau, and the equipment contractor for evaluation and corrective measure.

The importance of reporting failures and the causes thereof cannot be too highly stressed, particularly the circumstances which exist when failures occur under actual operating conditions. The reports are to be filled in completely and in conformity with the instructions accompanying the card. Many reports received by the Bureau are valueless because they do not give the essential information required by the form or because the information given is incomplete. When indicating the model or type of equipment, include all significant nomenclature, modification letters, and digits. To avoid forwarding an incorrect stock number, check the number against the Stock Number Identification Table (SNIT), or, for newer equipment, the appropriate technical manual.

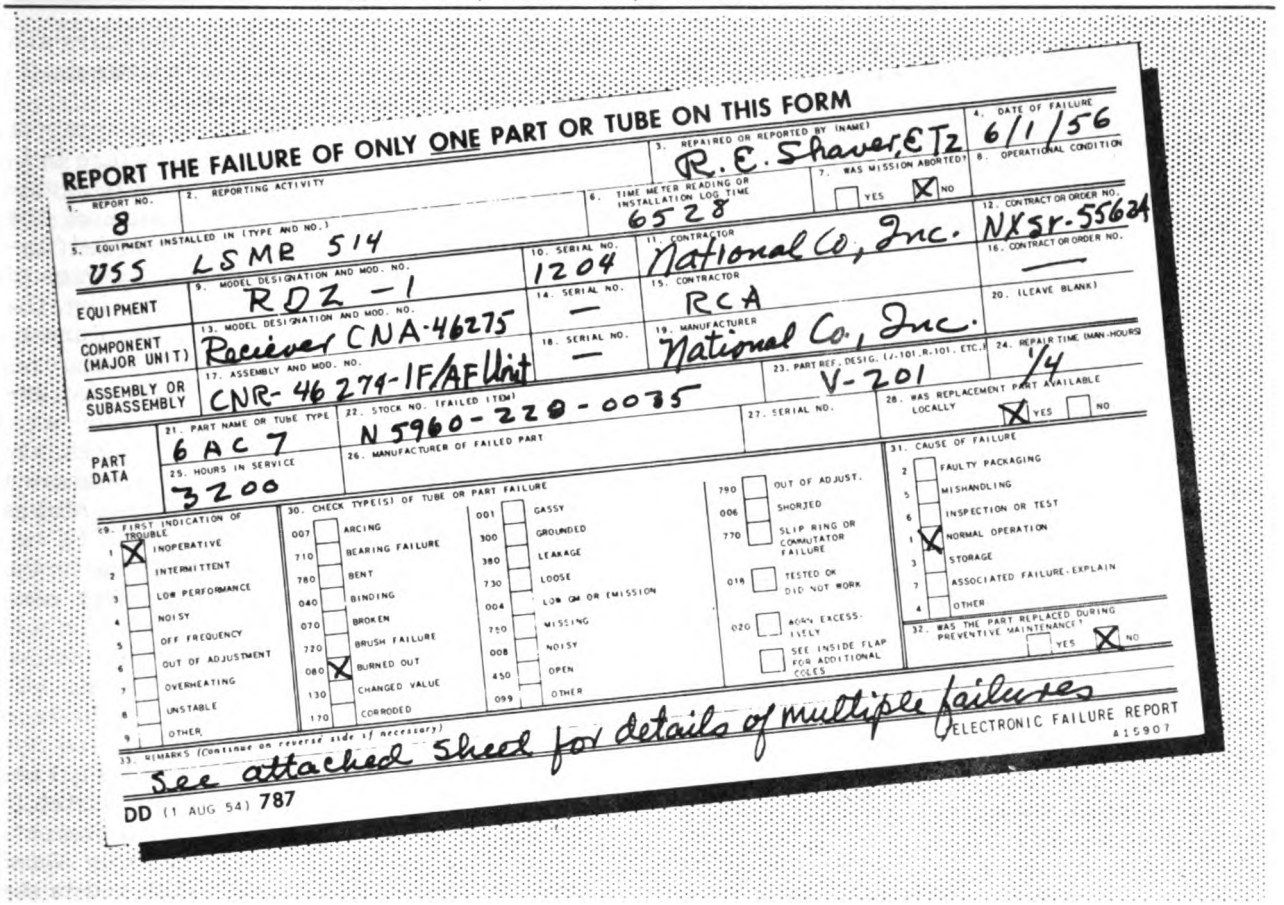
A separate DD-787 is required for each failure. It is important that the accuracy of the entry describing the reason(s) for the failure be verified.

A sample of an accurate and complete failure report is shown in figure 3-8. Note that every necessary detail is supplied to give a clear picture of the failure—date, complete description of equipment and part or tube failing, first symptom of failure, cause and type of failure, and approximate life of the failed part. This is the way all failure reports should be made if they are to be of value to the Bureau. The approximate life of the part failing is very important information and the heart of failure analysis.

The form DD-787 carries no security classification. Classified military information, including in some cases the operating frequency, is therefore not to be included on the completed form.

All parts and electron tubes received by a ship, station, or other using activity should be examined immediately upon receipt for obvious breakage, defective packing, or signs of rough handling. All large or expensive tubes should be checked upon receipt for filament continuity, shorted elements, and loss of vacuum, and, when possible, they should be checked in an equipment socket under rated operating conditions. Failure reports should then be completed and forwarded to the Bureau for all parts and tubes received in defective condition. In addition, the supply activity from which the defective material was received should be notified promptly in order that the activity may initiate appropriate action in conformity with instructions in the *Bureau of Supplies and Accounts Manual* and the *U. S. Navy Shipping Guide*. Information copies of correspondence concerning shipping claims are to be forwarded to the Bureau of Ships.

The failure reporting system, utilizing the Electronic Failure Report DD-787, is the heart of the Electronic Equipment Maintenance and Material Replacement Programs. The failure reports submitted by the fleet form the basic feedback of data essential for evaluation of equipment parts and circuitry, and evaluation of the physical and thermal designs of the



REPORT THE FAILURE OF ONLY ONE PART OR TUBE ON THIS FORM

1. REPORT NO. 8
2. REPORTING ACTIVITY
3. REPAIRED OR REPORTED BY (NAME) R. E. Shaver, ET2
4. DATE OF FAILURE 6/1/56
5. EQUIPMENT INSTALLED IN (TYPE AND NO.) USS LSMR 514
6. TIME METER READING OR INSTALLATION LOG TIME 6528
7. WAS MISSION ABORTED? YES [ ] NO [X]
8. OPERATIONAL CONDITION
12. CONTRACT OR ORDER NO. NXSr-55624

EQUIPMENT — 9. MODEL DESIGNATION AND MOD. NO. RDZ-1 — 10. SERIAL NO. 1204 — 11. CONTRACTOR National Co, Inc. — 16. CONTRACT OR ORDER NO. —

COMPONENT (MAJOR UNIT) — 13. MODEL DESIGNATION AND MOD. NO. Receiver CNA-46275 — 14. SERIAL NO. — — 15. CONTRACTOR RCA — 20. (LEAVE BLANK)

ASSEMBLY OR SUBASSEMBLY — 17. ASSEMBLY AND MOD. NO. CNR-46274-1F/AF Unit — 18. SERIAL NO. — — 19. MANUFACTURER National Co, Inc. — 23. PART REF. DESIG. (J-101, R-101, ETC.) V-201 — 24. REPAIR TIME (MAN-HOURS) 1/4

PART DATA — 21. PART NAME OR TUBE TYPE 6AC7 — 22. STOCK NO. (FAILED ITEM) N5960-220-0085 — 27. SERIAL NO. — 28. WAS REPLACEMENT PART AVAILABLE LOCALLY [X] YES [ ] NO

25. HOURS IN SERVICE 3200 — 26. MANUFACTURER OF FAILED PART

29. FIRST INDICATION OF TROUBLE
1 [X] INOPERATIVE
2 [ ] INTERMITTENT
3 [ ] LOW PERFORMANCE
4 [ ] NOISY
5 [ ] OFF FREQUENCY
6 [ ] OUT OF ADJUSTMENT
7 [ ] OVERHEATING
8 [ ] UNSTABLE
9 [ ] OTHER

30. CHECK TYPE(S) OF TUBE OR PART FAILURE
007 [ ] ARCING
710 [ ] BEARING FAILURE
780 [ ] BENT
040 [ ] BINDING
070 [ ] BROKEN
720 [ ] BRUSH FAILURE
080 [X] BURNED OUT
130 [ ] CHANGED VALUE
170 [ ] CORRODED
001 [ ] GASSY
300 [ ] GROUNDED
380 [ ] LEAKAGE
730 [ ] LOOSE
004 [ ] LOW GM OR EMISSION
750 [ ] MISSING
008 [ ] NOISY
450 [ ] OPEN
099 [ ] OTHER
790 [ ] OUT OF ADJUST.
006 [ ] SHORTED
770 [ ] SLIP RING OR COMMUTATOR FAILURE
018 [ ] TESTED OK DID NOT WORK
020 [ ] WORN EXCESSIVELY
[ ] SEE INSIDE FLAP FOR ADDITIONAL CODES

31. CAUSE OF FAILURE
2 [ ] FAULTY PACKAGING
5 [ ] MISHANDLING
6 [ ] INSPECTION OR TEST
1 [X] NORMAL OPERATION
3 [ ] STORAGE
7 [ ] ASSOCIATED FAILURE-EXPLAIN
4 [ ] OTHER

32. WAS THE PART REPLACED DURING PREVENTIVE MAINTENANCE? YES [ ] NO [X]

33. REMARKS (Continue on reverse side if necessary)
See attached sheet for details of multiple failures

DD (1 AUG 54) 787 — ELECTRONIC FAILURE REPORT — 415907

Figure 3-8.—Electronic Failure Report (DD-787).

equipments. These data enable the determination of what field changes must be made to make the equipments perform reliably. The data also show the point of diminishing return at which it is more economical to replace an equipment than to keep the old one in operation.

Failure reports are submitted directly to the Bureau of Ships without a covering letter. The ship is not required to retain a copy. It is suggested that once a week all failure reports filled out that week be inspected by the electronics officer. This should ensure their correct preparation and submission.

GUARANTEES.—An additional and important purpose served by reports of failures is the supplying of information for use in enforcing guarantees on electronic material. When purchasing electronic equipment, it is the practice of the Bureau of Ships in most cases to include in the contract for complete sets a guarantee covering design, material, and manufacture of each set and the components and parts thereof (except batteries, rubber, and material normally consumed in operation). This is also the general practice for electron tubes and piezo-electric quartz crystals which are covered by separate contract with the tube and crystal manufacturer respectively.

In recent contracts the practice has been to require a 1-year guarantee which becomes effective upon the date of acceptance by the Inspector of Naval Material. This date of acceptance, when available, and the date of installation should be entered by the installing activity in the appropriate logs, installation records, and equipment history card. Specified guarantee periods are automatically extended by whatever time the equipment fails to give the required performance because of any defect covered by the guarantee or lack of suitable replacement parts due to such defects.

To obtain maximum protection and effectiveness under terms of contractual guarantees it is essential that all failures be reported

promptly to the Bureau of Ships. The information forwarded should be complete and so described that the Bureau can conduct an analysis which will provide a basis for claim under the applicable guarantee. (System and unit defects and failures are reported to the Bureau on Electronics Performance and Operational Report, NavShips 3878. Other defects and failures are reported on the Electronic Failure Report, DD-787.) The activity reporting the defect or failure may be requested to furnish additional information to enable the Bureau to pursue claims under contractual guarantees. The Bureau will provide instructions requiring such information after analyzing the defects reported.

Upon determining that a claim is warranted, the Bureau advises the contractor and the cognizant Inspector of Naval Material (INM), since the INM is directly concerned with enforcing guarantees and obtaining suitable adjustments. When he receives this information from the Bureau, the Inspector of Naval Material takes the action necessary to obtain an appropriate adjustment under the terms of the guarantee.

Since guarantees apply to replacements for parts, units, and sets, as well as to the originals, these replacements must receive the same consideration as the original items with regard to recording dates of acceptance and periods of service and the prompt reporting of failures and defects.

TUBE GUARANTEES.—As a general rule, there is no life guarantee on MIL type tubes because each lot is accepted through a lot life test. In a limited number of cases, special type tubes are covered by a life guarantee. These may be identified by the life hour guarantee certificate which is shipped with the tube by the manufacturer. The life performance of these tubes should be recorded on this certificate by the user throughout the guarantee period. In case of failure during the guarantee period, the instructions contained on the certificate should be carefully followed.

If a ship or activity should for no apparent reason experience a series of premature failures of specific types of tubes, such information, along with a brief description of the failure conditions, should be forwarded immediately to the Bureau of Ships. Samples of the failed tubes should be retained by the activity until reply is received from the Bureau. Since failed tubes may convey valuable information to the manufacturer, their return for examination may be requested.

If, for information purposes, it is necessary or desirable for the Bureau to receive service life or performance data on new tubes or tubes of specific types, such information will be requested by special correspondence with the ships or activities operating equipment containing such tubes.

Additional Reports

Other electronics reports regularly required by the Navy Department are listed in the *Consolidated List of Recurring Reports Required by the Navy Department From Naval Shore Activities,* NMOINST 5213.2, and in the *Consolidated List of Recurring Reports Required by the Bureaus and Offices, Navy Department, From the Operating Forces,* OpNavInst 5213.7.

Type commanders and other authorities may require reports in addition to those required by the Navy Department. Instructions concerning such reports may be promulgated via letter, message, or other official means. The electronics officer therefore must examine all official correspondence regarding electronics forwarded to his activity in order to keep abreast of current instructions.

Publications

Various publications, some of which are discussed below, are available for guidance in maintenance work, or for reference and study by electronics personnel. Some are as vital to intelligent maintenance as is test equipment.

In general, publications are available from the appropriate forms and publications supply distribution point. The equipment installed, the mission of the ship or activity, the purpose of and distribution policy for the individual publication, and the available stowage space should all be considered, however, before requisitioning such material. The electronics officer may find it advisable to visit a forms

and publications supply distribution point and personally examine the publications in order to determine which of those available, but not automatically furnished, will be most useful to his division.

Because it is essential that reference material be as current and accurate as possible, publications changes and corrections should be entered as they become available. For example, if the current issue of the EIB corrects information in an earlier issue, the earlier issue should be changed. If the change affects other publications (technical manual, *Field Change Bulletin*, parts allowance list, for instance) these also must be corrected. Changes must be legible and accurate. If no page is furnished for recording completed changes some method for this must be devised. One method is to annotate the margin of the new material to indicate the publications in which the change has been entered.

By assigning to specific individuals responsibility for making all changes in designated publications and by checking their entries from time to time, the electronics officer will do much toward eliminating the possibility of his crew's using incorrect repair information.

In order that an activity's file of publications may be kept up to date, current issues of the *Bureau of Ships Journal*, the EIB, and the Index of Publications (Forms and Publications Supply Office Instruction 5600.1) should be examined for information on the availability of handbooks, final technical manuals, revisions, supplements, anc changes pertaining to the equipment on board.

INSTALLATION AND MAINTENANCE PUBLICATIONS

The Bureau of Ships is endeavoring to eliminate the large number of maintenance and installation publications now in use. Some of those currently in print and plans for their future are discussed below.

Bureau of Ships Manual (NavShips 250-000-65)

The *Bureau of Ships Manual* is the most complete authoritative reference available on Bureau of Ships' equipment. Chapter 67 of the Manual is titled Electronics and is required reading for electronics personnel. This chapter is available as a separate pamphlet and 2 copies per ship are usually required, 1 for the shop and 1 for the electronics officer. Chapter 67 lists other chapters containing information of value to electronics personnel.

The purpose of chapter 67 is to provide major policies and instructions pertaining to electronics work and electronic material under the cognizance or technical control of the Bureau of Ships.

The latest revisions to manuals, instructions, and notices referred to in chapter 67 apply in all cases. To minimize the need for pen and ink changes throughout the chapter, the index includes a list of applicable instructions, notices, and publications in effect at the date of preparation of the chapter. This list is revised as necessary as semiannual changes to the Manual are issued.

Electronics Installation and Maintenance Book (NavShips 900,000)

The *Electronics Maintenance Book* (EMB) is being revised and retitled *Electronics Installation and Maintenance Book* (EIMB) NavShips 900,000. Subordinate policies, installation and maintenance standards, and procedures required to implement the major policies of Chapter 67 of the *Bureau of Ships Manual* are provided by the EIMB. The new version also provides general information on electronics matter and material. For convenience, the EIMB consists of several volumes covering each major electronics field.

Handbook of Test Methods and Practices (NavShips 91828)

The *Handbook of Test Methods and Practices*, NavShips 91828, was prepared to meet the technician's need for a convenient reference on the fundamentals of testing electronic equipment. Valuable to both the beginning and the experienced technician, the manual incorporates many practical suggestions and time saving practices that have proved effective in the field.

The first section of the publication, Testing in General, stresses the importance of testing, discusses the functional divisions of testing, and explains the need for various types of measurements.

The second section, Test Equipment and Measurements, provides information on test equipment circuit theory. With the information given in this section and in the *Electronics Installation and Maintenance Book,* the technician should be able to select the test equipment most suitable for a particular job and correctly interpret the data obtained.

Section three, Testing—Techniques and Practices, gives in detail specific procedures to be used in testing communications, radar, and sonar equipment. The selection of logical test points, the correct interpretation of tests, the selection of suitable testing equipment, and speed of performance are also stressed.

The fourth section, Care and Repair of Test Equipment, gives information on preventive maintenance procedures, periodic inspections, and the care of accessories. It also discusses the different levels of maintenance.

Electronic Installation Practices Manual (NavShips 900,171)

The *Electronic Installation Practices Manual* (EIPM) NavShips 900,171, provides reference data and other information on standard or desired methods of accomplishing electronic installations. It is issued in chapters which are revised from time to time as new or improved procedures are developed.

Supplementing other manuals, the EIPM is currently under review and may be absorbed in other publications as the Bureau of Ships endeavors to reduce the number of publications dealing with installation and maintenance problems.

Electronics Information Bulletin (NavShips 900,022A)

The *Electronics Information Bulletin* (EIB), NavShips 900,022A, published bi-weekly, is forwarded to all naval ships and to naval electronics installation and maintenance activities. It contains advance information which is both authoritative and directive in nature on field changes, installation techniques, beneficial suggestions adopted by various yards and bases, and new publications. In general, it is devoted to information which is of primary benefit to the activities to which it is distributed. Confidential issues are published when sufficient classified data warrants. Material in the EIB that is of general interest to all activities is also published in other media such as the *Bureau of Ships Journal,* and the *Electronics Installation and Maintenance Book.* Issues up to EIB 300 have been included in the EIMB.

Although punched for insertion in a binder, no basic book or binder is supplied for the EIB. As issues are received they are to be filed in a folder or notebook in consecutive order.

Technical Manuals

Technical manuals carry information essential to the proper operation, maintenance, and repair of the equipment to which they apply. Two copies of the technical manual for a particular equipment are normally supplied with the equipment. In addition, the Bureau supplies file copies to activities concerned with installation and maintenance of the equipments or with training electronics personnel. Supplies of manuals, remaining after initial distribution, are stored at forms and publications supply distribution points for issue to individual activities. Where the supply of manuals is extremely limited, special justification may be required to obtain copies.

Requirements for technical manuals are included as a part of the contract for equipments, the number of manuals varying with the number of equipments included in the contract. Consequently the quantity of manuals is always limited and for this reason distribution is normally limited to recipients of the equipment and to those activities required to service it. A sufficient quantity is obtained, however, to supply the usual file requirements of Navy and Marine Corps electronics schools.

Technical manuals frequently contain errors. To permit correction of these, temporary correction sheets are published. When available, they are listed in the EIB. Corrections may also be published—that is, discussed—in the EIB. All corrections, including field changes, must be made in the manuals, regardless of the time and effort required. If the corrections are not made, many man-hours may be lost in, for example, attempting to repair an equipment, using an obsolete schematic.

Advance, preliminary, or temporary technical manuals may be furnished where a delay in completing the final manuals is anticipated.

As a general rule, return postcards are included under the front covers of these manuals. The cards provide a ready means for informing contractors of where the completed final manuals are to be sent. To ensure receipt of the final manuals, the postcards should be filled in and returned promptly. Advance, temporary, and preliminary publications are to be destroyed upon receipt of final technical manuals, as indicated with the covering letter forwarded with the final books. If the manuals to be destroyed are classified, disposal must be in accordance with existing regulations covering the destruction of classified material. Promulgating letters or instructions which accompany changes to technical manuals indicate the desired disposition of material removed from the basic publications.

With reference to the security of technical manuals and other electronics publications, the Bureau of Ships Manual, change 16, states that:

Confidential, Secret, and Top Secret technical manuals and other electronics publications shall be transported and safeguarded as prescribed by the United States Navy Security Manual for Classified Matter. Registered publications shall be transported and safeguarded as prescribed in the Registered Publication Manual. Periodic accounting is required for registered publications.

Confidential, Secret, and Top Secret Technical manuals shall be made available to commissioned, warrant, and enlisted personnel whose duties require knowledge of their contents. Similarly, they shall be made available to civilian personnel of the Navy and to Navy contractors' civilian personnel whose duties require knowledge of their contents in connection with the design, manufacture, installation, or maintenance of electronic equipment for the Navy and where the individual is cleared to handle classified matter for the particular classification involved. The security classification of technical manuals for Navy electronic equipment shall be as specified in the current edition of Security Classification of Electronic Equipment, JANAP 140C and supplement JANAP 140C1, and supplements thereto. It should be noted, however, that certain equipment is listed with a symbol (#) indicating that the classification of the technical manual and the associated literature differs from the classification given for the equipment. The security classifications of electronic equipments are under constant review, and classifications are lowered or equipment declassified when conditions warrant. It is essential, therefore, when changes to JANAP 140C and supplement JANAP 140C1 are issued that the security classification of all technical manuals and handbooks be checked against the classification indicated therein. When the symbol indicates that the security classification given for a particular equipment and the manuals differ, information regarding the proper classification shall be requested from the Bureau of Ships in order that manuals may be properly marked. For all other equipment not listed with the symbol (#), the front cover and title page of the books shall be prominently marked with the revised classification indicating JANAP 140C and supplement JANAP 140C1 as the authority for reclassification. (See United States Navy Security Manual for Classified Matter.)

Requests for technical manuals and other NavShips publications are made to the appropriate forms and publications supply distribution point. In view of the limited number of technical manuals printed, and the excessive cost of reprinting when stocks are depleted, requests for technical manuals must include a statement of the reason they are required. Normally only those requests for two manuals per equipment will be approved. Manuals for instruction and study can be issued only to Navy and Marine Corps schools and they only in quantities consistent with the stock available.

ALLOWANCE AND OTHER LISTS

Shipboard Electronics Allowance List

The Bureau of Ships lists the electronic equipment authorized and required to be on board a ship in the *Shipboard Electronics Allowance List* (SEAL). As pointed out in the more detailed discussion of this publication in the chapter on allowances, the SEAL consists of two groups: S67, electronic equipment, and S69, electronic testing and measuring equipment. Each group consists of two parts: I, installed equipment, and II, portable equipment.

Electronic Repair Parts Allowance List

The allowance of repair parts which would ordinarily be part III of each of the two SEAL groups is a separate list known as the Electronic Repair Parts Allowance List (ERPAL). The ERPAL consists of two sections, one giving the electron tube allowance and the other, the

electronic repair parts other than electron tubes. It is prepared and issued by the Electronics Supply Office, Great Lakes. It is discussed more fully in the Allowance chapter.

ERPAL and other allowances are being superseded by COSAL, *Coordinated Shipboard Allowance List*. This, too, is discussed in the chapter on allowances.

List of Nomenclature Assigned to Naval Electronic Equipment

A confidential publication, the *List of Nomenclature Assigned to Naval Electronic Equipment*, lists the principal radio, radar, and sonar equipments that have been proposed by the Navy and to which nomenclature has been assigned as of January 1955. It provides brief identifying data for the equipment listed and is distributed to all ships and stations. The edition mentioned here will be the last one of this publication. Copies may be retained as long as they are of value.

Navy Stock List of the Electronics Supply Office

As segments of the Navy Supply System convert to the use of Federal stock numbers, *Navy Stock Lists* (NSLs) are progressively superseding sections of the *Catalog of Navy Material*. These stock lists contain identifying information formerly listed in the Catalog but expressed in terminology approved by the Federal Cataloging Program.

Portions of the *Navy Stock List of the Electronics Supply Office* are replacing those portions of the *Catalog of Navy Material* which pertain to electronic material. For instance, the *Navy Stock List of the Electronics Supply Office (Electronic Parts)* was formerly the *Catalog of Navy Material, Bureau of Ships Section, Pt II (Electronic Parts)*. Published in sections, each of which is devoted to a specific type of common electronic parts having high substitution potential, this portion of the NSL gives detailed descriptions, Federal stock numbers, and illustrations of the parts included.

Electronic parts peculiar and items of limited application are listed only in the *Master Cross Reference List*, another portion of the NSL of ESO.

The *Navy Stock List of the Electronics Supply Office (Electronic Equipment)* was formerly the *Catalog of Navy Material, Bureau of Ships Section, Part III, (Electronic Equipment)*. This is a confidential looseleaf publication containing data sheets that provide major military characteristics of all separately issuable Bureau of Ships' electronic equipment currently in use by naval ships and shore facilities. Other pertinent data, such as dimensions, weights, and stock numbers for the listed equipment are also provided. New and revised data sheets are issued periodically.

Although this portion of the Navy Stock List was originally issued as a confidential publication, data sheets for all unclassified equipment should be removed and filed in a separate binder, thus making 2 volumes, 1 of which will be classified. A separate list of effective pages is provided for both the classified and unclassified portions.

All holders of the publication are responsible for keeping the security classification of each equipment data sheet up to date in accordance with the latest edition of the *Security Classification of Electronic Equipment* (JANAP 140).

Personnel should refer to the previously described *List of Nomenclature Assigned to Naval Electronic Equipment* (NavShips 900,123) to identify equipment which does not appear in the Electronic Equipment portion of the Navy Stock List.

The *Navy Stock List of the Electronics Supply Office (Major Electronic Units)* describes major electronic units which are issued separately and which are currently in use by naval ships and shore facilities. The publication provides major military characteristics and other data, such as dimensions, electrical characteristics, manufacturers' reference numbers, and Federal stock numbers for the units listed. It is published in looseleaf form to permit the insertion of new and revised data which are issued periodically. It is not a procurement catalog. This portion of the Navy Stock List was formerly the *Catalog of Navy Material, Bureau of Ships Section, Part IIIA (Electronic Major Units)*.

Compilations of Electronic Equipment Installations

There are four publications which list electronic equipment installations by ship and by function. They are designed primarily for the use of fleet and type commanders and their

titles are: *Compilation of Electronic Equipment Installations in the Active Atlantic Fleet, Compilation of Electronic Equipment Installations in the Active Pacific Fleet, Compilation of Electronic Equipment Installations in the Atlantic Reserve Fleet, and Compilation of Electronic Equipment Installations in the Pacific Reserve Fleet.* Each is a confidential publication based upon the Ship Electronics Installation Records (NavShips 4110) submitted by the individual ships.

MISCELLANEOUS PUBLICATIONS

The *Bureau of Ships Journal*, NavShips 250, 200, is published monthly. It carries topics of interest to all personnel in the Bureau of Ships or at field activities of the Bureau. Of particular interest to electronics personnel is the section in each issue that is devoted to discussions of electronics matters.

Other publications of value to electronics personnel are:

Elements of Electricity and Radio (NavShips 900,012)

Radar Electronics Fundamentals (NavShips 900,016)

Radar Systems Fundamentals (NavShips 900,017)

Microwaves and Wave Guides (NavShips 903-5)

U. S. Navy Synchros (Ordnance Pamphlet No. 1303, published jointly by the Bureau of Ordnance and the Bureau of Ships)

Radio Frequency Transmission Lines (NavShips 900,008)

Shipboard Antenna Details (NavShips 900, 121)

Applicable technical handbooks and textbooks. (See *Radio Maintenance Book*, chapter 1, for suggestions.)

As their titles indicate, many of these publications offer information on the theories and principles basic to a fuller understanding of electronic equipment. The training needs of the technicians and the time available for study will determine which of such publications are required by a ship or station.

Conclusion

In addition to the tasks of preventing equipment breakdown and effecting corrections, the electronics material officer must administer such paperwork as the keeping of adequate records, and the completion and forwarding of required reports. He must also have at hand an adequate file of current electronics reference material.

Properly maintained and used records enable the electronics material officer to keep abreast of the current condition of his equipment, to know what work is outstanding, to know which outstanding work is beyond the capacity of his force, to know when to request a particular type of outside assistance, and to determine what further training his men require.

By checking outgoing reports, the EO becomes further acquainted with his equipment and with the maintenance capabilities of his crew. If the reports are carelessly completed he knows also that additional explanation is needed to make his men more fully aware of the purposes and importance of these reports and of the procedures for completing them properly.

Familiarity with the contents and uses of various publications is also a part of electronics administration, for although it is not necessary that the EO know the answer to every problem, it is important that he know where the answer can be found. He therefore should familiarize himself with all pertinent publications so that he knows the general content and purpose of each. He must also ensure that his publications are current, either by obtaining the latest editions or by having all applicable changes entered in his copies.

CHAPTER 4

ALLOWANCES

Kinds and amounts of equipment and parts to be carried by naval operating forces are established by allowance lists developed in accordance with the concept that naval ships must be self-sufficient to the maximum possible extent and that a ship's own storeroom is its first echelon of supply support.

Shipboard allowances list operating equipments for individual ships and the repair parts necessary to support these equipments. They set forth the range (number of kinds of items) and depth (number of individual items) of material a given ship should carry to maintain its mobility and retaliatory power.

Ship allowances are not a new development. The first one, authorized by an act of Congress in 1842 and published in 1854, was called Book of Allowances. Since then, technological advances in equipments and changes in ship design have made allowance revisions necessary from time to time. In 1865, in 1890, and again in 1926, allowance books were changed and lists consolidated.

Coincident with the tremendous surge in shipbuilding and the introduction of new types of material during and after World War II, many variations in allowance lists were developed to meet specific needs. This unsatisfactory situation is being remedied at the present time as allowances are again undergoing change. This change will standardize allowance format and procedure.

A ship's total allowance is composed of several separate allowance documents, each covering a particular type of material. For example, there is an allowance list for electronic equipments, another for electronic repair parts, one for ordnance equipment, one for general stores, and so on. These separate lists have varied considerably in recent years as each preparing activity presented varying kinds of information in varying format. With the advent of COSAL, however, allowances are being standardized. COSAL is the *Coordinated Shipboard Allowance List* which will eventually supersede existing varieties of allowance publications.

It is with the allowance for one particular type of material—electronic—that this chapter is primarily concerned. The present complete electronics allowance for a ship consists of two documents: (1) the *Shipboard Electronics Allowance List* (SEAL) which is that portion of the allowance furnished by the Bureau of Ships and (2) the *Electronic Repair Parts Allowance List* (ERPAL) which is furnished by the Electronics Supply Office. (SEAL and ERPAL are rapidly being superseded by COSAL. Although there are many detailed differences between the present and superseding allowances, the basic principles are similar. All three allowance lists are discussed in this chapter. The electronics segment of COSAL, in effect, combines the functions of SEAL and ERPAL.) The SEAL lists electronic equipments. These are F cognizance material. The ERPAL lists the repair parts necessary to support these equipments. These are N cognizance items.

Material Cognizance

The cognizance of naval material is identifiable by a letter prefixed to the Federal stock number. When this first letter is F, the material is electronic equipment under the

cognizance of the Bureau of Ships. N indicates electronic repair parts under ESO cognizance.

"F" cognizance material usually consists of complete equipments or units provided by the Bureau of Ships at no cost to the individual ship. Ordinarily, release of F cognizance material must be requested of the Bureau of Ships in accordance with *Bureau of Ship's Material Requisitioning Guide,* NavShips 250-550-2. BuShips Instruction 10550.1B, which discusses the issue of BuShips-controlled material, states, however, that in cases of field change kits and items appearing in the Electronic Repair Parts Allowance List, a ship may order F cognizance material directly from the supply system without referring the request to the Bureau of Ships.

In general, N cognizance material consists of consumable repair parts, replenishable through regular supply channels, and paid for with funds from the ship's operating target amount.

Equipment Allowances

The allowance of electronic equipment for any ship type is established by the Bureau of Ships after considering the military operational requirements, prescribed by CNO, which are to be met by the electronics installation in the ship type.

Based upon the mission of the ship, CNO specifies communications and other electronics requirements. For example, for each ship type, CNO will prescribe in broad terms the number of receiving and transmitting frequencies, range required, etc. (These technical characteristics are grouped into categories by means of the Ship Type Electronics Plan (STEP) OpNav 09672.2). It is then the responsibility of the Bureau of Ships to recommend the exact model which will fulfill these requirements. The Bureau's recommendation takes into consideration such factors as the availability of equipment, feasibility of installation, and the necessary space, weight, and moment compensation required to accomplish installations in the specific type of ship in question.

When the prescribed CNO requirements cannot be met by a current equipment, the Bureau of Ships recommends the use of a specified interim equipment pending the development, evaluation, and procurement of a new equipment which will have the prescribed characteristics.

SHIPBOARD ELECTRONICS ALLOWANCE LIST (SEAL)

Listing BuShips electronic equipments allowed and required to be on board, the *Shipboard Electronics Allowance List* (SEAL) becomes part of the total allowance for an individual ship. When received, it should be inserted in the ship's *Allowance Book.*

As indicated in the list below, both installed and portable equipment are included in the SEAL. As further indicated, the material is divided into groups. Part I of each group lists equipments which require installation; that is, bolting to a deck or bulkhead, running of cables, or some other means of fixing to one location. Part II of each group lists portable equipments which may be transported for operation in various locations.

The paragraphs which follow define more fully the types of material in each group and explain the conditions under which Part I and Part II items may be obtained by the ship. Full details on the SEAL are contained in BuShips Instruction 4441.33B.

Group S67

Part I	Group S67-1	Installed electronic equipment
Part II	Group S67-1	Portable electronic equipment
Part II	Group S67-2	Accessories, fittings and replacement material
Part II	Group S67-3	Tools

Group S69

Part I	Group S69-1	Installed electronics testing and measuring equipment
Part II	Group S69-1	Portable electronics testing and measuring equipment
Part II	Group S69-2	Electrical testing equipment

(The Electronic Repair Parts Allowance List takes the place of Parts III of the above groups; therefore no Parts III are issued as such.)

Part I Group S67-1

Part I Group S67-1 lists the installed electronic equipment authorized and required to be on board to enable a ship to carry out its assigned mission. As an allowance item, listed equipment is identified by its primary nomenclature. For example, one TCZ-2 radio transmitter is listed as an allowed item. The components which make up the TCZ-2 (Transmitter COL-52286-A, Dynamotor Assembly COL-211624, Remote Control Unit COL-23410, Crystal Unit CR-2B/U, Antenna Load Coil COL-47505, Antenna Shunt Capacitor COL-481628 and interconnecting cables 65X7, 65X8, 65X9, and 65X10) if listed at all, are shown for information only.

This section of the allowance does not authorize the installation or removal of the items listed. In general, these items are installed when a ship is built. Subsequent installations or removals are accomplished only upon receipt of an authorized (not merely approved) Shipalt. The Bureau of Ships should be informed of any equipment listed in Part I which is not on board.

Part II Group S67-1

The Part II Group S67-1 portion of the SEAL lists the portable electronic equipment authorized and required to be on board. This portion of the SEAL authorizes a ship to requisition any of the items listed herein which are not on board. Furthermore, it is the ship's responsibility to maintain a full allowance of portable equipment on board and ready for use. Examples of equipment in this group are portable radio communications equipment and portable infrared and radiac equipment.

Part II Group S67-2

Accessories, fittings, and replacement material authorized to be on board to support or complete installed electronic systems are listed in Part II Group S67-2. Since it is not feasible to indicate each allowed bolt and length of wire, only principal accessories and fittings are listed. By extension, these minor items, necessary to support the electronic installation are also authorized by this part of the allowance. Replacement material listed in this portion of the SEAL is similar to the repair parts listed in the ERPAL. Included in Part II are such installation material as insulators and whip antennas which are required to support a system but which are not included in the ERPAL. Replacement material listed in Part II Group S67-2 should be stowed and accounted for aboard ship in the same manner as explained later for parts allowed by the ERPAL.

Part II Group S67-3

All common tools normally used in the maintenance of electronic equipment are listed in Part II Group S67-3 of the SEAL. Tools peculiar to a specific piece of equipment are furnished with the equipment. These therefore are automatically allowed and are not shown with Group S67-3.

Part I Group S69-1

Similar to Part I Group S67-1, Part I Group S69-1 lists test equipment only. It indicates all of the installed electronic test equipment authorized and required to be on board and may also indicate the recommended location of the equipment. Installation is usually authorized in the same manner and accomplished at the same time when other electronic equipment is being installed.

Part II Group S69-1

Part II Group S69-1 of the SEAL lists portable electronic test equipment authorized and required to be on board. In addition to indicating the total quantity of each model allowed for a ship, Group S69-1 usually recommends specified portions of the allowed total for custody of the various user technical ratings—electronics technicians, fire control technicians, interior communications electricians, and power and lighting electricians. This recommended custody is for guidance only, however. Custody should be assigned as necessary to achieve the most efficient utilization aboard the particular ship. Equipment in the custody of the various technicians should be made available to other ratings on a loan basis so that each group may perform its functions without unduly increasing the quantity of test equipment carried on board.

Part II Group S69-2

Except that it lists the electrical test equipment authorized and required to be aboard,

Part II Group S69-2 of the SEAL is like Part II Group S69-1.

Bureau SEAL Responsibilities

In general, a new SEAL is issued by the Bureau to an active ship each time the ship reports for a regularly scheduled overhaul. The complete SEAL may be issued in several steps. Normally, Part II, which gives authority for action by the ship, is made available to the ship 30 or more days before commencement of the overhaul. Part I, on the other hand, which does not give authority for action by either the ship or the overhaul activity, may not be issued until the last week or two before completion of the overhaul.

Changes, either additions or deletions, to the SEAL may be authorized only by the Bureau of Ships. Any or all parts of the allowances may be issued on either an individual ship basis or on a class or type basis. Thus, a change in requirements for portable electronic equipment which affects an entire ship class may be promulgated by issue of a new Part II Group S67-1 to all ships of the class. Other portions of the SEAL for these ships would of course remain unchanged by this action.

Ship SEAL Responsibilities

When a ship receives a new SEAL, or portion thereof, the allowed items should be checked against those actually on board. If the allowance and onboard equipment match, the new SEAL should be filed and the earlier issue destroyed. If only a portion of the SEAL has been replaced, only the superseded portion should be destroyed. All other sections remain in effect until they are superseded.

If any items listed in Part I are not on board, the Bureau of Ships should be notified. No equipment, even though listed in the SEAL, may be installed without Bureau authorization in each instance.

Missing Part II items should be requisitioned, since it is the ship's responsibility to ensure that all such items are on board. Bureau of Ships Instruction 4441.33B gives authority for issue of these items.

Any SEAL items believed to be in error should be referred to the type commander. The Bureau should then be informed of any matters determined to be errors.

SEALs are mandatory but not final allowances. Changes may be made upon approval by the Bureau of Ships. Should a change in a ship's SEAL be considered advisable, such change may be requested by the ship, type commander, or other activity. The request must be forwarded to the Bureau of Ships through the chain of command and must contain an explanation of the need for, or benefit to be derived from, the requested change.

In case of a temporary or emergency requirement for electronic equipment in excess of allowance, the required equipment should be requested from the type commander who will arrange the necessary details.

To service electronic equipments satisfactorily, it is essential that ships have the prescribed testing and measuring equipments. As indicated in the foregoing list of SEAL sections, portable test equipments are Part II items and as such may be requisitioned to fill allowance. Since these items are Bureau of Ships F cognizance material, they will be furnished at no cost to the ship when requisitioned to fill allowances. Many test equipments still are in short supply, however; therefore, before requisitioning, the electronics officer should determine whether or not the needed item is on the critical list. The Bureau of Ships has given issue control of critical items to Service Forces Commanders who have set up procedures for issuing this material. In the Atlantic Fleet, for example, ComServLant Instruction 9670.2E sets forth the procedures governing critical electronic material. The appropriate ComServPac Instruction 9670.5B should be consulted before taking action to obtain critical items in the Pacific Fleet. These publications normally are held by the ship's supply officer.

FITTING-OUT ALLOWANCE

A fitting-out allowance indicates the electronic equipment and material (including testing equipment and tools) necessary to complete a ship's initial electronics allowance. It includes only those items which require no installation work on the part of the shipbuilding activity. It is not necessary that this material be placed on board a vessel prior to delivery by the building activity unless the building activity is also the fitting-out activity. Where ships are built at one activity and fitted out at another, the material is retained at or shipped to the fitting-out

activity for placing aboard during the fitting-out period. Certain items of material in this category may be required during check-out of the ship prior to Preliminary Acceptance Trials. Requests for these required items should be made by the cognizant supervisor of shipbuilding for delivery to the ship.

ESO CONSOLIDATED LOAD LIST (CLL)

Based upon the appropriate supply demand control point's estimate of the items most likely to be needed, a load list is an authoritative expression of items to be carried aboard a given supply issue ship, tender, or repair ship. Electronic repair parts load lists prepared at ESO are known as ESO Consolidated Load Lists (CLL). The purpose of the material listed is to fulfill demands of the fleet when supported by mobile logistic support forces.

Load lists are mandatory as to minimum range and depth. They may be supplemented, however, to provide for special or unique support requirements, as directed by the commander in chief in accordance with OpNavInst 4441.5. "Add" items may be either new items or increased quantities of items already included. Such items are chargeable to type commanders' funds.

Material on fleet issue ships is financed in Class 207 (Navy Stock Fund financed load and allowance list inventories carried on board tenders and repair ships under the simplified stores accounting procedure). In the past, material on all tender and repair ships was financed by type commander funds. Currently, several tender and repair ships are being experimentally funded in Class 207. It is expected that in the future all load list material will be financed in Class 207.

Load list items may be deleted also. Deletions may be the result of later issue of a load list or they may be requested (request for change in load list) by Service Force commanders. These items may be either completely deleted or decreased in quantity. The value of items deleted from load lists financed by type commander funds is credited to the type commander if they meet the criteria established by ESO for creditable material.

Requests for load list changes go to ESO via the type commander.

Ships maintaining ESO Consolidated Load Lists (CLL) will have Supply Corps officers aboard. Parts required to support equipment installed in load ships are integrated with load list material. At time of overhaul, load ships receive an information ERPAL and a load list supplement. The information ERPAL lists the entire range of parts required to support installed equipment. Quantities on the information ERPAL are for information purposes only and are not additive to load list quantities. The load list supplement lists parts that are not included in the load list but are required for support of installed equipment. These parts should be requisitioned in load-list supplement quantity. Stock record cards for all parts listed in the information ERPAL should be tabbed to prevent their being offloaded as the result of load list deletions. In the event that a tab stock number is deleted from the load list, the quantities listed in the information ERPAL should be retained for support of installed equipment.

SMALL CRAFT AND BOAT ALLOWANCE

In the past it has been the practice of many shore activities to install electronic equipment in miscellaneous types of small craft assigned to naval districts and stations. This has necessitated carrying a stock of electronic equipment in shore station allowances in order to supply these craft. To eliminate the accounting confusion which resulted each time a change was made in the assignment of such craft to shore stations, the Bureau of Ships now promulgates allowances on a type basis for these boats, including district craft and floating equipment. In each case the electronic equipment is considered a part of the boat and normally accompanies it upon transfer, thus requiring no change in station electronics allowances.

Cognizant commands are required to advise the Chief of the Bureau of Ships in the event the assigned duties of these miscellaneous craft require installation of electronic equipment in excess of the type allowance. If the change is applicable to a sufficient number of craft of one type, the allowance will be amended accordingly. If the type allowance is not changed, the excess equipment may be installed upon receipt of the Bureau's approval, but such equipment remains on the shore station's allowance and must be removed from the craft upon its transfer from the station.

Repair Parts Allowances

The present repair parts allowance system for supporting BuShips electronic equipments began with the binning program in 1948 when boxed sets of spares were broken down for bin storage. The large number of parts from boxes found to be common to more than one equipment necessitated an automatic method for reducing the allowance of these items—that is, for determining the total number of each of these common parts required to support all electronic equipments on board.

The method which evolved is known as the Integrated Electronic Repair Parts System, and the parts allowed a particular ship at present are usually listed on an *Electronic Repair Parts Allowance List* (ERPAL). (Although ERPALs are being replaced by COSALs, as indicated later in this chapter, many ERPAL principles and procedures apply also to the newer allowance list. The following discussion therefore is largely applicable to both allowances inasmuch as it points up certain basic allowance concepts and the roles played by the cognizant technical bureau, supply demand control point, and ship in ensuring an adequate electronics allowance.)

Three requirements are basic to the integrated parts system. These are (1) definitive nomenclature, (2) identification of equipment parts by stock numbers, and (3) an equipment inventory reporting system.

Definitive nomenclature means that when a name is applied to an individual equipment, the equipment contains a particular grouping of specific parts. It means further that when this name is applied to any other equipments, these others are composed of the same group of parts. The purpose of definitive nomenclature is to ensure that if a nameplate indicates that an equipment is an AN/XXX-1, no other equipment bearing this name will contain different kinds of parts.

Identification of parts by stock number means that each different type of part in an equipment is identified by a particular stock number. Identification by stock number is of importance to the user of the equipment for maintenance purposes, to the supply system for supply demand purposes, and to allowance preparation activities for purposes of determining individual parts population. Identification by stock numbers is made known to all cognizant personnel through the promulgation of a SNIT (Stock Number Identification Table) for each equipment with definitive nomenclature. The SNIT is published as a reference document for use by maintenance and supply personnel. For allowance preparation, the SNIT takes the form of a deck of electronic accounting machine cards to permit easy sorting and resorting into various sequences.

Inventory reporting means that ships and shore stations must make known to the allowance preparation activity the number of each kind of electronic equipment on board—that is, the total on board of various equipments assigned the same definitive nomenclature. NavShips 4110, Ship Electronics Installation Record, provides for forwarding this information from ships. NavShips 3603 is used ashore. On the basis of the installation record, ESO arranges the appropriate SNIT cards in stock number sequence and applies integration formulas as necessary to reduce allowances of parts common to onboard equipments. The Electronic Repair Parts Allowance List is then printed.

Determining a practical parts allowance requires realistic data based upon considerations that go beyond usage and demand. In many cases, technical judgment is the primary factor in determining placement of an item in the allowance. Weight and cube, balanced support, and depth formula are all problems requiring machine and manual collection of data on which to base practical allowances.

ESO ERPAL RESPONSIBILITIES

The function of parts allowance preparation lies with the technical bureau whose equipments require parts support—in this case, the Bureau of Ships. The Bureau of Ships has delegated the mechanics of allowance preparation to ESO and has assigned ED officers to ESO for technical guidance in this and other programs.

The major reasons for this delegation of responsibility are the availibility at ESO of (1) a large punched card machinery installation and (2) current stock number information. With over 100,000 stock numbers involved in electronics allowances, it is essential that current

information be readily accessible to personnel who prepare allowances.

The Bureau of Ships has also delegated its provisioning functions to ESO. Provisioning is selecting the initial range and depth of repair parts required to support new equipments. Obviously, provisioning information is necessary for complete allowance preparation.

In recent years, electronic parts allowances have been expanded to include electronic parts support for equipments under the cognizance of the Bureau of Ordnance. By this expansion electronic repair parts allowances now consider the parts populations of both BuShips and BuOrd onboard electronic equipments. Duplications are thus further eliminated, and the total number of parts a ship need carry is reduced. Under COSAL procedures (discussed later) ESO will determine the "N" cognizance parts required to support all program managers' equipment. This will eliminate all duplication of support.

Whenever a ship undergoes a regular shipyard availability and a change is made in its electronics installation, ESO prepares a new Electronic Repair Parts Allowance List. When equipment is installed or removed at other times, ESO provides other appropriate allowance documents.

Since all items on an allowance are considered essential to a ship's readiness (OpNav Inst 4441.4), it is important that the ERPAL or other allowance document be correctly processed. Personnel concerned should therefore become familiar with the appropriate processing instructions.

To make such familiarization easier, ESO has combined all instructions applicable to ERPAL processing and financing and has issued them as ESO Instruction 4441.17B, *Electronic Repair Parts Allowance List Processing Guide*. This instruction is intended as a basic reference tool to be used when a change in electronic equipment installation occurs. It provides detailed guidance in procedures to be followed in obtaining and processing the ERPAL and related allowance documents, as well as an explanation of various sources of electronic repair parts allowance information. It is the document to be consulted whenever questions arise concerning the ERPAL.

Broad distribution of the above instruction has been approved. Requests to ESO, Code 8, will result in prompt forwarding of copies to requesting ships and activities.

ELECTRONIC REPAIR PARTS ALLOWANCE LIST

The Electronic Repair Parts Allowance List (ERPAL) is a list of a ship's allowed quantities of electronic repair parts. The list provides parts support for installed electronic equipments and indicates range and depth for the parts listed.

The ERPAL provides, insofar as practicable, a 90-day operating supply of predictable life (wear out) items and an endurance load (overhaul to overhaul supply) of random life items. Quantities of repair parts listed in ERPAL are determined at ESO by formulas which consider many factors, including such individual ship factors as configuration of the ship's equipment, its assigned mission, and available space.

The usual time for a ship to have new electronic equipment installed or old equipment removed is during a regular shipyard overhaul. To ensure that the parts allowance supports the changed electronic installation, a new ERPAL must be prepared.

ERPAL Processing

The Bureau of Ships starts ERPAL preparation by forwarding to ESO the Bureau's plans for adding or removing equipment during overhaul. The list of equipments already on board, as indicated in the NavShips 4110, is also forwarded to ESO. With the information provided, ESO prepares a Preliminary Equipment Index and forwards it to the overhaul activity before the date for starting overhaul. The Preliminary Equipment Index is a summarization, based upon information available to ESO, of all installed electronic equipment expected to be on board upon completion of overhaul.

Ship's personnel also have some work to do in advance of overhaul. Their jobs consist of making a complete physical inventory of onboard electronic equipment and parts and bringing their N cognizance stock records up to date. Advance accomplishment of this work simplifies comparing onboard equipments with the Preliminary Equipment Index furnished by ESO. It also permits the use of stock record

cards in determining parts deficiencies or excesses in lieu of physically matching items against the ERPAL during overhaul when both time and personnel are at a premium.

After the ship has arrived, and immediately following the arrival conference, ship and shipyard personnel together must compare the Preliminary Equipment Index with the equipment actually scheduled to be on board at overhaul completion. All discrepancies, either listed equipment not in fact scheduled for installation or equipment not listed which is scheduled for installation, must be reported promptly to the Allowance Coordination Section, ESO. Upon receiving this information, ESO prepares the allowance list and forwards the ERPAL package to the ship via the overhaul activity.

Processing an ERPAL is a complex procedure not always easily understood by shipboard personnel on whom the burden falls. If, after consulting ESO Instruction 4441.17B, ships experience difficulty in processing the ERPAL, they should contact the overhaul activity, type commander, or ESO. Since ESO urges ships to make known to that office any ERPAL processing difficulties, and since ESO prepares the ERPAL and promulgates processing procedures, it is suggested that this may be the best source from which to seek assistance.

Repair Parts Support Guides

A repair parts support guide is furnished a ship to indicate the parts required to support equipments which have been modified or installed at times other than during overhaul. The three types of support guides are (1) an ERPAL Supplement which lists quantities of additional items required to support newly installed equipments, (2) a SNIT which contains an Allowance Guide indicating quantities of items required to support an equipment, and (3) an Interim Parts List (IPL) which in general supports equipment so new to the Navy that stock number assignments are not yet available for all items.

Since major changes to equipment configuration frequently are made while a ship is undergoing a restricted availability or during normal operations, the burden of initiating action to obtain a repair parts support guide usually rests with the ship. The reason for this is that there often is no advance notification to the Bureau of Ships and the Electronics Supply Office of the specific modifications to be made at such times. In cases, however, where major programs are initiated by the Bureau of Ships, ESO will be informed and will then provide the ship with advance notice as to the type of support guide that is to be provided.

Unless notified by ESO that a support document will be provided without action by the ship, the ship should advise ESO by message of the quantity of each type of equipment, including complete nameplate data, requiring support. Requisitions for items listed in an ERPAL Supplement, SNIT Allowance Guide, or IPL required to support added or modified equipment should be submitted to the nearest ERPAL processing point in accordance with the procedures in ESO Instruction 4441.17B.

ERPAL Financing

A Bureau of Ships allotment pays for many ERPAL (N cognizance) items. For instance, all items to support newly installed equipment are chargeable to this allotment. Payments are made by the Bureau of Ships regardless of when the new equipment is installed. ESO Instruction 4441.17B gives complete information on financing N cognizance items required to support new electronic equipment.

The use of the appropriate allowance guide or IPL, in lieu of a requisition, is instrumental in ensuring that these parts will be charged to the shore allotment. (An allowance guide is part of a SNIT; an IPL is an advance allowance guide.) The fact that the parts appear on these lists establishes them as parts for support of new equipments and chargeable to the shore allotment. Before forwarding, the marked-up list must be authenticated by the commanding officer.

Type commanders' afloat funds must pay for only those electronics items required for end-use replenishment. In other words, repair parts ordered to replenish the ship's allowance are paid for from the ship's operating target amount—the funds allowed a ship by the type commander for operations during a quarter. The ship's commanding officer divides the total allowed funds among the ship's departments. The electronics officer must keep informed on the funds available for purchasing electronic repair parts. He obtains this information from the supply officer.

Should there be insufficient funds to purchase necessary parts, the commanding officer must be informed. The commanding officer may then make funds available from any he has retained, or he may find it necessary to request an augmentation of funds from the type commander. When requesting an augmentation he follows the type commander's instructions.

Should the electronics officer transfer parts from his ship to relieve an emergency aboard another, he should forward the receipt for this material (or other papers indicating the transfer) to the type commander, via the chain of command. The type commander can then credit the ship with the amount of the material furnished. Such action will eliminate the need for an augmentation to replace the transferred items.

Coordinated Shipboard Allowance List

The many variations in allowance format and procedures which developed during and after World War II made it difficult for ship's personnel to accomplish their responsibilities for allowances. Other shortcomings were duplicate listings of some items in several allowance lists and lack of coverage in others. For example, electronics and ordnance allowance lists might duplicate a number of general stores tools. Varied criteria for establishing range and depth of items to be carried was also unsatisfactory from the standpoint of readiness, as one allowance preparing activity provided for a 6-month supply, another for a 3-month supply, and others for still other periods of time.

To eliminate the confusion caused by variations in format, types of information included, and periods provided for by different allowances; to prevent duplications; and to ensure that all material is covered by an allowance, a program for allowance coordination and management has been initiated. Allowance coordination includes standardizing allowance documents so that these will not only permit ease of use by fleet personnel but will also permit machine processing for faster production and subsequent maintenance at less cost.

The Bureau of Supplies and Accounts has been delegated allowance coordination and management responsibilities for the Navy. As a result of this delegation of responsibility, a new branch, the Coordinated Allowance Branch, has been established in the Bureau of Supplies and Accounts. The mission of this branch is to implement OpNavInst 4441.4 of 20 December 1956, the instruction which set allowance coordination in motion. The new branch is responsible for coordinating allowance preparation actions of the technical bureaus and supply demand control points, with a view toward standardizing allowance documents and developing standardized criteria and procedures for their preparation, publication, and maintenance.

Since its establishment, the Coordinated Allowance Branch, in cooperation with the bureaus and SDCPs, has developed a standardized format for a new allowance publication called the *Coordinated Shipboard Allowance List* (COSAL). This is a simplified consolidated shipboard allowance list designed to provide balanced shipboard stocks, ship self-sufficiency, and easy-to-use publications.

Initial distribution of the COSAL began in November 1957, with 19 destroyers of the DD692 class selected as the first group to use the new allowance. Future issuance will generally be geared to the overhaul schedule. COSAL publications are expected to be distributed to all ships by June 1960.

It is anticipated that indoctrination teams, initially composed of members of the Coordinated Allowance Branch, will deliver the first COSALs and explain their use, content, and maintenance. As the program accelerates, these indoctrination teams may be expanded to include personnel from fleet commands, shipyards, fleet training commands, and supply demand control points.

COSAL FORMAT

A COSAL is identified with the ship for which it is intended. The complete COSAL for each ship consists of three segments, one for each major shipboard equipment category. There is a segment for electronics (BuShips/ESO) one for ordnance (BuOrd/OSO) and one for ships parts (BuShips/SPCC). Present plans call for

expansion, with segments to be added covering submarine, aircraft, automotive, and materials handling parts. The electronics segment replaces data now included in SEAL and ERPAL; the ordnance segment replaces NavOrd Lists and VOCALS; and the ships parts segment replaces RIALS.

In general, all of a particular item shown in COSAL will be listed in only one segment of the allowance. For example, N cognizance repair parts appear only in the electronics segment, regardless of the cognizance of the equipment in which these items may later be used—electronic, ordnance, or engineering, for instance.

Each segment of a COSAL contains an introduction and three parts. The introduction contains a chapter of general interest applicable to all users and another chapter of specific information useful only to a particular division of the ship, such as the electronics division. To the extent feasible, the introduction will consolidate outstanding directives applicable to the cognizance material listed in that segment.

Part I, *Equipment Index,* is a listing of onboard equipments, equipage, and units, in alphabetical sequence, with shipboard application, service, and installed quantity indicated. This part of the electronics segment replaces Part I of SEAL (installed equipment lists) and the ERPAL Index.

Part II, *Allowance Parts Lists* (APL) is a collection of all APLs for equipments installed in a particular ship. There is one APL in Part II for each equipment listed in Part I.

Each APL describes a component and lists its applicable maintenance items, such as the various supporting repair parts and special tools. Each contains adequate component descriptive data; applicable bureau manual or plans references; and a breakdown of repair parts, with manufacturers' numbers, nomenclature, and current stock numbers shown. APLs thus constitute standardized parts lists for particular equipments. They are the parts of COSAL that will be most frequently used by ETs.

Part II of the electronics segment of COSAL will replace the collection of SNITs previously prepared by ESO. Individual SNITs will be phased out and replaced by APLs as the SNIT supply is exhausted.

Part III, Stock Number Sequence List (SNSL) —a consolidated stock number sequence listing of repair parts, special tools, consumables, and equipage under the inventory control of the supply officer, allowed for support of equipments listed in Part I. To use Part III it is necessary only to identify the stock numbers of interest, as these are listed in sequence.

The SNSL lists stock number, nomenclature, equipment application, unit of allowance, and storeroom quantity, for each repair part in the COSAL. By consolidating all SNSLs received, the supply officer has a single source for effecting stock and inventory control. Part III of the electronics segment replaces the SNSL of ERPAL.

CHAPTER 5

WORK BEYOND CAPACITY OF SHIP'S FORCE

As stated in chapter 1, electronics work within the capabilities of a ship's force is accomplished by the ship's personnel. Such work is considered operational and technical maintenance. When, however, the required work cannot be accomplished by the ship's force, aid must be enlisted from a repair facility afloat or ashore. This is considered tender/yard maintenance or repair work. Obviously, even with experienced and skilled crews, ships cannot operate indefinitely without repairs of various sorts. To keep them in prime operating condition, therefore, specific intervals of time are allotted for their overhaul and repair.

The electronics officer is responsible for advising his commanding officer of the necessity for repairs to electronic equipment and of the appropriate priorities to be assigned to individual repair items. To do this he must know the condition of his equipment. He must know the purposes of the various types of ship availabilities, and the kinds of repairs which may be accomplished during each type. He also must understand the regulations governing the accomplishment of alterations and the kinds of assistance available through contract field service technicians.

Availabilities

The control and disposition of a vessel at all times is a function of certain operating commands. A vessel in commission, therefore, may not informally and on her own initiative, enter a shipyard or go alongside a tender for repairs. Instead, when there is need for outside assistance, the vessel's type commander, or in some cases the task-force commander, assigns the vessel an availability at a repair facility. This means that the ship is available to the facility for repair, overhaul, and/or alteration. *Navy Regulations*, 1948 defines availability as "the period of time assigned a ship by competent authority for the uninterrupted accomplishment of work at a repair activity."

KINDS OF AVAILABILITIES

Availabilities vary according to the kinds and amounts of work to be accomplished. These are discussed as follows.

Restricted Availability

A restricted availability is an availability for the accomplishment of specific items of work by a repair activity, with the ship present. For example, assume that a leak is discovered in the sonar dome. Since it is necessary that the ship be in drydock for the repair of the dome, the commanding officer would request a restricted availability for the repair of the specific item. If additional urgent repairs of a kind requiring shipyard accomplishment are discovered after the ship is in the yard, accomplishment must be requested of the type commander. Routine shipyard repairs will not be accomplished during a restricted availability. They will be deferred until the ship's regular overhaul period.

Technical Availability

A technical availability is one authorized for the accomplishment of specific items of work by

a repair activity, with the ship not present. For instance, should a component of an equipment require repair, that is, a component which can be removed and repaired without the presence of the ship itself, such as an amplidyne motor, a technical availability would be requested. The item to be repaired would be removed, repaired, and returned to the ship.

A technical availability must be requested of the type commander. If he approves the request, the type commander makes the arrangements and provides funds for the availability.

Upkeep Period

An upkeep period is a period of time assigned a ship, while moored or anchored, by competent authority for the uninterrupted accomplishment of work by the ship's force or other forces afloat; that is, a period during which the steaming notice is extended sufficiently to facilitate overhaul of machinery and equipment. The ship may or may not be assigned availability alongside a repair ship or tender or at a ship repair base during such a period, depending upon whether the work to be done is within or beyond the capacity of ship's force. For example, a ship's force may be able to clean a corroded antenna. Since, however, this job is dangerous with the ship underway, an upkeep period would be requested in order that the work could be accomplished while the ship is moored or anchored.

Regularly scheduled upkeep periods are a normal part of a ship's maintenance cycle. Their purpose is to keep the ship in condition during the intervals between regular overhauls. They are scheduled in advance by the type commander. During peacetime, ships are generally assigned upkeep periods 3 months after an overhaul and at approximately 4-month intervals thereafter. Combat requirements influence the scheduling of ships during wartime. For regularly scheduled upkeep periods, work requests, similar to those for a regular overhaul, are prepared and forwarded via the type commander to reach the repair facility approximately 30 days before the date scheduled for the upkeep period.

Tender Availabilities

The purpose of tenders is to provide mobile repair support for the accomplishment of work which is beyond the capacity of ships' forces. Tender availabilities are similar to shipyard availabilities.

United States Pacific Fleet Regulations (CinCPacFltInst 5440.3, 12 Sept. 1955) defines a tender availability as a maintenance period assigned alongside a tender or repair ship for repairs or authorized alterations beyond the capacity of the ship's force. Tender availabilities are generally assigned during upkeep periods scheduled by operating commanders. The Regulations say further that type commanders or officers responsible for maintenance shall arrange for at least one three-week upkeep period alongside a repair ship or tender, or at a ship repair base about mid-way between regular overhauls, whenever practicable.

Repairs by tenders under the cognizance of the Commander, Service Forces, U.S. Atlantic Fleet, are classified as ALONGSIDE, NOT ALONGSIDE, and SHIP-TO-SHOP.

An alongside tender availability is similar to a regular overhaul in that such an availability is normally included in the operating schedule of most ships, other than capital ships. The ship concerned is assigned a definite period, usually 2 weeks, to tie up alongside a repair ship or tender. Work requests, similar to those required for a regular overhaul, are submitted to the ship's type commander at least 6 weeks before the date of an alongside availability.

Similar to a restricted availability, a not alongside tender availability is normally granted for specific repairs of an urgent nature. When such repairs, beyond ship's force capacity but within the capacity of tender accomplishment, are required, they are requested of the ship's type commander. He screens the request and forwards it for final approval by the type commander under whose cognizance the tenders operate. The latter then designates the tender that is to accomplish the work. When time is an important consideration, the not alongside request should be hand carried. If this is not possible, the request should be submitted by naval message.

A ship-to-shop tender availability provides for the repair of items which can be physically removed from the ship and taken to a tender for overhaul. It is similar to a shipyard technical availability and may be assigned at any time for any ship type. As with not alongside availabilities, ship-to-shop repairs must be beyond the capacity of ship's force accomplishment but

within the capabilities of a tender. When ship-to-shop availabilities are required, they are requested and approved in the same manner as that described for not alongside availabilities.

Voyage Repairs

The term voyage repair refers to emergency work necessary to enable a ship to continue on its mission and which can be accomplished without requiring a change in the ship's operating schedule or the general steaming notice in effect. For example, during a midshipmen cruise, a ship may be in port for a week, at which time voyage repairs may be accomplished by such repair facilities as are available.

Regular Overhaul

A regular overhaul is an availability for the accomplishment of general repairs and alterations at a naval shipyard or other shore-based repair activity, normally scheduled in advance and in accordance with an established cycle. This kind of availability is discussed in some detail later in the chapter.

Post-Shakedown Overhaul

A newly commissioned or converted ship operates at sea for a trial period, or shakedown cruise, during which her construction, machinery, systems, and equipment are tested. In order to correct the faults noted during this shakedown cruise, after the cruise the vessel is granted an availability, or post-shakedown overhaul, at a shipyard (usually the yard where she was constructed, in the case of ships constructed or converted in a naval shipyard).

Defects in a newly constructed or converted ship, which are discovered before final acceptance of the ship from the contractor and for which the contractor is considered responsible, are reported by the commanding officer to the Chief of Naval Operations, if the defects are of such nature as to affect seriously the ship's performance. Copies of the reports to CNO are forwarded to the bureau having cognizance of the defective items. If the noted defects are less serious they are reported to the Board of Inspection and Survey.

The post-shakedown overhaul is the last opportunity for getting the ship and her equipment in top operating condition before she enters unrestricted duty. After this availability she is expected to operate for a period of from 18 months to 2 years without benefit of shipyard overhaul.

Except for the time allowed for advance planning, and the action to be taken in the event of noting serious defects, the procedures for requesting and accomplishing repairs during this availability are in general the same as for a regular overhaul as discussed later.

Emergency Repairs

Emergency repairs may be made by tenders, repair ships, or by a naval shipyard if the ship is near such an activity. In emergencies the ship's commanding officer usually requests an availability for only the specific repair needed. Such an availability may be a restricted availability, a voyage repair, or, if the presence of the ship is not required, a technical availability.

Regular Overhaul

Ships are scheduled for and assigned availabilities at shore-based repair activities as directed by the Chief of Naval Operations. The first regularly scheduled overhaul is normally granted a ship after an initial operating period of about 2 years. Thereafter, scheduled overhauls are granted about every 18 months, depending on the ship type. The amount of time in the shipyard for these overhauls varies. If the shipyard works on a one-shift basis the overhaul often requires 6 months, but if the yard works around the clock overhaul time can be reduced to 3 months for large ships and less for smaller. The employment schedule, an operating directive furnished by the type commander, indicates when a ship is scheduled for overhaul.

PROCEDURES PRECEDING OVERHAUL

In order that the best use may be made of the time and funds available for an overhaul, planning for the repairs to be accomplished during

the overhaul must be done in advance of the ship's arrival at the repair activity. Advance planning is required of both the ship and the repair activity, as indicated in the following discussion.

Work List Preparation

About 60 days before the date set for entering the repair activity, the ship submits to the activity, via the type commander, a work list showing the repairs and improvements to be accomplished during the overhaul. The work list is prepared by combining the information from individual work lists submitted to the ship's commanding officer by the various department and division heads. These individual lists indicate (1) all work which the particular department or division head considers necessary for accomplishment during the overhaul, (2) the priority considered appropriate for each item, and (3) the names of the ship's inspectors (the officer or enlisted personnel familiar with the condition of the equipment). These lists indicate all requested items in the order of their relative priorities within the following groups:

Hull;
Engineering (mechanical);
Engineering (electrical, including degaussing);
Electronics (including ordnance electronics, with applicable Ordalts, and Ordnance field changes);
Aeronautics (where applicable).

Finally, a single ship's priority index is prepared by dovetailing the items in the several groups. This enables the shipyard to allocate the available funds and manpower in the order desired.

Supplementary lists, that is, lists of repair items which develop after preparation of the basic list, should be similarly arranged in groups and then fitted into the ship's priority index. Decimal numbers, such as 1.1 and 1.2, are used to indicate the relative importance of such supplementary items.

Work incidental to a repair or improvement in a different group is given the same priority as the basic item. For instance, if repair or modification to an electronic equipment (Electronics Group) requires a change in the ship's wiring, the change in wiring receives the same priority as the basic item, although the wiring is listed under Engineering (electrical).

The assignment of priorities is extremely important since the limitations of time or funds usually prevent the accomplishment of all the work requested. It is necessary therefore that urgent items be high on the priority list and that all items be assigned priorities commensurate with their relative importance.

In preparing the electronics work list for submission to his commanding officer the electronics officer must give for each item requested all information necessary to assist shipyard personnel in locating and rectifying the trouble. A sample request for one item follows:

Identity: Model RDZ-1, Admiral Corp., Chicago, Ill., Serial No. 2666

Location: Radio central

Repair: Sensitivity tests indicate r-f amplifier requires realignment

Parts: No parts required for this repair

Plans: Refer to *RDZ-1 Technical Manual* (NavShips 900,617)

Ship's Force Assistance: Ship's Force will remove equipment, deliver to shop, and reinstall after repair

Ship's Inspectors: LT J. F. Doe; G. W. Reissig, ET1

Priority: 2

The necessity for stating in the work list exact information on each item of work cannot be emphasized too strongly. Poorly worded or ambiguous statements will cause return of request for clarification. To be avoided are requests which indicate lack of familiarity with the condition of equipment. For example, such a general statement as "Inspect and repair radar antenna as necessary," should be reworded to state specifically the nature of the trouble and the repair required, as, "Water in radar antenna pedestal causes weak signals and sluggish rotation. Remove, clean, and waterproof pedestal."

It is also necessary to state specifically what plans or repair parts (if any) are required and whether or not the ship can furnish them. The repair facility can fabricate many parts but will not do so if the parts are available from the ship or if standard parts are specified for use.

The reason for appointing ship's personnel to act as inspectors is to assist in the overhaul and ensure that each repair is carried out in a manner satisfactory to the ship. An inspector, as the term is used here, refers to someone who

knows what work is required and can speak authoritatively on the particular piece of gear involved. He may be an officer or enlisted man. Inspectors' names are given on the work list in order that shipyard personnel may know whom to contact for consultation on any given job.

The electronics officer must avoid including requests for work (1) which is within the capacity of the ship's force, (2) on an article which is the subject of pending survey action, (3) on an article which, if repaired, will be in excess of the ship's on-board allowance, or (4) on an article for which the estimated cost of repairs exceeds the limiting amount prescribed by the Bureau. In the latter case, however, Navy Regulations states that if an exception appears warranted, the matter shall be referred for decision to the bureau concerned.

To determine what work is required, the EO refers to the repair record cards in the Current Ships Maintenance Project (CSMP) on which are recorded items of work awaiting accomplishment. Items in the CSMP are recorded as a result of observing equipment operation, periodic inspections by the ship's force, and any material inspection of the ship by a Board of Inspection and Survey or other authorized inspection group. Since recommendations by these officials do not constitute authority to accomplish the recommended repairs and improvements, these items must be requested and approved in the same manner as other work beyond the capacity of the ship's force. The ship's commanding officer may report to appropriate authorities any board-recommended repairs which he considers unnecessary. He relies upon the technical knowledge of the EO to assist in determining whether or not electronics repairs recommended by a board are necessary.

Upon its completion, the work list is forwarded to the shipyard as prescribed by the appropriate fleet commander. Generally it is forwarded via the type commander to reach the shipyard about 60 days before the ship's scheduled arrival. Since receipt of the approved work request from the appropriate authority constitutes authorization for advance manufacture of material required for the overhaul, this gives shipyard personnel time to assemble in advance the plans and material necessary for the work authorized during the overhaul.

Work To Be Done by Ship's Force

In addition to the work list forwarded via appropriate channels to the shipyard, the commanding officer of the ship prepares a list of work to be accomplished by the ship's force during the availability. Normally this list also is forwarded to the shipyard commander to ensure proper scheduling of all work to be accomplished.

Work List Review by Authority Allotting Funds

Preliminary determination of the nature and extent of the repair work to be performed on a ship during a regular overhaul is made by the authority allotting the funds to cover the cost of such work. This authority is the chief of the bureau concerned or the commander administering the funds allocated by the bureaus for this purpose.

Work List Review by Repair Activity

Upon receipt of a ship's work list the repair activity investigates the work requested. If at this time, or during the course of the overhaul, conditions develop which render it inadvisable to do the work requested the commanding officer of the repair activity so informs both the commanding officer of the ship and the authority allotting the funds. If the scope of the work is greater than that originally determined, the commanding officer of the repair activity may request additional funds from the allotting authority.

Plans and Material Assembly

After examining the work list submitted by a ship, the commanding officer of the repair activity, insofar as is practicable, assembles in advance the plans and material required for the work authorized for accomplishment during the availability.

Receipt of the approved work request from the appropriate authority constitutes permission to begin manufacturing materials needed to accomplish the work requested.

PROCEDURES DURING OVERHAUL

During an overhaul the ship continues to have responsibility for the items scheduled for repair. Such responsibility includes a final

review, jointly with repair activity personnel, of the repairs requested and inspections of the repairs during accomplishment and upon completion. The commanding officers of the ship and the repair activity also have certain responsibilities to each other, to the grantor of the availability, and to the authority allotting the overhaul funds. The following paragraphs describe the above responsibilities in more detail and indicate those which the ship's EO may be called upon to assume.

Arrival Conference

Upon arrival of a ship at a repair activity an arrival conference is held to discuss the work requested by the ship. The conference normally is conducted by the commanding officer of the repair activity. It is attended by the commanding officer of the ship and by representatives of the repair activity, the ship, and such other commands and authorities as the circumstances may justify.

During the conference the work requested by the ship is reviewed, and the EO, as a representative of the ship, may be asked to amplify and explain certain of the electronics items listed. Questions of material, parts, and assistance by the ship's force are also discussed and settled.

If the commanding officer of the repair activity considers it advisable to make any significant changes pertaining to the work requested, he makes appropriate recommendations to the grantor of the availability. He includes in his recommendations the comments of the commanding officer of the ship regarding the recommended changes.

Use of Shipyard Facilities by Ship's Force

In order to expedite the repairs and improvements to be undertaken by the ship's force, the commanding officer of the repair activity is responsible for seeing that, insofar as is practicable, the facilities of the shipyard are made available to the ship's crew.

Information Furnished the Ship

The commanding officer of the repair activity is responsible for keeping the commanding officer of the ship appropriately informed of the repair activity's action on all items of work; the costs thereof when determined; and the issue, closing, cancellation, or other changes in status, of job orders affecting the ship.

By copy of his official communication to the authority allotting the funds or the grantor of the availability, the commanding officer of the repair activity informs the commanding officer of the ship when work cannot be accomplished within the funds allotted or within the time of the assigned availability.

If repairs to an article of equipage cannot be completed during the availability of the ship and the article is required for military efficiency or for the health and comfort of the crew, the commanding officer of the repair activity so advises the commanding officer of the ship in order that the latter may have the article surveyed and replaced.

Inspections

The commanding officer of the ship is responsible for inspecting the work being done by the repair activity for the ship. He makes such inspections as may be necessary to determine that the work is satisfactory, both during its progress and when completed. To this end he appoints such additional ship's inspectors as may be necessary to assist and represent him. He and his assistants confer frequently with the appropriate officials of the repair activity concerning the work being undertaken.

Unsatisfactory Work

In the event the commanding officer of the ship considers unsatisfactory any work done by the repair activity, and satisfactory adjustment cannot be obtained locally, when the circumstances warrant it, he reports the facts directly to the Chief of Naval Operations, with copies to the type commander, the grantor of the availability, and the commanding officer of the repair activity. The commanding officer of the repair activity then immediately submits his recommendations in the matter to the Chief of Naval Operations.

PROCEDURES UPON COMPLETION OF OVERHAUL

As described below, completing an overhaul requires a report on the completion status of all

authorized repair items, plans for the cancellation or later accomplishment of uncompleted work, and readying the ship for its initial voyage after the overhaul.

Completion Report

Insofar as its material condition is concerned, a ship leaving a repair activity upon completion of its overhaul normally is ready for war service.

Upon completion of the overhaul, the commanding officer of the repair activity submits to the authorities concerned a report showing the completion status of each item of repair or alteration. In his report he includes a list of all items which were authorized but not undertaken.

Uncompleted Work

Except in unusual circumstances, job orders for uncompleted repair work are closed or canceled upon the ship's departure from the repair activity. Job orders for authorized alterations, however, are held open until the work is later completed or canceled by the bureau concerned.

In case of the departure of the ship when unfinished work is to be completed at another activity, all outstanding job orders are transferred to the latter activity together with all pertinent information and such material as has been assembled for the work.

Should work be desired later on job orders which have been closed or canceled, new requests must be made by the commanding officer of the ship.

Preparing for Sea Duty

Readying a ship for sea, including its initial voyage after an overhaul, involves meticulous planning, persistent work and determined followup to make certain that no necessary action or material is omitted. The electronics officer must see that his division is in order and that his allowances of equipment, tools, and repair parts are on board and properly stowed. The reason for this is obvious, as negligence can make his ship a liability during crucial action. The EO must impress his technicians and the operators with the importance of reporting to proper authority all defects, regardless of their apparent insignificance. When he reports his division ready for sea, or for getting underway, his commanding officer assumes that each equipment is in condition to give the performance required of it. If, however, the commanding officer is advised of the exact condition of the equipment on board he knows to what extent his ship can or cannot meet her commitments and can act accordingly.

Alterations

An alteration is any change in hull, machinery, fittings, or equipment which involves changes in design, materials, number, location, or relationship of the component parts of an assembly, regardless of whether undertaken separately or together with repairs. Changes in allowances of installed equipment are alterations and should be so handled.

The word "approve" in connection with an alteration indicates the Bureau's action on the proposed change. Bureau approval is promulgated in letters of technical instruction or Shipalts as defined below. Approval alone, however, does not constitute authority to proceed with the work. The work "authorize" is used to signify the Bureau's permission to proceed and the granting of funds for a particular ship during a particular availability.

Alterations which affect the military characteristics of a ship may be approved only by the Chief of Naval Operations, who also establishes their relative priority for accomplishment.

Alterations other than those affecting military characteristics are approved by the cognizant bureaus without reference to CNO. In general, alterations of this type concern matters of safety, efficiency, and economy of operation or upkeep (recorded in the Operational Improvement Plan) and health and comfort of personnel (recorded in the Habitability Improvement Plan). The bureau concerned is responsible for determining whether or not military characteristics are involved.

Alterations to vessels which are made necessary by changes in armament or by

changes in equipment furnished by other bureaus are under the cognizance of the Bureau of Ships.

SHIPALTS

Approved alterations under the cognizance of the Bureau of Ships are known as Shipalts. Each quarter these are listed according to priorities (A, mandatory; B, essential; and C, desirable), are compiled as type priority lists, and are forwarded to cognizant type commanders for information. Type commanders are requested to review outstanding approved alterations periodically and to initiate action to cancel those no longer considered absolutely essential.

Priority lists are also forwarded to the cognizant naval shipyards for guidance in advance planning; for proceeding with design, procurement, and installation work; and for resolving conflicting demands upon personnel and facilities.

In order to facilitate record keeping in the case of multiple building programs, alterations ordered in ships under construction which are also approved as Shipalts for ships already delivered are indicated by including the ships under construction in the applicable Shipalt. This facilitates the orderly accomplishment of these alterations after delivery in case they are not completed during the construction period.

Items omitted from master lists are assigned appropriate priorities at the time work is authorized for applicable ships, or upon request.

The Bureau reviews outstanding shipalts for an individual ship in advance of its scheduled overhaul period and issues, not later than 4 months (120 days) before such overhaul, a list of the alterations authorized for accomplishment during the overhaul. The list is based upon available funds and equipment. The order of priority follows, as far as is practicable, that of the type priority lists. The type commander and the commander of the overhauling naval shipyard are requested to comment upon this list. Upon receipt of their recommendations, the Bureau modifies, as considered desirable, the original list of authorized alterations.

Shipalts are issued on form NavShips 99. Upon completion of an alteration the pink copy of NavShips 99 must be returned to the Bureau without delay with an endorsement reporting its completion, and a statement to the effect that the ship's plans and technical manuals have been corrected to record the changes made. This copy is forwarded by the following persons under the circumstances indicated:

1. Cognizant supervisor of shipbuilding, industrial manager, or commander naval shipyard for ships under construction or conversion;
2. Commanding officer via the type commander for ships in commission;
3. Reserve fleet group commander via the reserve fleet for reserve ships;
4. District commandant for ships assigned to Naval Reserve training.

Shipalts no longer planned for accomplishment are canceled by the issuance of a NavShips 97 having the same file number and designation as that previously given to the appropriate NavShips 99.

Ship's Responsibilities for Shipalts

In his capacity as repair officer, the engineer officer of a ship maintains the ship's master Shipalt file. He receives all new Shipalts and is responsible for routing them to other department heads concerned. His records can be consulted to ensure that the electronics Shipalt cards in the CSMP are up to date. When a new Shipalt is received, a Shipalt card, should be prepared and placed in the Material History.

Receipt of a Shipalt constitutes an approved alteration. Accomplishment will be authorized later, in accordance with priority lists, as previously discussed. Since Shipalt priority lists are forwarded to type commanders, the ship electronics officer can obtain priority information form the electronics officer on the staff of the type commander. The ship itself will be notified by the Bureau of Ships 120 days before an overhaul of the alterations scheduled for accomplishment during the overhaul. This letter is generally referred to as the 120-day letter.

Shipalts fall into three classes, each of which is indicated by a letter (A, K, or D) after the Shipalt number, as, for example, A01263K. A and K Shipalts are funded by the Bureau of Ships. Since the Bureau and the Chief of Naval Operations establish priorities for these and schedule them for accomplishment, ships

should not include requests for A or K Shipalts in their overhaul work lists. These will be accomplished as directed by the Bureau of Ships when they fall within the established priority. The number of Shipalts to be accomplished is determined by the funds available for the Ship Improvement Program.

If a commanding officer believes that the Shipalt priority arrangement could be improved or that an alteration listed below the cutoff priority should be accomplished, he should forward his recommendation to the Bureau of Ships via his type commander. To permit routine handling, any such recommendations must be forwarded not less than 6 months before the start of overhaul.

Class D Shipalts are funded by the type commander. Work requests for this class of alteration must be submitted in the overhaul work list.

ALTERATIONS EQUIVALENT TO REPAIRS

An alteration is considered an "alteration equivalent to repair" when it meets any of the following conditions:

1. Substitution, without other change in design, of different materials which have been previously approved by the Bureau for similar use, and which are available from standard stock.

2. Replacement of wornout or damaged parts requiring renewal by those of later and more efficient design and previously approved by the Bureau.

3. Strengthening of parts which require repair or replacement in order to improve reliability, provided no other change in design is involved.

4. Minor modifications involving no significant changes in design or functioning of equipment, but considered essential to prevent recurrence of unsatisfactory conditions.

Electronic field changes for Bureau of Ships equipment are normally classified as alterations equivalent to repairs. When, however, the work required is extensive or requires concurrent weight and moment compensation, field changes are designated as alterations, and Shipalts are issued.

Alterations equivalent to repairs may be approved and authorized for accomplishment by type and reserve fleet commanders without reference to the Bureau provided they do not involve increases in weight or vertical moment, do not require BuShips special material, and provided they meet other requirements set forth above. They are financed and otherwise administered by type commanders in the same manner as repairs except that their approval is reported to the Bureau.

In the interest of uniformity, when possible, alterations equivalent to repairs are approved at about the same time for all vessels of the type to which they are applicable. To this end full exchange of information among the corresponding type commanders of the fleet is essential.

ALTERATION REQUESTS

Because type commanders may modify procedures for requesting alterations, the applicable type commander's instruction should be referred to before such a request is forwarded. In general, alteration request procedures are as described below for ships in various categories.

Active Fleet Ships

When the commanding officer of a ship of the active fleet determines that an alteration is advisable or necessary for the increased efficiency of his ship he requests an alteration, outlining the changes required to obtain the desired results. He makes his request to the Bureau of Ships in standard letter form, and in addition to discussing the change in question, he covers specifically the following points:

1. The estimated change in weight and moment about the center of gravity. In case weight and moment compensation is required he recommends appropriate action.

2. In case a reduction in the space normally available for the accommodation of the crew will result, a statement as to the amount of this reduction is included, along with a statement of the reasons for accepting it.

Alteration requests are forwarded via type or other administrative commanders, as applicable, for their endorsement and recommendations as to approval, classification, and applicability to other ships of the type. Copies of the basic request, and endorsements thereto, should be forwarded to corresponding commanders in other fleets, with a request that their comments on the proposed change be forwarded to the Bureau of Ships for information.

Commanding officers should bear in mind that even though alterations are recommended by the Board of Inspection and Survey, they normally will not be acted upon by the Bureau until after receipt of appropriate requests from commanding officers and recommendations thereon of type commanders.

Upon receipt by the Bureau, requests for alterations which affect military characteristics are forwarded to the Chief of Naval Operations for action. Other alteration requests are acted upon by the Bureau after consideration of all the factors involved, such as the effect on weight, stability, space, power, and the possible increased effectiveness of the ship.

Requests for alterations equivalent to repairs involving weight and moment changes are addressed to the Bureau of Ships as indicated above for other alterations.

Reserve Fleet Ships

Requests for alterations, or alterations equivalent to repairs, for reserve fleet ships are addressed to the Bureau of Ships by reserve fleet commanders, with copies to the corresponding type commanders and the other reserve fleet commanders. Except in unusual circumstances, no alterations are authorized for accomplishment in reserve fleet ships other than those which are equivalent to repairs and which are essential to bring the ship concerned to a fully operational condition.

Naval Reserve Training Ships

Alterations authorized for accomplishment in ships assigned to Naval Reserve training are limited to the minimum necessary to provide satisfactory training units. Requests for such alterations are forwarded to the Bureau of Ships by district commandants, with a copy of the request to the Bureau of Naval Personnel.

Ships Under Construction

Alterations requested for ships under construction are forwarded to the Bureau of Ships via the supervisor of shipbuilding or commander of the naval shipyard responsible for development of the design.

Shipalts are canceled by the issuance of a NavShips 97 having the same file number and designation as that previously given to the appropriate NavShips 99.

WEIGHT AND MOMENT COMPENSATION

Weight and moment compensation is required for alterations, allowance list changes, and other changes in the loading of ships as found necessary by stability and buoyancy studies made by the Bureau of Ships. The Bureau exercises its discretion in limiting weight and moment additions to those items which are of military importance or which are absolutely essential for other reasons. Shipalts and other correspondence approving alterations are not issued therefore until the required compensation has been designated, including an estimate of the net change in weight and moment resulting from the alteration involved and a statement of the action required to compensate for the effect on displacement and stability. If compensation is not required because of the status of the ships and the importance of the alteration, a specific statement to that effect must be given.

It is the joint policy of the Bureau of Ordnance and the Bureau of Ships that when armament is removed in compensation for material placed on board during peacetime to enhance comfort and morale, such added material shall be capable of expeditious removal by the ship's force.

The Bureau of Ships Manual points out that many naval vessels have suffered from increased weight to such an extent that drastic steps have been necessary to avoid compromising their power of survival. In some cases the situation has been so serious that the ship has been unable to carry the desired armament. The Bureau is able to control weight increase only (1) through action taken on proposed alterations and allowance changes, (2) as the result of unsatisfactory conditions reported by forces afloat, or (3) as the result of inclining experiments. It is important therefore that type commanders and personnel aboard ships, at shipyards and at repair activities, learn to think in terms of weight and find ways and means to minimize weight increases. Fleet commanders, type commanders, commanding officers, and other shipboard personnel can contribute, for example, by (1) eliminating unauthorized alterations and installations of unauthorized equipment; (2) locating unnecessary

equipment, structures, fittings, stores, and miscellaneous items which may be removed or replaced by lighter items; and (3) determining approved alterations which can be canceled.

Though the weight of an individual item may be insignificant when compared to the weight of a ship, the danger lies in the cumulative effect of many weight increases over a period of years.

Additional details on alteration procedures may be found in BuShips Instruction 4720.1 ser. 508-30 of 25 March 1954.

Contract Field Service Technicians

In addition to the regular repair assistance available at shipyards or alongside repair ships and tenders, ships may request assistance from contract field service technicians. These are civilian electronics personnel from commercial firms who are under contract with the Bureau of Ships. Their primary purpose is to assist naval personnel through training.

Ordinarily, electronics work assigned to or undertaken by field activities of the Bureau of Ships is accomplished by naval military and civilian personnel. When necessary, however, to meet the needs of the Service, the Bureau of Ships will provide the professional services of contract technicians for work at these activities.

As directed by the Bureau of Ships, contract field service technicians are assigned by contractors to shipyards, maintenance yards, and fleet commands requiring their services. They are administered, and their services coordinated, by the command designated by the fleet commander or by the shipyard or maintenance authority to which they are assigned. Ships desiring the services of these technicians make their requests to the appropriate service force commander.

Contract technicians provide technical information to naval military and civilian personnel on unusual design, planning, installation, and maintenance problems associated with the introduction of new equipments. The major justification for their use, however, is their contribution to on-the-job training. Their function is to help local personnel to perform their duties more efficiently—not to do the work for them. At naval shipyards, for instance, they train and instruct shipyard personnel in installation, checkout, and adjustment of equipments to enable these personnel to carry on their duties more capably. Shop men are given detailed information on the fine points of equipment, maintenance short-cuts, and improved techniques. On board ships, contract technicians familiarize the ship's force with the adjustment, maintenance, and operation of installed electronic equipments as necessary to make these personnel less dependent upon outside assistance.

In addition, contract technicians train naval personnel at regularly established schools. Located at key points, these schools provide continuous training on such systems as ASW, fire control radar, AN/URT, SRT, and other electronic equipments in use by the Navy.

In addition to the duties described above, field service technicians report to the Bureau of Ships the conditions they find on each job and the steps taken to remedy defects notes. These reports are complete. They state the nature of the services performed, the symptoms of failure, condition of equipment, reason for failure, training level of assigned personnel, action taken, and anything else considered of value to the Bureau. They provide the Bureau with vital information on each equipment serviced and present a cross-section of equipment performance in general. From a compilation of the data thus received, the Bureau can determine whether a piece of equipment is of poor design or has been either improperly installed or maintained. The reports tie in closely with the electronics failure report system and add to the data on which depend much of the design of new equipment, the modification of old, and changes in installation or maintenance procedures.

Because this is an expensive program, using funds that would otherwise be used for purchase of equipment or for research and development, it is of utmost importance that contract technicians be assigned and utilized in such a way that maximum benefit is derived from their

services. Requests for their assistance should always be based upon the realization that their purpose is to help the Navy to help itself. They are not to perform work that is a normal responsibility of naval military and civilian personnel.

Conclusion

In order to make the best use of outside assistance when electronics work is beyond the capacity of the ship's force, the electronics officer must know the kinds of assistance available and the circumstances under which each may be requested. This means that he must first be fully aware of the technical capabilities of his crew. Such awareness will enable him to avoid requesting outside assistance unnecessarily and also to avoid delay in requesting such assistance when needed. He must understand the purposes of the various availabilities and the procedures to be followed when these are required. Such understanding includes his responsibilities for electronics work before, during, and after regular overhauls.

In order to advise his commanding officer on Shipalt priorities, he must keep himself and his leading technicians informed on proposed alterations. Because of his daily contact with equipments under operating conditions he is in a position to recommend alterations which will improve installations aboard his ship type. Knowledge of the procedures for requesting alterations will enable him to know which kinds of alterations may be approved for ships in the category to which he is assigned.

It is also important that he appreciate the necessity for having his men available for training during all periods when contract field service technicians are on board.

CHAPTER 6

STAFF ELECTRONICS OFFICERS

Knowledge of the general organization of the fleet is necessary if the electronics officer is to appreciate fully his relationships to commands or units above or below the one to which he is assigned. In general the structure described here is that of the Pacific Fleet, but where important differences occur in Atlantic Fleet practices these are noted. Though within either fleet there are important differences between war and peacetime organization, this discussion deals primarily with current peacetime structure.

The designation of Commander in Chief Pacific (CinCPac) refers to the commander of the Pacific area who functions under the Joint Chiefs of Staff. This is the unified command through which joint operations are conducted within the area defined. The strictly naval command of the Pacific Fleet is exercised by the Commander in Chief U. S. Pacific Fleet (CinCPacFlt).

Fleet organization for operational, or tactical, command differs from its organization for administration. (See fig. 6-1.)

Operational, or tactical, organization has to do with the actual deployment and utilization of ships and other fleet units in military operations. The primary purpose of operational commands is to fight.

Administrative organization, on the other hand, has to do with the logistics of fleet support and maintenance, including technical training and repair; preparation of doctrine and tactical instructions based on war experience; supply; and general administration. The purpose of administrative commands is to provide operational commands with the means to fight and relieve them of the administrative responsibilities which would interfere with combat operations.

As indicated in figure 6-1, the operating forces are organized for operational purposes into fleets, task forces, task groups, and task units. The fleets, under commanders in chief, such as CinCPacFlt and CinCLantFlt, are the major commands, with each fleet containing several task forces. Each task force is composed of task groups, and the groups are made up of task units.

For administrative purposes, the operating forces are divided into type, division, and squadron commands. Figure 6-2 shows the various type commands under CinCPacFlt. These are subject to change as military requirements change. The organizational structure depicted in figure 6-1 is relatively stable. A type command may be composed of a number of vessels of specific type(s) or it may carry out a particular type of function. For example, Commander Submarine Force Pacific has administrative responsibilities for a particular ship type assigned to the U. S. Pacific Fleet, whereas Commander Training Commander Pacific is responsible for a particular type of function throughout the fleet.

Supply and logistics responsibilities, although comprising a large portion of fleet administration are not allocated to each type commander for his respective units, but are concentrated in the three largest type commands—Commander, Service Force; Commander, Air Force; and Commanding General, Fleet Marine Force. Logistics matters pertaining to the Pacific Fleet, with the exception of aviation and Marine supplies, are the

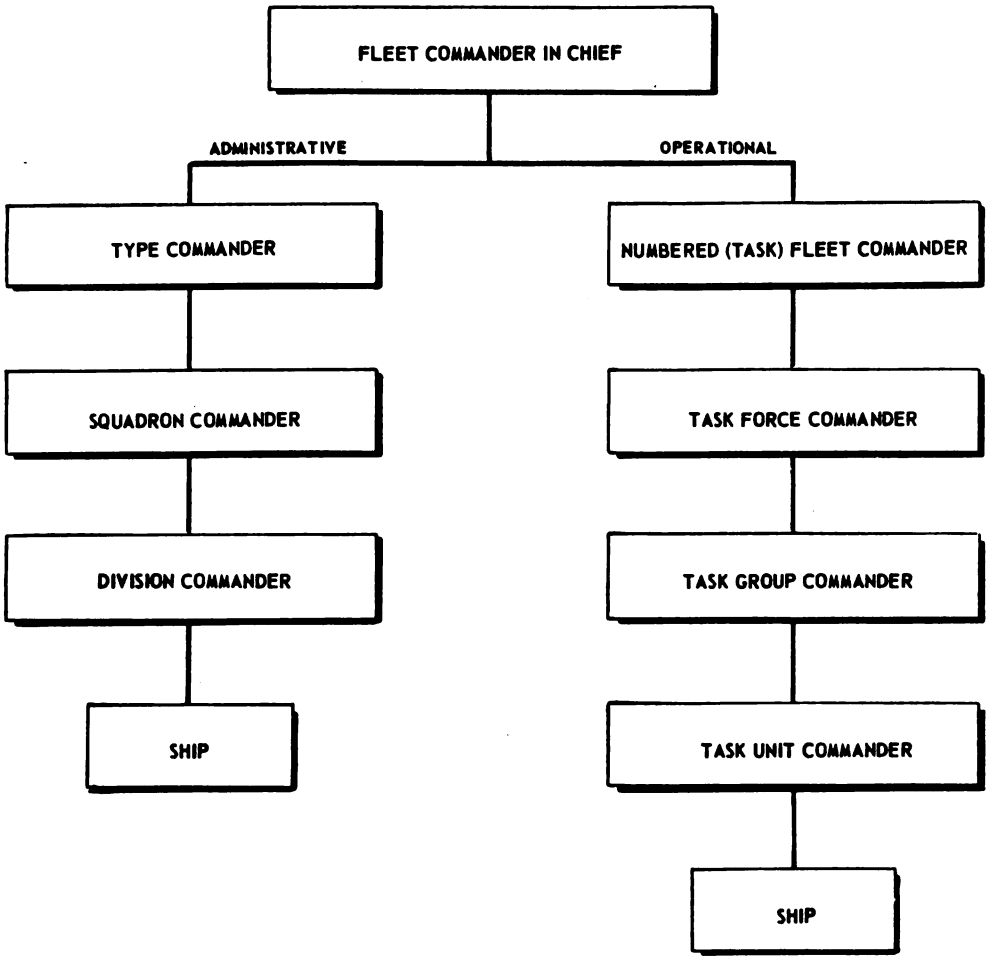


Figure 6-1.—Fleet organization for administrative and operational control.

responsibility of the Commander Service Force Pacific (ComServPac). The Commander Air Force Pacific (ComAirPac) is responsible for the support of Navy and Marine aviation units. Marine support, except aviation, is a responsibility of the Commanding General Fleet Marine Force Pacific (ComGenFMFPac).

From the foregoing brief discussion of fleet organization it is apparent that the electronics officer may expect to find his billet somewhere in the administrative chain of responsibility. Maintenance and material usually are considered logistic functions; therefore, the largest number of billets is in the Service Force.

Staff Organization

Diversity of missions and forces precludes rigid naval staff organization. *Navy Regulations, 1948* provides some general instructions to the effect that the organization should be as prescribed by the commander and that it should conform in nature to that of the staffs senior to it. It further defines the authority and responsibilities of the staff officers in a general way. The chief of staff is responsible for the supervision and coordination of the staff officers, while the latter are responsible for the duties assigned and advise the commander on such matters as are pertinent to those duties, but the staff officers have no command authority of their own. When the staff is embarked in a ship, the staff officers are subject to the

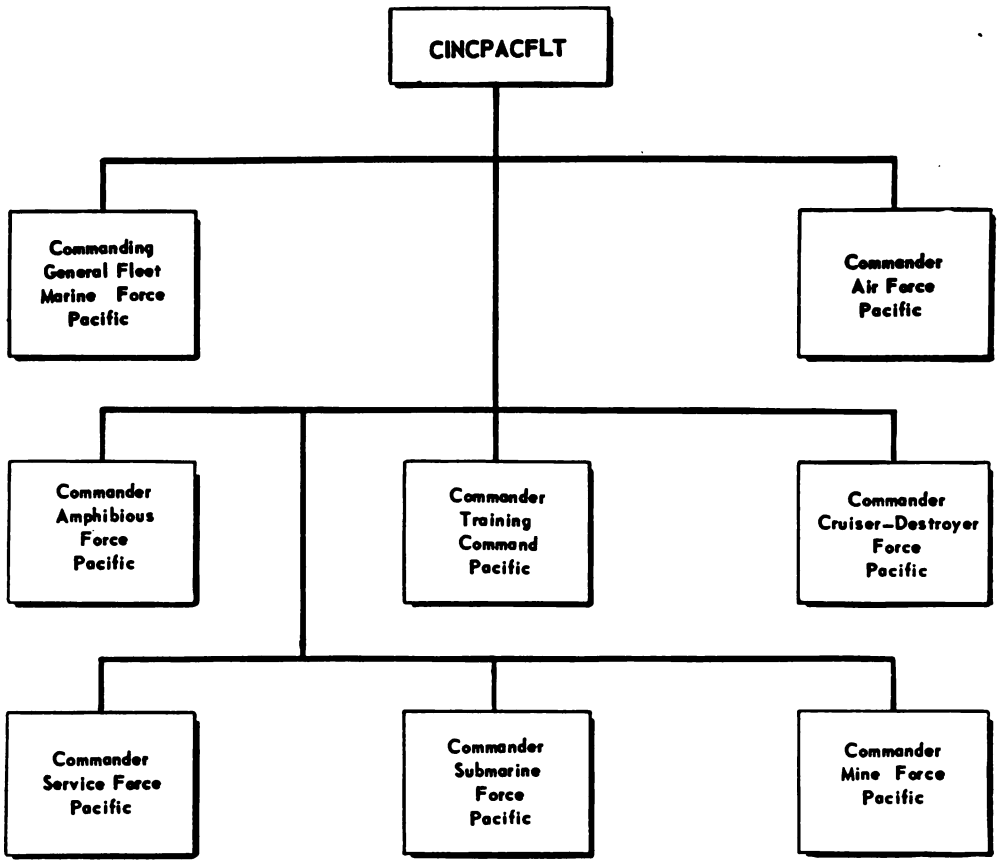


Figure 6-2.—U. S. Pacific Fleet type commands.

internal regulations and routine of the ship, and the enlisted personnel of the staff are assigned to the ship for administration and discipline. When the staff is ashore, the enlisted personnel are assigned to an appropriate shore activity for administration and discipline. This is as far as the regulations go.

Amplifying the above regulations, *The Navy Staff, NWP12*, presents an organizational pattern, and outlines staff organization principles, staff functions and procedures.

Type (administrative) and force (operational) staffs have similar subdivisions but emphasize them differently. Staff divisions usually are: personnel (or administration), intelligence, operations, logistics, communications, and plans. Inasmuch as the commanders immediately under CinC Pac Flt pattern their staff organizations to a large extent on his plan, figure 6-3 is presented as an example. Because this is an extremely large staff, with heavy planning, administrative, and operational responsibilities, it is logical to expect considerable abbreviation and combination in the staffs of the type commanders.

The general internal administration of the staff is within the province of the flag secretary whose responsibilities include the mail room, routing, filing, and checking of correspondence for timely action and correct form; assignment and supervision of enlisted personnel; preparation of officer and enlisted watch lists; preparation or endorsement of orders for officer personnel; and officer records.

The Chief of Staff supervises and coordinates the work of all divisions of the staff. He screens all action which must be referred to the commander for decision. Since heads of staff divisions usually have the authority to sign letters and release dispatches "by the direction of the commander," it is important that the officers clearly understand what kinds of action must first be cleared with the commander. The degree of independence allowed

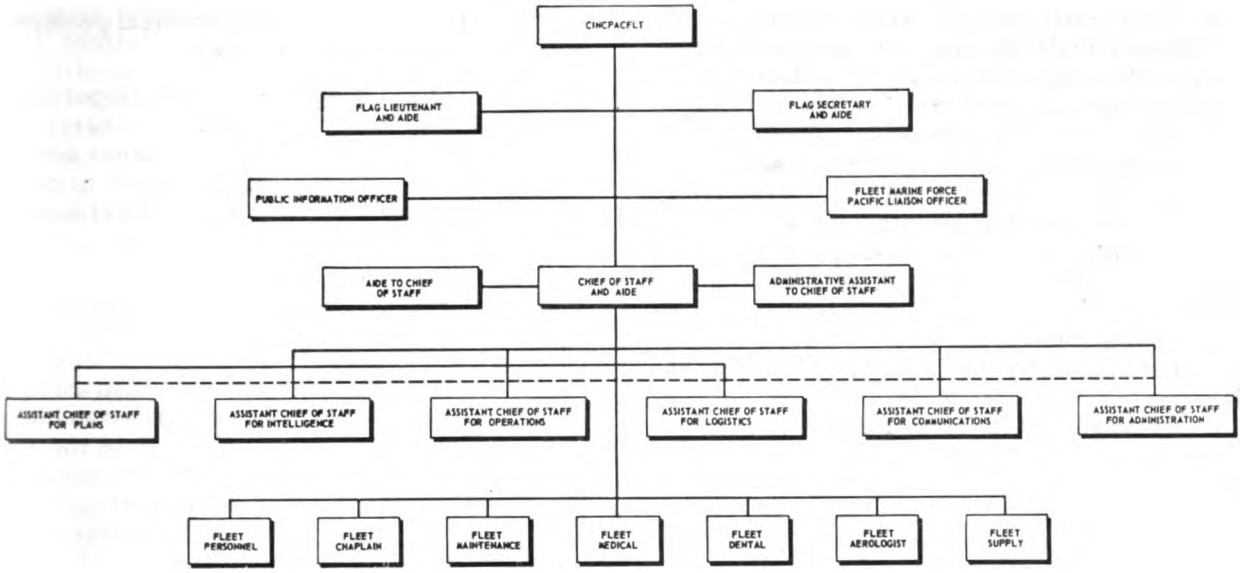


Figure 6-3.—CinCPacFlt staff organization.

varies widely between commanders, but it may be generally stated that any pending action that might influence policy currently in effect must be referred to the commander for clearance. Action clearly within the outlines of current policy may be directed without his personal clearance.

It is the responsibility of all officers to initiate action without delay on any communications they receive which require reply or further promulgation. In order that such action will conform with the commander's policies, staff officers must keep themselves informed of those policies. They also must keep the commander informed on matters under their cognizance.

Most staffs follow the doctrine of completed staff work. This means that any officer preparing paper work must pass it to his senior for action or release in a final or finished form. To do this requires thorough consideration of all the factors involved and drafting to the best of the officer's ability. Thus the senior, or the commander, has only to read and approve or disapprove the finished product. He is relieved of the chores of proofing and editing which are time-consuming. If the paper is not approved, the work must be redrafted according to the changes indicated and again presented in finished form.

In addition to his section responsibilities, each officer periodically assumes the status of staff duty officer in accordance with the watch list prepared by the flag secretary. Among his responsibilities as duty officer are: (1) receiving and making routine reports, (2) making reception or departure arrangements for visiting officers, and (3) taking administrative action on matters not normally under his cognizance, in the absence of officers usually responsible for these matters.

CINCPACFLT ELECTRONICS OFFICER

The electronics officer on the staff of the Commander in Chief, U.S. Pacific Fleet is an assistant to the Assistant Chief of Staff for Communications and to the Assistant Chief of Staff for Logistics. Through the appropriate assistant chief of staff he is responsible for keeping CinCPacFlt in touch with all current electronics problems, practices, training, applications, developments, and progress; for the technical policies of CinCPacFlt in matters affecting the use of electronic equipment; for the technical control of electronics training; and for other electronics matters, including logistics planning, with which CinCPacFlt is concerned. His responsibility is extended to include comparable functions with respect to electronics matters that concern the Commander in Chief, Pacific (CinCPac).

In carrying out the above responsibilities, his duties are as follows:

1. He assists the Assistant Chief of Staff for Communications, and other staff divisions concerned, in advising the Commander in Chief on all electronics matters.

2. He assists the Assistant Chief of Staff for Logistics in matters affecting electronics logistics planning.

3. He assists the Assistant Chief of Staff for Communications, the Assistant Chief of Staff for Logistics, and the Fleet Maintenance Officer in the planning, construction, and operation of shore communications stations under the cognizance of CinC Pac and CinC Pac-Flt.

4. He assists the Fleet Personnel Officer in matters concerning the assignment of electronics personnel.

5. In cooperation with the Fleet Readiness Officer, he prepares recommendations to CNO and the appropriate bureaus and offices on matters affecting electronics training.

6. He maintains close liaison with task fleet and type commanders and renders all possible assistance and guidance in electronics applications by: (1) recommending or initiating, in cooperation with the Fleet Readiness Officer and the Fleet Maintenance Officer, policies affecting the installation and maintenance of electronics in the Pacific Fleet; (2) coordinating the views and recommendations of type commanders in the formulation of recommendations to the Navy Department; and (3) implementing, through type commanders, the policies and programs promulgated by CNO or a bureau.

7. He makes periodic visits to subordinate activities to keep in touch with and assist in the solution of operating and technical problems encountered at these activities.

8. He keeps informed on Navy Department electronics programs, including research and development, evaluation, procurement and installation, and allowances, in order to make constructive recommendations to CNO and the bureaus on these programs.

CINCLANTFLT ELECTRONICS OFFICER

The electronics officer assigned to the staff of CinCLantFlt is officially designated as Electronics Material Officer. He assists the Assistant Chief of Staff for Logistics in advising the Commander in Chief on electronics research, design, procurement, installation, maintenance, and related matters. He correlates pertinent technical data for dissemination to the Fleet and the Navy Department, as appropriate. He visits periodically, or has liaison with, subordinate commands and certain joint service activities to coordinate technical electronics matters. From time to time he attends conferences which are also attended by type commanders, staff electronics officers, and representatives of CNO and the Bureau of Ships. At these conferences electronics problems are discussed and information is disseminated on new and future electronic equipment for the Fleet.

In addition he advises the Staff ASW Officer, Readiness and Training Officer, and other staff members on matters involving the broad field of electronics.

Type Organization And Administration

The type commands of the U.S. Pacific Fleet (fig. 6-2) are administrative commands under the fleet commander in chief. The functions of these commands are given here in a general way to illustrate the job they perform. It is well to keep in mind that there is not always a hard and fast division between operational functions and administrative functions since some phases of operation occasionally require the assumption of certain administrative duties by operational personnel, as for example, during sustained operations in remote areas. In such cases, the operational and administrative commanders must maintain close liaison in order to avoid overlapping or conflicting requirements.

Type commanders are charged with issuing instructions, where necessary, for the operation, maintenance, and administration of ships of the type in amplification of manuals, regulations, and other directives issued by higher authority. Operational control of ships and units is normally exercised by type commanders, until such control is passed to other commanders by specific assignment. As a corollary to issuing instructions to their ships

and units, type commanders are further charged with administration of inspections (material, operational readiness, and administrative) to ensure the maintenance of adequate standards. The type commander determines the standards and recommends the inspections which are then conducted by operational commands such as commanders of task forces and groups for the ships assigned to them.

One of the administrative functions embraces supervision and allowances of personnel within the type. For over-all fleet administration, this function is assigned to the service forces. For ships of his command however, planning and recommendations in personnel matters rest with the individual type commander. Although all commanders and commanding officers are charged with training in preparation for war, the type commanders are responsible for establishing suitable minimum training requirements for their respective ships.

Type commanders are responsible for the administration of material matters within their commands, but may decentralize this responsibility to the extent that effective supervision can be employed. Primary responsibilities for logistics matters are assigned to the Service Force, Air Force (Naval), Marine Force, and the Sea Frontier commands, each for its particular specialty. For instance planning, issuing directives, and implementing logistic support to ships, units, and overseas bases devolve upon the Service Force Commander, whereas similar responsibilities pertaining to aircraft devolve upon the Air Force Commander. Support in matters peculiar to the Marines falls upon the Commanding General of the Fleet Marine Force; and support by continental activities is coordinated by the Sea Frontier Commander.

The foregoing general functions are applicable to both the Atlantic and Pacific Fleets. Regulations published in each fleet outline the responsibilities of the type commanders assigned to that fleet.

COMCRUDESPAC STAFF

It would be difficult and misleading to present a composite structure of a typical staff, since each staff is governed by its own staff instructions which present the organization and define the responsibilities of each officer. The first step in becoming acquainted with a new job on a staff is to study and understand these instructions. As supplementary material, there is usually a set of staff orders and memorandums which govern details or special contingencies not covered in the general staff instructions. These are equally important.

The following paragraphs describe the staff organization (illustrated in fig. 6-4) under the

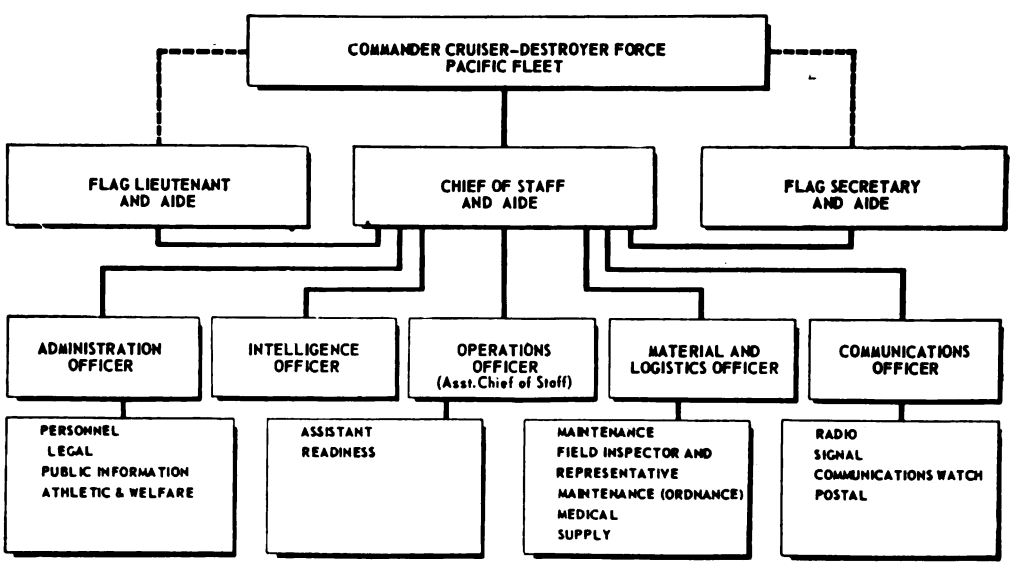


Figure 6-4.—Cruiser-Destroyer Force, U. S. Pacific Fleet, staff organization.

Commander, Cruiser-Destroyer Force, U.S. Pacific Fleet. In this organization the framework necessary for immediate expansion to wartime size has been retained. The duties of the type commander and the guiding directives for the staff are largely contained in *United States Navy Regulations, 1948; United States Pacific Fleet Regulations;* Navy instructions and notices; CinC Pac instructions; and the like.

The ships assigned to ComCruDesPac for administration include destroyers, destroyer pickets, destroyer escorts, high speed minesweepers, destroyer tenders, and light and heavy cruisers.

As a type commander in the administrative organization of the U. S. Pacific Fleet, ComCruDesPac is charged with administration of all units and activities assigned. As a task force commander, he is charged also with certain responsibilities for tactics, doctrine, and the techniques necessary for the operation and combat readiness of his force as a whole. The staff assists the type commander in discharging these responsibilities.

Since the officers of the staff are selected because of their technical knowledge and experience, they are required to make this knowledge and experience available not only to the type commander but also to all units of the force.

Each staff officer, irrespective of rank, corps, or duty assignment, bears a certain responsibility for the operational readiness of the force. Discharge of this responsibility is effected only by close contact with all units. To this end, therefore, staff officers are urged to visit other commands, units of the command to which assigned, and shore facilities to observe exercises and discuss problems.

INSPECTIONS

Type commanders must ensure that the ships under their command are informed of and keep up to prescribed standards of maintenance and readiness. These standards are found in various directives stemming from fleet commanders, technical bureaus, and CNO. These directives may be in the form of regulations, letters, directives, or manuals. Most of these sources get fleetwide dissemination, but the material is so voluminous that it is not readily effective except for detailed reference. Consequently, type commanders issue type instructions and type letters in which pertinent material is quoted or summarized, thus reducing the general instructions to specific instructions peculiar to the type.

Not only must type commanders issue data as to the standards required for their ships, they must also enforce these standards by means of inspections. The number and kinds of inspections are specified in *Navy Regulations* and CNO directives. Three types of inspections are mandatory—ADMINISTRATIVE, OPERATIONAL READINESS, and MATERIAL. The scheduling of inspections is based upon the operating cycles of the ships; that is, the periods between regularly scheduled shipyard overhauls.

Inspections of ships and aircraft squadrons are under the control of the fleet commanders who delegate this responsibility to the type commanders. The commanders of task forces or groups conduct, or direct the conduct of, such inspections as are recommended by the type commanders and submit to the latter the appropriate reports. When requested, fleet training commands assist the type commanders in the conduct of administrative and operational readiness inspections.

The grade a ship receives on an inspection is based upon the readiness of its personnel and material to meet the requirements of current and prospective missions, particularly those required for war service. Final grading is done by the type commander, or a designated subordinate, in order to obtain uniformity within the type.

An administrative inspection is an inspection of all the administrative methods and procedures normally employed by a ship to determine whether or not the ship is being administered in an intelligent and efficient manner, and whether the organization, methods, and procedures are directed toward keeping the ship prepared to perform her wartime mission. At least one administrative inspection is conducted in each training cycle and is divided into two categories, the ship as a whole and each department.

An operational readiness inspection consists of a demonstration on the part of a ship of her readiness and ability to perform the operations which might be required of her during war. Normally two such inspections are conducted during a training cycle.

As with administrative inspections, the conduct of an operational readiness inspection is the responsibility of the type commander who normally requests the assistance of the fleet training command. The inspection includes a battle problem prepared, conducted, and observed as specified by CNO in the publication, *Preparation, Conduct and Analysis of a Battle Problem* (FXP3-2). In addition, other operational exercises are prescribed by the type commander, including gunnery, damage control, engineering, CIC, communications, seamanship, and aviation.

The inspection is conducted under way except for those portions which are tasks normally conducted at anchor, or in getting under way and coming to anchor. The inspection lasts for a period of 24 hours during which the ship is rigged for battle to the maximum extent possible. The criteria for performance are (1) whether the ship as a whole can carry out her operational functions and (2) whether the ship's company is well trained and competent in all phases of the evolutions.

The purpose of a material inspection is to determine the actual material condition of a ship and her equipment in respect to ability to perform all functions for which the items were separately and interrelatedly designed, and to recommend repairs, alterations, changes, or developments that will ensure the material readiness of the ship to carry out the mission for which it was designed. Material readiness implies that the ship has established routines for own force inspections, tests, and preventive maintenance; that there is effective utilization of facilities for repair and preservation; and that outstanding items of work have been correctly determined as within the capacity of the ship's force, repair ships/tenders, or naval shipyards, respectively.

The scope of material inspections is similar to that of inspections made by the Board of Inspection and Survey (InSurv). Since an InSurv inspection is required every 3 years, and since in most cases the period between overhauls is 18 months, the scheduling of a material and an InSurv inspection is alternated. One of the above inspections should be conducted a minimum of 3 months prior to a shipyard overhaul.

The chief and assisting inspectors designated by the type commander express their opinions and make recommendations on the necessity or desirability of work items for the ship inspected, but the final decision as to those authorized for accomplishment rests with the type commander or his seniors.

A report of an inspection is compiled by the chief inspector from data supplied by his assistants. The report is forwarded via the commanding officer of the inspected ship to the type commander. The latter forwards it to CNO unless military characteristics are involved, in which case it is forwarded via the fleet commander. The report contains the inspector's evaluation and grading of the inspection with supporting comment. Forwarding officers, including the type commander, are charged with analyzing and endorsing the report indicating the following:

1. Action necessary to correct defects or improve material conditions and reclassification of work list items.
2. Effectiveness of the methods and routine for upkeep of the ship.
3. Sufficiency of the time assigned and of that actually devoted to upkeep.
4. Opinion of the ship's material readiness for war, including comment on any item of major deficiency disclosed by the inspection or otherwise known.

BATTLE EFFICIENCY COMPETITIONS

Closely related to the conduct and analysis of inspections is the conduct of intra-type competitions for awards. During these competitions, ships of the type compete in the performance of battle exercises and problems as determined by the type commander and his staff. As a result of the competition the type commander may recommend to CNO those ships standing highest in the competition. He bases his recommendation on the over-all performance in all forms of exercises, in the general performance of assigned duties, and in material and organizational readiness.

The conduct of the competition is normally administered by the operational readiness section of the type commander's staff. This section depends, however, on the maintenance section to grade that part of the competition dealing with engineering, electronics, and damage control performance and exercises. These grades are then combined with other performance grades to obtain a total grade for each ship of the type.

Fleet training publications contain detailed instructions as to what factors are to be evaluated, and illustrate and describe the reporting forms to be used. These publications also include a list of possible exercises. According to the type of ship, some exercises are highly desirable while others are not applicable. The type commander specifies the exercises which are mandatory and others which are optional for each of the classes of ships within his command. It is further necessary for the type commander to divide the ships under his administration into competitive groups since they may have major design or functional differences. For example, the ships of the service force are of many types; thus, grouping for a fair competitive balance is difficult.

Upon completion of the competition, letter reports of the exercises are made to the type commander by the chief observer, in which he states his evaluation of the results with supporting evidence for his conclusions. The reports are forwarded via the commanding officer of the ship inspected with copies to CNO and such other commands as the type commander desires.

TYPE ELECTRONICS OFFICER

Because staffs differ in such things as organization, specific duty assignments, and officer titles, details of the following discussion are not identical for all type command electronics officers. The general responsibilities described, however, are common to all such officers.

On the staff of a type commander of the Atlantic Fleet, the electronics officer is offically designated Assistant Material Officer for Electronics. He is responsible to the Material Officer for all electronics matters and assists in matters other than electronics as required. He must be sufficiently familiar with the duties of the Material Officer and his other assistants to act as a relief in the absence of any one of them.

He works in close cooperation with the Communications, ASW, and CIC sections of the staff on such electronics matters as operational characteristics and frequencies of equipments, shipboard allowances, and actual shipboard installations. He allocates funds for electronics repairs during regular overhauls and during restricted and technical availabilities for ships of the command, and he controls the screening of ships' requisitions for electronic material. The staff supply officer provides technical assistance as necessary for such screening. In addition, the EMO advises all members of the staff on matters involving electronics, and in common with all staff officers, he must be familiar with existing staff policies and instructions and must understand and carry out the concept of completed staff work.

Normally all incoming correspondence relating to technical electronics, CIC, communications, ASW, and the training and administration of electronics personnel is forwarded to the assistant material officer for electronics for appropriate action or pertinent comments and recommendations. Before taking action or making recommendations on such correspondence, he confers with any other staff officers who may have an interest in the matter at hand.

As circumstances warrant, the assistant material officer for electronics prepares letters and instructions to the vessels of the command. Such letters and instructions may concern maintenance and upkeep methods, tuning procedures, record keeping, and conservation of tubes and equipment; or they may call attention to policy, or violations thereof; errors in, or failure to make reports; and other routine matters. These letters and instructions are one means by which the experience and knowledge of the staff electronics material officer are passed down the line.

It is a primary responsibility of the staff electronics material officer to consult at every opportunity with shipboard personnel, as this is another means by which his knowledge may be passed on to others. This also is one of the ways he learns "what's going on in his ships"—their technical, personnel, and logistics problems; their discoveries of maintenance short cuts; their ideas for improving equipments or procedural routines; and the like. As a result of such consultations he is better able to coordinate the electronics work of the command, and because he has obtained firsthand knowledge of existing problems, he is better able to help solve them or interpret them to an appropriate activity for solution. Because shipboard personnel actually work with the equipments, he calls on them for opinions or assistance as necessary.

Because the type commander is called upon to act as liaison between ships and the fleet commander, the Bureau of Ships, and naval shipyards, the electronics material officer on his staff must be familiar with the organizational setup of these establishments and with their policies and directives, especially where they are concerned with electronics.

The staff electronics officer's responsibilities include reviewing material inspection reports, and screening the electronics portions of shipyard and tender work lists and requests for alterations. In the case of material inspection deficiencies, the commanding officer of the ship takes initial action to see that the deficiencies are brought up to required standards. The type commander reviews the commanding officer's action and makes recommendations or takes action as appropriate. In screening work lists he ensures that no work within the capacity of the ship's force is approved for yard accomplishment (necessary because of budgetary and manpower limitations), that all unauthorized items are deleted, and that priorities are correctly assigned to ensure that the most important items are high on the list. He checks alteration requests to determine the desirability of the requested changes and their applicability to other vessels of the type.

Thus it is evident that the staff electronics material officer must be familiar with the status of the installations aboard ships of the command and know their operational characteristics and limitations.

The type commander maintains an alteration and improvement record for ships under his cognizance, and the electronics officer on his staff is responsible for the electronics portion thereof. This record furnishes the type commander with information on the status of equipments throughout his command and thus is useful in future planning. It consists of a compilation of approved alterations and alterations equivalent to repairs for all vessels of the command. Information recorded includes alteration numbers, titles of alterations, specific vessels to which applicable, and codes indicating the status of each alteration in each ship—that is, whether it has been completed, not completed, partially completed, canceled, or is not applicable. When an alteration has been canceled or completed in all applicable vessels, it is dropped from the list upon periodic revision of the type commander's record. Although the entire record is revised periodically, entries are usually made as changes occur, thus keeping the list current on a day-to-day basis.

In electronics logistics matters, the assistant material officer for electronics on the staff of a LantFlt type command screens and follows up as necessary ships' requests for material. Ships scheduled for extended operations or foreign duty often require special electronics material. The assistant material officer for electronics acts for the type commander in ascertaining that this material is aboard, installed as necessary, and fully operative prior to departure of the ships.

The staff electronics officer serves also as an assistant to the staff operations officer. In this capacity he makes recommendations as necessary pertaining to operational electronics training. As required, he assists in CIC team training, in training in the use of electronic equipment in CIC's, and training of other electronics personnel such as radarmen.

The staff electronics officer must ascertain that full use is made by ships' personnel of shore-based technical and operational schools and that adequate on-the-job training is provided in ships of the command. His responsibility for training usually is carried out via directives and instructions to appropriate shipboard officers, inasmuch as the type commander normally has no facilities for actual training.

The staff EO has responsibility also for the CIC component of the Battle Efficiency Competition. He reviews the requirements to see that they are realistic, adequate, and provide definite benefit to the CIC teams. In this connection he prescribes the required and optional exercises to be performed each quarter, assigns relative weights to each, and if necessary prepares new exercises. He reviews all exercise reports, compares them, and assigns the final grade on each if at variance with the grade recommended. He maintains all records of the competition, including a quarterly summary of standings.

As pointed out in chapter 3, shipboard electronics officers forward certain records and reports to their type commander. The electronics officer on the type commander's staff ensures that these reports are made promptly. When they are received, he reviews them and takes any action considered neces-

them and takes any action considered necessary. In addition he prepares such reports as may be required by the Fleet Commander in Chief, the Bureau of Ships, and the Chief of Naval Operations; as for example, the quarterly report required by CNO on the state of CIC readiness in the command.

Copies of staff instructions, letters, and competition and inspection instructions are available to assist all staff members in the performance of their duties. In addition, the electronics officer maintains a library of pertinent technical information, including publications such as those discussed in chapter 3.

Service Forces

The foregoing information applies to the service forces as well as to other type commands. However, since the service forces play a part somewhat different from that of other type commands, the following discussion is included to show the responsibilities of the electronics officer attached to the staff of such a force.

The noncombatant auxiliary ships of the fleet are referred to as the service forces. These forces are composed of a variety of vessel types, among which are cargo ships, AKA; general stores issue ships, AKS; seaplane tenders, small, AVP; refrigerator ships, AF; salvage ships, ARS; and repair ships, AR, ARH, ARG.

The principal difference between the service forces and other type commands is the additional logistics responsibilities assigned to the former. Naval logistics entails determining requirements to meet the operating needs of the naval forces and meeting these needs at the time and places required. It includes procurement, storage, distribution, transportation, and maintenance of material, and procurement, housing, training, distribution, transportation, and maintenance of personnel, together with the rendering of services to the operating forces.

COMSERVPAC

ComServPac is the principal naval logistics agent for CinCPacFlt. With the exception of certain logistics functions performed for their commands by other type commanders, ComServPac is charged with planning, conducting, and supervising services to the U.S. Pacific Fleet; furnishing Pacific Marine aviation units with supplies, other than technical aviation material; and supplying subsistence items, petroleum products, medical supplies, and ground ammunition (except small-arms ammunition) to the Marine Forces. A further exception to the logistics responsibilities of ComServPac exists when joint logistics agreements within specified areas make the Army or Air Force responsible for specific classes of supplies or maintenance. The promulgation of directives for the disposition of surplus property in the Pacific also is a responsibility of ComServPac.

Service force staffs ashore compile requirements, set delivery intervals, and take action necessary to ensure that the required materials are procured and delivered on time where needed. They perform or administer inspections as required and assist in training Fleet personnel. In addition to supplying materials, auxiliary ships deliver personnel, distribute mail, transport the sick and wounded, and perform towing, salvage, repair, and other services for ships of the Fleet, including those of the service force itself.

ComServPac serves as CinCPacFlt's principal supervisory agent for Pacific Fleet maintenance. In addition, he is responsible for coordinating the logistic support for all communication and electronics facilities at bases for which CinCPacFlt is responsible.

Within their areas of material responsibility, ComAirPac, ComGenFMFPac, and ComServPac prepare and issue the directives required for the logistic support of operations, plans, and policies of CinCPacFlt. Such directives are considered as emanating from CinCPacFlt. These three commanders are authorized to conduct such direct correspondence with bureaus, offices, and naval commands as may be necessary to develop and carry out established logistics plans and policies. Operational type commanders are required to keep ComServPac advised of their service requirements, to comply with the logistics directives issued, to submit recommendations wherein logistics affects their readiness, to conduct inspections as necessary, and to take over operational control of such mobile service and supply

units as are allocated to them by ComServPac. In like manner, type commanders keep ComAirPac and ComGenFMFPac advised on logistics matters which are under the cognizance of these two commanders.

The staff organization of ComServPac is illustrated in figure 6-5. As may be noted on the chart, officers assigned to certain billets occupy similar positions with associated duties on the staff of CinCPacFlt, and their assistants occupy similar assistant positions on the Fleet staff. Although administrative cognizance is assigned, and detailed duties are blocked out, in accordance with the organization illustrated, there is no "compartmentation" on the staff; that is, the action section must consider the interests of other staff sections before recommending or taking final action.

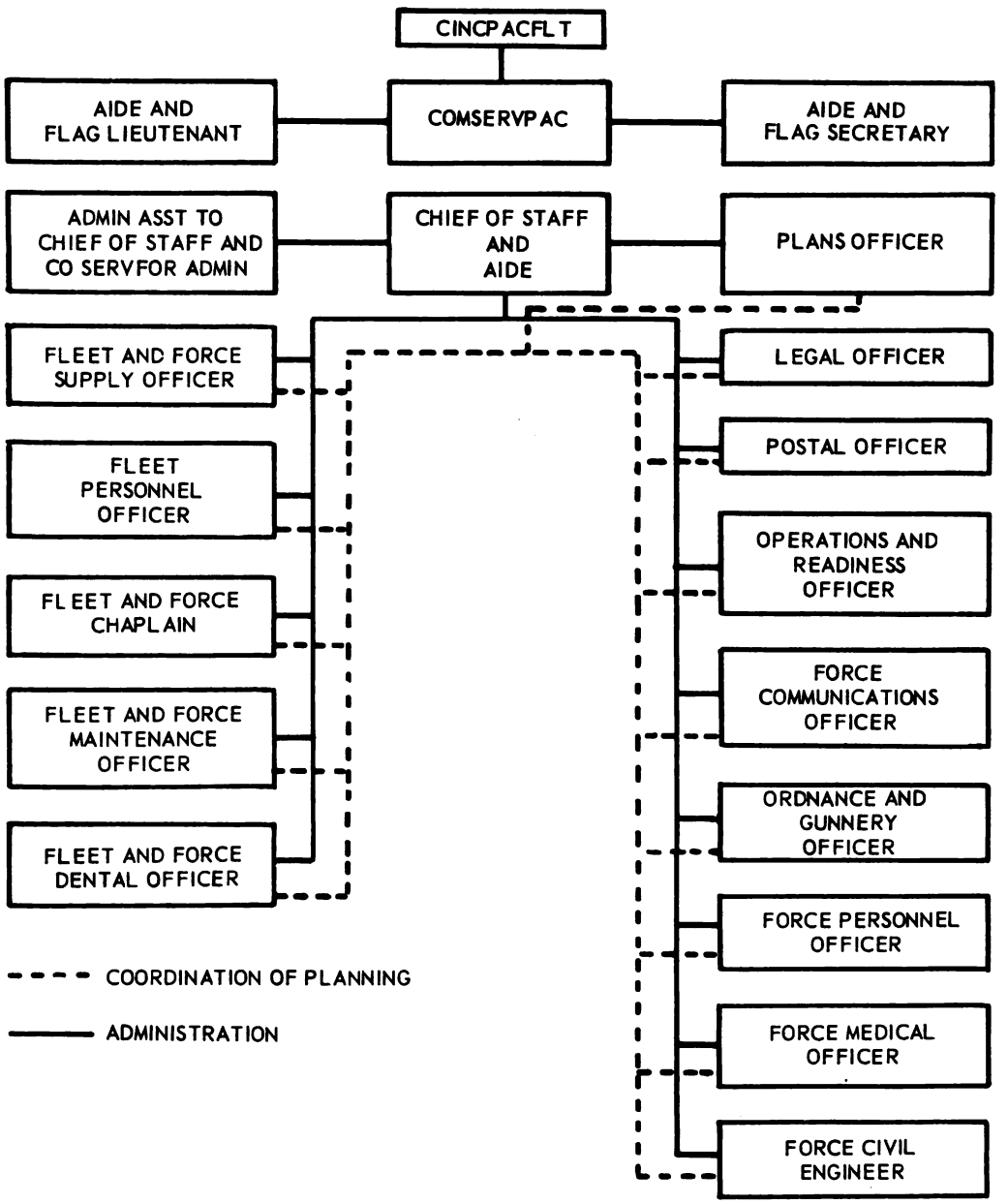


Figure 6-5.—ComServPac staff organization.

ServPacEO

The electronics officer assigned to the staff of ComServPac carries the title Electronics Material Officer and is an assistant to the Fleet Maintenance Officer. The maintenance division is relatively large, as it is concerned with maintenance problems of the Fleet as a whole, as well as with type maintenance for ships of the Force. The Fleet Maintenance Officer is a department head on ComServPac's staff and normally is assigned for additional duty to the staff of CinCPacFlt. The Electronics Material Officer therefore functions as a type commander's electronics officer and in addition has certain responsibilities under CinCPacFlt, stemming from the dual position of the Fleet Maintenance Officer. The electronics officer on the staff of ComServPac thus has a wider range of material responsibilities than do other EO's in the Pacific. He is the link between the operating fleet and the Bureau of Ships in the exercise of technical control of BuShips electronic equipments afloat and ashore outside the continental limits of the United States.

He prepares the directives necessary to support ship maintenance, industrial, and material policies of CinCPacFlt insofar as these apply to electronics. These directives include information on such matters as proper maintenance procedures, practices, records, and the use of available repair facilities.

He maintains liaison on electronic matters with CincPacFlt, other type commands, material bureaus of the Navy Department, area commanders, naval shipyards, Ship Repair Facilities, and subordinate commands of the service force. He keeps himself familiar with the progress of shore electronics installations at Pacific bases, by attending conferences and making periodic visits to these commands and bases.

ComServPac is the coordinator and acts for CinCPacFlt in supervising the technical and logistics aspects for all shore electronics installations at Western Pacific bases. This involves maintaining files of general information on each base, including equipment maintenance, and on the status of construction projects. It involves making recommendations on requests for changes in allowances of electronic equipments, reviewing annual electronic inspection reports of shore installations, and promulgating instructions on the above. In this connection ComServPac maintains close liaison with CinCPacFlt Assistant Chief of Staff for Communications. In addition, in cases where electronics work beyond the capacity of West Pac local commands and maintenance authorities (ShipRepFac's) is required, he assigns assist tasks to an industrial activity, (Pearl Harbor or CONUS).

The Electronics Material Officer recommends the locations and allowances (stock level) of electronic materials under BuShips cognizance. This requires supervising inventory, redistribution, care and preservation, salvage, and disposal of such material. To assist in carrying out this responsibility, he maintains complete inventories of electronic material at all Pacific Ocean area supply activities. He recommends to BuShips stock levels for the supply activities concerned, basing his recommendations on issue data, missions of the activities, and known or planned requirements. Redistribution among the various supply activities is accomplished as necessary to meet changing conditions.

He also supervises release from stock of BuShips special electronics material in the Pacific Ocean area. Further information on this material is to be found in the *BuShips Manual, BuShips Index of Special Material,* and *BuShips Material Control Plan.* (The Navy Supply System and repair parts supply are discussed in later chapters.) He advises the fleet supply officer on the technical aspects, stock levels, and load lists of materials other than "F" Cognizance used in support of electronic equipments.

The Electronic Material Officer is responsible for administering the allowance of contract field service technicians and for designating assignments to mobile electronics technical units and Pacific area ship repair facilities. The use of contract field service technicians is discussed in the chapter on Work Beyond Capacity of Ship's Force.

Mobile Electronics Technical Units (METU) are composed of naval and civilian technical electronics specialists who assist ships in performing maintenance and repairs. They also assist in training ETs aboard ship. The Electronics Material Officer supervises ComServPac administration of METUs.

The Electronics Material Officer's responsibilities for ServPac ships parallel those

of any other type electronics officer. He gives technical assistance and advice to his department head on maintenance, alterations, allowance changes, and repair of electronic equipments, and he specifically recommends action on electronics work requests. He renders technical assistance to and advises the ServPac Ordnance and Gunnery Officer on electronic equipment employed in connection with harbor defense and ordnance fire control systems. He maintains a complete inventory of harbor defense electronic equipment in the Pacific Ocean area. Administrative and material inspections are conducted as in other type commands and the same records and reports are required.

In addition to his regularly assigned tasks, the ServPac Electronics Material Officer is responsible for any special assignments received from the various material bureaus or CinCPacFlt. These assignments may include such things as maintaining control of certain critical material, conducting special inspections, commenting on fleet personnel and material problems, and assisting material bureaus in obtaining information for bureau projects.

To assist in carrying out his responsibilities, the ServPac Electronics Material Officer has several officer assistants. The number of assistants and the division of duties may vary with the needs of the force. Usually there are the following assistants: Senior Assistant Electronics Material Officer, Assistant Electronics Material Officer for Shore Facilities, Assistant Electronics Material Officer for Ships, and Assistant Electronics Material Officer (Technical Services). This last assistant serves as Officer in Charge, Mobile Electronics Technical Unit ONE, with collateral duties on ComServPac Staff.

ComServPac administers his ships through service squadrons. These squadrons represent the Service Force in the field, and during World War II, they were responsible for on the spot decisions in the many problems of ship maintenance and battle damage repair.

The ServRon maintenance officer coordinates all local or squadron maintenance activities, such as those aboard assigned repair ships and floating dry docks. Depending upon its size, a squadron may be divided into service divisions with further subdivision into service units. During World War II, for instance, such subdivisions enabled the distribution of afloat repair facilities at advanced outposts where shore repair facilities were not yet established or where established shore facilities required supplementing. Each of the subdivisions has a staff maintenance officer who controls local maintenance problems.

The ServRon maintenance officer maintains close liaison with the commander of operational forces in the area in order to keep assignments of availabilities within the capacity of his maintenance facilities, to distribute work among his facilities, and to determine the necessary number, type, and distribution of his facilities to maintain required standards. He maintains such records as are necessary to keep informed of the current status of each of his facilities with regard to personnel, capacity, and workload.

It devolves upon division and unit maintenance officers to review and accept, or trim, work requests from ships; exercise immediate supervision over the conduct of work by repair ships; prepare docking schedules if floating docks are available; and report to the ServRon commander the workload and personnel status in the various repair departments. All staff maintenance officers are responsible for furnishing technical advice to ships requiring or requesting it. They also take such steps as are within their province for obtaining special material and parts. These smaller staffs form the chain of command between Service Force ships and ComServPac. Within each echelon, the staff electronics officer assists and advises on matters pertaining to electronics.

COMSERVLANT

Although greater distances in the Pacific Ocean present logistics problems not found in the Atlantic, the over-all organizations of the two Service Force staffs are essentially the same. In the Atlantic, however, the staff of the Service Force is separate from that of CinCLantFlt. In general, staff maintenance functions for the Atlantic Fleet are performed by the appropriate section of CinCLantFlt's staff, with the staff of ComServLant concerned primarily with type (Service Force) maintenance. Certain electronics responsibilities for the Fleet as a whole have, however, been

delegated to ComServLant. Briefly, these responsibilities are as follows:

1. Administration of civilian electronics technicians assigned to the Atlantic Fleet to provide on-the-job training of enlisted personnel and to assist forces afloat with electronic installations and repairs.

2. Administration of Mobile Electronics Technical Units to provide engineering and technical assistance on installations and repairs beyond the capacity of ship or tender forces and to provide a nucleus of skilled technical personnel for wartime expansion and deployment to forward areas.

3. Provision of necessary boats, crews, and facilities for calibrating shipboard direction finders and for taking antenna radiation patterns.

4. Control of allocations and issues of electronic repair parts and equipments when directed by CinCLantFlt.

5. Logistics support of the fleet and appropriate bases insofar as electronic parts are concerned.

6. Operation of the wartime equipment pool.

7. Conduct of pretraining checkouts of Atlantic Fleet ships.

In carrying out the responsibilities outlined in paragraphs 1 and 2 above, ComServLant assigns civilian technicians and supervisory naval personnel to fleet commands outside the Norfolk area as required. He also assigns civilian technicians to tenders and repair ships to advise and assist repair department personnel and those of ships alongside.

ServLant Pretraining Checkouts

The purpose of pretraining checkouts is to determine the operational and material readiness of electronic equipment installed in Atlantic Fleet ships prior to the reporting of these ships for training. They determine such factors as (1) the operational readiness and physical condition of each electronic equipment and system installed in the ship and (2) whether or not any noted deficiencies require correction before the ship can undertake required training exercises. The checkout team is charged with assisting the ship's force in correcting deficiencies insofar as feasible within the time assigned. The team then informs the ship of methods for obtaining additional assistance if such is required.

Pretraining checkouts are scheduled for the period between end of overhaul and departure of the ship for training.

At the conclusion of the checkout a critique must be held and all major deficiencies discussed. A rough list of all deficiencies, noting the status thereof, should be left with the ship. The final report, prepared from rough copies of equipment sheets, is in letter form but is not graded. It must state, however, whether or not the ship's electronic equipment is satisfactory to undergo training. If found not satisfactory, the reason for such finding must be stated. A list of equipment deficiencies found, corrective action taken, and, when required, further corrective action necessary must be included as Enclosure (1) to the report.

Normally the report will be addressed to the type commander, with copies to CinCLantFlt, ComTraLant, ComServLant, the ship, the yard at which the ship recently completed overhaul, and the Bureau of Ships. When the type commander is also the command performing the checkout, the report is addressed to the commanding officer of the ship concerned, via the administrative chain of command. Type commanders may vary the routing and addressing of these reports as long as designated addressees receive copies.

ComServLant Instruction 9670.5A gives additional information on pretraining checkouts. Enclosures to the instruction include a sample material inspection letter report, with a sample form for reporting deficiencies found and action recommended; a sample inspection summary sheet, with instructions for its use and an explanation of the grading system required; and a sample pretraining checkout report.

Operational Development Force[1]

Chapter 1 includes a discussion of the duties of the electronics officer attached to a ship assigned to the Operational Development Force. The present discussion refers to the EO attached to the staff of the commander of this force (ComOpDevFor).

[1] Changed to Operational Test and Evaluation Force.

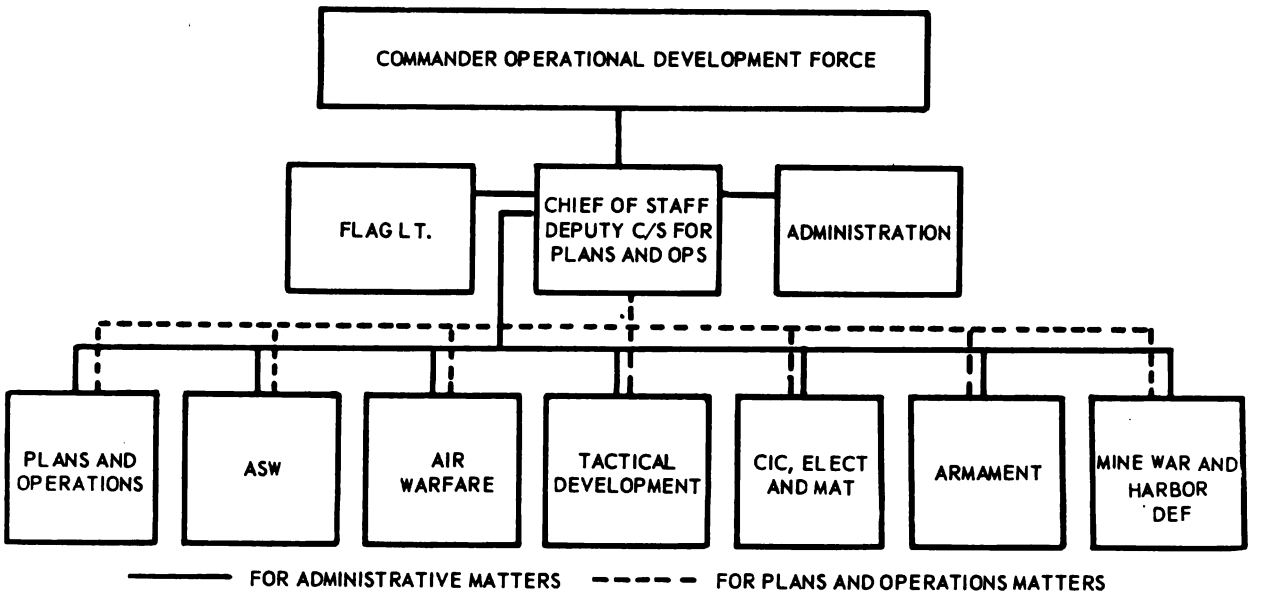


Figure 6-6.—ComOpDevFor staff organization.

The mission of the Operational Development Force is:

1. To evaluate, by operational tests and reports, such projects as may be assigned. These projects arise from: (a) proposals for, and development and introduction into the fleet of, new weapons and equipments and new methods of employment and (b) efforts to secure more effective use of standard equipment and weapons currently installed in the fleet.

2. To recommend training procedures, training aids, all types of countermeasures, and changes in tactical doctrine incident to the proposals and efforts outlined in item 1.

3. To assist other naval and extra-naval agencies engaged in evaluation projects by furnishing services and facilities.

Operational evaluation of new material developments, to determine their usefulness or adequacy to meet the needs of the Navy, is a function of the Chief of Naval Operations. Upon completion of the development and technical evaluation of new weapons, equipments, or systems by the cognizant bureaus and offices, the Chief of Naval Operations assigns to the Commander Operational Development Force, or other afloat activities, projects for conducting the operational evaluation of this material. Such evaluation is conducted under service, or simulated service, conditions with service personnel. Basing his decisions on the results of these evaluations, CNO determines whether or not the equipment is acceptable for service use and so advises the cognizant bureaus and offices.

The Chief of Naval Operations also assigns to forces afloat certain projects by which the afloat activity assists a technical agency in conducting tests. Under these projects, participation by the Operational Development Force, or other afloat activities, is limited to furnishing ships, aircraft, or personnel. All test data are obtained by the technicians furnished by the activity which requested the project. Such a project is considered as assist project and normally the report submitted by the assisting force consists only of a letter reporting completion of the project.

As soon as a cognizant bureau or office makes firm plans for the operational evaluation of equipment, it requests from CNO the assignment of a project for the desired evaluation. This request contains the following information: purpose of the evaluation, description of equipment to be evaluated, scope of tests to be made, status of the equipment, and classification and security requirements. It also includes remarks indicating the approximate date on which the tests should start, estimated number of operating days required to complete the evaluation, availability of technical personnel from the activity requesting the evaluation,

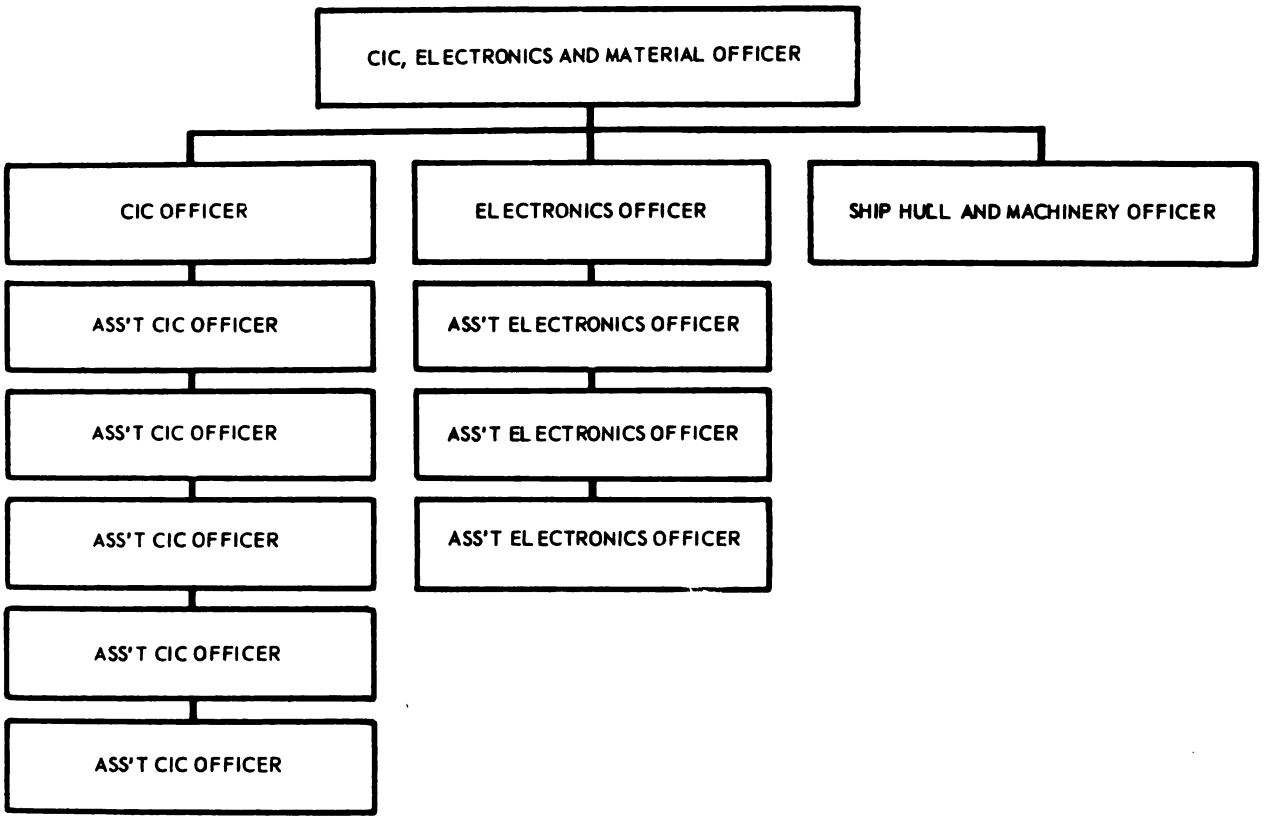


Figure 6-7.—CIC, Electronics, and Material Division of OpDevForStaff.

and the name of liaison personnel for the project. Information on deadlines, production, and fiscal matters may be included also, if applicable.

All types and classes of ships may be assigned to the Force temporarily. Some are permanently assigned, but these are not necessarily representative ships, since, for example, a gun may have been removed to compensate for the weight of an equipment installed for evaluation. The vessels permanently assigned make up an organization composed of destroyers and various small ships. The permanent Force also includes air development squadrons and an airship, a surface antisubmarine development detachment, a mine warfare evaluation detachment, and a guided missile evaluation unit. Larger ships such as carriers, cruisers, and large amphibians, may be assigned temporarily in connection with a particular project.

In connection with paragraph 3 of the OpDevFor mission, personnel from ships and shore activities not under the cognizance of ComOpDevFor may be assigned temporarily to the Force. For instance, the Naval Research Laboratory may assign military and civilian engineers and technicians to ComOpDevFor for the evaluation of a specific project.

In addition to working alone or with personnel temporarily assigned to ComOpDevFor, project officers from OpDevFor are often assigned to the fleet during exercises or in the prosecution of projects requiring their presence in ships other than those assigned to the Force.

In other instances—for example, in developing air defense tactics—the OpDevFor staff may design projects to be carried out by the entire fleet.

OPDEVFOR STAFF EO

Figure 6-6 presents the staff organization under the Commander Operational Development Force. Figure 6-7 shows the CIC,

Electronics, and Material Division of this staff in detail and indicates that the head of Electronics Section carries the title, Electronics Officer. This officer has the following administrative and evaluative responsibilities.

ADMINISTRATIVE RESPONSIBILITIES:

1. Advise the Force commander and other staff departments on matters pertaining to the development, design, installation, maintenance, and utilization of electronic equipment.

2. Take staff action on all matters pertaining to the installation, maintenance, repair, and removal of electronic equipment in ships and aircraft of the Operational Development Force.

3. Administer the electronics organization within the CIC, Electronics, and Material Division. This organization consists of several officer assistants and specially trained enlisted technicians.

4. Maintain a record of electronics equipment installed in ships and aircraft of the Force.

5. Maintain a technical library consisting of current technical publications, technical reports and studies, pertinent naval publications, and standard electronics engineering reference books.

6. Maintain an electronics repair shop and an allowance of special test equipment.

7. Advise and assist all ships and units of the Force in the installation and maintenance of both regularly allowed electronics equipment and that assigned for evaluation.

EVALUATIVE RESPONSIBILITIES:

1. Prosecute or supervise assigned projects. Those projects normally assigned for both operational and material evaluation consist of the following:

a. Major communication equipments.
b. Communication equipment accessories such as antennas, transmission lines, couplers, monitors, and control units.
c. Radar equipments including display units, and special equipments such as electronic processing systems.
d. ECM equipment and accessories such as antennas, control and display accessories.
e. Sound powered and I. C. equipment.
f. Complete communications and ECM systems.
g. Infra-red equipment.
h. Cryptographic equipment.

2. Assist other staff divisions in the prosecution of the electronics portions of projects assigned to those divisions. This involves material tests of equipment and complete systems.

3. Maintain files of information on new developments in the field of electronics, keep himself informed of future plans for new development applications, and maintain files on the equipments used in various ships.

In carrying out his responsibilities for equipment evaluation, the staff electronics officer assists in designing specific tests for completely investigating the equipment or system to be evaluated. To ensure that available ships and aircraft are utilized efficiently, he assists the operations officer and the project coordinator in scheduling tests.

When all tests have been completed, the EO assists in coordinating the data and preparing the project report. Each report is passed through the entire staff department for review. This is done in an effort to make the report a true evaluation of the equipment—to prevent, for instance, biased reports by enthusiastic technical personnel who may be unfamiliar with the operational implications of test results or, vice versa, by operating personnel who may not recognize the equipment's technical limitations. In all instances the expected employment of equipment, and the abilities of the men who will use and maintain it, must be borne in mind when reporting an equipment's potential value to the Navy. Because these reports influence the Navy's future electronics planning, they are exceedingly important.

CHAPTER 7

ELECTRONICS ASHORE--BUSHIPS

Since the outbreak of World War II the application of radio principles has grown from a comparatively simple field to one that is highly complex. The Bureau of Ships has played an important part in this growth and continues to have broad and important responsibilities in the field of naval electronics. An electronics officer is therefore likely at some time to be assigned a billet in this Bureau or at some activity under its management control.

The Bureau of Ships exists to build and maintain ships and certain systems of the Navy in the highest state of material readiness for war. To do this, it designs, buys, builds, converts, alters, repairs, maintains, and equips (except for equipment supplied by the Bureau of Aeronautics and the Bureau of Ordnance) ships of the Navy, except for certain types of service craft which are assigned to the Bureau of Yards and Docks. It exercises management and technical control over those activities of the shore establishment engaged in design, construction, and repair of vessels; and over laboratories engaged in research, tests, and design development pertaining to shipbuilding and ship propulsion. It exercises technical control over inspection of equipment procured by the Bureau.

This chapter discusses the over-all electronics responsibilities of the Bureau of Ships and its organization for carrying out these responsibilities. In general, only those organizational segments having responsibility for some phase of electronics work are discussed in detail.

Bureau Electronics Responsibilities

Bureau of Ships responsibilities for, and technical control of, Bureau of Ships electronic equipments used by the Navy include research, design, preparation of specifications, development, procurement, manufacture, testing, inspection, distribution, survey, alteration, repair, plant engineering, installation, maintenance, inactivation, preservation, and preparation and distribution of technical instructions pertaining thereto.

The Bureau of Ships is, in addition, responsible for:

1. Administration of the Bureau of Ships Electronics Maintenance Engineering Program.

2. Ensuring the proper maintenance support for services beyond the capabilities of forces afloat.

3. Monitoring, inspection, and control of fleet maintenance of shipboard electronic equipment.

4. Coordination of the Bureau of Ships Electronics Maintenance Program with other agencies of the Navy Department and Department of Defense, in order to ensure completeness and consistency.

5. Preparation and promulgation of the Ship Electronics Allowance List, SEAL (Groups S67 and S69 of the ships Revised Individual Allowance List, (RIAL)—being converted to COSAL.)

6. Research, development, design, specifications, and tests of electron tubes, electronic components, parts, and materials, except those peculiar to the needs of the Bureau of Ordnance and the Bureau of Aeronautics.

7. Standardization of electronics components and parts.

8. Preparation and promulgation of Electronics Repair Parts Allowance Lists (ERPAL). (Redelegated to Commanding Officer, Electronics Supply Office.) ERPAL is also being converted to COSAL.

9. Nomenclature, nameplates, and identification plates for all electronics parts, subassemblies, assemblies, units, groups, sets, systems, and accessories, except those nameplates and identification plates peculiar to the needs of the Bureau of Ordnance and the Bureau of Aeronautics.

10. Management control at its assigned shore activities of installation, maintenance, repair, alteration, and appropriate tests of ordnance electronics equipment, subject to technical control by the Bureau of Ordnance.

11. Procurement of cryptographic equipment (including special tools therefor), alterations authorized by CNO, and maintenance and repair of such equipment. (Distribution and property accounting is under CNO cognizance.)

12. Coordination within the Department of the Navy and liaison with other departments, offices, and agencies, as appropriate, of the technical and material phases of interference reduction.

The Bureau of Ships also has certain responsibilities for Marine Corps, Military Sea Transportation Service, Coast Guard, and Military Assistance Programs electronic equipments.

With respect to training FACILITIES, the Bureau of Ships is responsible for:

1. Providing and installing the necessary electronic equipment under Bureau of Ships cognizance.

2. Making major repairs to such equipment.

3. Ensuring that adequate repair parts for the equipment are in the supply system. Financial responsibility for NSA material required for day-to-day operation and upkeep of electronic training equipment is assigned to the Bureau of Naval Personnel.

4. Replacing or reinstalling such equipment when necessary either within or remote from the activity or location at which previously installed. If the transfer, removal, or reinstallation of the equipment concerned is accomplished at the request, or for the convenience, of a bureau having neither cognizance of the equipment nor responsibility for the training involved, the financial responsibility for the cost so incurred will be that of the requesting bureau or office.

With respect to training FUNCTIONS, the Bureau of Ships includes as part of the equipment production contract, provisions for:

1. Training at factory, yard, or school for a nucleus of installation, maintenance, and instructor personnel prior to the first installations of electronic equipments procured in production quantities and for those developmental equipments which are expected to culminate in production contracts.

2. A proposed training course to the Bureau of Naval Personnel, suitable for use in Navy electronics schools, on equipments procured in production quantities and for those developmental equipments which are expected to culminate in production contracts.

3. The professional services of commercial electronics technical personnel to assist in the training of military and civilian personnel.

4. An estimate to the Bureau of Naval Personnel of the number of personnel, by rates, required to operate and maintain the equipment.

Further responsibilities for electronics training include:

1. Advising the Bureau of Naval Personnel when training courses on specific equipments should be initiated or terminated.

2. Advising the Bureau of Naval Personnel of requirements for implementing study courses involving new or novel circuits and techniques which are expected to be incorporated in Navy electronic equipments.

Bureau Organization

The Chief of the Bureau of Ships is assigned authority and responsibility for accomplishing the Bureau's mission. He is aided by a deputy and assistant chief of bureau who is his principal executive assistant, six assistant chiefs, the comptroller, and the director of contracts.

Each of these heads a major organizational segment of the Bureau. Four of the assistant chiefs are concerned with vessel design and component specifications, construction, and repair: the assistant chiefs for ship design and research, shipbuilding and fleet maintenance, technical logistics, and nuclear propulsion. Responsibilities of these, and of the assistant chief for field activities, are discussed more fully later.

The Assistant Chief for Administration Code 200 provides the administrative services necessary to the operation of Bureau headquarters. The director of contracts buys the ships, ships' parts, and services which the Bureau supplies to the fleet. The comptroller develops and administers the budget and supervises the accounting for Bureau funds.

In addition to these major organizational units, the Chief of the Bureau is assisted by various special assistants: the Inspector General, Director of Planning, Coordinator of Undersea Warfare Planning, Director of Value Engineering, Special Assistant for Legislation and Liaison, and Office of Counsel, Office of the Patent Counsel, and the Planning Council. These officials serve in a staff capacity to the Chief of Bureau, advising him and recommending action on matters under their cognizance.

In the area of electronics, the Chief of the Bureau of Ships has responsibilities as previously listed. The organization for carrying out these responsibilities is indicated in discussions of the responsibilities of the assistant chiefs of the Bureau. Also indicated in these discussions is the integration of electronics functions into various organizational segments of the Bureau. Such integration provides for the performance of electronics functions under the same general organizational pattern provided for performing functions in other specialty areas (see fig. 7-1).

Throughout this discussion, the reader must bear in mind that detailed organizational assignments as here presented are not entirely firm. This means that officers assigned to duty in the Bureau will need to acquaint themselves with the organization as it then exists. They will find, however, that the general pattern is firm and that the functions described here are being performed, regardless of possible shifts within the over-all organization.

SHIP DESIGN AND RESEARCH

The Assistant Chief of the Bureau for Ship Design and Research (Code 300) is responsible for administration and coordination of Bureau research and development programs and preparation of design of all naval ships, including conversions and major alterations. Under this assistant chief, there are two divisions—the research and development division and the ship design division.

Research and Development Division

The director of the research and development division administers and coordinates the research and development programs of the Bureau of Ships. With the assistance of assigned staff and operating personnel, he discharges the following specific responsibilities. He plans and conducts research and development programs contributing to the fund of scientific knowledge upon which the Navy and the Bureau depend for success in ship design, equipment design, and research programs. He coordinates Bureau research and development programs within the Bureau, with Bureau laboratories, and with outside agencies. He establishes standards and specifications for basic materials; exercises management and technical control over Bureau of Ships laboratory programs and funds; and exercises management and technical control over U. S. naval inspection offices for petroleum in foreign countries.

In carrying out the above duties, the research and development division maintains liaison with Navy, Defense, and Federal activities; and with private industry, professional and technical societies, foreign governments, and international organizations.

Within the research and development division, there are program planning officials having responsibility for each of the engineering disciplines, including electronics.

Ship Design Division

The ship design division designs the ships of the Navy. This includes preparation of designs for new ships and ship types, conversions, major alterations, small boats and landing craft, and conversions of merchant ships for naval use. Personnel of the division work closely with personnel from the Office of the

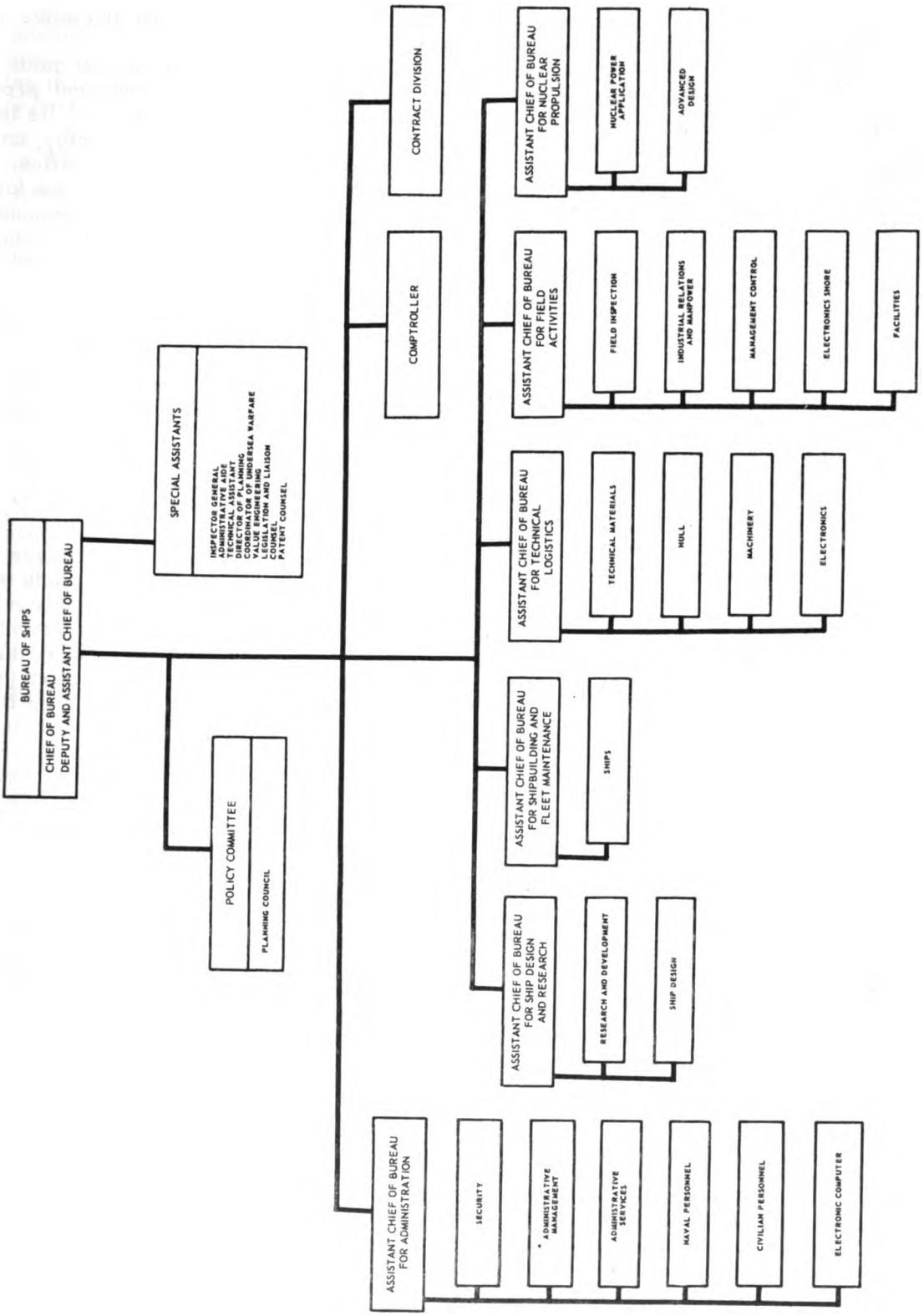


Figure 7-1.--Bureau of Ships organizational chart.

Chief of Naval Operations, the Ships Characteristics Board, and with other branches and divisions of the Bureau of Ships. Working within limits set by the Chief of Naval Operations, the division prepares preliminary designs and contract plans and specifications for ship construction.

This division consists of the following organizational subdivisions: specification administration and coordination section, preliminary design branch, machinery design branch, hull design branch, electronics-electrical design branch, and conversion design branch.

ELECTRONICS-ELECTRICAL DESIGN BRANCH.—In this branch there are four electronics officer billets—the branch head and three project officers, including an assistant for combat direction stations. Project officers are responsible to the branch head for system design of electronic and electrical systems aboard new construction and conversion ships. One of their primary duties is procuring and preparing facts and data on shipboard electronic equipment and systems for presentation to the Ships Characteristics Board and other interested groups. When collecting and preparing data for the Board, they work closely with the assistant chief of the bureau for ship design and research.

To indicate more clearly the electronics areas for which these officers have some responsibility, certain functions of the ship electronic systems design section of this branch are listed below.

1. Creative, developmental, and experimental efforts in scientific and progressive electronics fields, which may result in the evolution of new shipboard systems or improvement of existing systems.

2. Development and design of coordinated and compatible electronic systems for all types and classes of naval ships.

3. Review and approval of all proposed physical and electrical changes to shipboard electronic systems.

4. Establishment of governing policies and administration of the shipboard electronic equipment and systems compatibility program, and coordination with other bureaus and Department of Defense agencies as applicable.

5. Procurement and preparation of shipboard electronic equipment and systems application facts and data for presentation to the Ships Characteristics Board and other interested groups.

6. Administration and technical guidance of the shipboard antenna improvement program of the Bureau and coordination of its implementation by shipyards, laboratories, universities, contractors, and other activities.

7. Establishment of requirements for new auxiliary units and accessories necessary to complete shipboard systems and furnishing technical characteristics to the applicable equipment and design group.

8. Review of Operational Development Force reports, attendance at inspection and survey trials, and maintenance of close liaison with fleet operational groups in order to provide feed-back data on shipboard electronic systems.

SHIPBUILDING AND FLEET MAINTENANCE

The Assistant Chief of Bureau for Shipbuilding and Fleet Maintenance (Code 500) is responsible for procurement, construction, repair, and maintenance of ships, amphibious craft and vehicles, boats, surface targets, barges, and service craft of the Navy (except service craft assigned for control to the Bureau of Yards and Docks); for development and coordination of design of ships and for conversion of ships (after approval of contract plans and specifications); and for the planning, preparation, and justification of budgets and the administration of funds to support programs under his cognizance.

The operating groups under Code 500 are the ship branches (colloquially: "Type Desks") within the ships division. The ship branches are organized by the type of ship; for example, the submarines branch. They are responsible for management of matters pertaining to new construction, conversion, and ship maintenance programs throughout the Bureau, field, and fleet and for coordination of the design of new ships and conversion with practical experience from the fleet relative to ships types assigned.

There are four electronics officer billets in these branches, one each in the cruisers, carriers, destroyers, and submarines branches. At present these are all LCDR billets. Since this is the division where final planning for putting a ship together takes place, these officers are responsible for any coordination

and expediting necessary to ensure timely availability of electronic equipments for installation in individual ships under construction or being converted or altered.

TECHNICAL LOGISTICS

The Assistant Chief for Technical Logistics is responsible for directing and coordinating the technical logistics programs of the Bureau of Ships. This includes responsibility for the budgeting for and the design, development, procurement, distribution, installation, maintenance, and repair of all hull, machinery, electrical and electronic components, equipments, and systems essential to the shipbuilding and fleet support programs. The four divisions under this assistant chief are the technical material, hull, machinery, and electronics divisions.

Functions of certain organizational segments under this assistant chief are given in some detail to indicate the relationship of this area of Bureau responsibility to many of the electronics jobs discussed throughout this text.

TECHNICAL MATERIALS DIVISION

The director of the technical materials division is responsible for executing and implementing material management policies and functions within the Bureau of Ships for Bureau of Ships special material (S cognizance) and for major electronic equipments (F cognizance). He directs the business functions associated with materials, such as the planning, execution, and implementation of methods and procedures pertaining to procurement, inventory management, inventory statistics, material management manual, logistics planning for "S" and "F" material, material requirements and funding, distribution and disposal of material, cataloging, controlled materials, ship statistics, material delivery status, and ship allowances.

He is also responsible for maintaining effective liaison on material matters with other bureaus and agencies, supply demand control points, offices of the Navy Department, offices of the Secretary of Defense, fleet supply staffs, and field activities.

In addition to heads of the following branches and sections, the division director is assisted by an assistant for inventory management (S cognizance), a special projects officer, an assistant for Marine Corps liaison, an assistant for inventory management (F cognizance), an assistant for management, and a staff assistant for liaison (S cognizance).

PLANNING BRANCH.—The planning branch is responsible for developing and coordinating inventory management policies for the Bureau of Ships and for executing and implementing policies and procedures for "S" and "F" type materials. It maintains liaison within the Bureau, with other bureaus and offices, and with inventory managers on matters of inventory management. It is responsible for policy and procedural planning for the Bureau of Ships for the several types of coordinated procurement.

"S" COGNIZANCE INVENTORY MANAGEMENT CONTROL BRANCH.—This branch directs the operation of inventory management and procurement programs, process coordinated procurement documents for "S" cognizance material, establishes and conducts liaison with field activities concerning inventory control functions for "S" cognizance material, and is responsible for all catalog functions for this material.

"F" COGNIZANCE INVENTORY MANAGEMENT CONTROL BRANCH.—The head of this branch directs, supervises, and administers the work of 6 assistants and 5 sections responsible for determining Bureau of Ships requirements for electronic material. More specifically, he directs the collation and analysis of data leading to the establishment of requirements; assists Code 614 with preparation and justification of budget requests; initiates procurement to fulfill requirements; initiates planning and establishment of production schedules; initiates shipments from manufacturing plants and between naval activities; authorizes issues of electronic material; receives and takes action on requests for electronic material; and directs disposition or utilization of excess material.

Titles of the following assistants indicate their areas of responsibility within this inventory management branch: staff assistant, assistant for electronic data processing machine and management planning, assistant for disposal and Government furnished material, assistant for interdepartmental and mutual defense assistance program matters, assistant for procurement, and assistant for requirements.

The communications section has logistics cognizance of radio transmitters and receivers, teletype, mobile radio, facsimile, and television equipment and for major components thereof.

The radar section has logistics cognizance of ship and shore radar, IFF, radar repeaters, AEW equipment, and associated components.

The sonar section has logistics cognizance of all sonar; sonar countermeasures; hydrographic, sonar, navigational aids, and harbor defense equipments; and associated components.

The special equipments section has logistics cognizance of radar and sonar test equipment, radiac, loran, radio and radar countermeasures, direction finders, infra-red equipment, and associated components.

With respect to the assigned equipments, each of the above sections performs the following functions:

1. Receives phased summaries from various Bureau codes indicating material needs for ship use, shore use, and use by other bureaus and departments.

2. Analyzes requirements for stock to meet the needs indicated by the above summaries, as well as needs for pipeline and maintenance purposes and needs of other production schedules for Government furnished material.

3. Maintains production requirement analyses for all material under its cognizance, taking into consideration existing stocks and already authorized production.

4. Advises appropriate codes on the feasibility of meeting the phased needs reported by these codes, suggesting substitutions when appropriate.

5. Plans phased production schedules and forecasts budgetary requirements for material with the concurrence of appropriate codes.

6. Initiates procurement under each of its production schedules.

7. Establishes requirements for Government furnished material needed to implement its own production schedules and takes appropriate planning, funding, and procurement actions through the cognizant codes.

8. Maintains up-to-date mobilization requirements for material under its cognizance, using methods similar to those outlined above.

9. Distributes material under its cognizance from production or from stock through the Electronics Supply Segment of the Navy Supply System.

10. Maintains records of all uninstalled material under its cognizance through the Electronics Supply Segment or such pool reporting systems as may be authorized.

The stock control section has logistics cognizance of electron tubes and repair parts. It plans and coordinates the provisioning of parts for new electronic equipments procured for or by the Bureau of Ships, establishing required quantities of repair parts to be procured. It plans initial requirements for new electron tubes and parts of new design, and initiates procurements thereof. It coordinates for the Bureau and assists the Electronics Supply Office in the distribution of critical tubes and parts. It furnishes equipment populations and planned requirements data to the Electronics Supply Office, with tubes and parts complements, to permit maintenance replacement. It assures availability of tubes and parts as Government furnished material. It maintains Federal Catalog Stock Number description card file.

PRODUCTION SCHEDULING AND RAW MATERIALS BRANCH.—This branch is responsible for administering all matters pertaining to raw and semifinished material requirements; securing raw and semiprocessed material for naval and commercial shipyards and private contractors for naval construction, conversion, alterations, and repair; expediting deliveries of contractor-furnished equipment or subcomponents as required; production control; ships statistics; and material delivery status within the Bureau of Ships.

Within this branch there is a unit in the raw materials section which is responsible for electrical-electronic material and a unit in the production progress section which is responsible for electronic equipment.

ALLOWANCE AND SUPPORT BRANCH.—This branch plans and develops over-all policies, requirements, and procedures for Bureau of Ships allowance lists, procurement of technical manuals, for mechanical and electrical equipment provisioning, bin drawer stowage of onboard and tender load repair parts, preparation of tender load lists, and the Fitting Out Program for new construction and conversion. It is responsible for over-all administration of the Allowance Program and for the development

of budgetary requirements for allowance list preparation and maintenance.

In the allowance and support branch, there is an electronics allowance and support section which directs the contract planning for all electronic equipments, components, electron tubes, and electronics services purchased by the Bureau; administers the disposal of obsolete and excess electronics materials and the SERAD program; and administers control of all electronics procurement activities initiated by the Bureau.

Hull Division

The hull division is composed of the following six branches: minesweeping; hull machinery; hull arrangements; weapons; metals fabrication; and damage control, ship salvage, and personnel protection. This division is concerned with the most basic part of the ship—the hull, into which must be placed all the complex equipment necessary to run the ship. Experts from division branches deal with such technical problems as hull arrangement and structure; preservation and insulation; welding, casting, and fabrication; damage control, salvage, and personnel protection; and armament and hull machinery consisting of steering gears, winches, elevators, cranes, hoists, and utility machinery. As indicated by branch titles, mine countermeasures for sea mines are also assigned to the hull division.

Machinery Division

The following eight branches make up the machinery division: steam turbines and gears; internal combustion and gas turbine engines; machinery arrangements and piping systems; refrigeration, air conditioning, and pumps; boilers and heat exchangers; propellers and shafting; electrical; and interior communication, fire control, and navigation. Branch titles indicate the areas of responsibility assigned to specialists in the machinery division.

Electronics Division

The director of the electronics division is responsible for the organization and direction of all work required in the design, development, test and evaluation, installation, maintenance, support, and production engineering of shipboard electronic equipments, components, and parts. He is also responsible for the development of shore electronic equipments. In addition, he provides engineering support to the U. S. Marine Corps and U. S. Coast Guard. He has five assistants, and a Coast Guard liaison officer, with duties as indicated below. See figure 7-2.

The assistant for Marine Corps programs administers research, design, development, applications engineering, production engineering, installation and maintenance functions for amphibious and Marine Corps electronic equipment.

The assistant for management performs management planning, including research and development budget, management statistics, and mobilization planning. He maintains liaison with other divisions, bureaus, et cetera, on policy matters concerning financial, program, and management planning. He also provides management services for the division.

The assistant for development directs and coordinates the research and development and applied engineering programs and the formulation of short and long range research and development plans to ensure a sound, forward looking electronics program. He maintains liaison with other divisions, bureaus, departments, and agencies for policy matters concerning applied research, design, and development.

The assistant for installation and maintenance directs and coordinates electronics division operations in providing installation guidance and technical data and in the development and implementation of maintenance programs to assist the Fleet in obtaining optimum performance of BuShips electronic equipments. He establishes policies for installation, maintenance, and support of electronic equipments.

The assistant for special projects provides military direction and coordination for wide range urgent projects as assigned to ensure maximum division effort. Such projects as anti-submarine warfare, Navy tactical data system, Polaris, sound surveillance, and operational control centers are assigned to this assistant.

The electronics division is divided into six branches. In their assigned areas, heads of four of these branches—radar, communications, sonar, and electronic countermeasures and parts—have similar responsibilities. Each

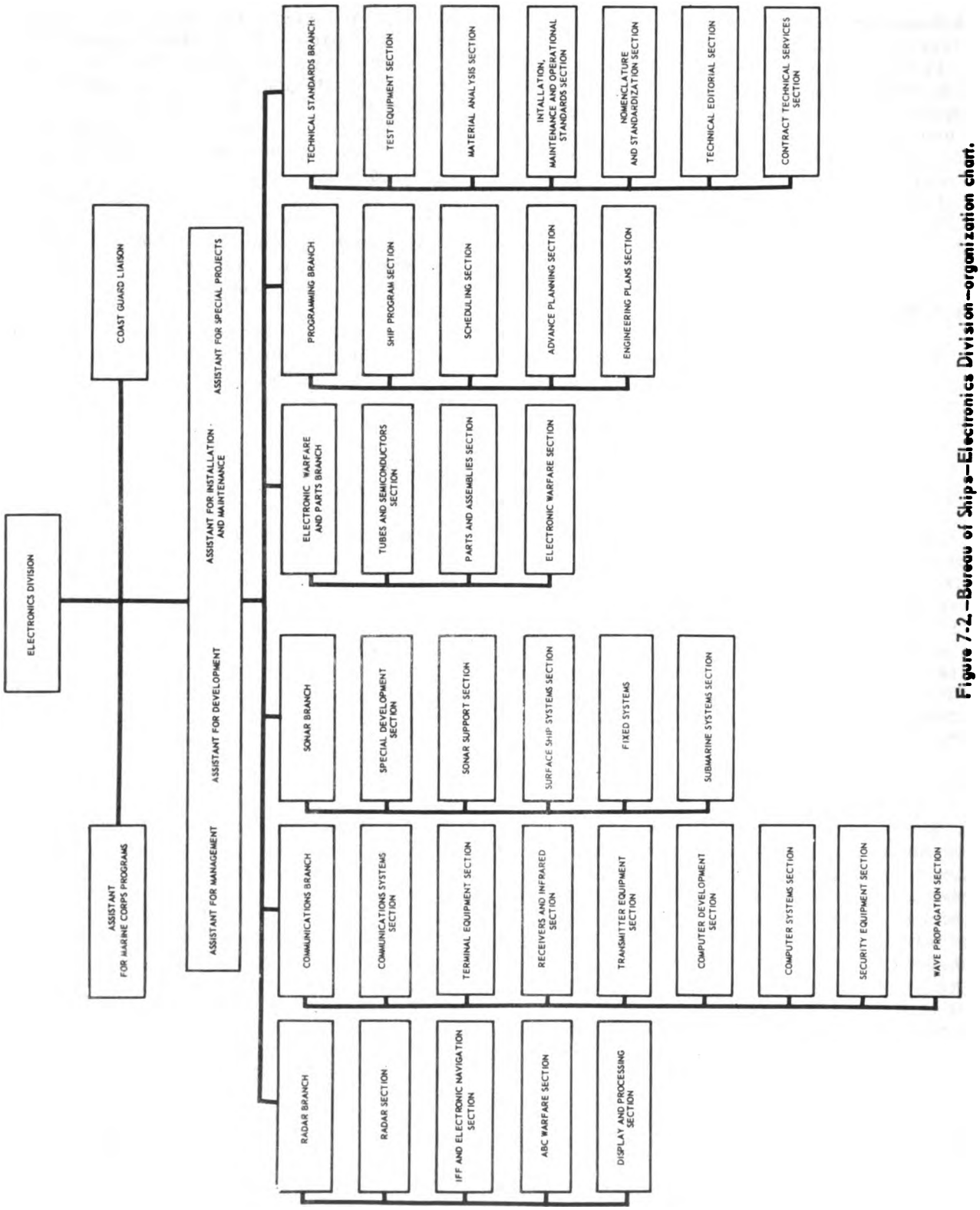


Figure 7-2.—Bureau of Ships—Electronics Division—organization chart.

directs and administers applied research, design, development, applications engineering, installation, and maintenance of technical items under his cognizance. As necessary, each branch head also maintains liaison and coordinates the work of his branch with other branches, divisions, bureaus, et cetera and provides technical support for logistics and procurement programs. In addition, the communications branch performs budgetary functions for security equipment.

RADAR BRANCH.—This branch is composed of the following sections, with responsibilities as indicated: radar section—air search, submarine, height finder and control, missile control and special applications, surface, and special air search radars; IFF and electronic navigation section—air traffic control, beacons, short and long range navigation, IFF, and aircraft approach and landing equipment; ABC warfare section—dosimeters and radiac equipment; and display and processing section—indicators, displays, data processing, Navy technical data system, and special devices.

COMMUNICATIONS BRANCH.—The eight sections of the communications branch, with their assigned responsibilities, are: communications systems section—single side band, amplitude modulated and frequency shift keying systems, data transmission, microwave and radio links, special purpose systems, antennas, and communication countermeasures; terminal equipment section—record communications, facsimile, data transmission, and television; receivers and infrared section—shipboard and shore receivers, infrared, anti-jam techniques, and receiver auxiliary equipment; transmitter equipment section—shipboard and shore transmitters, transceivers and portable communication equipment, RF antenna tuners, and auxiliary equipment; computer development section—special analytical systems, general purpose digital, digital input-output, data handling, and special projects; computer systems section—systems operation and program analysis, and ship digital data processing; security equipment section—research and development planning, electro-mechanical system, electronic system, applications engineering, and field services; and wave propagation section—noise and propagation.

SONAR BRANCH.—The sonar branch has responsibility for various underwater physical phenomena (primarily acoustic). Responsibilities of the five sections in this branch are as follows: special development section—mine and torpedo developments, special equipment, harbor defense, and variable depth; sonar support section—oceanography, analysis, applied research, and instrumentation; surface ship systems section—active, passive, and attack sonar; classification, depth determining sonar, and mechanical systems; fixed systems section—project officer (ocean defense) and project officer (range instrument); and submarine systems section—active and passive sonar, classification, communication, and navigation.

ELECTRONICS WARFARE AND PARTS BRANCH.—There are three sections in the electronic warfare and parts branch. The tubes and semiconductors section is responsible for semiconductors, receiving tubes, microwave tubes, power, gas, and radiac tubes, and display tubes and techniques. Tube standardization and tube complement reports are also administered in this section. The parts and assemblies section is responsible for common usage parts and assemblies and for administering the standardization programs for these items. The electronics warfare section is responsible for jamming and deception, electronic interception, direction finders, underwater electronic countermeasures, and integrated equipment.

PROGRAMMING BRANCH.—The programming branch consists of four sections, with assigned responsibilities as indicated in the following paragraphs.

The ship program section prepares the Ship Electronic Installation Plan (SEIP); develops and prepares the Ship Alteration Material Summary (NavShips 4661); and the Bureau Responsibility Material (NavShips 3855) for new construction and conversion of ships. It prepares shipboard electronics allowance lists, maintains class master planning sheets, and administers the electronic accounting machine system for shipboard electronics requirements. It also prepares the Ship Type Electronics Plan (STEP) Key.

The scheduling section administers the electronics portion of the Military Improvement Program and the Operations Improvement Program. It provides allocation guides for equipment distribution, reviews tentative allocations for compliance with priority guides, and furnishes future installation rates to the technical

materials division of the Bureau. It assists the shipbuilding and fleet maintenance division in budgeting for installation funds. It administers the ship electronics installation record system and the electronics distribution schedule. It also plans equipment programs for ships in or out of commission.

The advance planning section provides advance planning for shipboard electronics programs. More specifically, it prepares guides for proposed ship improvements, prepares project cards and revisions for catalog of material improvement, and serves as liaison with CNO on related matters. It performs long range budget review to ensure continuity of improvement and maintenance replacement programs. Coordination and maintenance of Appendix A of STEP is also this section's responsibility.

The engineering plans section provides engineering drafting services for the electronics division. From engineering notes or specifications, it develops equipment installation plans, bills of material, mono-details, etc. It administers procurement and distribution of, and prepares specifications for, manufacturing drawings, microfilms, and prints, maintaining files of these items and conducting liaison on matters related to the drafting of manufacturing drawings.

TECHNICAL STANDARDS BRANCH.—Functions assigned to the five sections of the technical standards branch are outlined below.

The test equipment section is responsible for applied research, development, and applications engineering for all electronic test equipment. The section establishes applications, requirements, priority of distribution, and calibration of shipboard test equipment.

The material analysis section develops, administers, and coordinates electronics support involving maintainability, reliability, frequency allocation, interference reduction, training, and value and human engineering.

The installation, maintenance, and operational standards section develops, maintains, and exercises technical control of standards for installation, operation, performance, maintenance, and testing of shipboard electronic equipment.

The nomenclature and standardization section coordinates participation by Bureau of Ships electronics codes in Department of Defense standardization. This section exercises nomenclature control over all electronic equipments designed, developed, or procured by the Bureau of Ships, Bureau of Ordnance, Bureau of Aeronautics, Marine Corps, and Coast Guard. It represents the electronics codes in the Federal cataloging program.

The technical editorial section directs and administers electronics technical publications requirements, including quantity and distribution. It coordinates and approves publications, including technical manuals, prepared by contractors, and it prepares publications specifications.

The contract technical services section initiates requirements and administers all Bureau of Ships electronics technical service contracts and technical services furnished under equipment contracts. It also coordinates the budget and shopping list for electronics technical programs and services for the Ships and Facilities Navy budget project.

FIELD ACTIVITIES

The Assistant Chief of Bureau for Field Activities (Code 700) supervises the management of Bureau field activities which include naval shipyards, offices of industrial managers, supervisors of shipbuilding, naval inspectors of ordnance, naval inspectors of machinery, and miscellaneous activities engaged in research and in ship repair. The organization under this assistant chief is composed of the field inspection and work planning division, management control division, industrial relations and manpower division, electronics shore division, and facilities division. These divisions are concerned with such management phases of field activities as organization, procedures, and methods used in the field; staffing (both military and civilian); distribution of work to field activities, private yards, and private industrial plants; industrial mobilization planning; administration of an industrial relations and manpower program for field activities; development of specifications for industrial equipment and tools used in shipbuilding; and shore electronics. Certain field activities supervise and inspect the work of private firms which manufacture equipment for the Bureau. These activities are in turn supervised by Bureau field activities divisions.

Electronics Shore Division

Figure 7-3 shows the organization of the electronics shore division. Functions of the

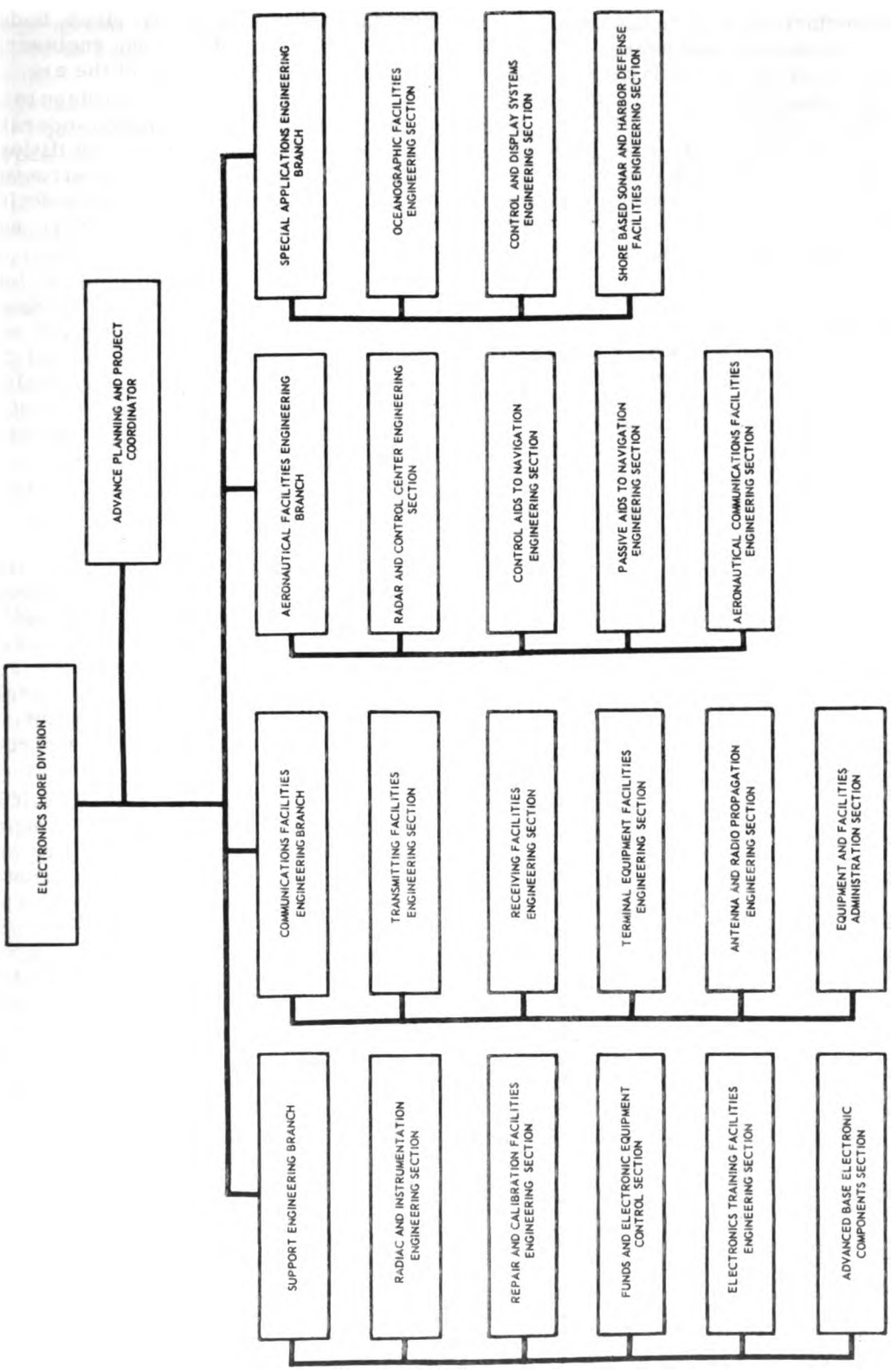


Figure 7-3.--Bureau of Ships--Electronics Shore Division--organization chart.

division are performed within this organizational framework as indicated below.

The Electronics shore division director supervises and administers plant engineering for all shore electronics facilities of the Department of the Navy. He exercises engineering supervision over installation, maintenance, and improvement of shore electronic and auxiliary equipment, prescribing pertinent engineering standards for new and existing installations and advanced base functional components. He maintains liaison with other bureaus and agencies relative to shore engineering programs. He is assisted by a chief engineer, an assistant director, an advance planning and project coordinator, and the following branches and sections, having functional responsibilities as indicated.

SUPPORT ENGINEERING BRANCH.—This branch plans, supervises, and administers plant engineering for electronics repair and calibration facilities, and for Navy and Naval Reserve training activities. It administers the electronic test equipment program for shore activities and the radiac program for Navy and Coast Guard shore activities and naval aircraft squadrons. It coordinates military construction and interbureau procurement programs for shore based electronic equipment, compiles the division's annual budget estimates, and administers the preparation of allowance lists and bills of material for the electronics portion of the advanced base program.

The following sections perform branch functions within the areas specified by their titles: radiac and instrumentation engineering section, repair and calibration engineering section, procurement liaison section, electronics training facilities engineering section, and advanced base electronics components section.

COMMUNICATIONS FACILITIES ENGINEERING BRANCH.—This branch plans, supervises, and administers plant engineering for all shore naval communications facilities, except those under management control of the Bureau of Aeronautics. The Naval Communications System, under the management control of CNO, is the branch's major responsibility. In performing plant engineering functions, the branch:

1. Develops and maintains engineering criteria and standard plans publications for communications facilities; plans, budgets for, and controls an applications engineering program to advance the state of the art.

2. Provides consultant services to management bureaus for maintenance, operation, and budgetary support of current facilities, and of improvement, and military construction projects. It carries out line responsibilities for these functions for fleet support ashore at BuShips-managed activities.

3. Plans and designs facilities for major improvement and military construction projects by establishing specific plant engineering criteria for each project and following through to completion by approvals of installation design and schedules of Bureau maintenance authorities or contractors, including field inspections of work.

4. Plans and designs advanced base communication functional components and budgets for these.

The following organizational segments perform branch functions for equipment and systems within the areas of assigned responsibility, as indicated by section titles: transmitting facilities engineering section, receiving facilities engineering section, terminal equipment facilities engineering section, antenna systems engineering section, and equipment and facilities administration section.

AERONAUTICAL FACILITIES ENGINEERING BRANCH.—This branch plans, supervises, and administers plant engineering for communications, radar, passive and control aids to navigation at Navy and Marine Corps aeronautical activities. It exercises engineering supervision over installation, maintenance, and improvement of shore electronic equipment at areonautical facilities, prescribing pertinent engineering standards for permanent, mobile, tactical, and advanced base applications. In carrying out its responsibilities, the branch:

1. Provides or approves engineering plans, technical instructions, site recommendations, and requirements specifications for associated facilities and structures. It also provides or approves cost estimates in connection with installations and reinstallations, during both preliminary budget and budget implementation stages.

2. Develops, improves, or alters systems to provide service consistent with current

echnical progress to conform with local onditions, or to reflect changes in operational equirements.

3. Analyzes operational requirements for lectronic equipments and recommends effective types in feasible arrangements, to rovide basic justification for equipment procurement programs.

4. Establishes equipment maintenance planing, develops logistic support guidelines, lesigns field modifications, promulgates maineenance and modification instructions, and rosecutes these programs to completion.

5. Designs and modernizes advanced base unctional components in which radar, navigational aids, communication, and control quipments are required. Such design requires selection, correlation, and integration f various types of electronic equipment into roupings capable of fulfilling the base's nission.

6. Provides budget estimates to the Bureau f Aeronautics, initiates and justifies equipment allowances to the Chief of Naval Operations, and directs a program of annual nspections. It also translates military characteristics provided by CNO into equipment requirements and provides the Bureau of ards and Docks with specifications necesary to implement construction projects involving electronic equipment.

Within the areas of responsibility indicated by their titles, the following sections perform branch functions for the ground electronics portion of equipment systems at naval aeronautical facilities: radar and control center ngineering section, control aids to navigation ngineering section, passive aids to navigation ngineering section, and aeronautical communication engineering section.

SPECIAL APPLICATIONS AND ENGINEERING BRANCH.—This branch plans, supervises, nd administers plant engineering; project nitiation; and installation, maintenance, and mprovement of control and display systems t command centers, oceanographic installaions, harbor defense installations, and of corresponding advanced base components.

The systems and supporting functions for which the branch is responsible require the following kinds of engineering effort:

1. Electronic system design, including technical specifications, drawings, instructions, electronics support specifications, and cost estimates for budget processing.

2. Analysis of operational requirements and development of engineering standards on installation and maintenance matters for the guidance of fleet and shore activities.

3. Development of techniques, materials, publications and equipments for the technical advancement of installation and maintenance practices.

4. Effecting installations through industrial manager forces or private contractors.

5. Provision of technical consultation services to the Chief of Naval Personnel regarding naval training programs, curricula development, production of training films, and training devices problems.

6. Performance of facility management engineering in coordination with operational interests of the United States Coast Guard, other bureaus, offices and services.

7. Design, modernization, and re-design of advanced base functional components for harbor defense.

8. Provision of technical consultation services to the Chief of Naval Operations regarding technical aspects of plans submitted by fleet commanders.

The following sections perform the foregoing functions within their assigned areas of responsibility: oceanographic facilities engineering section, control and display systems engineering section, and shore based sonar and harbor defense facilities engineering section.

NUCLEAR PROPULSION

The Assistant Chief of the Bureau for Nuclear Propulsion (Code 1500) directs the research, design, and development of nuclear power plants for main propulsion machinery in naval ships. His organization is responsible for acting as lead activity and technical coordinator for developmental or new design nuclear propulsion plants for naval ships; designing, developing, procuring, and maintaining all nuclear components, and directly associated systems; for over-all propulsion plants control; and for collaborating with

other divisions of the Bureau as necessary to complete this work expeditiously. It is responsible for research and development projects pertaining to nuclear propulsion development; for correlating with the Atomic Energy Commission, its field activities and other outside activities, projects and actions in the Bureau's interest in matters pertainin to nuclear propulsion development, and fo establishing and maintaining training program pertaining to nuclear propulsion, coordinatin such training at naval shipyards with th Assistant Chief of the Bureau for Field Ac tivities.

CHAPTER 8

ELECTRONICS ASHORE--FIELD ACTIVITIES

In addition to his departmental responsibilities, the Chief of the Bureau of Ships has responsibilities for electronics at Navy shore communications and electronics activities. Such activities include electronics repair and project facilities; electronics laboratories; electronics search, guidance, and instrumentation facilities; and activities in the Naval Communication System. The Chief of the Bureau exercises his responsibilities through shipyard commanders; industrial managers, USN; supervisors of shipbuilding, USN; and commanding officers of other activities.

Naval shipyards, offices of industrial managers, and other shore commands which have been assigned technical and management control of shore electronics activities in a given area, or which provide technical maintenance services for ships, are known as maintenance authorities.

To indicate how these activities work with the Bureau in the field of electronics, this chapter discusses the missions and organizations of a naval shipyard, office of industrial manager, USN, and office of supervisor of shipbuilding, USN, and certain other field activities.

Naval Shipyards

The primary mission of a naval shipyard is to render service to the fleet. This service includes providing logistic support for ships of the active and reserve fleets and for assigned service craft; performing authorized work in connection with construction, conversion, overhaul, alteration, repair, drydocking, and outfitting of ships as assigned; and related or special manufacturing work. In addition, the naval shipyard performs research and development projects and conducts tests as assigned by proper authority; develops and conducts training programs as required; and furnishes miscellaneous common services.

A naval shipyard is a component activity of a naval base. It is under the management and technical control of the Chief of the Bureau of Ships and under the technical control of other naval bureaus and offices for matters under their cognizance. It is under the military command and coordination control of the commander of the naval base. The shipyard commander is responsible to the commander of the naval base for matters of internal security, fire protection, defense, administration of naval discipline, and for coordination of shipyard activities with other components of the base in providing direct logistic services to the operating forces.

SHIPYARD ORGANIZATION

Included in naval shipyard organization, under the control and authority of the shipyard commander and having direct access to him at all times, are the heads of the planning, production, public works, supply, comptroller, medical, dental, and administrative departments. The staff of the shipyard commander also includes an industrial relations department, and a management planning and review department. These organizational segments are shown in figure 8-1.

Each of the above listed department heads is responsible to the shipyard commander for

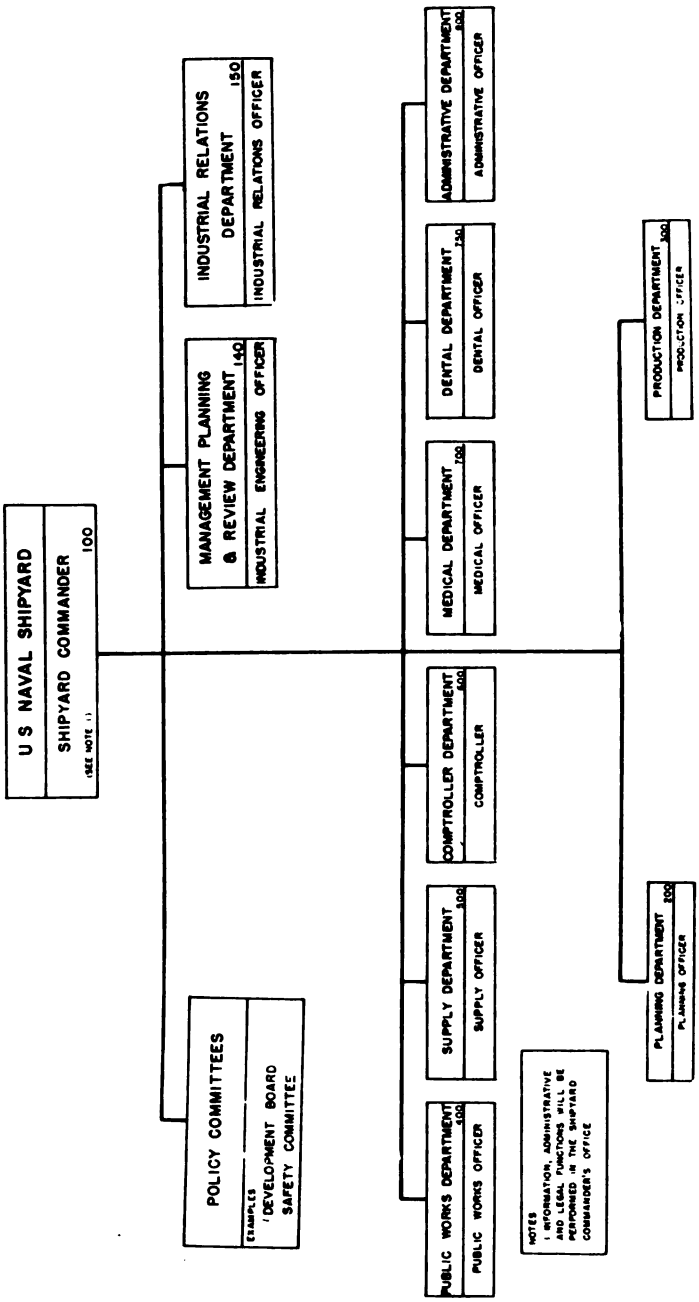


Figure 8-1.—Standard naval shipyard organization.

satisfactory performance of the duties assigned to him.

Management Planning and Review Department

The management planning and review department is a staff department which provides management staff assistance to the shipyard commander in all matters concerning management engineering, industrial engineering, and mobilization planning. The industrial engineering officer is the head of the management planning and review department.

Industrial Relations Department

The industrial relations department is a staff department which provides assistance to the shipyard commander and to all levels of management in developing and administering the shipyard industrial relations program. It serves all departments in meeting civilian manpower requirements and in matters concerning civilian employees.

The industrial relations officer is head of the industrial relations department.

Planning Department

The planning officer is responsible to the shipyard commander for the organization, administration, and supervision of the planning department, and for such other work as may be assigned by the shipyard commander.

Excepting work under the cognizance of the public works officer and excepting work on shop expense job orders issued by the production department and other general expense job orders issued by the departments concerned under standing job orders issued by the planning officer, the planning officer is responsible for approval, issue, and transfer of work authorizations and plans. He is responsible for initiating procurement of necessary material and funds for all work requested of the shipyard by other activities and performed in production department shops and for all manufacturing work requested by the supply department.

The planning officer is responsible for preparation and revision of man-day and cost estimates for all work issued by the planning department. He must ensure that no job order is issued by the planning department which authorizes incurring direct costs against a customer order in excess of funds available. He issues advance information to the production department to be used for central scheduling purposes. In authorizing work, he must consider the available productive capacity as stated by the production officer.

He is responsible for all ship design work required of the shipyard.

When a ship arrives for overhaul, he arranges as soon as possible for a conference, to be attended by representatives of the planning department and the ship concerned, and of such other departments as the shipyard commander may direct. At this conference, work to be done is reviewed and decided upon.

He is responsible for initiating and reviewing correspondence and reports on shipbuilding and ship overhaul, and for promulgating to those concerned pertinent information and instructions derived from such correspondence and reports.

He is responsible for notifying the appropriate activity if, for any reason, work requested is not to be undertaken or will be delayed beyond the specified completion date.

He must ensure that, except in an emergency, no job orders are issued for shipyard work on ships that have not been, or are not scheduled to be, made available for that work. He is responsible for disseminating information on ship availabilities within the shipyard and for requesting revision when necessary.

He is responsible for maintaining prescribed records of ships assigned to the shipyard as "Home Yard." He is further responsible for records planning, and design work on types of ships for which the shipyard has been designated as "Planning Yard."

He is responsible for seeing that no item of work is issued for accomplishment which will require more time to complete than is available, as shown by his estimates.

Organization of the planning department consists of an administrative assistant (optional position), a planning and estimating division, and a design division.

PLANNING AND ESTIMATING DIVISION.—The planning and estimating superintendent is responsible to the planning officer for overall job planning, issuing job orders, arranging for ship availabilities, requisitioning material for work in hand, controlling assigned funds,

administering a defense material system program, and operating a program for shipyard "farm out" work.

Organization of the planning and estimating division is shown in figure 8-2. Of particular interest to officers experienced in electronics are the assistant planning and estimating (P & E) superintendents and the technical planning and estimating assistants.

As indicated on the chart, there may be several assistant planning and estimating superintendents having responsibilities for assigned ship types. Each has technical and coordination control of advanced planning, issuing of job orders, reviewing and assigning work requests, and directing civilian assistants in work on ship types assigned.

There is also an assistant planning and estimating superintendent who administers shipyard farm out matters. His responsibilities include determining farm out work requirements and initiating action for farm out services for the shipyard; maintaining necessary liaison for planning, coordination, conduct, and acceptance of farmed out work; and directing assigned civilian assistants.

Figure 8-2 shows that there may be a number of technical planning and estimating superintendents. Each of these is a specialist in hull, machinery, electronics, or other technical field, and each is responsible to the various assistant planning and estimating superintendents for technical matters pertaining to his specialty.

DESIGN DIVISION.—Organization of the design division is shown in figure 8-3. This chart depicts an optional organizational change which, when made, affects the placement of electronics functions at naval shipyards. The change in question is concerned with disestablishing the ship electronics branch, electronics division (not shown on new chart) and reassigning these functions. This change grew out of the Shipyard Commanders' Conference held in 1957. To show the developments which brought about the change, resumes of the pertinent BuShips Instructions are given below:

BuShips Instruction 5450.51 of 22 July 1958 (since cancelled, but discussed here to indicate the problems in organizing for electronics work at shipyards and the solutions developed by certain yards) said, in effect, that the placement of electronics functions and responsibilities in naval shipyard organizational structure had been a subject for study and discussion since 1946. A logical objective seemed to be to place SHIP electronics functions in existing shipyard organizational components in order to accomplish electronics work within the same framework as that provided for accomplishing work in other specialty areas. The disposition of SHORE electronics work, however, remained a problem and became the key to complete action. The problem was eventually solved at both the Puget Sound and Long Beach Naval Shipyards by transferring shore electronics functions and personnel to the assistant industrial managers at Seattle and San Diego, respectively.

Since this approach had worked successfully at these two shipyards, the Bureau of Ships at first directed (BuShipsInst 5450.51 of 22 July 1958) all naval shipyards to:

a. Disestablish the Ship Electronics Branch of the Electronics Division and reassign the functions and personnel to the Assistant Chief Design Engineer for Electrical and Electronic Engineering.
b. Transfer the shore electronics functions to the Industrial Manager organization . . .

The direction to transfer electronics functions was later canceled by BuShips Instruction 5450.51A of 8 Oct 1958 which is quoted in part below:

> . . . The Bureau of Ships considers that the organization for the performance of electronics work in the shipyards should be compatible with the following objectives:
>
> a. Organizational responsibility for accomplishing work in the electronics area should be located as for other complex technical areas.
> b. Should provide for the maximum flexibility of the technical talent required to perform necessary work.
> c. Provide for maximum economy in supervision and provision of common services and support. The Bureau recognizes that local circumstances preclude establishment of a rigid definite organization suitable to all naval shipyards.
>
> . . . In order that the Bureau may be informed of the situation in each shipyard, it is requested that your

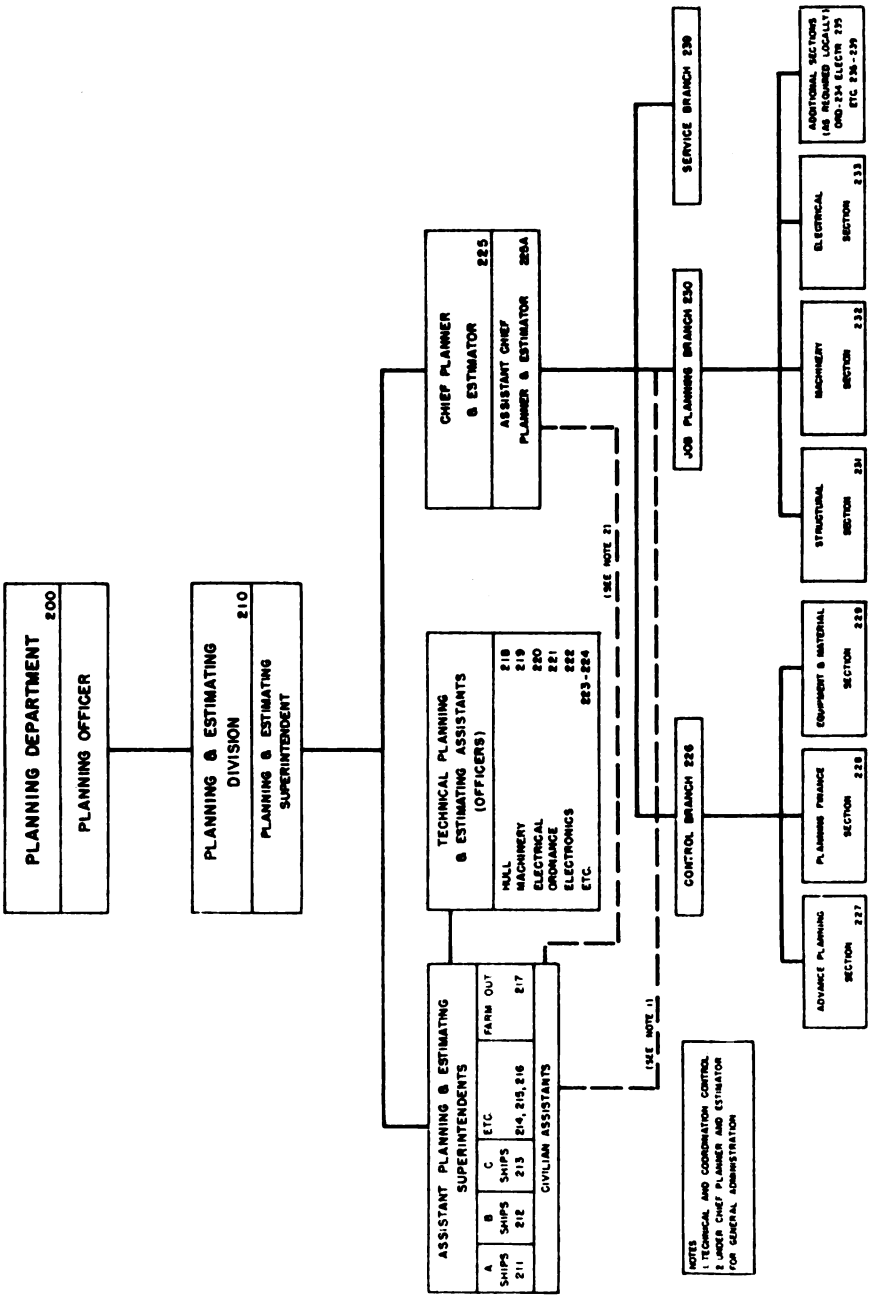


Figure 8-2.—Standard naval shipyard organization—planning and estimating division, planning department.

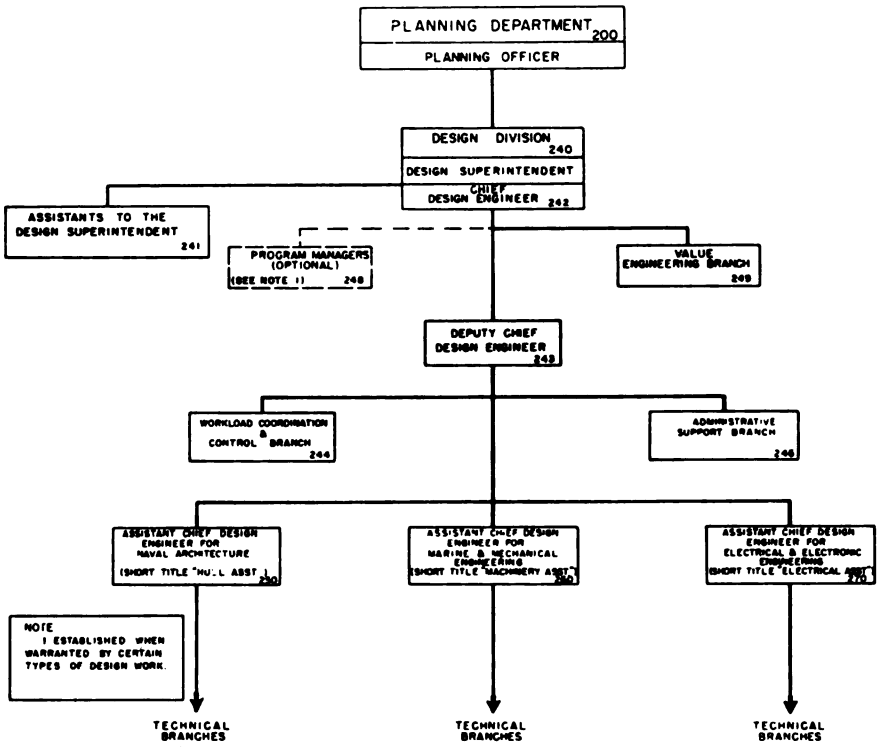


Figure 8-3.—Standard naval shipyard organization—design division, planning department.

choice of organization and staffing for electronics work be provided the Bureau as soon as a decision is reached on this matter.

Where shipyard commanders elect to transfer electronics functions as indicated above, responsibility for administering special shore programs should be assumed by the industrial manager, utilizing such shipyard organizational components as may be required. Such special programs include radiological repair, navigational aids repair, and crystal manufacturing facilities.

As is apparent from the later instruction, the organization depicted in figure 8-3 is optional. It has, however, been adopted by a number of naval shipyards; and although the electronics officer may be assigned to a shipyard having a different organizational pattern, his responsibilities will not be materially changed. Major differences will be in chain of command and work flow, resulting from placement of electronics functions within the organization. Obviously, to perform his duties effectively, the EO must familiarize himself with the organization of the particular activity to which he is attached.

The design superintendent is responsible to the planning officer for engineering consultation and investigation; design and drafting work for ships under overhaul, construction, conversion, or inactivation, and for assigned special design projects; development and revision of allowance lists; and preparation of test memoranda and reports.

The chief design engineer is responsible to the design superintendent for efficient performance and coordination of all activities of the design division. He is principal advisor to the design superintendent on administrative and technical matters.

The deputy chief design engineer is responsible to the chief design engineer for daily technical and administrative supervision and coordination of the work of the division. He acts for the chief design engineer in the latter's absence.

Assistants to the design superintendent are responsible for technical matters pertaining to their specialities (hull, machinery, electronics, etc) and for those matters for which they

may have responsibility as program managers, such as noise reduction, etc.

As indicated on the chart, there are three assistant chief design engineers, each of whom is responsible to the deputy chief design engineer for the work performed by assigned technical branches. For example, the assistant chief design engineer for electrical and electronic engineering administers two technical branches—the electrical branch and the electronics branch. He is responsible to the deputy chief design engineer for furnishing all design and test engineering services and material procurement specifications concerned with lighting; power; interior communication; degaussing; electrical fire control, including switchboards, generator installations, distribution systems transformation and associated power analyses; radio communication; radar and sonar installations, associated antenna and wave guide installations; and other responsibilities as assigned.

Production Department

The production officer is responsible to the shipyard commander for the organization, administration, and supervision of the production department (including shops, facilities, and personnel of the department) in its execution of work issued by the planning department and such work as may be assigned by the shipyard commander.

His duties include responsibility for ensuring that all work issued for accomplishment by the production department is accomplished within the time allowed and in accordance with applicable instructions and sound engineering practice. This work is also to be accomplished by the department within the total funds made available under each customer order or planning estimate applicable to each ship or program.

The production officer is responsible for notifying the planning officer (in advance of the release of work on a ship or program, and based upon current and prospective work loads) of limitations on the quantity of work which can be accomplished on that ship or program. When it is determined that authorized work cannot be undertaken within the time or total funds available, the planning officer must be informed immediately.

The production officer is responsible for notifying the planning officer if he predicts that the time or total funds are in excess of needs, so that additional job orders may be issued, or the availability time curtailed.

The production officer has custody and is responsible for the care of all materials removed by shipyard personnel from ships under overhaul and scheduled for reinstallation. (Excepted are materials turned over to the supply department for storage and safekeeping.) He also has custody and is responsible for the care of manufactured or partially processed materials awaiting installation, except when such materials have been turned over to the supply department for storage and safekeeping.

The production officer is responsible for routine repair and maintenance of ships and service craft assigned to the shipyard. (Exceptions are tugs, derricks, cranes, dredges, pile drivers, ships and service craft assigned to other departments, and ships in commission or assigned to the reserve fleet.) He is also responsible for operation, security, and routine repair and maintenance of floating drydocks.

In the production department, each division superintendent (see fig. 8-4) is an assistant production officer, and, in addition to the usual administrative and supervisory responsibilities of a division head, he is responsible for yard-wide coordination of the work of his division.

SHIPBUILDING AND SHIP REPAIR DIVISION

Two divisions of the production department (shipbuilding and ship repair) had major organizational changes in 1958. Because few naval shipyards have a shipbuilding division, BuShips Notice 5450 of 23 May 1958, which set forth the changes, was devoted primarily to the revised ship repair division organization. The Notice stated, however, that where there is a shipbuilding division, its organization should parallel that of the revised ship repair division; its work should be divided among ASSISTANT shipbuilding superintendents according to complete jobs, possibly by ship type rather than by technical specialty; and functions of TECHNICAL shipbuilding superintendents should be recognized organizationally, with this work performed by officers double-billeted from other billets in the division.

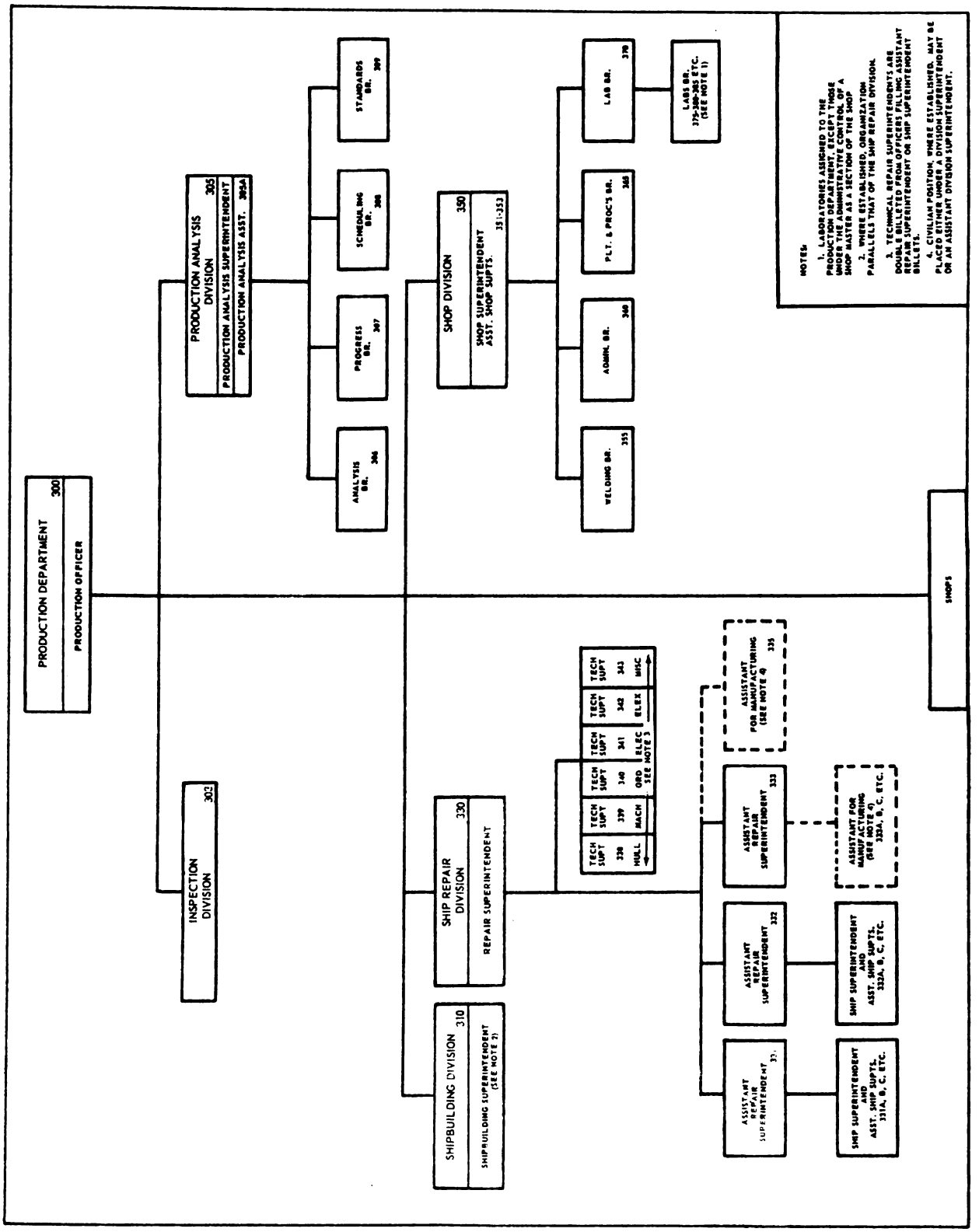


Figure 8-4.—Standard naval shipyard organization—production department.

Under the new ship repair division organization, assistant repair superintendents are assigned duties according to work areas rather than according to technical specialities (hull, machinery, electronics, etc.). Each assistant repair superintendent has full responsibility for all productive work in his area—that is, conversions, repairs and new construction, and manufacturing, as required. The number and nature of assistant repair superintendent billets may fluctuate as the workload changes.

To indicate that advantage is taken of the technical qualifications of officers assigned to the ship repair division, the technical functions to be performed are recognized organizationally by including on the chart the billet titles which encompass these functions—that is, technical superintendents (hull, ordnance, electronics, etc.). Technical functions are performed, however, on a dual assignment basis. Additional officers therefore are not required. This arrangement is similar to that for the previously described technical planning and estimating assistants who give staff assistance in their respective specialities to officers having line responsibility for the work being done.

Advantages of the new arrangement are: the repair superintendent can more effectively delegate responsibility to assistant repair superintendents as responsibility for entire jobs is fixed; ship superintendents are held responsible to a single assistant repair superintendent, rather than to several; fewer officers are required for assignment as assistant repair superintendents; and officers assigned to these repair billets receive broader and more valuable experience than when limited to a technical specialty. Under tight fund and personnel conditions, this is an extremely desirable condition. It is also in consonance with organizational concepts for the design and the planning and estimating divisions.

SHIPBUILDING AND SHIP REPAIR BILLETS.—The shipbuilding superintendent (assistant production officer for shipbuilding) is responsible to the production officer for all ship and shop work on ships and craft (other than small boats) constructed at the shipyard until completion of the post-shakedown availability, and for special projects as assigned. He is assisted by assistant shipbuilding superintendents, ship superintendents, assistant ship superintendents, and technical superintendents (hull, machinery, electronics).

The repair superintendent (assistant production officer for ship repair) is responsible to the production officer for all ship and shop work for ships and craft assigned to the shipyard for repair, overhaul, or conversion and for special projects as assigned. He is also responsible for assignment of berthing space and scheduling of ship movements in collaboration with the administrative officer. He is assisted by assistant repair superintendents, technical superintendents (hull, electronics, etc.), ship superintendents, and assistant ship superintendents.

Whether in the shipbuilding or repair division, each TECHNICAL superintendent is a specialist who is responsible for furnishing staff assistance to his respective division head and to this official's line subordinates in technical matters pertaining to his specialty (hull, electronics, etc.). In discharging his responsibilities, each has the full authority of his respective division superintendent.

Similarly, each SHIP superintendent is responsible to his respective assistant division superintendent for satisfactory, timely, and economical accomplishment of the department's task on his assigned ship or project. He has the full authority of his assistant division superintendent over all work on the ship or project assigned to him.

Responsibilities of a ship superintendent, whether he is in the shipbuilding or ship repair division, include:

1. Meeting the ship on arrival, seeing that necessary services are provided, calling on the commanding officer and heads of departments, and establishing liaison with the ship;

2. Directing the work on his ship(s) outside the shops and following the progress of the work on his ship(s) inside the shops to the end that completion of individual jobs and the entire overhaul or projects meet approved schedules; and coordinating shipyard and ship's force work;

3. Expediting the flow of information and material so as to ensure orderly progress;

4. Notifying higher authority immediately whenever he believes that any schedule is jeopardized by factors beyond his control;

5. Directing minor departures from job specifications, plans, and schedules as necessary to ensure a satisfactory result, to avoid

interferences, or to expedite the work. (Such departures must be reported immediately to the cognizant shipyard technical authority);

6. Maintaining liaison with the ship as the representative of the shipyard and in this capacity coordinating all shipyard work on and services to the ship;

7. Inspecting the work in progress at frequent intervals and ensuring that tests are accomplished on schedule and in accordance with test requirements;

8. Obtaining the signature of ship's inspectors for satisfactory completion of individual job orders, or obtaining a statement of why the work specified has not been satisfactorily completed;

9. Ensuring prompt connecting, disconnecting, and reconnecting of services when the ship arrives or is shifted on the waterfront; supervising those preparations for departure for which the production department is responsible; and assisting in timely completion of the ship's preparations for sea. As a matter of good practice, the ship superintendent deals directly with the senior supervisors of the several trades or shops assigned to the ship(s) for which he is responsible, coordinating and directing their efforts and assisting them in their relations with other trades, with other shipyard activities, and with the ship's force. He takes direct action with personnel below the level of the senior supervisor assigned to his ship(s) only when such action is immediately necessary to prevent or correct errors, for reasons of safety, or in emergencies, and in such instances he informs the senior supervisor as soon as practical of the action he has taken.

An assistant ship superintendent reports and is responsible to the ship superintendent to whom he is assigned.

Although an electronics officer at a naval shipyard may have official dealings with such other departments as public works, supply, comptroller, and administrative, he is unlikely to be assigned a billet in one of these organizational segments. Responsibilities of these departments therefore are not included in this text. Interested officers are referred to BuShips Instruction 5450.14A of 18 March 1958, *Standard U. S. Naval Shipyard Regulations,* for a discussion of these departments, as well as for functions of other naval shipyard branches and sections omitted from this chapter.

Industrial Manager

In each naval district there is an office of industrial manager which is under the military command and coordination of the district commandant and under the management of the Bureau of Ships. Technical responsibility is exercised by the Bureau of Ships and other bureaus and offices of the Navy Department for matters under their cognizance.

The industrial manager (IndMan) is the senior representative of the Bureau of Ships in the naval district. As such, he is usually the maintenance authority.

The industrial manager is on the staff of the district commandant and is responsible for shore electronics installation and maintenance within the naval district.

In addition to shore electronics functions, the industrial manager performs practically the same functions with regard to Navy ship conversion, repair, and salvage that the supervisor of shipbuilding performs with regard to Navy ship construction. The industrial manager has jurisdiction over allocations (to either Government or private shipyards) of conversion, repair, and salvage work within the naval district, not specifically assigned by higher authority. The supervisor of shipbuilding normally works with new construction at private facilities only. In those naval districts in which naval shipyards are located, the IndMan is usually the naval shipyard commander also. Thus the industrial managers in the First, Third, Fourth, Fifth, Sixth, Eleventh, Twelfth, Thirteenth, and Fourteenth Naval Districts are naval shipyard commanders as well.

Industrial managers who are shipyard commanders are expected, when practicable, to utilize shipyard personnel in discharging their industrial manager duties. Usually the

industrial manager division is incorporated in the shipyard planning department.

Figure 8-5 shows the approved standard organization for the office of industrial manager. Responsibilities of the various assistants and departments are outlined in the following paragraphs.

full- or part-time basis, the industrial manager may assign the functions to other organizational units.

The ordnance assistant serves as advisor to the industrial manager and exercises technical control over the conduct of the ordnance work of the organization.

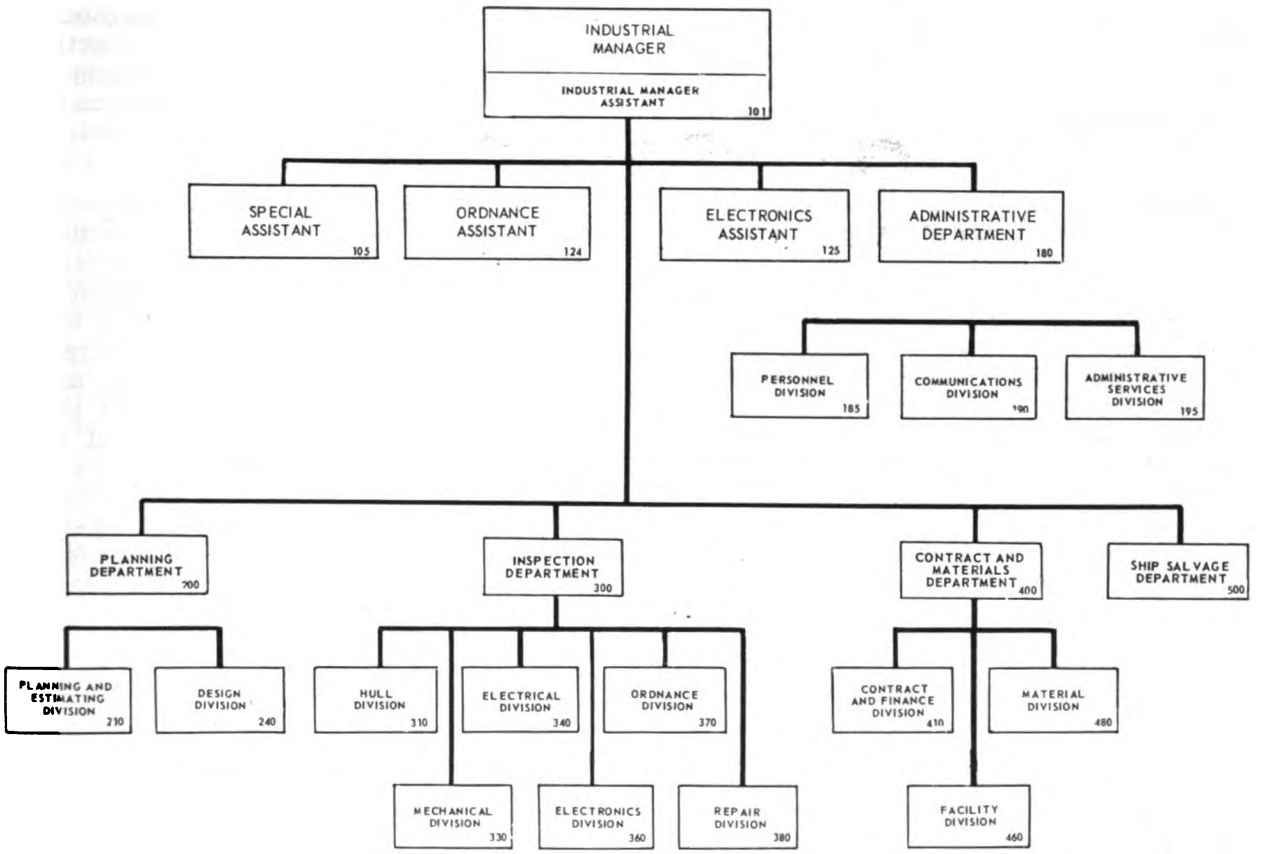


Figure 8-5.—Office of industrial manager, USN—standard organization chart.

The industrial-manager assistant represents the industrial manager and carries out duties assigned by him. He also administers public relations matters for the organization. As indicated in the discussion of naval shipyards, this assistant may be assigned responsibility for shipyard shore electronics work.

The special assistant is responsible for over-all coordination of mobilization planning. He serves the industrial manager in a staff capacity and in addition is responsible for such management and special studies as the industrial manager may assign. This billet is optional and if the billet is not filled on a

The electronics assistant assists the industrial manager by carrying out the latter's policies in connection with electronics matters. He serves as advisor and provides guidance and assistance on electronics technical matters of the organization concerning shore-based electronics and shipboard-type equipment afloat and ashore. He exercises technical control over the conduct of electronics work and acts as liaison with other departments of the organization. These departments are the planning department, inspection department, contract and materials department, and ship salvage department.

Each department is composed of divisions, but only in the inspection department is there usually an electronics division. This division inspects and tests ship and shore work involving electronics installations and equipment and prepares required inspection and production reports. It is also responsible for requested installation and repair of electronic, ordnance, and other equipment and for assisting contractors by furnishing advice on Navy policy pertinent to work being performed. The officer at the head of the electronics division is known as the assistant inspection officer (electronics).

In the planning department, depending upon the amount of electronics work to be done, there may be billets for an assistant planning and estimating officer (electronics) and an assistant design officer (electronics).

In dealing with the planning department, the electronics assistant is responsible for review of planning and estimating work in connection with electronics matters; for screening requests for electronic equipment and materials; and for reviewing specifications for both ship and shore electronics contract work.

In his work with the inspection department, the electronics assistant works with the department head to ensure good engineering practices and adequate safeguards for the types of equipment involved.

The administrative department is assigned all automotive transportation connected with the industrial manager's organization. The electronics assistant advises the head of the administrative department on the technical features of vehicles assigned throughout the district which are equipped with electronic components. He must review and keep fully informed of the status of all electronics funds and authorize expenditures for electronics work.

The electronics assistant cooperates and works with the local supply officer, the district public works officer, the director of training, and the district communications officer. He recommends stock levels of electronic equipments under the cognizance of the Bureau of Ships to be held in the supply officer's custody. He advises the public works officer on the technical and operational features of electronics public works construction. He provides the director of training with technical advice, as requested, and he arranges for procurement of electronic equipments for Naval Reserve activities, via the planning department.

Supervisor Of Shipbuilding

To carry out responsibilities of the Navy Department for new construction of naval ships at private shipyards by private contractors, there is assigned to many of the large private shipyards, or groups of small shipyards, a supervisor of shipbuilding, USN (SupShip). His office is under the military command and coordination control of the district commandant and the management control of the Bureau of Ships. Technical responsibility is exercised by the Bureau of Ships and other bureaus and offices for material under their cognizance.

The supervisor of shipbuilding represents the Bureau of Ships and deals directly with private contractors, administering shipbuilding, design, and facility contracts at shipbuilding plants under his cognizance. Such administration includes approval of certain design plans, inspections, tests, and certifications. He carries out prescribed industrial mobilization planning functions. He also performs inspection duty as naval inspector of ordnance with respect to specialized ordnance material under his cognizance.

The office of supervisor of shipbuilding usually includes a planning department, an inspection department, a contract and materials department, and an administrative department.

When his office is not staffed with personnel qualified to accomplish necessary electronics work, SupShip, with the concurrence of the Bureau of Ships, usually requests technical assistance from the nearest naval shipyard. In some cases, the Bureau of Ships provides assistance through contract engineers from private engineering firms. Such assistance in each case is covered by a separate contract.

Before completion of installation and repair work by the private contractor, the supervisor of shipbuilding provides anticipated completion

dates to the naval shipyard concerned so that a satisfactory test and commissioning schedule may be established and carried out by naval shipyard electronics engineers.

Electronics Laboratories

There are two electronics laboratories under the management of the Bureau of Ships—the U. S. Navy Electronics Laboratory at San Diego, California and the U. S. Navy Underwater Sound Laboratory at New London, Connecticut.

U. S. NAVY ELECTRONICS LABORATORY

The U. S. Navy Electronics Laboratory (NEL) is one of the Bureau of Ships' principal activities for research and development. Under the management control of the Bureau of Ships, and the military command of the Commandant, Eleventh Naval District, the mission of the Laboratory is to:

Conduct research, development, and tests in the field of electronics and the related fields of engineering and science, including radio, radar, sonar, oceanography, and the instrumentation for and analysis of environmental weapons effect and human factors; and provide consultative service and sea test facilities as authorized for the Fleet, for Navy contractors, and for other agencies of the Department of Defense.

In accomplishing its mission, NEL performs the following assigned tasks and functions:

1. Conducts research and development in the application of electronics and related sciences to naval problems, primarily in fields of acoustic and electromagnetic detection and location, communications, navigation, classification identification, countermeasures, and signal and data processing. Results of such research and development are analyses, information, techniques, designs, specifications, or prototypes leading to the production and effective use of new and improved equipment and systems in the fields of antisubmarine operations, submarine warfare operations, and air defense operations. Supporting functions include:
   a. Operations and systems analyses
   b. Environmental research in the atmosphere and the oceans, including the Arctic
   c. Human factors, including human engineering and psychophysics
   d. Theoretical and computer analyses
2. Conducts technical evaluations and engineering assists tests of electronic components, equipments, and systems to determine their technical suitability for naval use.
3. Cooperates with the Forces Afloat, Shore Establishment, other agencies of the Government, and with Navy contractors by providing assistance, consultation, and advice on scientific and technical matters.
4. Maintains sea and shore test facilities for the Laboratory and for Navy contractors for the support of scientific and technical programs of the Laboratory and of the Bureau of Ships.
5. Maintains an Office of Patent Counsel to provide services relating to patents, inventions, copyrights, and matters connected therewith to the Laboratory and to other Bureau of Ships activities as assigned by the Bureau of Ships.

The commanding officer and director of NEL is assigned by the Bureau of Ships and is responsible to that bureau for the general management, administration, and technical work of the laboratory.

Organizationally, functions of the laboratory are divided among a scientific department, a services department, and a comptroller department.

Functions of the administrative and comptroller departments are similar to those of such departments at other naval activities.

The scientific department is responsible for conducting the scientific work of the laboratory. Its major organizational components are the scientific planning board, consulting staff, human factors division, propagation division, special research division, acoustics division, electromagnetics division, systems development division, and technical analysis division.

The scientific planning board maintains familiarity with program plans of the Navy Department and Bureau of Ships, and with research and development work underway at

other laboratories and on commercial contracts in fields of interest to the laboratory and the Bureau. On the basis of the knowledge thus gained, it plans for the scientific program of the laboratory; periodically reviews the current program and reviews newly-assigned or proposed problems, to determine conformance with the over-all planned program. It makes recommendations to the commanding officer and director on matters under its cognizance.

Providing the talents of individual scientific authorities, the consulting staff furnishes advisory and consultant services to the technical director, the laboratory, other naval activities, and to others as authorized by the Bureau of Ships.

The human factors division conducts experimental and theoretical studies of human factors involved in design, operation, maintenance, and use of Navy electronic and associated equipment and systems. It also makes engineering applications of research results and functional evaluations through joint work with other divisions.

The propagation division conducts theoretical and experimental investigations on the propagation of energy through the atmosphere, the ocean, the ocean bottom, along any of their boundaries, and on the environment and its effects on propagation. Its work includes a major effort in the field of underwater sound.

The special research division conducts theoretical and experimental investigations in broad fields or combinations of fields outside the areas of responsibility of other research divisions. Such problems include self-radiated and ambient noise and weapons effects.

The accoustics division develops, designs, constructs and evaluates all models, through the prototype, of equipments and components of an acoustical nature or application. It conducts developmental research on related theory and phenomena.

The electromagnetics division develops, designs, evaluates, and constructs prototype models of electronic and electromechanical devices, equipments, and system components.

The systems development division studies, devises, assembles, and evaluates integrated electronic systems for the collection and dissemination of information.

The technical analysis division analyzes proposed equipments and systems to determine their feasibility; evaluates those in existence to discover changes which should be made to increase capabilities; and indicates promising areas for future work. It performs analyses in theoretical physics, engineering, and statistics. It also provides machine computing facilities for the solution of complex problems.

Within the technical areas specified by their titles, all divisions provide consultant services to the Bureau of Ships, naval activities, and others as authorized by the Bureau.

The services department provides various services for the laboratory. Two of its divisions furnish services of a technical nature. These are the mechanical engineering and engineering divisions.

The mechanical engineering division provides engineering design of mechanical and electro-mechanical devices; designs and develops mechanical components of electronic equipments; provides mechanical and electrical engineering drafting services and standards; and maintains central drawings files.

The engineering division provides shop, materials engineering, recording, and equipment construction services and facilities; performs acceptance and specification tests of equipments; and maintains a reliability improvement program for electronic equipments.

Many of the laboratory's problems are in the field of sonar and thus require seagoing laboratories. For this reason the laboratory usually has assigned to its operational command certain craft, such as PGE(R)'s and at least one fleet submarine, converted into floating laboratories. In addition, several small surface craft and some PBY aircraft are usually available.

Naval officers, called director's aides, are assigned to duty with heads of divisions. They do some administrative work and assist in establishing integration between the military needs and scientific aspects of the laboratory's work. These aides are assisted by other naval officers designated as project officers. Project officers work closely with scientific personnel and provide liaison with fleet activities when required. A project officer may be assigned to a particular branch of a division or to a specific program or both.

U. S. NAVY UNDERWATER SOUND LABORATORY

The mission of the U. S. Navy Underwater Sound Laboratory (USL) is to conduct research, development, system studies, and engineering evaluation in the fields of sonar, radio, radar, infra-red, and related physical sciences; to provide technical assistance and consultation to the forces afloat, naval shore activities, including other naval laboratories, and Government contractors on problems of mutual concern.

USL is under the military command of the Commandant, Third Naval District, and under the management control of the Bureau of Ships.

In accomplishing its mission the U. S. Navy Underwater Sound Laboratory performs the following assigned tasks and functions:

1. Conducts research, development, investigations, and tests to solve naval problems in the field of electronics and related physical fields, including but not limited to radio, radar, infra-red, sonar, and other underwater sound equipment and systems.

2. Undertakes design, development, procurement, and test of electronic equipment and systems as assigned by the Bureau of Ships.

3. Makes recommendations to the Bureau of Ships based upon observations of fleet operations and on confirming or exploratory laboratory experiments at sea in order to keep the fleet equipped in the best state of readiness from the standpoint of anti-submarine warfare detection and communication systems.

4. Maintains a facility to conduct research, development, and investigation in the field of underwater sound and sonar, as specifically applied to undersea warfare, including a facility for calibrating hydrophones and transducers.

5. Maintains a facility to conduct development and testing of antenna systems for installation on submarines.

6. Maintains a facility to develop and test infra-red systems for all types of ships.

7. Cooperates with the Forces Afloat, naval shore activitites, other Government agencies, and various Government contractors to provide assistance, consultation, and advisory service on any of the above problems.

8. Maintains a facility for performing acceptance and qualification tests of production and pre-production equipment.

Organization of the laboratory is shown in figure 8-6. Although there are variations in organization and consequently in assignments of responsibilities within their assigned areas, functions of USL divisions are in general similar to those at the previously described NEL.

The commanding officer and director of USL is responsible for all work of the laboratory. He is assisted by military personnel assigned as program officers, other naval officers, and civilians. He and the program officers usually are engineering duty officers with sea-duty backgrounds.

Program officers as a group report to the office of the commanding officer and director. During progress of a project, the assigned program officer acts as military representative of the commanding officer and director. He has no direct authority over the scientific division concerned or any phase of its work unless specifically delegated such authority. It is the program officer's function to interpret, where necessary, the military viewpoint on projects and problems. He provides liaison with outside military and commercial activities as required to prosecute the project. He participates in sea testing as necessary and keeps himself continuously informed of the status of all division projects requiring development and facilities department action during the procurement, planning, installation, and sea test phases.

Other officers at the laboratory are occupied with administrative duties, program planning, scheduling of operations, supervision of development facilities, and similar duties.

Electronics Search, Guidance, And Instrumentation Facilities

The *Bureau of Ships Manual* defines shore electronics search, guidance, and instrumentation facilities as those utilizing electronic means to collect, evaluate, or distribute data relating to the presence and movement of aircraft, ships, and subsurface craft; the

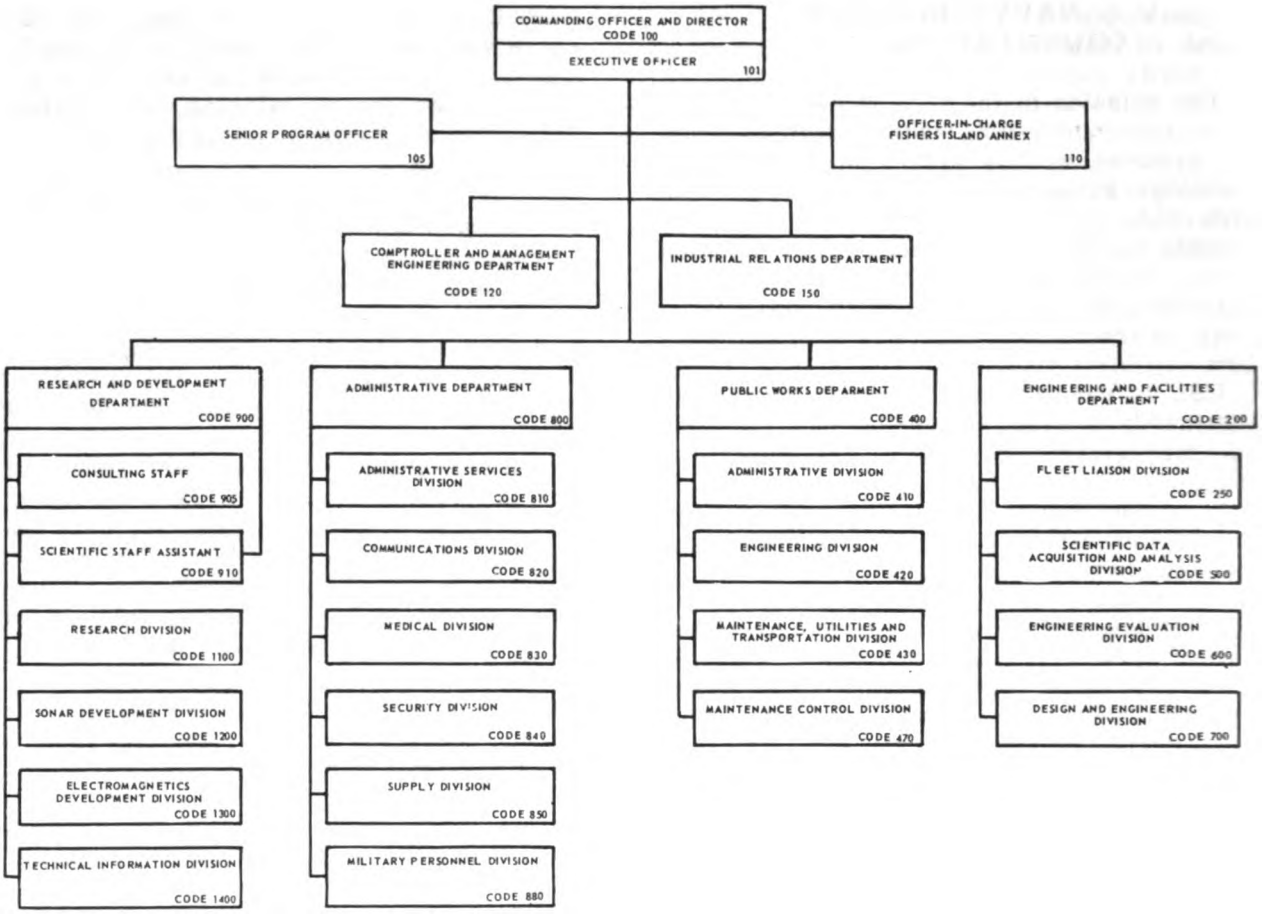


Figure 8-6.—U. S. Navy Underwater Sound Laboratory Organization.

presence of natural and special signals and radiations; the presence and movement of weather masses and other detectable phenomena; and the control of industrial processes. The following are types of instrumentation facilities:

1. Air traffic control and defense centers
2. Air warning centers and air surveillance radar installations
3. Ground-controlled approach units
4. Harbor defense centers and harbor entrance control posts
5. Weather stations and weather radar and photoelectronic installations

Few of the above activities have billets for electronics materials officers as such. When maintenance work is beyond the capabilities of available station personnel and facilities, the commanding officer or the officer in charge is responsible for reporting the condition via the chain of command to the cognizant maintenance authority and requesting assistance therefrom.

Naval Communication System

The Naval Communication System is the integrated network, essentially interarea in nature, required to provide the basic framework for rapid communications on a worldwide scale.

Under the direction of the Chief of Naval Operations (Director of Naval Communications), the Naval Communication System functions through naval communication stations (or facilities), naval communication units,

registered publication issuing offices not assigned to naval communication stations, and certain activities in the Washington, D. C., area.

A naval communication station (NAVCOMSTA) is a major activity composed of smaller activities and the auxiliary equipments required to provide essential interarea communication services for a specific area. A naval communication station is under a commanding officer and normally includes a communication center, radio station(s) as required, and a registered publications issuing office. For example, the U. S. Naval Communication Station, Norfolk, Va., consists of the following activities:

1. Communication Center, Headquarters Fifth Naval District, including transmitting and receiving equipments located at the Naval Base, Norfolk, Va.;
2. Registered Publication Issuing Office, Norfolk, Va.;
3. U. S. Naval Radio Station (R), Northwest, Va.;
4. U. S. Naval Radio Station (T), Monogram, Va.;
5. U. S. Naval Radio Station (S), vicinity of Norfolk, Va.

A naval communication facility is similar to a NAVCOMSTA but is located on foreign territory.

A naval communication unit is a small activity which fulfills limited or special functions as specifically prescribed by the Chief of Naval Operations. A NAVCOMUNIT is under an officer-in-charge.

The Naval Communication System is under the management control of the Chief of Naval Operations. Technical control of communication matters such as methods, procedure, military characteristics, and operational requirements is exercised by the Chief of Naval Operations (Director of Naval Communications).

Allowances of electronic equipment for shore communication activities are determined and promulgated by CNO.

Technical control of communication equipment and material, other than airborne, is exercised by the Bureau of Ships. All cryptographic equipment for the Naval Communication System, after procurement by the Bureau of Ships, is turned over to the cognizance of CNO (DNC) for distribution and property accounting. The Bureau of Ships is responsible for alterations authorized by CNO, and for the maintenance and repair of such equipment.

The commanding officer or officer-in-charge of a communication activity is responsible for seeing that equipment is in satisfactory operating condition. When maintenance work is beyond the capabilities of local personnel and facilities, he is responsible for reporting the condition via the chain of command to the cognizant maintenance authority and requesting assistance therefrom. Maintenance authorities include offices of industrial managers, assistant industrial managers, ship repair facilities and other shore commands specifically designated by the Chief, Bureau of Ships.

Naval Air Stations

Technical control of ground electronic equipment, except meteorological, at naval air stations and facilities is exercised by the Bureau of Ships through assigned maintenance authorities. Technical control of airborne communication equipment and material is exercised by the Bureau of Aeronautics.

One of the chief responsibilities of the EO at a naval air station is that of providing an adequate maintenance program for communication equipment and electronic navigational aids. Installation of the equipment normally is made by, or under the control of, the maintenance authority. When, however, installation work is within the capabilities of the local electronics material division, and when suitable arrangements have been made with the maintenance authority, such work may be accomplished by local personnel. When maintenance work is beyond the capabilities of available station personnel and facilities, the commanding officer is responsible for reporting the condition to the cognizant maintenance authority and requesting assistance.

Civilian Personnel Administration

When an electronics officer is assigned to a shore billet he may have administrative responsibility over various types of civilian employees. On such an assignment it is necessary therefore that he understand and be able to administer the basic civilian procedures established for the Navy.

Recognizing that naval officers without experience in working with civilian personnel will face administrative problems somewhat different from those encountered with military personnel, steps are taken to acquaint such officers with management practices which have been found to be good. The publication, *Navy Civilian Personnel Instructions* (NCPI), contains basic information on industrial relations. Naval post-graduate courses also frequently include studies on this subject. To assist naval management, either military or civilian, in keeping abreast of modern personnel practices the Navy has an Industrial Relations Institute in Washington, D. C., and, through its employee development program, naval management may continue to be trained at local activities.

In addition to the above, the Bureau of Naval Personnel has made available two publications which are helpful in this area of management —*Personnel Administration*, NavPers 10848-B, and *Industrial Relations*, NavPers 10793.

In the case of civilian employees of the Navy, the electronics officer will find that practically all civilian personnel actions and relations are governed by *Navy Civilian Personnel Instructions* (NCPI). This publication is based primarily upon the *Federal Personnel Manual*, rulings and decisions of the Comptroller General, directives of the U. S. Civil Service Commission, Presidential Executive Orders, statutes, and policies established by the Secretary of the Navy and the Secretary of Defense. It presents detailed regulations governing such matters as employment, compensation, hours of work, leaves of absence, in-service and other training, promotions, discipline, employee grievances, and the degree of authority of military personnel over civilian employees in specific instances.

When a naval officer observes any infraction of the rules of the activity and the civilian supervisor is not readily available, he should inquire into the circumstances and take such immediate steps as appear warranted. Thereafter the officer should locate the civilian supervisor, fully explain the circumstances to him, and place responsibility for final disciplinary action in his hands.

At those activities where a shortage of qualified civilian personnel makes it necessary to utilize military personnel as immediate supervisors of civilians, such military personnel exercise the responsibility and authority over their subordinates which normally would be the function of civilians occupying these positions. Military personnel should not be placed in such supervisory positions unless the commanding officer is satisfied that they are capable of assuming all the administrative responsibilities required by the positions.

When a naval officer is assigned duties as the head of a department, an office, or one of certain other prescribed organizational units, he has disciplinary responsibility for his subordinates. He may delegate some of this responsibility to lower levels of supervision.

The delegation of authority for such actions as removal, demotion, or suspension of an employee depends upon the group or rating of the offending individual. Before taking action, therefore, it is necessary to determine to whom such authority has been delegated. NCPI and pertinent local directives give this information.

Since the electronics officer does work with civilian employees on many of his assignments and may have administrative responsibility for such employees in certain billets, it is necessary that he familiarize himself with the rules and regulations governing his relationships with civilians and with the personnel policies and procedures in effect in each instance. In addition to the NCPI, he must understand local regulations and any from higher echelons, governing civilians attached to a specific activity. He should work closely with the industrial relations officer in all matters relating to civilian personnel.

When assigned to the fleet and to some military establishments ashore the electronics officer will find that the civilian employees

reporting to and working with him consist mainly of professional and scientific personnel whose training and endeavors are specialized in nature and who are assigned to specific equipments or problems such as equipment evaluation, surveys, and consultant duties. These individuals often are employees of private companies, or are carried on the complement of military commands other than the one to which the electronics officer is assigned. These civilians thus are not always under the technical or management control of the electronics officer.

To determine just what his authority is toward such personnel and to determine the personnel actions and procedures which are appropriate in specific instances, the electronics officer must understand the contract which exists between the Government and the individual company or corporation of which these personnel are employees. These contracts vary according to the purposes for which they are executed. The EO therefore cannot assume that his thorough understanding of one contract makes him an authority on all civilian contract personnel procedures. To be adequately informed, he must study each applicable contract.

Personnel working for the Navy under private industry contracts are not Federal employees.

CHAPTER 9

NAVY SUPPLY SYSTEM

In February 1947 the Secretary of the Navy approved a plan to coordinate the various naval supply systems which had developed during World War II. The proposed integrated system, known as the Navy Supply System, is now in effect.

Complete integration involves details which are of concern to supply officers only. However, since a general knowledge of supply is essential to any administrative billet in the Navy, this chapter is devoted to a discussion of the Navy Supply System.

In World War I, despite the tremendous increase in the Fleet and in the Naval Establishment, the Navy did not operate independently. It made use of bases in French and British harbors where piers, docks, buildings, and warehouses were already available. Though highly successful in World War I, the Navy had not yet begun to think logistically.

Early in World War II it became apparent that the war would be one that revolved around the physical means for prosecuting it—that the logistics aspects would be an important factor in determining the strategy to be followed. The problems of producing munitions in our factories and transporting and distributing them to the Armed Forces were gigantic. The logistics problems of World War II were of such magnitude that the logistics planning and implementation of plans involved not only the service personnel trained in that particular branch of military art but also area and tactical commanders; port authorities; railway, truckline, and air line executives; warehousemen; longshoremen; manufacturers; and on down through the entire working population of the United States.

Those functions of a material support system which pertain to the procurement and flow of material to the consumer are supply functions. They are cataloging, procurement, inventory control, storage, transportation (freight traffic), stores accounting, issue, and disposal.

Before World War II there was no established system for supplying repair parts, electronic equipment, ordnance, and similar items. There was little need for such a system, for at that time the Navy's supply problems were relatively simple. The fleet was small and the amount of such material expended was small. The chief emphasis was on general stores, as the small volume of required technical material was handled largely by the technical bureaus themselves. Even the number of items handled in general stores was small compared to those demanded by a global war which required tropical gear, arctic gear, and hundreds of thousands of technical items necessitated by the Navy's gigantic expansion and by rapid technological changes.

During World War II entire fleets had to be supported thousands of miles from home ports. The technical bureaus, whose supply problems had been minor before the war, now found themselves swamped with identification, procurement, and distribution problems. Experienced manufacturers, who in the past had had no problem in turning out the quantities of both general stores and technical items required by the Navy, could meet only a fraction of the ballooning war needs. New sources had to be discovered and new production lines had to be set up by the manufacturers inexperienced in meeting Government requirements.

This sudden transition from a relatively small scale of operations, with divided responsibilities, decentralized control, and varying procedures, to an all-out scramble to obtain as much of the Nation's output as possible and to distribute this material throughout the world inevitably caused confusion.

The increased emphasis on technical items made it apparant to those concerned that specialized supply activities were called for. As a result, each bureau developed, independently, special systems for determining requirements for, procuring, and distributing increasingly large quantities of various specialized materials. These systems were not constructed to conform to any standard pattern, nor to provide a single system of supply for the Navy. About 30 systems grew in this manner.

To accomplish movement of material, a corresponding movement of "paper" is necessary. An examination of the naval supply systems in effect during World War II reveals that the same basic channels were used for the flow of both material and paper, but such an examination reveals also that the development of most of the systems was incomplete and lacked standardization in the application of common procedures, methods, and basic principles. For example, recognizing the need for inventory control, each system had a control point established as a separate agency or subagency of an office or bureau. Paper flowed to these various control points through differing channels and with varying degrees of detail and extent of coverage. Action by an individual control point depended upon its charter, which in some cases permitted completed action, while in others approval from, or action by, higher authority was necessary.

Some of the war-born supply systems achieved a high degree of efficiency and well-ordered organization, while others were makeshift processes created only to meet the basic needs of the moment. As combat operations became concentrated in the Pacific after VE-Day, it became clear that the interests of economy and efficiency could best be served through the development of a comprehensive support plan which would provide centralized coordination without losing the advantages of decentralized operation.

Official Studies Of Supply Systems

Shortly after the war ended two independent studies were conducted to examine the logistics structure of the Navy and make specific recommendations for its improvement.

One survey was made by a committee of civilians headed by Mr. John M. Hancock, who, at the request of the Secretary of the Navy, examined the Navy's supply organization in the light of good business procedure, effective service to operating forces, and economical adaptability to war or peace. The Hancock Report, presented in April 1946, affirmed the need for an integrated supply system which could meet the demands of a fighting Navy and at the same time remain adaptable to industrial and technological progress.

The other study was conducted under the direction of the Chief of the Bureau of Supplies and Accounts. The purpose of this project was to examine and compare the features of each different supply system and to present detailed plans for the integration of all supply activities into a single coordinated system. Without central control, continued operation of many independent supply systems could ultimately lead only to confusion.

Independently reaching the same conclusions, the BuSandA and Hancock Reports formed the basis upon which the present Navy Supply System is founded.

Plan For An Integrated Supply System

Comparing the supply systems then in effect, the BuSandA committee, in its Plan for an Integrated Supply System, stated that "uncoordinated application of sound basic principles and uncompleted organizational development are the inherent weaknesses in the Navy's many supply systems. These major defects lead to inefficient and uneconomical practices. Proper

integration of the Navy's supply program becomes, then, a matter of coordinated application of basic principles to the details of supply operations and completion of the organizational development of all the systems. The necessary coordination can be achieved only through centralized direction of the performance of the supply functions. The need, then, is for a sound long-range program for the establishment of an efficient, flexible system of supply consonant with technical variations in materials which will utilize the concept of decentralization of operation and will at the same time provide for centralized coordination with respect to the application of policy and principles. Essential to such a program is the establishment of clear lines of control, responsibility, and authority, requiring the most effective use of technical and supply personnel."

PHYSICAL AND FUNCTIONAL COGNIZANCE

Perhaps the most significant feature of the new plan was its implied departure from the traditional connotation of the term "cognizance." Functional cognizance as distinguished from physical cognizance is the keynote of the new supply system. Technical bureaus have always been responsible for control of certain categories of material. This control included performing many of the supply functions involved in handling the material concerned. During World War II, jurisdictional disagreements arising out of various interpretations of the term "cognizance" often resulted in duplicated effort and overlapping supply activities in such limited geographic areas as small Pacific islands. The waste of time, manpower, material, and facilities under such circumstances, had little justification.

Technical and Supply Functions

The new supply system is designed to eliminate such practices as those described. Under this new system all naval materials of a replenishable nature are controlled jointly by the technical bureaus concerned and the Bureau of Supplies and Accounts. Thus, where training, ability, and experience in supply matters can be used to advantage in the logistic process, BuSandA supplies the talent. Where specialized technical knowledge is required, it comes from the technical bureau concerned. For example, if electronic material is required for naval use, the engineering specialists in the Bureau of Ships specify what is to be obtained, and supply officers perform the supply function of procurement. If the nature of the material requires special care in handling, the engineer prescribes the manner; the supply officer performs the task. By this close functional cooperation the specialized skill and experience of both the engineer and the businessman are utilized to the utmost, and the margin of error in the procurement, distribution, care, handling, issue, and use of technical items is reduced.

Insofar as electronic material is concerned, this division of functions at present applies only to repair parts, since the Bureau of Ships—the technical bureau—retains control of equipments and major components.

An examination of the approved Plan for an Integrated Naval Supply System (also known as the Navy Supply Plan) shows it to be based upon the thesis that the operation of a material logistic support system requires the performance of certain functions which may be grouped by their nature into technical functions and supply functions, as follows:

Technical	Supply
Research and Development	Cataloging
Design	Inventory Control
Determination of Requirements (initial)	Procurement
Technical Supervision of Cataloging	Storage
Technical Supervision of Storage	Transportation
Technical Supervision of Issue	Stores Accounting
Inspection—During and after Production, and in Service	Issue
Construction and Manufacture	Disposal
Maintenance	

From the foregoing list it may be seen that technical functions are peculiar to each type of material being supplied, while supply functions are common to all types. It will be noted that certain over-all functions are broken down into both technical and supply functions, as, for example, cataloging. The technical supervision of cataloging is considered a technical function because technical knowledge of the material is

required to determine the accuracy and completeness of the information to be included in catalogs. Such knowledge varies with each type of material. Cataloging is listed also as a supply function, since such general procedures as assembling the information and arranging it in an established order are nontechnical or management functions. They are common to all types of material.

The plan pointed up the need for coordination of both technical and supply functions and the need for cooperation and exchange of information between technical and supply personnel at the various levels of control.

LEVELS OF CONTROL

The Navy Supply System, as recommended in the supply plan, breaks down into four levels of control.

The highest is the departmental, or top management, level. At this level, broad material logistic support policies are decided and performance of the over-all operation is reviewed. It is here that bureau policies are coordinated and controlled. Top management is responsible, too, for seeing that the Navy's material control system complies with decisions made by such higher authority as the Secretary of Defense.

For example, a certain kind of steel may be in short supply. The Secretary of Defense, when notified of this shortage, will inform Navy's top management level. Top management will then issue the directives necessary to ensure that use of such steel by the Navy will be only as specified by the Secretary of Defense.

Below Top Management is the bureau level. Here, detailed management and technical control of the operation of the Navy Supply System, through field activities, is exercised by the bureaus.

The operating, or program and commodity management, level is represented by the various supply demand control points (supply offices) each exercising inventory control over specifically assigned categories of material. Each supply demand control point, or supply office, is under (1) the technical control of the technical bureau having cognizance over the special category of material assigned to that supply demand control point and (2) the management control of the Bureau of Supplies and Accounts. For example, the Aviation Supply Office is under the joint control of the Bureau of Aeronautics and the Bureau of Supplies and Accounts, while the Electronics Supply Office is under the joint control of the Bureau of Ships and the Bureau of Supplies and Accounts. It is at this level that Navy-wide control is exercised over special categories of material of a replenishable nature to obtain balance between such material coming into the supply system and that going out. One supply demand control point, the Electronics Supply Office, is discussed in chapter 10.

The fourth, or field, level is comprised of such field activities as supply centers, supply depots, and supply departments at other activities. These local facilities are concerned with the physical handling of materials, with issue, and with such stock status reporting as may be required by a higher level of control to ensure correct inventory balance within the system. It is at the field level that the electronics officer comes into direct contact with the supply system.

COORDINATION AT THE BUREAU LEVEL

With respect to material logistic support functions, the BuSandA study revealed that detailed management and technical control over field agencies as exercised by the bureaus were in large measure uncoordinated between the bureaus.

For instance, regulations issued by the Bureau of Ships for reporting BuShips material at a field activity often conflicted with regulations issued by the Bureau of Ordnance for reporting similar material at the same activity. Such a situation made it difficult for the reporting activity to set up administrative controls to obtain the information required by the bureaus. Duplicate files and separate stock levels often had to be maintained, and in many instances separate inventory reports were required—one under BuShips stock numbers and one under BuOrd stock numbers.

Technical functions often were duplicated also. Lack of coordination among the bureaus made it possible, for instance, for the Bureau of Aeronautics to design, develop, and introduce under a different stock number, a new item although one which would have met that bureau's requirements already had been developed and stocked by the Bureau of Ships.

In discussing the factors necessary to achieve a well coordinated and efficiently organized system, the Plan for Integrated Supply System pointed out the need for integration, at the bureau level, of certain functions as discussed below. It is to be understood that only material of a replenishable nature was considered in the proposed system.

Cataloging

Basic and of utmost importance to the efficient operation of any supply system is the accurate determination of (1) identity of material items as defined by specifications and engineering data, (2) interchangeability and supersedure for each item, and (3) assignment of uniform stock numbers based on such determinations. The only feasible method by which all personnel of a system may speak of an item in identical terms is one based upon a complete and uniform catalog. The Navy Supply System cannot operate with acceptable economy and efficiency unless the material handled is cataloged and the catalog is available throughout the Department of the Navy.

In the interests of economy, efficiency, and the avoidance of duplication, the BuSandA committee therefore urged that the cataloging efforts of the various bureaus be coordinated at the bureau level.

In recent years, coordination of cataloging has been expanded to include the entire Department of Defense. Under the Federal Catalog Program, replenishable material for the Army, Navy, and Air Force is now described and cataloged by one agency—the Catalog Division, Office of Assistant Secretary of Defense (Supply and Logistics)—and Federal stock numbers replace stock numbers previously assigned by the individual services.

Procurement

Sound and efficient procurement of material is based on two fundamentals—what is required and how much is required.

The determination of what is required is basically a technical matter. The engineers, designers, and other technical personnel establish the details of specifications in order that procurement personnel may get exactly what is needed.

How much to procure is determined by estimating future needs on the basis of all available information, including knowledge of the status of the Navy's stock of the material.

Procurement thus requires coordination and cooperation between the technical agency and the supply agency. When material becomes standardized, and changes in design are infrequent, procurement proceeds on the basis of experience plus a continuing review by the technical agency.

The greater part of procurement is accomplished through purchase. The determination of what is to be purchased falls into two categories, one of which includes purchases requiring technical knowledge and coordination, such as are required in the introduction of a new item of equipment. The other category includes purchases to replenish existing stock items; that is, items ordinarily covered by standard specifications and requiring only limited technical control. The same purchase organization can perform both types of purchase, provided the necessary technical assistance is available.

At the time the various supply systems were studied, Navy material (including replenishable items) was largely procured and financed by the bureau having need of it. Little or no coordination existed among the several supply systems to satisfy demands by the interchange of material among them. To remedy this situation, the plan provided for coordination of procurement at the bureau level where divisions of control of specific materials can be established on a Navy-wide basis.

Inventory Control

The basic objective of inventory control is to ensure a proper balance between the supply of and demand for those individual items of material required to operate and maintain the Department of the Navy. To accomplish this objective it is necessary (1) that material be identified and cataloged to ensure accurate knowledge of what material the Navy uses, and (2) that each item be assigned to a control point to ensure one point of responsibility for knowledge of both how much of a specific item the Navy has on hand in relation to the amount required and also the location of these items within the Navy.

Balance between the supply of and demand for any item is obtained by reconciling the sum of expected receipts and stock on hand with the sum of planned, working, and reserve requirements. To be of real value, this balance with respect to any item must encompass all of that item in the system—hence, the policy of establishing one point of control for each category of material.

It has been said that inventory control is the hub of the supply wheel, since data resulting from inventory-control procedures serve as the basis of the intelligent performance of other functions involved in the operation of a supply system. For example, before procurement can be made, the quantity to be procured must be determined. Before disposal can be initiated, the quantity to be disposed of must be determined. Before storage can be planned or accomplished, the quantity to be stored must be known; and before transportation can be arranged, the points from and to which it is necessary to move an item must be known. Neither inventory control nor other supply functions can be intelligently and efficiently performed, however, without adequate and continuous coordination. For this reason it is necessary that such coordination be accomplished at the bureau level.

Storage

Realizing the necessity for integrating the storage function in the expanding supply system, the Chief of Naval Operations established the Navy Storage Control Committee in July 1944 and directed it to study the adequacy of available facilities, ensure utilization of all alternatives to new construction, and establish a planned program for any necessary construction.

The Navy Storage Control Committee was subsequently abolished and the Chief of Bureau of Supplies and Accounts, was charged with responsibility for administering, in accordance with policies and standards to be promulgated from time to time by CNO, a centralized storage operating organization to:

1. develop uniform storage control techniques,
2. improve procedures for estimating storage requirements,
3. obtain and consolidate space estimates periodically from all bureaus and offices and thereby determine over-all Navy storage requirements,
4. recommend increases, decreases, or transfers of storage facilities to meet over-all requirements, and
5. correlate storage control plans and operations with over-all Navy plans and operations, including logistics plans and policies.

Transportation

The transportation, or freight-traffic, function is concerned with controlling the movement of material from one point to another. Since such control is essential to the effective operation of a supply system, it is necessary that transportation be coordinated as an integral part of the system. Navy regulations delegates responsibility for the transportation of Navy property to the Chief, Bureau of Supplies and Accounts.

This Bureau exercises its responsibilities for commercial traffic within the continental United States through the Military Traffic Management Agency (MTMA). This is an agency established under the Single Manager Plan—a plan which provides for assigning to the Secretary of the Army, Navy, or Air Force management responsibilities for specified services or commodities common to the three military departments. The MTMA implements the transportation responsibilities of the Secretary of the Army who has been designated as the single manager of Department of Defense commercial transportation between points within the United States.

Other single manager assignments in the transportation area are the Military Sea Transportation Service (MSTS), under the Secretary of the Navy, and the Military Air Transport Service (MATS), under the Secretary of the Air Force. These latter agencies are responsible for sea lift and air lift, respectively. The Bureau of Supplies and Accounts ensures transportation coordination between the Navy and these single managers.

The customer's responsibility for transportation consists of determining the priority and assigning the due date for all items requested and requiring shipment.

Stores Accounting

The stores accounting function provides management with statistics to assist in controlling inventories and property responsibility. It

involves accounting for receipts of material into the custody of supply officers and expenditures of such material.

In order that the information developed through stores accounting may be of effective use to management, it is necessary that the recording and reporting techniques be uniform throughout the supply system. Such uniformity can be achieved only by centralizing, on the bureau level, the function of stores accounting, and for Navy-wide management, this centralization must be the responsibility of the agency designated as the coordinating authority for the supply system. The Bureau of Supplies and Accounts has been designated as this coordinating authority.

Issue

Coordination of the supply system extends also to issue, the function by which custody of material is transferred from the supply system to the consumer. Since issue is the point of contact between the supply system and the consumer, the procedures must be as simple, uniform, and effective as possible. To attain this simplicity and uniformity, it is necessary that control of this function also be centralized at the bureau level.

Disposal

Although specialized detailed procedures for disposing of material were necessitated by the excessive amounts of material on hand after World War II, disposal of excess, damaged, obsolete, or surveyed material normally is a routine function of supply. Even though disposal is normally a routine function, coordination is required at the Bureau level, if uniform procedures are to be used throughout the Navy and if no activity is to dispose of material that might be used elsewhere.

COORDINATION AT THE OPERATING LEVEL

In addition to the integration required at the bureau level, there is need for coordination at the operating, or program and commodity management, level. It is at this level that technical variations in materials have their greatest effect upon the performance of supply functions. For example, such supply functions as procurement, inventory control, and distribution of clothing differ from these same functions when applied to electronic repair parts. The BuSandA Committee recommended therefore that materials be grouped into types with each type assigned to a specific supply office (supply demand control point) where technical and supply personnel (under the joint cognizance of the appropriate technical bureau and BuSandA) could work together for the most effective control of each item assigned to the supply office.

As recommended by the Committee, coordination at this level is effected by the decentralized supply demand control points, each of which is responsible for specified categories of material. At present, there are 10 of these supply demand control points (SDCP's), and each is responsible jointly to the Bureau of Supplies and Accounts and to the material bureau having technical cognizance over the category of material assigned to the specific SDCP.

It is emphasized that these SDCP's are not stocking and warehousing agencies. They are material control offices. Each SDCP, under the technical guidance of a technical bureau and the management guidance of the Bureau of Supplies and Accounts, (1) assimilates planning data which flow down through the bureaus in terms of equipment and personnel to be supported, (2) develops itemized lists of material required to render this support, (3) collects issue data from stocking activities, and (4) maintains records of stock on hand and on order.

With these basic data, each supply demand control point is able (1) to redistribute available stock to meet the latest deployment and operational needs, (2) to estimate future requirements for each item in its material category, (3) to deduct those quantities on hand and on order, and (4) to initiate purchase for only that quantity which is additionally required.

Additional functions of supply demand control points are brought out in the following chapter wherein one such control point—the Electronics Supply Office—is discussed in detail.

Supply offices, or SDCP's, are staffed by both technical and supply personnel. Close cooperation between these personnel is necessary for the effective discharge of their respective duties, since procedures which are the responsibility of technical personnel often

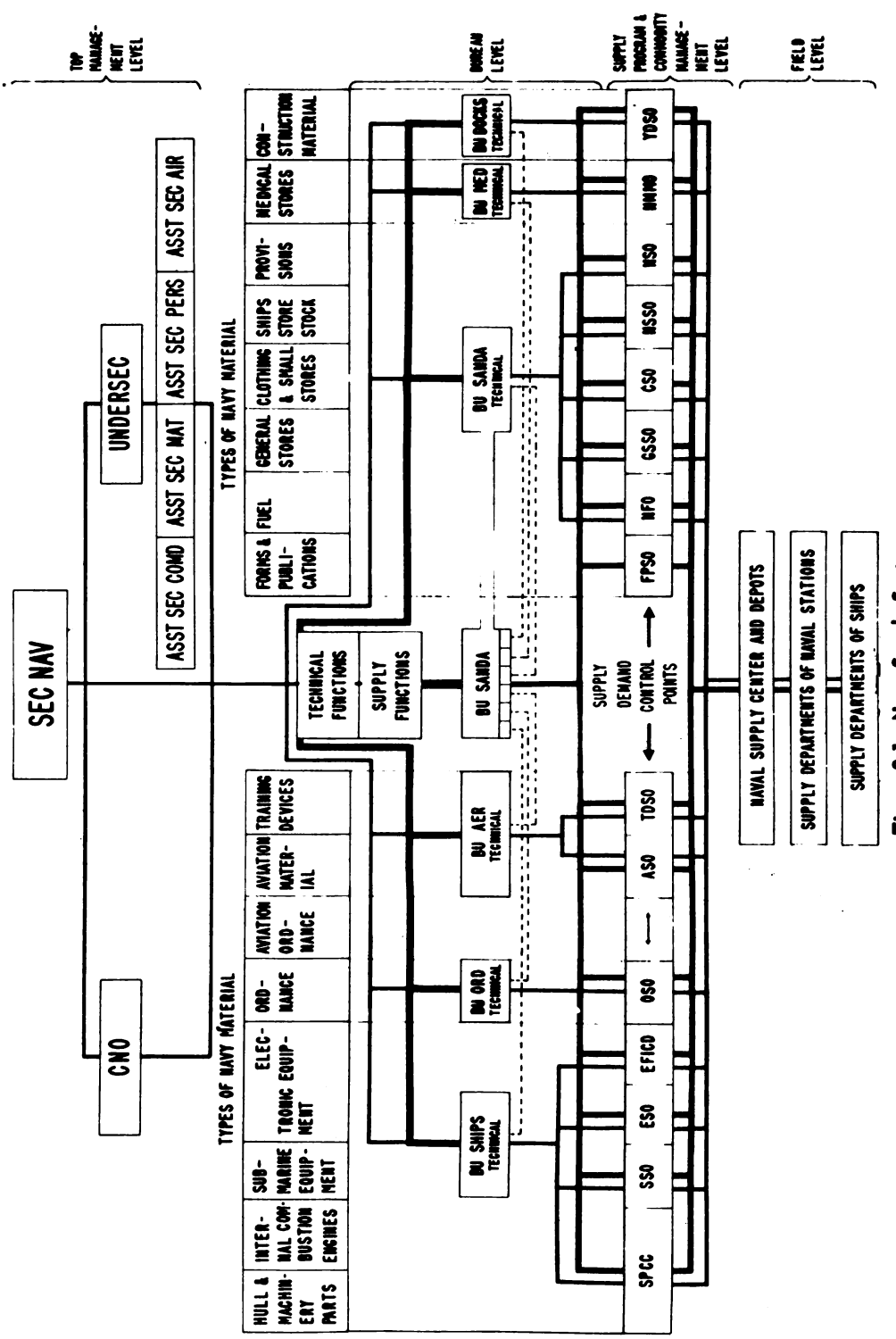


Figure 9-1.—Navy Supply System.

affect those which are the responsibility of supply personnel. The reverse also is true. For example, procurement, a supply responsibility, is affected by the determination of preferred and substitute items, a technical responsibility. On the other hand, the determination of preferred and substitute items is based upon issue and failure data, the compilation of which is a supply responsibility.

The various bureaus have retained inventory control of certain categories of material. For the material so controlled, the bureaus, though not specifically designated as supply demand control points, perform in general the same inventory control functions as the specifically designated supply demand control points, or supply offices.

The technical bureaus, the Bureau of Supplies and Accounts, and the several supply demand control points are the principal agencies for controlling and directing the flow of material in the Navy's material logistic support structure. As shown in figure 9-1, these agencies are sandwiched between top management, where the Navy's current operating and mobilization plans originate, and the far-flung physical facilities which handle the material necessary to support top management plans.

BUSANDA RESPONSIBILITIES

The Navy Supply Plan recommended that the Chief of the Bureau of Supplies and Accounts be made responsible for the coordination of the supply functions of the Navy Supply System and for the performance of these functions throughout the system. The plan also recommended that he be vested with the authority necessary to discharge these responsibilities with advice from the technical bureaus and subject to policy control, supervision, direction, and evaluation of effort by the Chief of Naval Operations and the Secretary of the Navy.

In addition to the coordination of the Navy Supply System, the Bureau of Supplies and Accounts is responsible for acting as a technical bureau for certain assigned material, for example, materials handling equipment. The responsibility of BuSandA for material under its technical cognizance is comparable to the responsibilities of the other technical bureaus for material under their cognizance.

Single Manager System

Since the Navy Supply System was inaugurated, centralized coordination on a broader basis has been effected by means of the Single Manager System. This system is based upon a plan which provides for centralized management of specified commodities or services for the entire Department of Defense. The purpose of the plan is to coordinate more effectively the supply support of Defense activities. Briefly, the plan is implemented as follows:

Under the general direction of the Secretary of Defense, individual Single Manager Agencies (each under the direction of the Secretary of the Army, Navy, or Air Force) are responsible for specified commodities or services for the Department of Defense. For example, the Secretary of the Navy has single manager responsibilities for medical material and petroleum for all three services. He carries out these responsibilities through the Military Medical Supply Agency and the Petroleum Supply Agency, respectively. The Secretaries of the Army and Air Force have similar responsibilities for other assigned categories of services or commodities; for example, the services provided by the previously mentioned Military Traffic Management Agency and the Military Air Transport Service under the single management of the Secretary of the Army and Air Force, respectively.

Each single manager designates, with the approval of the Secretary of Defense, an executive director to manage the operating agency established to perform his assigned single manager functions.

Single manager agencies having responsibility for assigned categories of commodities must purchase and distribute these items. The agencies are also responsible for cataloging, standardization, determination of net requirements (as opposed to gross requirements determined by the individual services), production, inspection, storage, disposal, transportation, maintenance, and mobilization planning for the assigned commodities. The

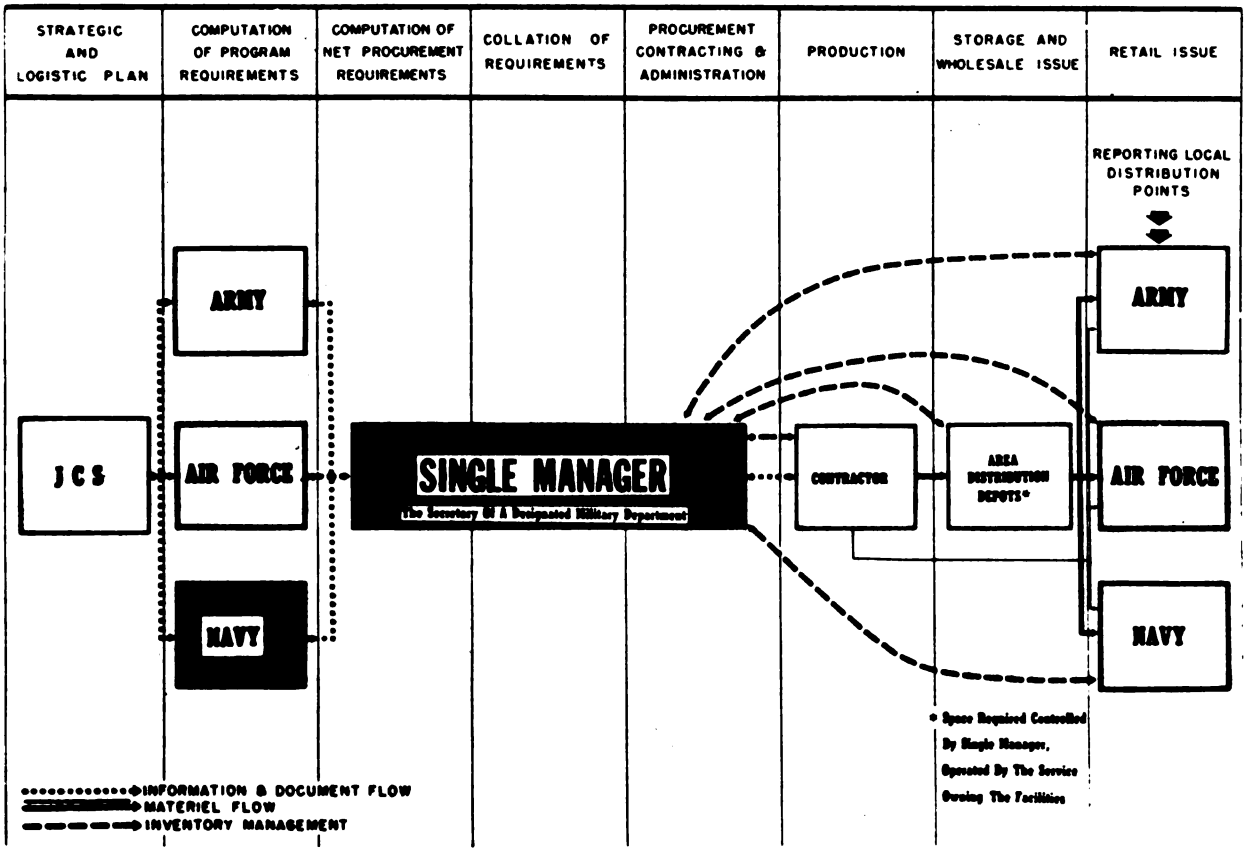


Figure 9-2.—Inventory management, and information and material flow, under the single manager system.

functions performed by single manager agencies thus correspond to a great degree to those performed by the Navy's supply demand control points, as discussed in this and the following chapters.

Under a single manager assignment for a commodity category, the individual services continue to be responsible for determining their own program requirements. A statement of these requirements is furnished the single manager who is then responsible for procuring stocks to meet these requirements. The material is bought by the single manager and is financed by a separate division of a single stock fund. The single manager thus owns and controls the movement of wholesale stocks within his assigned category.

When one of the military departments requires material that is under single manager control, the requiring department usually purchases the material from the single manager, normally using its own stock fund to finance the transaction.

In performing their assigned missions, the individual services can hold and control retail material in their own stock accounts as necessary for issue or resale to final consumers. Normally, retail stocks are restricted in quantity. Figure 9-2 indicates inventory management, and the flow of information and material, under the cognizance of a single manager.

Single manager assignments do not relieve the Navy Supply System of responsibility for service to Navy consumers. Close contact must therefore be maintained with Navy ships and bases to determine the effectiveness of the support rendered. The Navy Supply System continues to be the principal pipeline for fleet and field supply support; that is, whether procured by the Navy or another agency, naval replenishable material flows through the Navy Supply System to Navy consumers.

Physical Facilities For Material Support

Thus far the discussion has been of those activities which control and direct the flow of material. Obviously, any supply system must also include facilities for physically handling the material if it is to flow as directed from commercial plants to the operating forces of the Fleet.

The facilities which handle the bulk of the Navy's material and which perform the functions of receipt, storage, issue or shipment, and disposal are comprised principally of naval supply centers, naval supply depots, and supply departments of other shore activities and aboard ships. In addition, certain ship types are outfitted to furnish mobile supply support to the forces afloat.

NAVAL SUPPLY CENTERS

Naval supply centers are functional commands established to provide bulk and ready issue supply support direct to the operating forces and shore establishment. They also perform shipment and trans-shipment functions and other specified services. Geographically, supply centers are located at logistic support focal points—Norfolk, Virginia; Oakland, California; and Pearl Harbor, Hawaii.

A naval supply center as part of a naval base contributes to the base's mission of furnishing local logistic services direct to the operating forces. The local naval base commander exercises military command and coordination control over the naval supply center. Management control is exercised by the Bureau of Supplies and Accounts.

NAVAL SUPPLY DEPOTS

Naval supply depots are command organizations whose mission is to warehouse, distribute, and control particular types of naval material required to support assigned fleet units and shore activities and to furnish the necessary administrative service and maintenance functions incidental to these operations. Supply depots are activities of the naval base to which assigned, or, if independent, of the naval district in which they are located.

Today the Navy is operating 3 inland depots, 4 coastal depots, and 4 overseas depots. (There are also depots which are components of naval supply centers, as for example, the Ships Supply Depot, U. S. Naval Supply Center, Oakland)

Coastal depots have missions similar to those of supply centers. They do not, however, furnish support in the complete range of material categories. The coastal depot fulfills the majority of offshore base requirements, plus the requirements of shore activities in the proximity of the depot, and the requirements of ships in the area.

Representing the Navy's wholesale and retail activities in the material distribution scheme, supply centers and depots in composite ensure a regular flow of material to ships and to continental and overseas shore based consumers. In addition, certain centers and depots serve as reservoirs for housing strategic stock-pile material, mobilization reserves, and advanced-base components. Without these centers and depots, Navy material mobilization readiness would be based upon the impossible assumption that, in emergency, industry's production and shelf stock could meet and keep pace with the Navy's expanding requirements.

SUPPLY DEPARTMENTS

Supply departments of shore activities such as shipyards and air stations are primarily for the purpose of providing day-to-day retail supply support to the industrial, training, and operational programs of their parent activities. In some cases they provide depot-type support to other nearby activities and forces afloat, as for example, the depot-type support provided by the Supply Department, U. S. Naval Shipyard, Boston.

A supply department is an integral part of the parent shore activity organization. It is established to warehouse, distribute, or control material required by the shore activity in the performance of the latter's primary function. It performs only such administrative service and maintenance functions as are not provided by the activity command.

There are also supply departments aboard ships which supply day-to-day retail support to

other departments of the ship. In some instances these shipboard supply departments are like those at shore activities where Supply Corps officers, in addition to the paperwork involved, are responsible for such functions as storage, maintaining approved stock levels of replenishable items, and maintaining custody of materials until they are issued for consumption. In other instances, especially aboard small ships, the supply officer (not necessarily a Supply Corps officer) takes care of the paperwork only, while the department and division heads are assigned custody of materials as soon as the materials come aboard. In these latter instances, the department and division heads are made responsible for the maintenance of proper stock levels and for furnishing the supply officer with the information (stock number, price, priority, etc.) necessary to enable him to prepare the requisitions properly.

To perform the above duties effectively, it is important that each officer concerned have a general understanding of the Navy Supply System and of the organization within the system which controls the specialized materials essential to his department's efficiency. For example, it is important that a gunnery officer be familiar with the Ordnance Supply Office (supply demand control point for ordnance material) and the Ordnance Supply Segment of the Navy Supply System. Similarly, an electronics officer should know about the Electronics Supply Office and the Electronics Supply Segment of the Navy Supply System.

MOBILE LOGISTIC SUPPORT

Mobile logistic support refers to the use of specially outfitted ships for support of the Fleet while at sea. As may be seen from the following discussion, the use of such support developed as a result of efforts to meet the logistic needs of World War II.

War in the Pacific was fought from island to island. After capture, islands of strategic value were developed into bases for future military operations. Developing an island included the construction of supply facilities for the storage and distribution of the materials required by the Fleet and by shorebased activities. As the forces moved forward, however, bases in rear areas had less and less military value, and the supply facilities in these areas ceased to be required for logistic support.

Constructing supply facilities for such limited use caused much thought among logistics planners. Such construction not only tied up manpower and critical materials, but also required time. In some instances, for example, despite the rapid construction methods of the Seabees, the forces moved forward so rapidly that islands decreased in operational value even before the construction of facilities was completed.

As finally evolved, the answer to this problem of conserving materials, manpower, and time was the introduction of mobile support in the form of supply and repair ships and barges, which could move up as the war progressed and provide immediate logistic support to the forces in newly captured territory. The use of these ships thus eliminated the duplication of construction on various islands and the delay required for such construction. It also eliminated the accumulation of stocks at no longer needed points and the waste of personnel required to man these shore-bound activities.

Mobile support, found so effective during the war, has been adopted as a permanent instrument of logistic support to fleet units operating at great distances from established bases. Some of the ships used for this purpose are: destroyer tenders (AD), ammunition ships (AE), refrigerated stores ships (AF), cargo ships (AK), general stores-issue ships (AKS), oilers (AO), repair ships (AR), submarine tenders (AS), aviation supply ships (AVS), and floating dry docks (ARD).

Of particular interest to electronics officers is the fact that certain supply ships are outfitted with highly specialized types of material to meet the needs of other ships in advanced areas. For example, certain AKS ships carry thousands of different electronic items for fleet issue. (In determining the kinds and quantities of items to be stocked aboard such a ship, the Bureau of Ships and the Electronics Supply Office performed considerable research, taking into account the issue rates of the different items. For example, electron tubes, because of their high issue rate, form a large part of the load of each AKS carrying a specialized cargo of electronic material.) These fleet issue ships augment the services provided by tenders; that is, the tender provides a few ship types with many categories of material, whereas the specialized AKS services all ship types but with limited categories of material.

Conclusion

The Navy Supply System is the result of efforts to establish a well organized and smoothly functioning logistic support system for replenishable material based upon centralized control and decentralized operation.

A significant feature of the new system is the concept of a difference between physical and functional cognizance. As a result of this concept, functions which are peculiar to a particular type of material (physical cognizance) are made responsibilities of technical personnel. Functions applicable to this same material which are common to all types (functional cognizance) are made responsibilities of supply personnel. Under this assignment of responsibilities, naval replenishable material is thus controlled jointly by the appropriate technical bureau and the Bureau of Supplies and Accounts.

Cooperation and exchange of information between technical and supply personnel at all material control levels is basic to the success of the system. Such cooperation is more readily obtained if technical and supply personnel appreciate each other's responsibilities and problems.

As unification of the military departments has gone forward, still further centralized control has been accomplished by means of single managers of specific categories of material or services for the entire Department of Defense. Whether procured by the Navy or another agency, however, naval replenishable material flows through the Navy Supply System once it has been acquired.

CHAPTER 10

ELECTRONICS SUPPLY SEGMENT OF THE NAVY SUPPLY SYSTEM

The foregoing chapter discussed the efforts to alleviate the confusion which existed in naval supply during World War II and the Navy Supply System which developed as a result.

The present chapter is concerned with that phase of the Navy Supply System which pertains to electronic material—the Electronics Supply Segment of the Navy Supply System. It is emphasized that neither the Electronics Supply Segment, nor the Navy Supply System of which it is a part, is yet fully developed as contemplated in the Navy Supply Plan. The basic principles set forth in these chapters are sufficiently stable, however, to illustrate the effective system toward which the Navy is striving.

As indicated in the preceding chapter, the electronics organization of the Navy is composed of both technical and supply personnel. Although the duties of these personnel differ, it is impossible to separate them entirely since each is dependent upon the other. It is true that the electronics officer is concerned primarily with the actual maintenance and repair of electronic equipment and is not required to be familiar with the detailed procedures of a supply department. It is true, also, that the supply officer is concerned primarily with providing the materials required by the electronics officer and not with the technical knowledge required to accomplish repairs. The technical ability of the electronics officer, however, will be of no value unless he is supplied with the parts and tools he requires. By the same token, the supply officer cannot expect to have the necessary materials on hand when needed, if he has not been informed of the electronics officer's requirements. It follows, then, that these two officers must correlate their work if proper supply and maintenance support to the Fleet is to be accomplished.

Such correlation is more readily achieved if each officer understands the work and problems of the other. The purpose of this chapter, therefore, is to give the electronics officer an understanding of electronics supply, the problems of the supply officer, and the manner in which the work of both officers depends upon cooperation and mutual exchange of information.

Development of a Material Distribution System

Certain problems are common to the development of any material distribution system. To show how such problems arise and to present solutions which have evolved, the development of a commercial business from one small store to a nation-wide network of stores is discussed in the following paragraphs.

A radio store, stocking electronic items commonly required to repair radio sets and electrical equipment, is opening. The beginnings are meager. Half a dozen styles of lamps, a few resistors, as many capacitors, common plugs and cords, and possibly representative vacuum tube types comprise the initial stock.

Customers and clerks have no difficulty in locating stock as it is arranged in bins along the walls or under the counters with pertinent electrical characteristics, such as wattage and resistance, or tube-type number, inscribed on the bins. Even if the stock grows to include several thousand items, this method of stocking and selling will be effective.

DISTRIBUTION SYSTEM

A logical extension of this radio supply store is the establishment of other outlets for materials in the immediate vicinity or on a wider scale, perhaps on a nation-wide or world-wide basis. The original shop then becomes the "home office" and the other shops in the organization become retail suppliers responsible to the home office for their actions and dependent upon the home office for the replenishment of stocks. Indeed, if the organization becomes a nation-wide one, it may be desirable to spot, in various areas, warehouses or distributors, whose sole job is to supply the retail outlets with required stocks.

Describing and Cataloging Material

No sooner has a second retail store been established than a problem, previously unknown, arises. The manager of the second store cannot point to those items which he desires from the first store. He must indicate in writing the items which he needs. A description of the items, as well as the quantity required, must be included on the request. As the total number of items which can be ordered increases, descriptions must become more complete to differentiate between items which have many common characteristics. As a result, there will be as many descriptions for any one item as there are retail stores, since each manager will view a given item in a different manner. The submission of 10 different descriptions for one item will undoubtedly cause confusion at the home office when it attempts to supply material to the requesting stores.

To reduce this confusion, the home office might prepare a description of each item that can be ordered, list all of these descriptions in a booklet or catalog, and send copies to all retail stores. Then when material is ordered, the appropriate description need only be copied from the catalog and sent, with an indication of the quantity required, to the home office. The dissemination of such a catalog accomplishes the following: (1) it simplifies the supply of items from the home office by providing a standard description for each item; (2) it reduces the time spent at retail stores on developing descriptions; and (3) it provides all stores with a complete list of items that can be obtained from the home office. Such a catalog is a prerequisite to a mail-order business.

Despite the fact that descriptions are prepared only at the home office, certain inconsistencies will appear over a long period of time. For one thing, descriptions developed over several years for similar items will contain different types of information. Also, elements of information in different descriptions will appear in different sequence, especially if the descriptions are prepared by different people. To permit more rapid comparison of stock with descriptions, and to avoid ambiguity, it is highly desirable that the same characteristics of similar items be portrayed in the same sequence on all descriptions. To accomplish this, a list of questions to be answered when preparing a description must be developed for each type of item. A group of such lists of questions embracing all types of items forms the nucleus of a description manual. Such a manual should also include a list of names, with definitions, which can be used in describing items and abbreviations which may become part of the body of descriptions.

Numbering

As the number of different items in stock increases, descriptions become correspondingly lengthy to differentiate between similar but not identical items. The result is that considerable time is consumed in copying lengthy descriptions when requesting items. However this time is reduced significantly if a catalog, or stock, number is appended to each description, since only this number and a quantity need be mentioned in correspondence. In applying numbers to descriptions, it is necessary that a different number be applied to each different description and that the same number be applied to descriptions that are identical insofar as the supply system is concerned. That is, the same number may be applied to descriptions of two items which are not identical in every detail

but which are interchangeable and therefore are considered identical, insofar as the supply system is concerned. Furthermore, if stock numbers are stamped on material sent from the home office, this material can be readily identified at retail stores. Bins can be arranged in stock number sequence with the result that a given item can be located with a minimum of effort. The stock number then is a useful and necessary tool for indicating material requirements and supplying this material.

Preferred and Substitute Items

As the number of different items in the system increases, more space is required to bin material, more records must be kept, and more procurement actions must be taken. If the number of different items can be kept to a minimum consistent with the needs of consumers, the space required and the time necessary for the aforementioned procedures are reduced.

In any large recently developed supply system there are many pairs or groups of items which have similar, though not identical, characteristics and which are interchangeable, at least unilaterally. For example, a resistor with a resistance tolerance of 5 percent can also be used in any circuit where a resistor with a 10-percent tolerance is called for. If all 10-percent tolerance resistors can be eliminated from the system by permitting stock to be exhausted, then the number of bins required to stock resistors and the number of procurement actions taken to replenish stocks of resistors is reduced. In addition, quantity purchases of one item are usually less costly. Obviously, interchangeable items are preferable to those having only one application. An efficient home office, therefore, seeks to determine which items are interchangeable and prepares lists of these "preferred" items for the use of retail stores in issuing and requisitioning material.

Since in many instances it is possible to supply a substitute for an out-of-stock item desired by a customer, the home office also develops lists of such substitute items for the use of retail stores in meeting the requirements of consumers. Thus, the development of lists of preferred and substitute items reduces the number of items it is necessary to stock and ultimately results in reduced overhead costs.

Requisitioning and Procurement

In general, when an item at a store has been depleted or has reached a specified "low limit," the store informs the home office of the stock number and quantity of the item desired. If the home office maintains a large stock of each item, it then issues the required stock directly to the store. When home office stock reaches a specified minimum quantity, procurement is made from the manufacturer to bring the stock up to the desired level.

If the home office maintains no warehouse, material must be procured directly from manufacturers to fulfill each request as it is submitted by each retail store. Under these circumstances the ratio of procurement actions to the number of items procured is high since each store undoubtedly will request a given item one or more times per year.

To reduce procurement actions and related accounting costs, and to save on costs per item, a planned procurement program may be instituted whereby procurements are made periodically in sufficiently large quantities to provide stocks for all stores. Such a planned procurement program necessitates periodic submission of requests (requisitions) by retail stores and consolidation of these requests by the home office in order that the latter may know the total amount of stock which must be purchased to carry the entire organization through a given period.

In order that the information obtained by the home office from the stores' requisitions may be a true indication of the amount needed, these requisitions must carry, in addition to the stock number, the quantity of a given item issued during the past period, the number remaining on hand, and the estimated quantity needed during the ensuing period. (The estimated quantity will be the issues of the past period minus the amount on hand, unless it is known that there will be an unusually large demand for the item during the coming period.) The home office then reviews and consolidates these requisitions. If it is found that one store has more of an item than it will need for the coming period while another's stock is depleted, the second store may be restocked by redistributing material from the first store, thus reducing the quantity to be procured or possibly eliminating

the necessity for purchase. If upon consolidating the requisitions it is found that procurement action is necessary, one purchase can be made to satisfy the needs of all stores. Also, if successive consolidated requisitions indicate that a particular item has not been issued, this item may be eliminated from the line of stock carried with the result that required storage space is reduced and accounting costs lowered.

The above paragraphs have shown that as stocks in a supply system increase and the organization spreads over a greater area, the operations of describing, numbering, cataloging, determining preferred items, and planning requisitions and procurement are introduced.

Though there are differences in details between the electronics portion of the Navy Supply System and a commercial supply organization, the above discussion illustrates the fundamental reasons for, and the advantages of, various policies and procedures now performed in the electronics distribution system and at the Electronics Supply Office, the "home office" of the Electronics Supply Segment of the Navy Supply System.

Electronics Supply Office

During the closing years of World War II, it was recognized that a separate organization was required to identify, catalog, and effect inventory control and distribution of electronics repair parts. Following many preliminary efforts, and in accordance with the supply demand control point concept recommended by the Hancock Report, the Secretary of the Navy, in October 1946, established the Electronics Supply Office as the supply demand control point for electronic material.

The Electronics Supply Office (ESO) is located at Great Lakes, Illinois, where supply demand control is exercised over assigned electronic material. This office is under the military command and coordination control of the Commandant, Ninth Naval District, under the management control of the Bureau of Supplies and Accounts, and under the technical control of the Bureau of Ships. It has been designated by the Secretary of the Navy to serve as the supply demand control point for Bureau of Ships electronic repair parts (less nuclear items) required in the maintenance, upkeep, and overhaul of equipments in ships and at shore stations, other than those for which control is specifically retained by the Bureau. ESO also has supply demand control responsibility for such other electronic material as is, or may be, designated by other naval bureaus and the Marine Corps. In addition, ESO renders support to the entire Navy for electron tubes, dry batteries, and certain common-category electronic parts.

STOCK COORDINATION

Since an appreciation of stock coordination is helpful in understanding the material mission of ESO as redefined in 1955, the general purposes and some of the policies of stock coordination are discussed below.

Implementing the material cognizance program, stock coordination is a major step in achieving a single integrated Navy Supply System. The principal objective of stock coordination is the assignment or reassignment of supply management responsibilities for items or groups of items in a manner which will result in maximum effectiveness at minimum cost. The ultimate goal is the elimination of existing duplication and the prevention of future duplication of supply management of the same line items or groups of items within the Navy Supply System. Briefly, the general purposes of the program are to:

1. realign the material missions of the supply demand control points in order to increase supply responsiveness to basic Navy programs;
2. accomplish standardization or simplification; that is, to purify supply system stock in order to reduce to a minimum multiple management of identical material and to reduce the numbers of sizes, kinds, and types of similar items;
3. contain the input of material to those amounts determined to be essential for the support of authorized Navy programs; and
4. obtain maximum utilization of inventories.

Like other supply demand control points, ESO is responsible for reviewing the various categories of material under its management and for initiating action to transfer to a more appropriate supply demand control point any items not covered by ESO's material mission.

Repair Parts Stock Coordination

Repair parts stock coordination is the process by which stocks of each category of items required to operate and maintain Navy equipment are being assigned to specified supply demand control points for logistic support. In general, all stocks in a particular category are being assigned to only one SDCP for Navy-wide support. (Exceptions are as indicated in numbered paragraph 4 below.)

Logistic support for parts is of two kinds—program support, covering over-all parts support responsibility for an assigned equipment, and supply support, covering responsibility for support in only the specifically assigned categories of items.

PROGRAM SUPPORT means that the SDCP assigned such support is responsible for assuring that all categories of items required for the operation or maintenance of the parent equipment have been accepted for supply support by other SDCPs as appropriate. The SDCP having program support also has supply support for the repair parts peculiar to the equipment and for items that are not as yet in a stock coordinated category.

SUPPLY SUPPORT means that the SDCP assigned such support is responsible for assuring that the assigned items are available in the supply system.

As implied above, program support is assigned on the basis of EQUIPMENTS, supply support on the basis of CATEGORIES OF PARTS. For example, a BuOrd equipment assigned program support from the Ordnance Supply Office (and supply support of not-as-yet-stock-coordinated categories) would be in other distribution systems, as appropriate, for supply support in stock coordinated categories (ESO for supply support in electron tubes, for instance). To take another example, a BuShips equipment assigned program support from ESO might receive supply support from GSSO for certain categories of parts. In either case, the program support SDCP has supply support responsibility for all categories of items not as yet stock coordinated.

Program support and supply support SDCPs must coordinate their efforts in order to ensure adequate logistic support of all equipments.

Equipment Stock Coordination

In addition to repair parts, action is being taken to coordinate stocks of Navy equipment. Under this plan, like equipments will have but one inventory manager; that is, an equipment used in both ships and aircraft will be under the inventory management of either the Bureau of Ships or the Bureau of Aeronautics, not both.

Stock Coordination Policies

It is a basic policy of stock coordination that a supply demand control point has both program support and supply support responsibilities.

Other stock coordination principles and policies include the following:

1. An inventory manager can be responsive to more than one technical bureau.
2. One supply demand control point may manage both common and peculiar items.
3. Supply management responsibility for specific categories or subcategories of items will, to the maximum degree practicable, be consolidated in a single supply demand control point.
4. An identical item of material may, after proper review, be allocated to the supply management of more than one supply demand control point, provided it is demonstrated that it will adversely affect the efficiency of the Navy Supply System to allocate all of this item to a single supply demand control point. A single stock number will be used to the maximum practicable degree to identify each of the items assigned duplicate supply management.
5. The assignment of material cognizance of categories of parts to an SDCP includes assignment of responsibility for assuring the cataloging of these items. It also includes responsibility for assuring that the items are included in load lists and initial stock lists when appropriate and when within the policy limitations of the parent technical bureau. (Load lists are authoritative listings of the items to be carried on board given supply issue ships, tenders, or repair ships. They are based upon the applicable supply demand control point's estimate of the items most likely to be needed to satisfy the material demands of the fleet when supported by the mobile logistic support force. Initial stock lists indicate the initial loads of material—

general stores, provisions, ship's store stock, et cetera—to be carried on board a ship in support of that ship's operations. Prepared according to ship types, initial stock lists are used as guides for material to be carried aboard all active fleet ships of a type for operations of specified periods. They may also be used as guides in stocking the storerooms of newly constructed ships and by logistics planners in determining the supporting requirements for operations of specific ships.)

6. Reassignment of material cognizance between supply demand control points must be phased to ensure a minimum disruption to supply support and to permit immediate transition to full scale operations under full mobilization.

7. Cognizance of major items of equipment is transferable between the inventory managers of the technical bureaus.

8. Inventory control of material required by the Navy will be vested in inventory managers at supply demand control points, as distinguished from the inventory managers in the technical bureaus. Exceptions to the foregoing are equipments or items which, by design, use, cost, or other unique features, require direct control by the technical bureau. In the case of items requiring bureau control, the technical bureaus may, as appropriate, designate a supply demand control point as the inventory manager for such equipment or item, but retain in the bureau direct control of purchase, issue, and disposal of these items.

9. Optimum use must be made of material in all segments of the Navy Supply System before new procurement of this material is initiated.

10. When a program support supply demand control point is obtaining supply support from another SDCP for technical items, the program support SDCP must provide to the supply supporting SDCP the technical information covering the application of the supply support items to the degree that such information is required. The supply supporting SDCP must then ensure that this technical information is utilized in its supply determinations.

ESO MATERIAL MISSION

The increasing variety of equipments necessary to support basic naval programs caused the Bureau of Supplies and Accounts to redefine in as precise terms as practicable the material mission of each of the inventory managers of the Navy Supply System. Precise definitions of material missions were required to avoid duplications of supply support and repair parts inventory. They were necessary also to assure that repair parts support for all equipments were in fact assigned and that new items entering the system would be properly assigned.

BuSandA Instruction 4421.4 of 8 November 1955 promulgated the mission of the Electronics Supply Office in terms of the material over which this supply demand control point has supply management responsibilities. ESO's material responsibilities include inventory control, program support, and supply support for specified items. Certain of the material specified in the Instruction is at present controlled by other inventory managers. Such material is being transferred to ESO on a basis consistent with the capacity of the Electronics Supply Office to assume supply management responsibilities for this material.

A part of ESO's primary mission of supplying activities in the electronics distribution system with repair parts is to prepare Electronic Repair Parts Allowance Lists for ships and shore stations, develop and maintain stock numbered parts lists (referred to as SNITs or Stock Number Identification Tables) for individual equipments, and participate in the initial provisioning of parts for new electronic equipments.

ESO also has certain responsibilities for supporting equipments used by agencies outside the Department of the Navy as shown by the following discussion. In making requirements determinations, ESO must consider the needs of these agencies, as well as those of the Navy.

Coast Guard

The Navy is obligated to provide full repair parts support, on a reimbursable basis, for all current Navy type or Navy owned electronic equipments in use by the Coast Guard—that is, ESO is responsible for having available the electronic parts required for these equipments. In addition, the Coast Guard may buy other items stocked in the distribution system.

Military Sea Transport Service

Supply support, in terms of common items is furnished the Military Sea Transport Service on a reimbursable basis.

Military Assistance Programs

ESO is responsible for providing parts support for all Navy type electronic equipments furnished to other countries.

ESO ORGANIZATION

With minor exceptions approved by the Bureau of Supplies and Accounts, the organization of ESO conforms to the standard supply demand control point organization established by that bureau. Figure 10-1 shows the internal organization established for accomplishing ESO's mission and indicates in a general way the kinds of work performed by this supply demand control point.

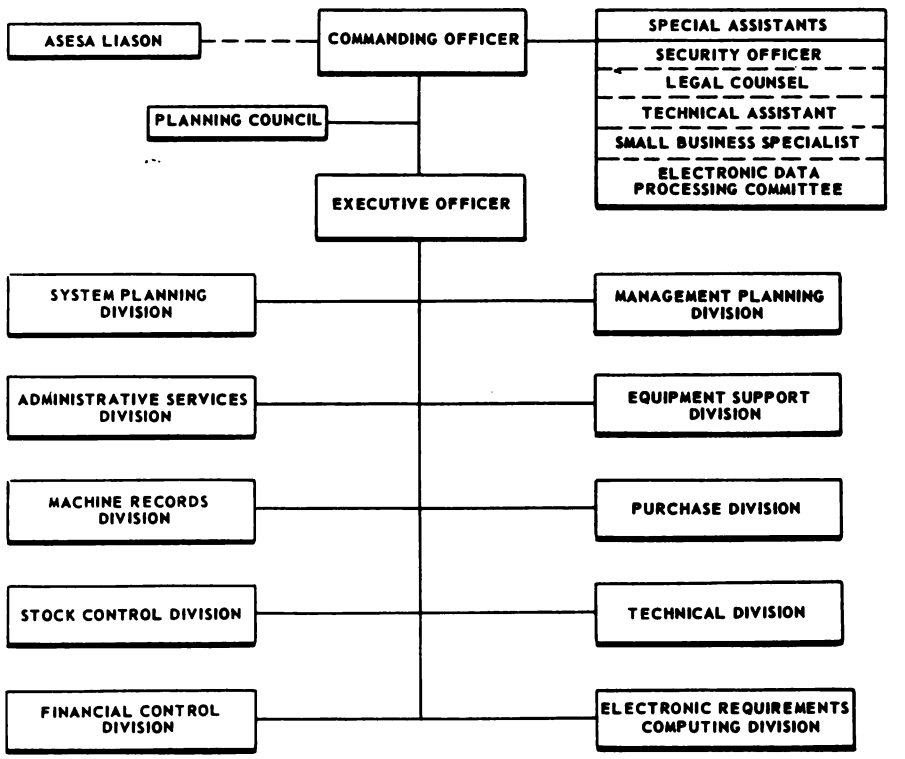


Figure 10-1.—Organization of the Electronics Supply Office.

Electronics Supply Segment of the Navy Supply System

The supply of replenishable electronic material in the Naval Establishment is accomplished through the Electronics Supply Segment of the Navy Supply System. This system is comprised of field activities designated as distribution points, primary stock points, secondary stock points, reserve stock points, and consumers or end users.

The Electronics Supply Office stocks no material. It controls and directs the flow of assigned electronic material through the various stock points listed in the preceding paragraph.

AREAS AND ECHELONS OF ELECTRONICS SUPPLY

To effect decentralization of responsibility for meeting demands and to ensure timely replenishment of consumer activities, the electronics distribution system is divided into

three major geographical areas—northeastern, southeastern, and western. In each area one major supply activity is designated as a distribution point and each distribution point is required (1) to maintain sufficient stock to meet estimated demands in its area of supply jurisdiction, and (2) to participate in mechanized inventory control through submission to the Electronics Supply Office of daily transaction reports on all transactions occurring each day, including the first replenishable demand for a not-carried item.

Each geographical area also includes primary stock points and secondary stock points. Primary stock points maintain stocks for issue to industrial departments of shipyards, to ships, and to other consumer activities or end users in the vicinity. (At present there are 20 primary stock points for N cognizance material. These include the Naval Supply Center, Pearl Harbor; Naval Shipyard, Long Beach; Naval Air Station, San Diego; Marine Corps Air Station, Cherry Point; Naval Shipyard, Boston; Naval Station, New Orleans; and Naval Supply Depot, Great Lakes.)

Secondary stock points also maintain stocks for issue to ships and to other consumer activities. The principal difference between the two is that primary stock points ordinarily have a greater demand and therefore are required to submit to ESO daily transaction reports showing all transactions that occurred during the day, including reports of the first replenishable demand for fast fraction not-carried items.

Distribution points and primary stock points are often referred to as regularly replenished reporting activities, while secondary stock points are referred to as regularly replenished nonreporting activities.

In addition to the above there are two reserve stock points where electronics bulk and reserve stocks are stored as directed by the Bureau of Ships or ESO. The Naval Supply Depot, Mechanicsburg, Pa. and the Naval Supply Depot, Clearfield, Utah, maintain such bulk and reserve stocks.

Consumer activities are normally dependent upon the nearest stock point and are replenished through the submission of requisitions to these stock points. Exceptions to the normal dependency of consumers are given under the section on replenishment in this chapter. Consumers are allowed only enough stock to maintain their allowance, or for scheduled need.

REPLENISHMENT

A basic responsibility of ESO is to ensure proper balance between the supply of and demand for electronic repair parts. This balance is maintained by a continuing review of stock positions at activities in the electronics segment of the Navy Supply System. Based upon such review, requirements are determined and stocks are replenished through redistribution of material in the system and purchase of additional items as necessary.

Distribution Points and Primary Stock Points

Replenishment at reporting activities (distribution and primary stock points) is accomplished on the basis of daily transaction reports. At the close of each working day, reporting activities submit to ESO transaction reports (Item Detail Cards, SandA Form 791) on all transactions that occurred during the day. If no transactions occurred, activities make negative reports by submitting Item Detail Cards marked "Negative." Each transaction report is coded with a transaction code which gives ESO definitive information as to the nature of the transaction. For example, transaction code "F" means "money value only—debit."

ESO consolidates transaction cards in weekly batches and processes them through the electronic data processing machine (EDPM). The EDPM is programmed to evaluate both individual activity stock positions and the system stock position.

The EDPM process results in a system replenishment recommendation and redistribution shipment orders. The system recommendation is reviewed by a stock analyst before it becomes firm.

ESO directs redistribution action to a consignor on Form DD-1145, Shipment Order. This form designates the stock number and quantity of items to be redistributed, the consignee activity, document order number, and contains other pertinent information. The consignor also receives an Item Detail Card for use in adjusting the activity's stock.

The consignee activity receives copies of the shipment order, Item Detail Cards to establish "due in" information on stock records, and a Due Card (SandA Form 786) for the due

file. The Due Card shows stock number, quantity, expected due date, consignor activity, and other pertinent information.

Secondary Stock Points

Secondary stock points obtain regular replenishment through submission of requisitions to designated supporting supply points.

Unexpectedly large demands may cause stock on hand and on order at a secondary stock point to be reduced below the approved minimum level. If the remaining quantity is insufficient to meet demands expected to occur before delivery resulting from the last scheduled requisition, interim requisitions should be submitted, or action taken to purchase the material under special authority for emergencies.

Consumers

The consumer or end user is required to use standardized stock record forms for his particular type of activity (shop stores, ship, etc.), in accordance with procedures prescribed in the *BuSandA Manual*. When a consumer's stock is reduced to a level established as the low level for that activity, a requisition should be submitted to the activity's supporting supply point as follows:

CONTINENTAL SHORE ACTIVITIES.—Consumer activities in the continental United States submit requisitions to their designated supporting supply points.

SPECIAL NAVAL ACTIVITIES.—Naval research activities are designated as direct dependents of distribution points. These include research and development groups, experimental and testing activities, ordnance plants, underwater sound laboratories, and other special naval activities. Designation as direct dependents is necessary to ensure meeting the high percentage of requirements of these consumer activities for types of material not ordinarily included in the range of stock at primary stock points.

SHIPS IN CONTINENTAL PORTS.—These ships submit their requisitions for ESO controlled material to the nearest primary or secondary stock point unless specifically authorized to submit requests directly to a distribution point. Ships in the San Francisco Bay area are authorized to submit requisitions to SSD, NSC, Oakland. Ships in the Hampton Roads area, exclusive of those at the Norfolk Naval Shipyard, are authorized to submit requests to SSD, NSC, Norfolk.

OFFSHORE CONSUMERS.—All offshore consumers, including ships, submit requests in accordance with current Fleet directives. Unless otherwise directed by ComServLant or ComAirLant, consumer activities in the Atlantic, Mediterranean, and Caribbean are authorized to submit requests directly to SSD, NSC, Norfolk, the distribution point for the southeastern area. Normally, however, these consumers are replenished by means of mobile logistics—that is, by ammunition ships (AE), Fleet issue ships (AKS), and the like. Consumer activities in the Pacific submit requests as directed by ComServPac or ComAirPac. Normally these also receive mobile logistics support. In addition, there are three bases in the Pacific which ships may use under certain conditions.

System Replenishment

In determining the actual stock levels to be maintained at the various activities in the electronics supply segment, such factors as the following are considered: authorized reserves, demand requirements, issue data, operational plans, construction and overhaul schedules, technical developments, procurement lead periods (average time required for delivery of purchased material after the transaction date or after preparation of requisitions), manufacturing setup costs, shipping and handling costs, and storage problems.

After considering the preceding factors and after reviewing the consolidated transaction reports, ESO estimates the total requirements for the electronics supply segment. The amount of stock that must be procured to bring the quantity of each item up to the required figure is then determined. If stocks are in excess of requirements, ESO determines the amounts which need be retained and designates the excess for possible cancellation of quantities on order or for surplus disposal. Whenever possible, the requirements of stock points are filled by shipment orders initiated at ESO and forwarded to applicable stock points for action. When there are local excesses at one or more activities, redistribution is ordered

to equalize stock levels. Remaining requirements are satisfied by initiating purchase action, usually for direct delivery to requiring activities.

Channeling of daily transaction reports and requisitions is shown in figure 10-2. This figure also illustrates the flow of material as directed by ESO in response to these requests. As indicated on the chart, consumers' emergency requisitions may be forwarded to ESO. This is the usual procedure when the requested material is not available at lower echelons of supply, or will not be available as a result of submitted transaction reports in time to meet required delivery dates. ESO with its system-wide record of stocks can determine where in the system the required material is available and can issue a shipment order accordingly. If it is determined that the material, or an acceptable substitute, is not available for diversion to the requesting activity, ESO initiates purchase action or authorizes local purchase.

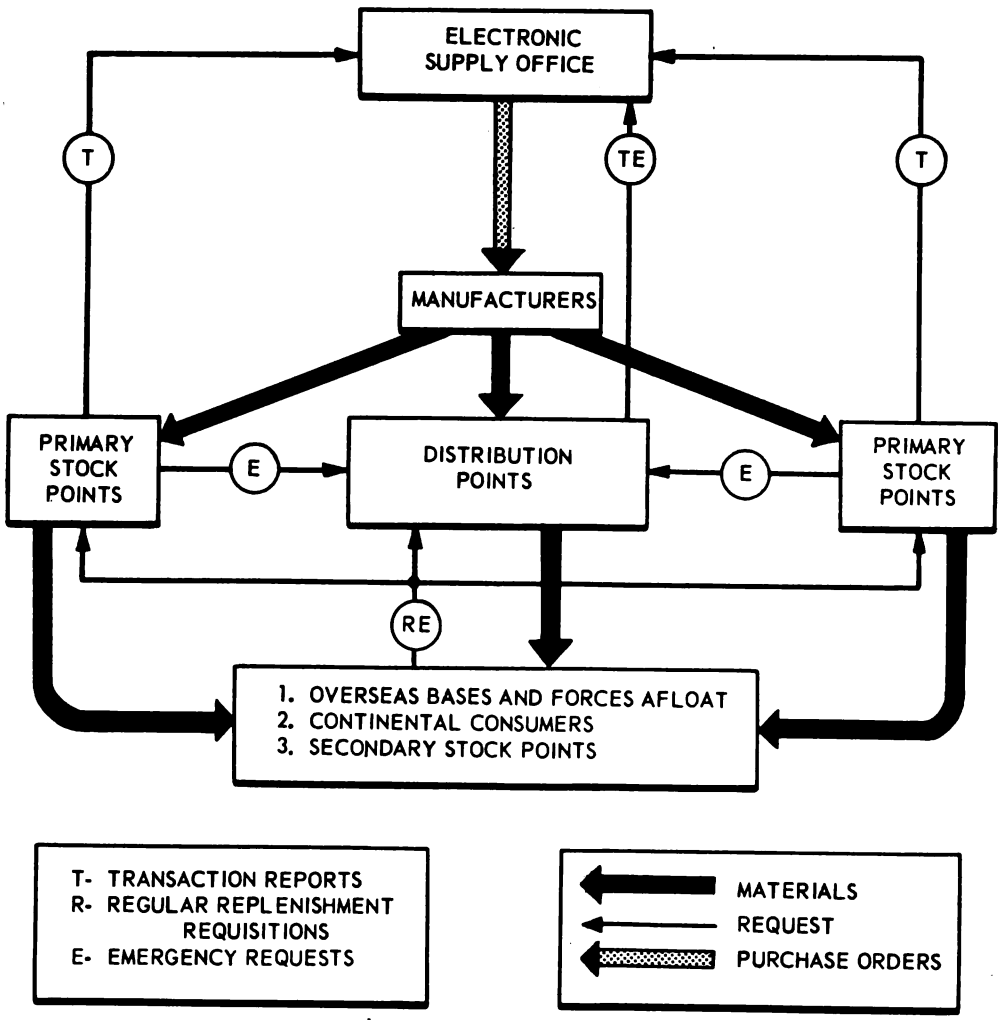


Figure 10-2.—Electronic material and request flow chart.

PROVISIONING NEW EQUIPMENTS

Repair parts must be available for equipments when they are initially placed in service. This is important for all types of parts used in the equipments, but is especially important for parts not in common use (parts peculiar). Because of this, Navy-wide requirements must be forecast for the kinds and quantities of the necessary parts at the time the equipments are

being manufactured. It is a complex problem. Sufficient parts must be forecast, because once the contract for production is completed, any arrangements for the manufacture of additional parts are difficult and extremely costly. For instance, once the manufacturer has discontinued production of a particular item and scrapped the dies, the engineering expense required in retooling for production of a small quantity may result in a cost of more than 100 times as much per item as the original sales price.

On the other hand, oversupply is not the answer. Such a method is not only a waste of materials and costly, but requires additional stowage space and cuts into the critical weight allowance aboard ship.

In order to avoid either oversupply or the danger of depleted stocks during the life of the equipment, it is essential that correct forecasts be made of the quantities to be procured. To this end, *Electronic Maintenance Parts Requirements Specification* (MIL-E-17362(B) and Amendment 2) provides time schedules, procedures, and guidelines, and sets forth the responsibility of the contractor and the cognizant bureau or agency for determining the quantities of parts peculiar which are to be supplied with the equipments in the form of equipment spares. Procedures for determining the quantities for stock which it is believed will meet the requirements for these parts peculiar for the life of the equipment are also set forth in the specification.

ESO's estimate of the number of parts needed for the life of the equipment is based partially on failure data for similar parts in the same category of material. In this respect, it is essential that the Fleet furnish the Bureau with complete Failure Reports on each repair part. These reports, when consolidated, should reflect a true picture of the frequency and types of failures so that usage predictions for similar items may be sound.

No parts common are procured under *Electronic Maintenance Parts Requirements Specification* MIL-E-17362 (B). ESO procures and maintains these parts as stock on the basis of supply and demand requirements.

CONSUMER RESPONSIBILITIES FOR SUPPLY

Effective functioning of the electronics distribution system depends upon the consumer for such responsibilities as maintenance of appropriate local stocklevels, correct preparation of requisitions, prompt submission of Failure Reports, and reporting of changes in ships' electronics installations.

Maintenance of Stock Levels

The necessity for a consumer activity to maintain sufficient stocks to meet its requirements is obvious. Less obvious, but also important, is the necessity to avoid overstocking. Overstocking not only increases the dollar value of an activity's inventory and occupies storage space unnecessarily, but stocks which may be needed elsewhere are immobilized. As shown in the foregoing discussion of replenishment, stocks at consumer activities are not reported through the supply system. There is no means, therefore, by which ESO may order diversion of this material even though an emergency need for it may exist at another activity.

Certain parts may require replacement so often that there may be a tendency to consider them as a part of shop stores. In such a case, an increase in the quality of manufacture, an improvement in design, or obsolescence may leave the shop store with a 6-year instead of a 90-day supply. For this reason alone it is desirable to keep shop stores to a minimum.

Furthermore, if a large quantity of a particular item is built up in shop stores, requisitions for this item will be forwarded to the supporting supply officer for electronics on only an annual or semiannual basis rather than on a monthly basis. The supply officer for electronics, however, determines his future requirements on the basis of quarterly or monthly demand. Since, for a long period of time, no requisitions have been forthcoming for this particular item, he naturally assumes that the demand is not great. He transmits this information to higher echelons of supply by means of a quarterly requisition or a transaction report. When the quantity of this item in the shop store finally becomes low and a requisition is submitted, the supply officer may not have a sufficient quantity on hand to fill the request and must submit an emergency requisition for action.

Often excess stocks are built up to ensure that sufficient material will be available at all times without immediate recourse to the supply system. The electronics distribution system is

so organized, however, that it can supply the electronics officer with material in a minimum of time if he (1) maintains only a 3-month supply in shop stores, (2) submits requisitions for material at monthly intervals, and (3) submits planned future requirements in sufficient time and detail to permit the supply officer for electronics to obtain materials from a higher echelon of supply.

In order to avoid building up excess quantities of material, consumer activities should review their stock records periodically.

Preparation of Requisitions

In order to have on hand replacements for parts which fail, activities operating electronic equipments must make their requirements known to the supply system. This is done by means of requisitions forwarded to the appropriate supporting supply activity.

To obtain the exact material and quantities required, it is important that all entries on the requisition form be filled in properly. The column marked "stock number" is especially important. A correct stock number enables ready identification of material by supply personnel who without technical knowledge of the material would otherwise be unable to fill the requisition.

Ships may obtain stock numbers from their parts allowance lists and Stock Number Identification Tables (SNITs). Shore activities may obtain stock numbers from *Stock Number Identification Tables, Assembly Breakdown List, Master Cross Index,* and applicable portions of the *Navy Stock List.*

If these publications are not available to the requesting activity, or, if after searching them, no stock number can be found, a complete electrical and physical description of the required item, as well as all reference numbers associated with it, should be entered in the "Description" column of the requisition. Only when this has been done can the requisition be considered complete.

A complete description lists the following information:

The set involved—such as RDZ, TDZ, QBH, or DAS-4.

The Navy Type Number of the material requested—as NT 211018 or CNR-49228.

The circuit symbol designation—as K-101, L-407, or R-1062.

The JAN (Joint Army-Navy) specification if known and applicable.

The manufacturer's drawing and part number—as 27—5016P1 or K-2D10416.

The contractor's part number—as Part No. 347, Part No. R-36.

A brief physical description, as single hole mounting, slotted shaft 1 inch long by 3/8 inch in diameter.

The important electrical characteristics—as Resistor, 65,000 ohms, 1 watt, 5 percent, composition, axial wire leads; Capacitor, fixed, mica dielectric, .005 microfarads, 10 percent, 600 working volts, tab mounted.

Any other information—as stamped type No. Y176-A; has six 12-inch leads with spade-type solder lugs, one lug coded with yellow tracer.

Because the cataloging of electronic material is never complete and stock numbers are subject to change, a particular item at a supply point may be stored under a stock number which differs from the stock number available to the requesting activity. It is well, therefore, to include brief descriptive information such as circuit symbol designation and Navy Type Number even though a stock number is available. This is required in the case of requisitions for material to fill an emergency need. The descriptive information assists in identifying the required material when the given stock number proves inapplicable, whether the difference is due to an official change or to an error in transcribing the number to the requisition. Delays caused by the necessity for further correspondence to identify the material are thus prevented. In all instances where a stock number has been assigned, requisitions must include the item (basic) name and the unit of issue, in addition to the stock number of the item.

PRIORITIES.—In addition to other required information, a properly prepared requisition must contain an assigned priority, and, where necessary, the date on which the requested material is required. The purpose of priorities is to enable supply activities to process and ship first those items of greatest importance to the requesting activity. Priorities are not established for the purpose of allocating items in short supply.

EMERGENCY, SCHEDULED, and ROUTINE are the types of priorities to be assigned requisitions. Emergency and scheduled requests

must contain a justification of the assigned priority. The justification must be in sufficient detail to permit the shipping activity to determine an appropriate mode of transportation.

The date on which requested material is required must be indicated on each emergency and scheduled request. The assigned date must be the best possible estimate of the time when the material is actually required. A date need not be shown on routine requests but may be included if justification for the assigned date is also provided.

The priority on a requisition indicates to the supplying activity the importance of meeting the date the material is required or if impossible of being met, the importance of keeping subsequent delay to a minimum. Both the priority and the date material is required are significant facts known best to the requesting activity and transmitted to the supplying activity for guidance in taking supply action. Only the actual nature of the need and an actual or carefully estimated date should be considered when assigning a priority and a DMR (date material required). Neither should be based upon supply processing and shipping time.

Failure Reports

Failure Reports (DD787) have been discussed in detail in chapter 3. These reports play an important part in supply. Since they influence new developments, modifications to parts in use, and the determination of preferred items, they have a definite effect upon the kinds and quantities of items procured to replenish the supply system. They also influence the forecasting of parts required to support new equipments. It is important therefore that complete data be submitted promptly in all instances of failure, in accordance with applicable instructions.

Ship Electronics Installation Record

Changes or modifications in electronics installations may change significantly the overall demand for certain electronic repair parts. To assist in adequate replenishment planning for these parts, as well as for other purposes, it is important that each ship submit promptly a corrected Ship Electronics Installation Record (NavShips 4110) whenever a major alteration is made in its electronics installation. Although these records are forwarded to the Bureau of Ships for inventory control of BuShips electronic equipments, the information they contain is made available to ESO for use in its supply demand control of electronic repair parts and in the preparation of ship electronic repair parts allowances. An up-to-date and correct NavShips 4110 for this latter purpose is extremely important. A more detailed discussion of the NavShips 4110 is given in chapter 3 where the procedure for reporting minor installation changes is also discussed.

Conclusion

To recapitulate, ESO is the supply demand control point for electronic repair parts, and as such is responsible for maintaining adequate supplies at the various stocking activities, either by purchase or by movement of stocks within the Electronics Supply Segment of the Navy Supply System. ESO performs many of the same functions as those performed by the previously discussed commercial supply system's home office. There is one great difference, however. The commercial home office is the final authority on what its supply system will stock and on the methods used in performing its functions; whereas the mission of ESO is established by the Secretary of the Navy, and in the performance of its functions it is responsible to the Bureau of Supplies and Accounts and to the cognizant technical bureaus. Within the scope of the commanding officer's mission, however, and within the established policies of BuShips and BuSandA, orders and instructions issued by him in the discharge of his duties have the same force and effect as if issued by either bureau chief.

The proper performance of ESO's mission, providing repair parts at the times, in the places, and in the quantities required, can be accomplished only through close cooperation between the electronics officer and the supply officer who is handling the parts. The very name, "supply demand control point" strongly suggests the close cooperation which must exist between the supply personnel themselves

and the technical personnel who are most aware of present and future demands.

As in all supply systems, the principal impetus of demand comes from the end user or consumer and flows back through the supply pipeline until an adequate supply can be located. ESO the nerve center for this operation, is assisted by transaction reports made daily by each of the major activities in the electronics distribution system. From these reports, ESO can determine the demand for individual items and can either purchase an additional supply, or, if one activity has an excess of material, transfer a sufficient quantity to meet the demands of another activity. Also from information furnished in these reports ESO is often able to fill emergency or interim requests by ordering shipments from a supply activity other than that which initially received the request.

The electronics officer is of vital importance to the successful operation of the Electronics Supply Segment of the Navy Supply System. By putting in his requests promptly, with full identifying information, and by keeping his supply officer for electronics informed of any expected future needs or changes in plans, he assists in assuring that the required materials will be available when needed. If no prior knowledge is available to the supply officer, changes in the requirements at any stocking point can seriously affect the supply of parts at that point.

Cooperation is essential among all segments and echelons of supply, but nowhere is it more essential than between the electronics officer and the supply officer for electronics.

CHAPTER 11

ELECTRONIC MATERIAL IDENTIFICATION

The preceding chapter pointed out that before a requisition is submitted it must bear either the stock number or a complete electrical and physical description of the requested item. Thus it can be seen that electronics officers stationed at naval shipyards or aboard ships and engaged in requisitioning material must understand the principles and tools of material identification. Furthermore, electronics officers attached to supply activities spend a major portion of their time in identifying and describing material. For instance, one of the missions of electronics material officers stationed at ESO is to assist in the identification of electronics items. As stated earlier in this text, however, no matter where an electronics officer is stationed, his ability to speak the language of supply and use stock numbers and descriptions understandable in the supply system greatly facilitates both his and the supply system's maintenance responsibilities. The following discussion is offered, therefore, to show the developments that have occurred in material identification and to describe some of the tools that assist in identification. This chapter describes in more detail those publications listed in chapter 3 that have to do with material identification.

Development of Standard Identification

To understand the system of material identification in use today, one learns much from a look into the past. With the inception of World War II, the number of items to be supplied and the quantities of each item increased significantly. This expansion was especially great in the fields of electronics and aviation where technical developments occurred at an unprecedented rate. Cataloging and control of this material were unable to keep pace with the material entering the supply system. As a result, each stocking activity improvised storage and identification methods, and during the war there were almost as many stocking and numbering systems as there were supply activities. This resulted in confusion in requisitioning and issuing material and in exchanging material between supply activities.

Later, with the development of the Navy Supply System and the establishment of supply demand control points for specific categories of material, the number of stocking and numbering systems was reduced, as these control points standardized the identification of materials under their control. But there still existed several methods of identification, and each control point had its own guides for describing material and its own method for numbering items.

Because the need for standardization of identification was recognized, a Navy-wide system for describing and numbering was established. This system resulted in the assignment of standard Navy stock numbers (SNSNs) to all material in the Navy Supply System regardless of the control point to which the material might have been assigned.

With the passage of Public Law 436 in 1952, another step in the development of standard identification was taken. This law established the Federal Cataloging System for the Department of Defense: Army, Air Force, and Navy.

FEDERAL DESCRIPTION GUIDES

To carry out the intent of Public Law 436, and to facilitate interchange of material between departments and activities, uniform identifications are required so that items in the supply system which are physically and functionally similar, and whose performance characteristics are the same in all applications, can be combined and controlled under one positive identification and stock number. To implement the requirements of this legislation, guidelines were established for all services working in the cataloging program and a series of cataloging handbooks were issued by the Department of Defense. These handbooks contain names, description patterns, reference drawings, manufacturers' codes, abbreviations, and symbols for all kinds of material that are approved for use in the Department of Defense. In addition, commodity classifications into which all items of supply could be placed were developed. The structure of the commodity classification as presently established, consists of 74 groups—the first two digits of the Federal Stock Number (FSN)—which are subdivided into approximately 500 classes—the third and fourth digits of the FSN. Each class covers a relatively homogenous area of commodities, either in respect to their physical or performance characteristics, or in respect to their usually being requisitioned or issued together.

The list that follows gives examples of assignment of commodity groups and classes.

58—Communications Equipment
- 5815—Teletype and Facsimile Equipment
- 5831—Intercoms and Public Address Equipments, Airborne

59—Electronic and Electrical Equipment Components
- 5905—Resistors
- 5910—Capacitors
- 5920—Fuses and Lightning Arrestors

61—Electric Wire, Power, and Distribution Equipment
- 6130—Rectifying Equipments, Electrical
- 6135—Batteries, Primary

Commodity classification code numbers are so assigned as to make it possible to expand the number of groups and classes when that becomes necessary. Within each group, gaps have been left between numbers assigned to adjacent classes. This has been done to permit the insertion of new classes in logical sequence, when necessary because of technological advances, or to accomplish other desirable changes.

FEDERAL STOCK NUMBERS

The Federal Stock Number (FSN) used throughout the Department of Defense, utilizes a 4-3-4 digit pattern prefixed by an alphabetical designator. See figure 11-1. The alphabetical designator is a device the Navy uses to identify the inventory manager of the material. It is called a "cognizance symbol." Some of the cognizance symbols are listed below.

Cognizance Symbol	Inventory Manager
F	Bureau of Ships
G	General Stores Supply Office
H	Ships Parts Control Center
N	Electronics Supply Office
R	Aviation Supply Office
Y	Yards and Docks Supply Office
Z	Ordnance Supply Office

When a stock number is preceded by an "N," the item of supply is controlled by ESO.

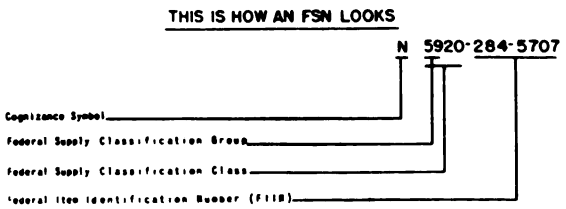


Figure 11-1.—Breakdown of a typical Federal Stock Number.

Following the cognizance symbol is a four digit number which indicates the Federal Supply Class. The first two digits represent the Federal Supply Group. In the example shown in figure 11-1, the "59" specifies that the item is an Electrical/Electronic Equipment Component. The second two digits, "20," together with the number "59," shows the

Federal Supply Class in which fuses and lightning arrestors have been classified. The last seven digits—the 3-4 part of the pattern—are the specific item identifier. They are called Federal Item Identification Numbers (FIINs) and are serially assigned. The same FIIN is never used to describe more than one line item, and once assigned, that number is never reassigned, even though the item identified by the number may have been dropped from the supply system.

Each FSN thus indicates

1. The activity responsible for the material (cognizance indicator).
2. The Federal Supply Group to which the item belongs (first two digits).
3. The Federal Supply Class of the Federal Supply Group the item falls within (third and fourth digits).
4. The specific item of supply (FIIN—last 7 digits).

To assign an FSN to an item of supply, the item must have a known reference number. This is usually a military specification or standard number, or the manufacturer's part or drawing number. Each company or concern which manufactures material for Government use is assigned a five digit "manufacturer's code." The importance of a reference number, the manufacturer's code, and their application to identification of material will be indicated later in this chapter.

Cataloging—A Common Language

The importance of the cataloging function cannot be fully appreciated until it is realized that the catalog is the basis of the "language" used in all supply systems, and that in the absence of such a language the supply system cannot respond promptly to the needs of the service. The number and variety of electronic repair parts is great. This in itself makes supply support difficult, but the difficulty is compounded when these repair parts are spoken of in several different languages. Electronics technicians have their own terminology for repair parts. Frequently the item names they use are quite different from those which are listed in supply catalogs. If they do not use catalog language in their requisitioning documents, however, delays are encountered.

Some of the objectives of supply cataloging are to classify items of supply so that they can be readily located and compared, to eliminate duplication in storage through proper nomenclature, to provide a means of describing materials for supply management, and to differentiate among items of supply.

The first step in item identification is to assign a name to an item of supply. The name is defined to include a specific range of items which have comparable characteristics and can be described by an applicable description pattern. (Description pattern handbooks have been published by the Department of Defense.) There are two fundamental reasons for knowing and using correct names. The first is to enable expeditious location of items in catalogs. (Catalogs in use today list all items by their correct technical nomenclature, and not by their Navy nickname.) The second reason for use of proper nomenclature is a corollary to the first. In transacting the supply function between two activities geographically removed, it becomes necessary to establish a "common language" by which all articles can be accurately identified. A uniform system of standard nomenclature serves this purpose. If both ends of the supply "pipe line" use the same terminology there is little trouble in identifying material requested.

Identification Publications

To many people the word "identification" implies only physical recognition and use of electronic parts and materials. This use is quite correct when only physical characteristics and uses are involved. But for catalog users, "identification" refers to correct nomenclature, stock number, specifications, name of manufacturer, unit of issue, and availability. To some degree, identification also deals with interchangeability and substitution.

If one wanted to bolt a file cabinet to a bulkhead, he wouldn't be too concerned about what the bolt looked like or what material it

was made of or even the size of the bolt as long as it was adequate to serve the purpose. But the substitution of parts in technical equipments is limited, and in some critical applications, even where it is possible such substitution may change the performance qualities of the equipment. Consequently, precise identification of technical electronic items is imperative in order that the exact part desired or an approved substitute may be procured.

IDENTIFYING NUMBERS

Numbers currently used by the Navy to identify and catalog electronic repair parts are Federal Stock Numbers. These are the numbers which should be used on all supply and inventory documents. Where FSNs are not available, other numbers must be used to identify the repair parts. Such other numbers may be circuit symbol numbers or reference numbers.

Circuit symbol numbers are alpha-numeric identification codes assigned by manufacturers to designate parts in the various circuits of a SPECIFIC electronic equipment. For example, circuit symbol C-0523, equipment model DBE, designates a specific item in the Loran Receiving Equipment, Model DBE.

Reference numbers are numbers, other than a circuit symbol number or current stock number, that have been used to identify a part. For example:

Manufacturer's Part Number: Raytheon Part No. 26-5021

Manufacturer's Catalog Number: Aerovex Stock No. AFH2-104

Manufacturer's Type Number: Triad Type HS-50

Army-Navy Type Number: JAN-CM-20A100K

Circuit symbol numbers and/or reference numbers are obtained from markings on the part itself, or from drawings found in technical manuals. Most parts lists in the older technical manuals include at least some Standard Navy Stock Numbers, but these should not be used on requests for repair parts. Instead they should be converted to FSNs and the FSNs used on the requests.

CONVERSION LISTS

Conversion from SNSN to FSN was accomplished at ESO by 30 November 1956. This involved changing SNSNs to FSNs in all records. To facilitate this change throughout the Navy Supply System, conversion lists have been issued.

Conversion List

A Conversion List is used to convert a Standard Navy Stock Number (former stock number) to a Federal Stock Number (new stock number). It contains two sections, Part A and Part B.

Part A (fig. 11-2) is arranged in numerical sequence by former stock numbers cross referenced to the new stock numbers. The sequence of former stock numbers is first by the old Navy class of material (e.g. 8, 10, 15, 16, etc.), then alphabetically by the alphabetic designator, and last by numerical sequence of the remaining digits.

Part B (fig. 11-3) is arranged in numerical sequence by new stock numbers cross referenced to former stock numbers. New stock numbers are in sequence first by Federal Supply Class (e.g. 5905, 5910, 5915, etc.) then by strict numerical sequence of the seven-digit Federal Item Identification Number.

Special Conversion List

The Conversion List cross references Standard Navy Stock Numbers of only those parts that were standard items of supply at the time of conversion. For this reason, approximately 40% of the onboard allowance material cannot be identified with a Federal Stock Numbered ERPAL even though it meets the support requirements of the installed equipment. To permit utilization of this material, a Special Conversion List is distributed to all ERPAL holders. This list cross references superseded Standard Navy Stock Numbers to Federal Stock Numbers of current items of supply. The Special Conversion List is similar in format to Part A of the Conversion List just described.

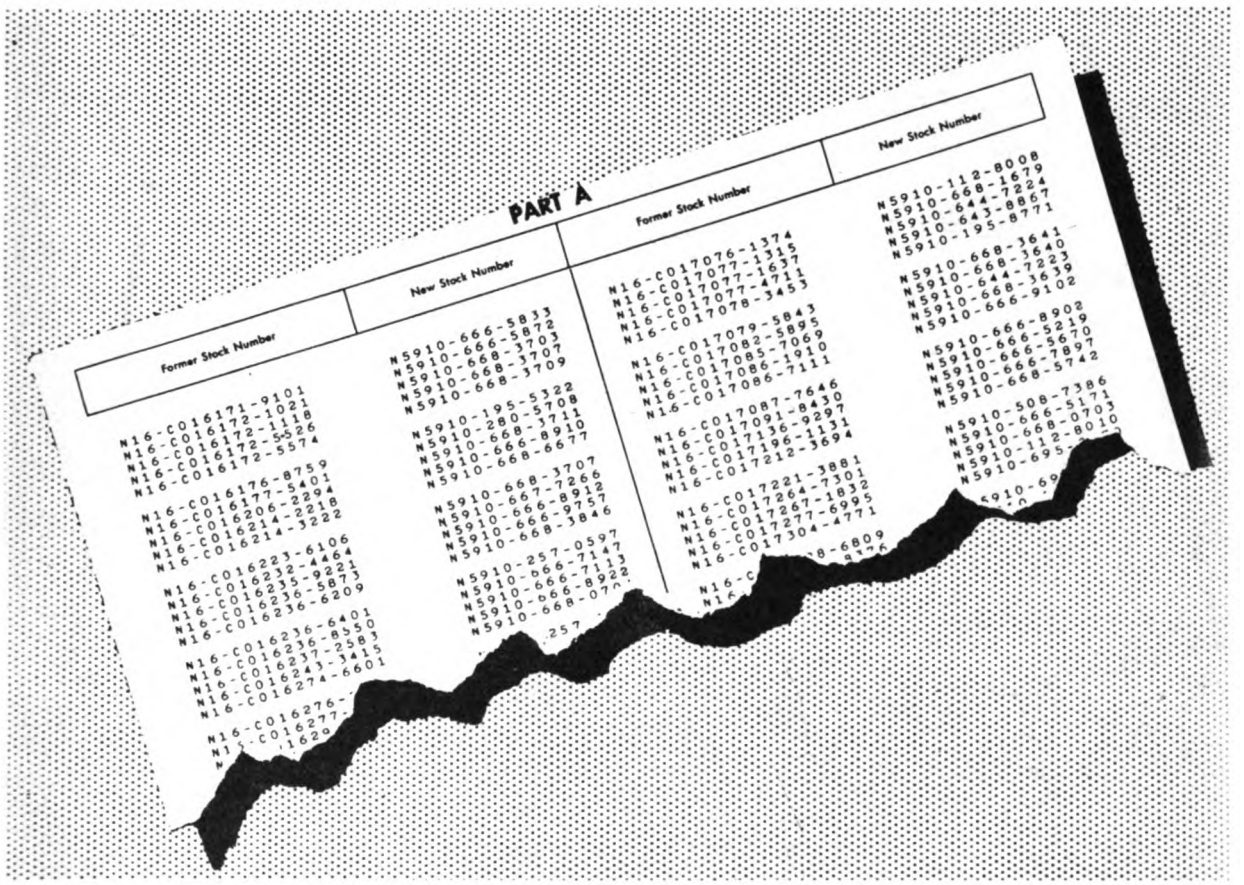


Figure 11-2.–Conversion List, Part A.

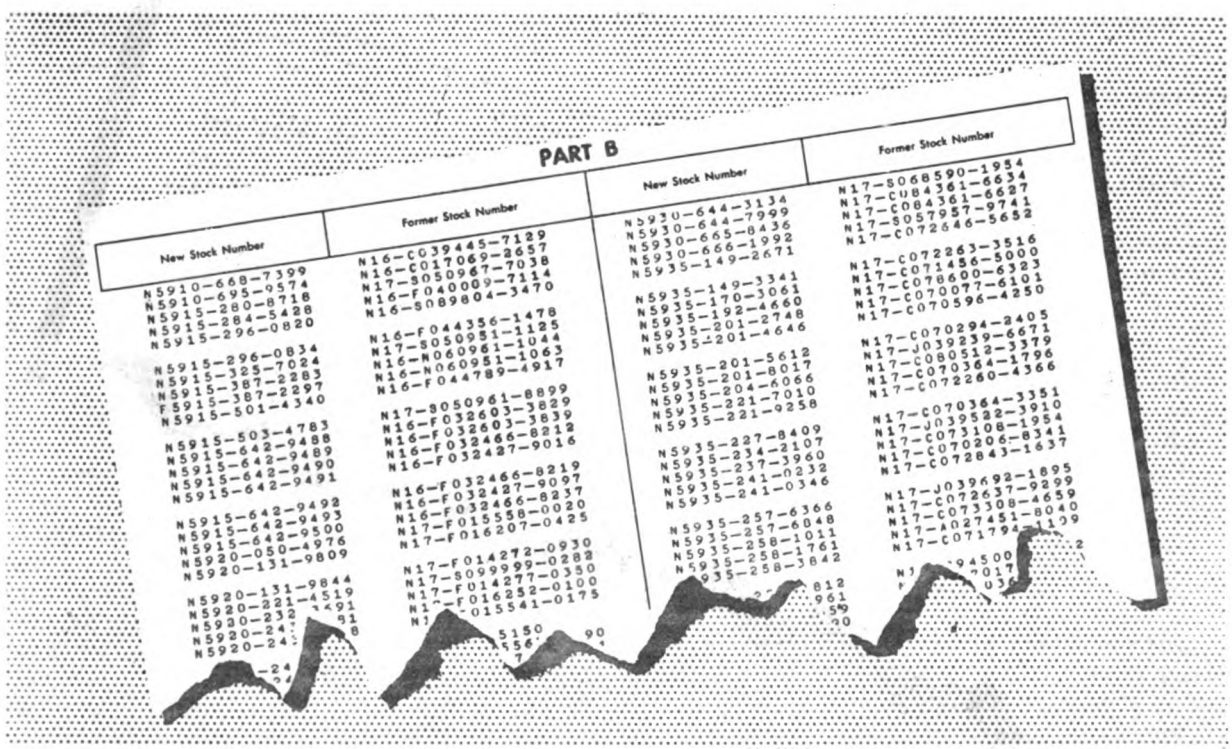


Figure 11-3.—Conversion List, Part B.

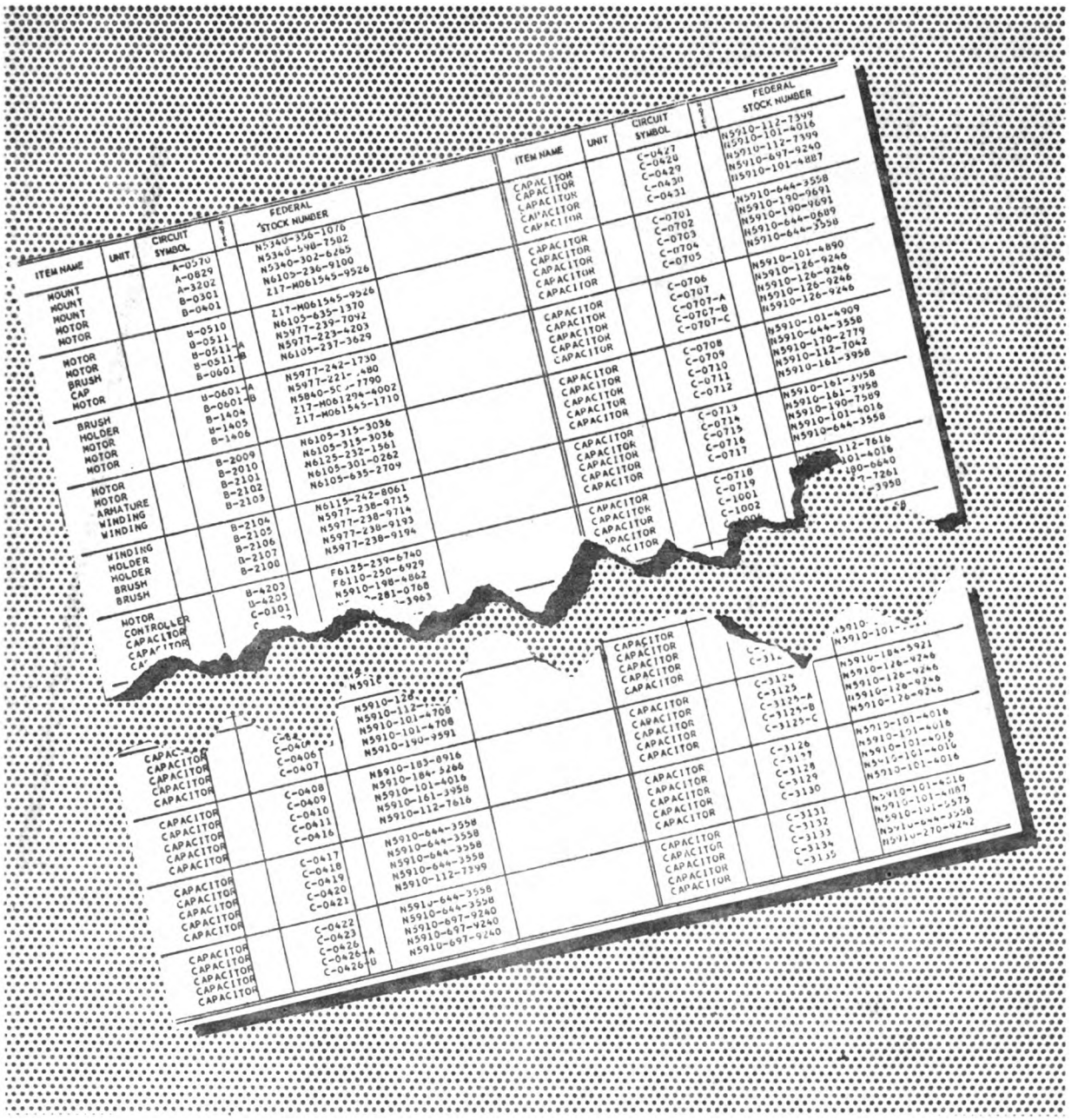
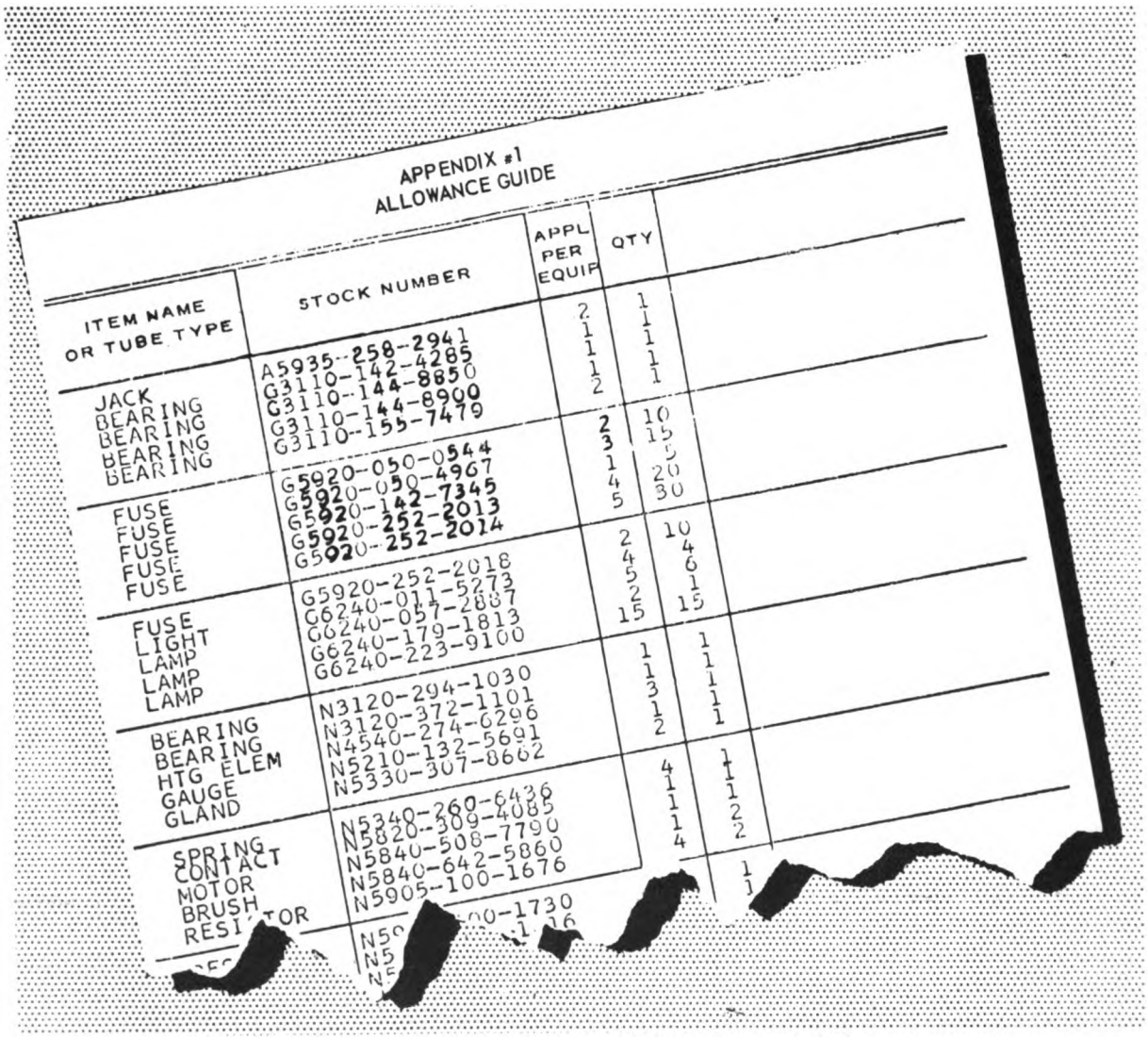


Figure 11-4.—Stock Number Identification Table, (SNIT) Main Section.

STOCK NUMBER IDENTIFICATION TABLES

Stock Number Identification Tables (SNIT), developed for most electronic equipments which are in use in the fleet, cross reference circuit symbol numbers to current stock numbers. The circuit symbol number thus is the key to locating the stock number, description, and reference numbers in the equipment technical manual.

The main body of the SNIT is a list of circuit symbol numbers referenced to stock numbers, as shown in figure 11-4. The SNIT also contains the following appendixes:

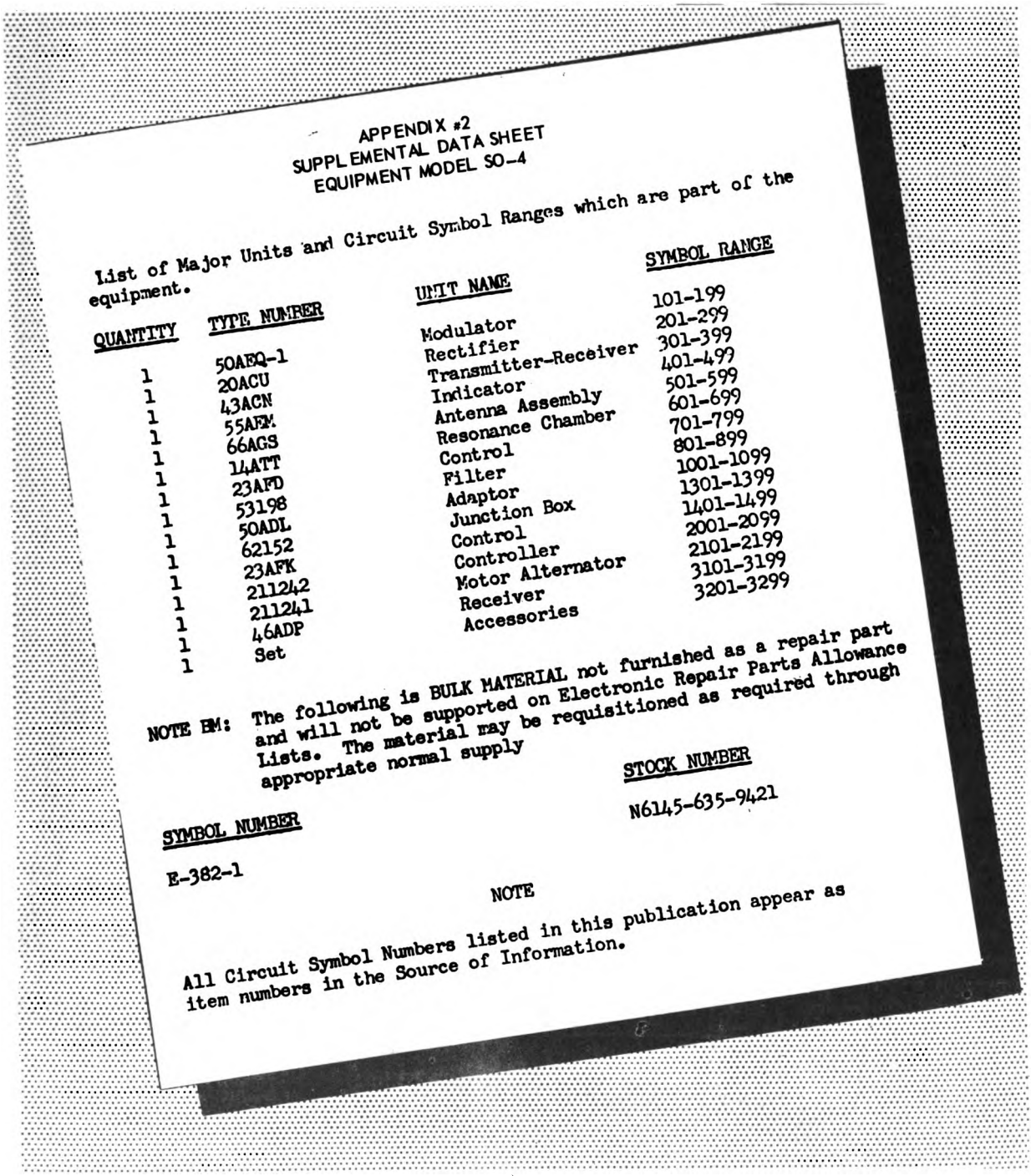


APPENDIX #1
ALLOWANCE GUIDE

ITEM NAME OR TUBE TYPE	STOCK NUMBER	APPL PER EQUIP	QTY
JACK	A5935-258-2941	2	1
BEARING	G3110-142-4285	1	1
BEARING	G3110-144-8850	1	1
BEARING	G3110-144-8900	1	1
BEARING	G3110-155-7479	2	1
FUSE	G5920-050-0544	2	10
FUSE	G5920-050-4967	3	15
FUSE	G5920-142-7345	1	5
FUSE	G5920-252-2013	4	20
FUSE	G5920-252-2014	5	30
FUSE	G5920-252-2018	2	10
LIGHT	G6240-011-5273	4	4
LAMP	G6240-057-2887	5	6
LAMP	G6240-179-1813	2	1
LAMP	G6240-223-9100	15	15
BEARING	N3120-294-1030	1	1
BEARING	N3120-372-1101	1	1
HTG ELEM	N4540-274-6296	3	1
GAUGE	N5210-132-5691	1	1
GLAND	N5330-307-8662	2	1
SPRING	N5340-260-6436	4	1
CONTACT	N5820-309-4085	1	1
MOTOR	N5840-508-7790	1	2
BRUSH	N5840-642-5860	1	2
RESI[illegible]TOR	N5905-100-1676	4	1
	N50[illegible]00-1730	1	1
	N5		
	N5		

Figure 11-5.–SNIT, Allowance Guide, Appendix I.

1. Appendix 1, *Allowance Guide*, which contains the recommended allowance of repair parts and tubes considered necessary to support one equipment model. The *Guide* is especially useful for this purpose when the equipment is not listed in ERPAL. It also assists activities without ERPAL to determine the quantities of material required to support installed equipment. Figure 11-5 is an example of an Allowance Guide.



APPENDIX #2
SUPPLEMENTAL DATA SHEET
EQUIPMENT MODEL SO-4

List of Major Units and Circuit Symbol Ranges which are part of the equipment.

QUANTITY	TYPE NUMBER	UNIT NAME	SYMBOL RANGE
1	50AEQ-1	Modulator	101-199
1	20ACU	Rectifier	201-299
1	43ACN	Transmitter-Receiver	301-399
1	55AFM	Indicator	401-499
1	66AGS	Antenna Assembly	501-599
1	14ATT	Resonance Chamber	601-699
1	23AFD	Control	701-799
1	53198	Filter	801-899
1	50ADL	Adaptor	1001-1099
1	62152	Junction Box	1301-1399
1	23AFK	Control	1401-1499
1	211242	Controller	2001-2099
1	211241	Motor Alternator	2101-2199
1	46ADP	Receiver	3101-3199
1	Set	Accessories	3201-3299

NOTE BM: The following is BULK MATERIAL not furnished as a repair part and will not be supported on Electronic Repair Parts Allowance Lists. The material may be requisitioned as required through appropriate normal supply

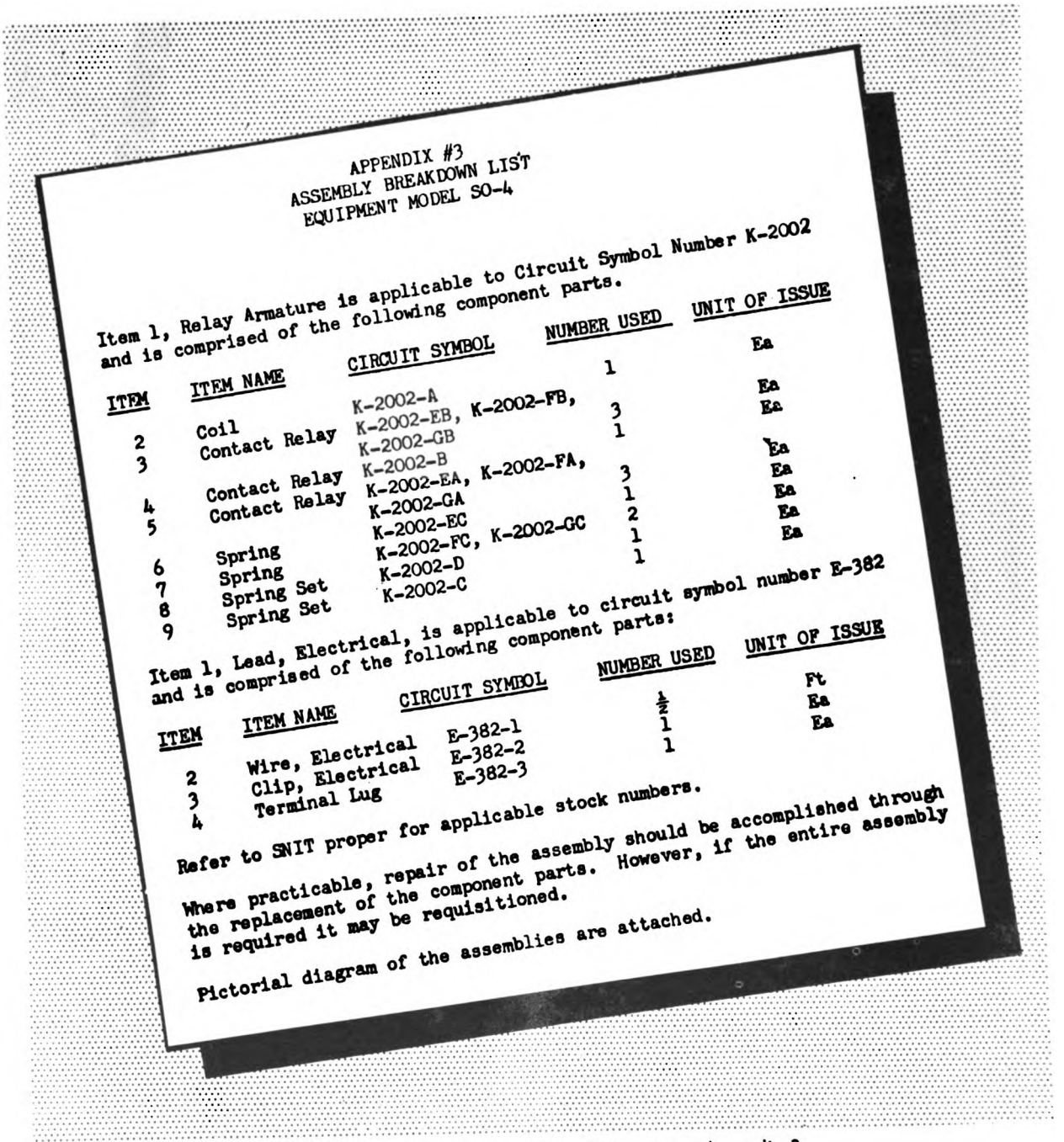
SYMBOL NUMBER	STOCK NUMBER
E-382-1	N6145-635-9421

NOTE

All Circuit Symbol Numbers listed in this publication appear as item numbers in the Source of Information.

Figure 11-6.–SNIT, Supplemental Data Sheet, Appendix 2.

2. Appendix 2, *Supplemental Data Sheets*, which provide cross references from manufacturer's part/drawing numbers or military type numbers to repair part circuit symbol numbers assigned by the Electronics Supply Office, with additional notes as required. Figure 11-6 is an example of a *Supplemental Data Sheet*.



APPENDIX #3
ASSEMBLY BREAKDOWN LIST
EQUIPMENT MODEL SO-4

Item 1, Relay Armature is applicable to Circuit Symbol Number K-2002 and is comprised of the following component parts.

ITEM	ITEM NAME	CIRCUIT SYMBOL	NUMBER USED	UNIT OF ISSUE
2	Coil	K-2002-A	1	Ea
3	Contact Relay	K-2002-EB, K-2002-FB, K-2002-GB	3 1	Ea Ea
4	Contact Relay	K-2002-B	3	Ea
5	Contact Relay	K-2002-EA, K-2002-FA, K-2002-GA	1	Ea
6	Spring	K-2002-EC	2	Ea
7	Spring	K-2002-FC, K-2002-GC	1	Ea
8	Spring Set	K-2002-D	1	
9	Spring Set	K-2002-C		

Item 1, Lead, Electrical, is applicable to circuit symbol number E-382 and is comprised of the following component parts:

ITEM	ITEM NAME	CIRCUIT SYMBOL	NUMBER USED	UNIT OF ISSUE
2	Wire, Electrical	E-382-1	½	Ft
3	Clip, Electrical	E-382-2	1	Ea
4	Terminal Lug	E-382-3	1	Ea

Refer to SNIT proper for applicable stock numbers.

Where practicable, repair of the assembly should be accomplished through the replacement of the component parts. However, if the entire assembly is required it may be requisitioned.

Pictorial diagram of the assemblies are attached.

Figure 11-7.–SNIT, Assembly Breakdown List, Appendix 3

3. Appendix 3, *Assembly Breakdown Lists*, which consist of each assembly item name, assembly circuit symbol number, circuit symbol numbers for the component parts, the quantity of each item used in the component, and when appropriate, a pictorial diagram. Figure 11-7 is an example of an *Assembly Breakdown List*.

The user of a SNIT must keep in mind that all parts listed in the equipment technical manual do not necessarily appear in the SNIT for that equipment. Items in the technical manual which have been omitted from the SNIT are for reference use only and are not required for support of the equipment.

NAVY STOCK LIST OF THE ELECTRONIC SUPPLY OFFICE

Public Law 436 provides for a single catalog to identify material stocked by the Department of Defense. The catalog may consist of a number of volumes, sections, or supplements containing descriptive and illustrative information as necessary. The Navy's portion of this catalog is called the Navy Stock List, and each supply demand control point (ESO is one of them) is responsible for the sections which contain descriptions and illustrations of material under its management control.

The *Navy Stock List of the Electronics Supply Office* (NSL of ESO) supersedes the BuShips Section, *Catalog of Navy Material*. It is composed of 3 sections: *Electronic Repair Parts*, *Major Electronic Units*, and *Electronic Equipments*. It also includes a *Standard Price Supplement*, and a *Master Cross Reference List*.

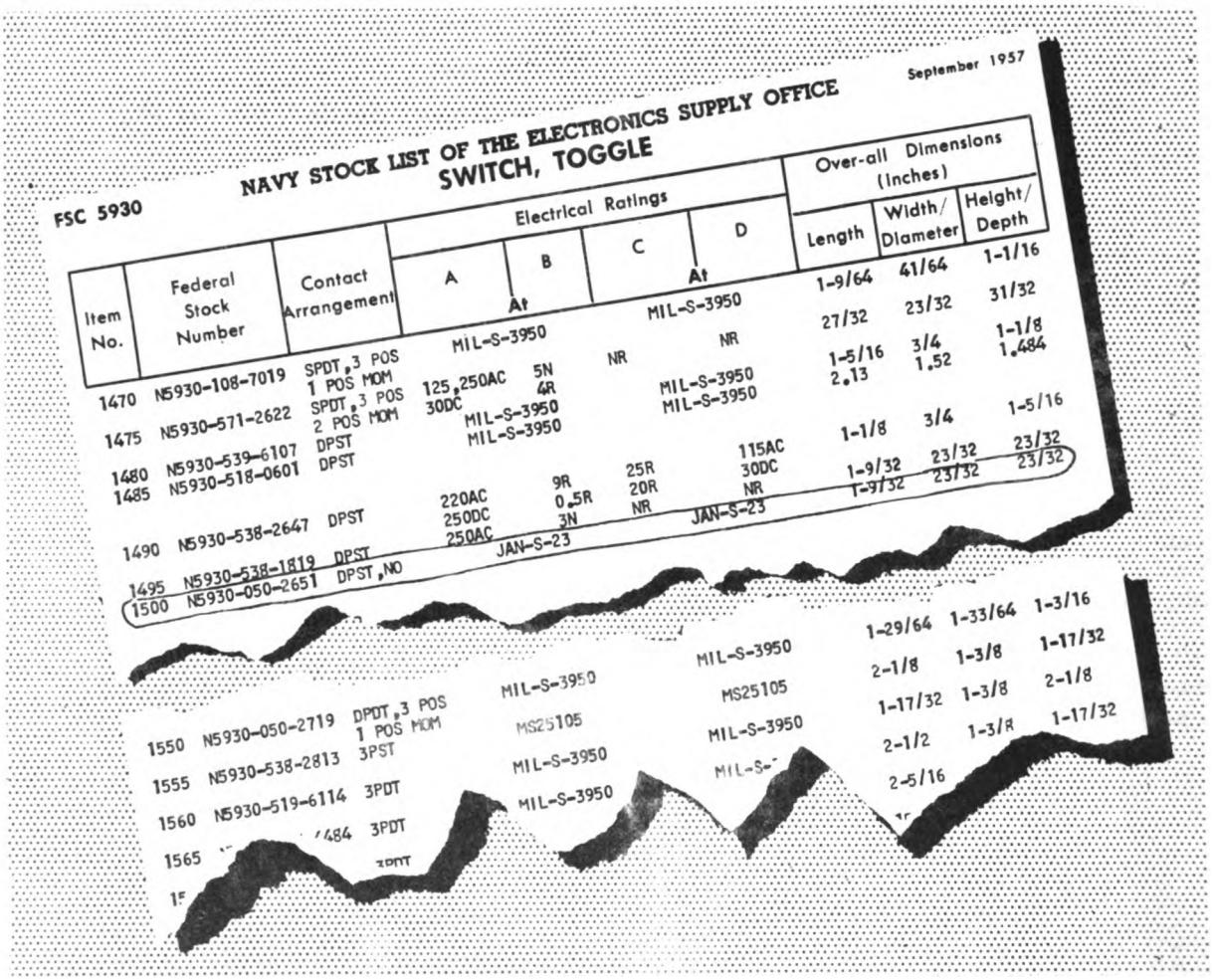
Repair Parts Section, NSL of ESO

A typical Repair Parts Section, NSL of ESO, contains the following parts:

INDEX TO ITEM NAMES.—This is a cross reference from item names to the pages where the items are described. For example, for FSC 5905 (Resistors), a portion of the index looks like this:

Item Name	Pages
Resistor, Fixed, Composition	100-149
Resistor, Fixed, Film	150-285
Resistor, Fixed, Wire Wound (w/taps)	Vol. II
Resistor, Fixed, Wire Wound (w/o taps)	Vol. II
Resistor, Step by Step	286-289

FOREWORD.—The Foreword contains important introductory information concerning the content, arrangement, and use of the section.



FSC 5930 — NAVY STOCK LIST OF THE ELECTRONICS SUPPLY OFFICE — September 1957

SWITCH, TOGGLE

Item No.	Federal Stock Number	Contact Arrangement	Electrical Ratings A	At	B	At	C	At	D	Over-all Dimensions (Inches) Length	Width/ Diameter	Height/ Depth
1470	N5930-108-7019	SPDT, 3 POS 1 POS MOM	MIL-S-3950					MIL-S-3950		1-9/64	41/64	1-1/16
1475	N5930-571-2622	SPDT, 3 POS 2 POS MOM	125, 250AC 30DC	5N 4R	NR		NR			27/32	23/32	31/32
1480	N5930-539-6107	DPST	MIL-S-3950					MIL-S-3950		1-5/16 2.13	3/4 1.52	1-1/8 1.484
1485	N5930-518-0601	DPST	MIL-S-3950					MIL-S-3950				
1490	N5930-538-2647	DPST	220AC 250DC	9R 0.5R	25R 20R		115AC 30DC			1-1/8	3/4	1-5/16
1495	N5930-538-1819	DPST	250AC	3N	NR		NR			1-9/32	23/32	23/32
1500	N5930-050-2651	DPST, NO	JAN-S-23				JAN-S-23			1-9/32	23/32	23/32
1550	N5930-050-2719	DPDT, 3 POS 1 POS MOM	MIL-S-3950					MIL-S-3950		1-29/64	1-33/64	1-3/16
1555	N5930-538-2813	3PST	MS25105					MS25105		2-1/8	1-3/8	1-17/32
1560	N5930-519-6114	3PDT	MIL-S-3950					MIL-S-3950		1-17/32	1-3/8	2-1/8
1565		3PDT	MIL-S-3950					MIL-S-		2-1/2	1-3/8	1-17/32
										2-5/16		

Figure 11-8.—Repair Parts Section, Part A.

PART A, ITEM IDENTIFICATION.—Part A contains descriptive data for each active item included in the FSC, together with its identifying stock number. For example, figure 11-8 contains descriptions of electronic repair parts by major electrical and physical characteristics. Individual items are assigned item numbers in the sequence in which they are listed in Part A. The item number is not an identifying number but is strictly an indexing device. Item numbers are never used on supply documents such as requisitions, stock records, inventories, etc. Only Federal Stock Numbers are used for these purposes.

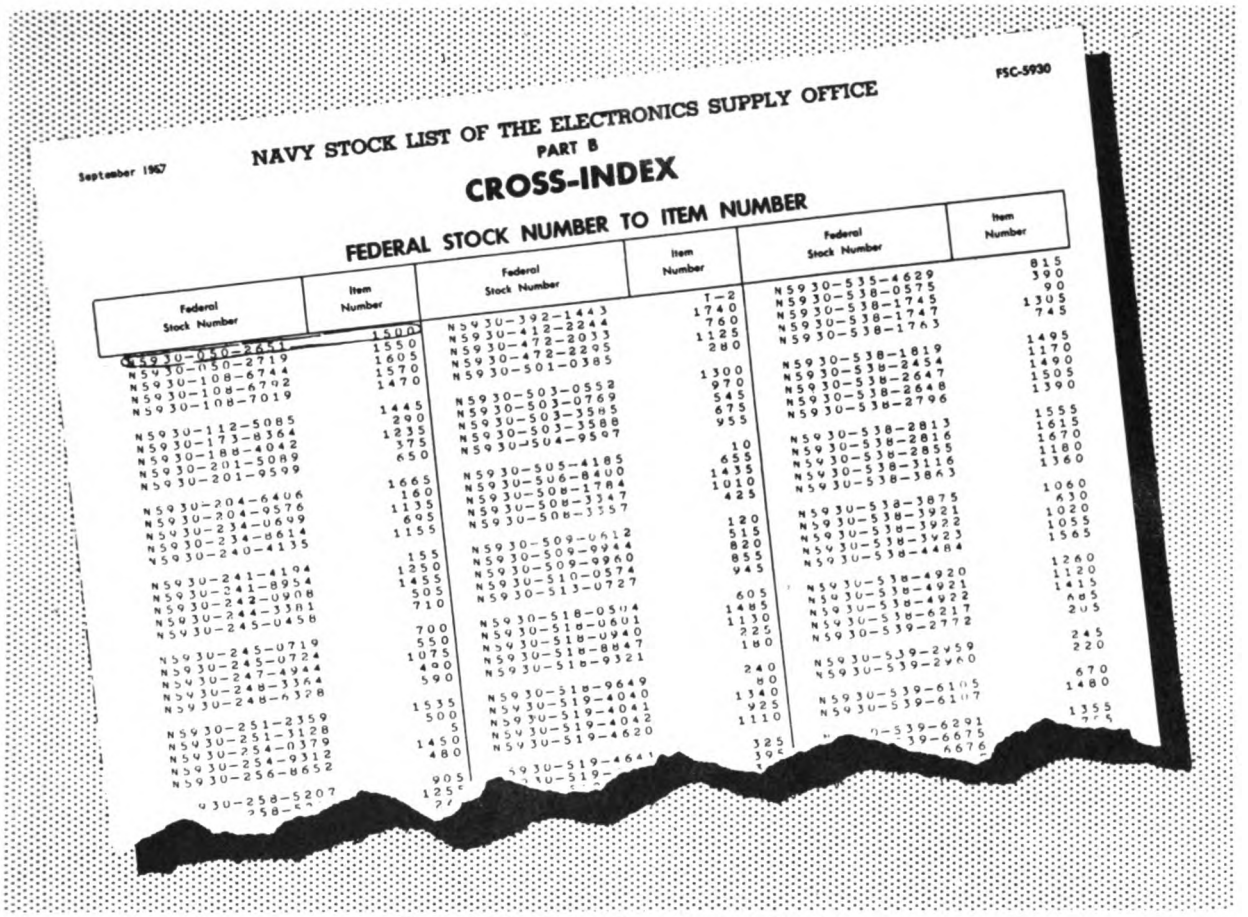


Figure 11-9.—Repair Parts Section, Part B.

PART B, FEDERAL STOCK NUMBER TO ITEM NUMBER CROSS REFERENCE.—This part lists in Federal Stock Number sequence all the items included in the applicable FSC. Each FSN is cross referenced to the item number assigned for indexing purposes in Part A. Part B thus enables the user to locate a given item in Part A quickly when the FSN is known. For example, in figure 11-9 the encircled stock number, N5930-050-2651, is listed as Item Number 1500. Using 1500 as a cross reference, the user may go to Part A to get additional information. Item Number 1500 has also been encircled in figure 11-8 in order to show the relationship between Part A and Part B.

To a limited extent, Parts A and B may be used to find suitable substitutes, provided stock numbers are known. Substitution is possible because items are cataloged by their electrical and physical characteristics. To find a substitute, the user looks up the known stock number in Part B to get the Item Number. Having found the Item Number, he looks in Part A in the vicinity of this Number. Sometimes a wide latitude for substitution exists, and by searching closely through the adjacent listings of physical characteristics, he may find characteristics of another item which approximate those of the item he desires. In the interest of optimum supply support effectiveness, this feature should be fully utilized in order to obtain the maximum benefits from the stock lists.

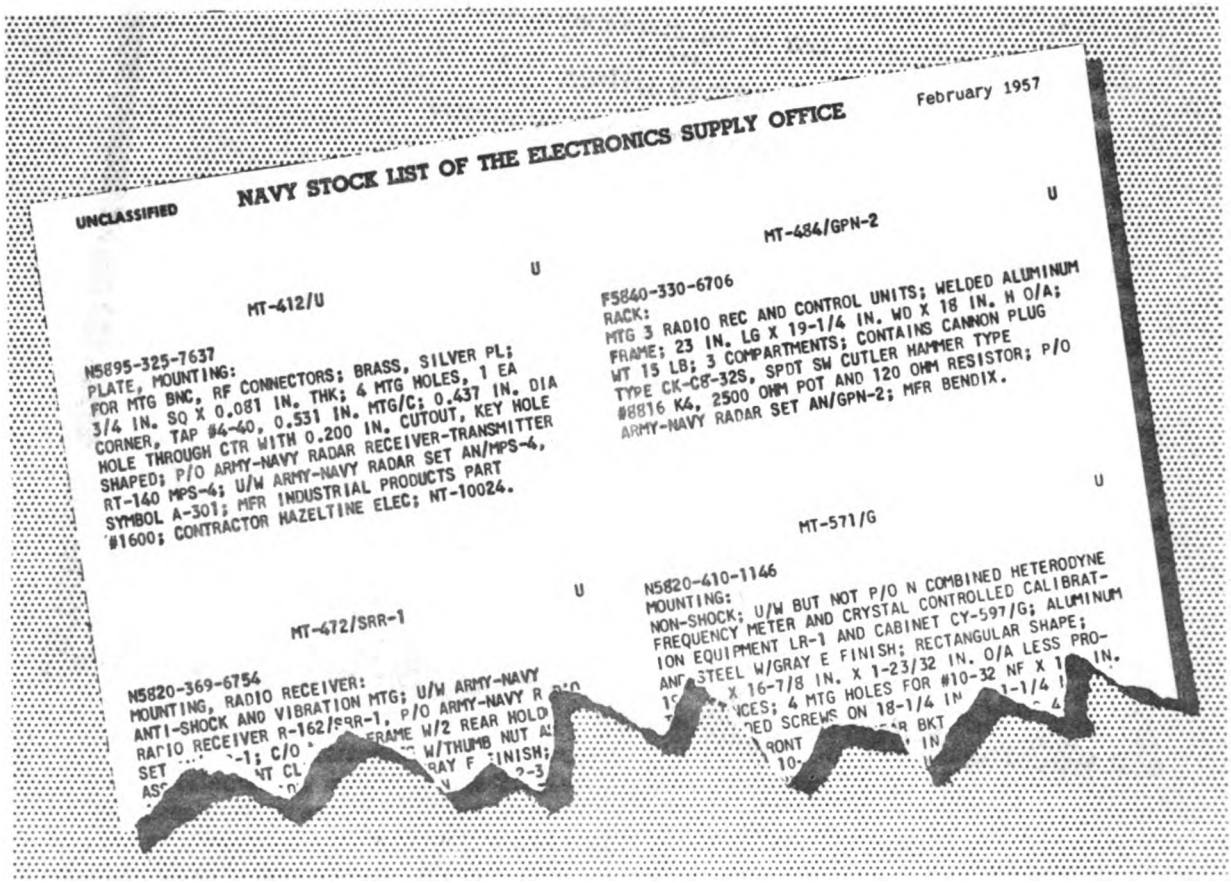
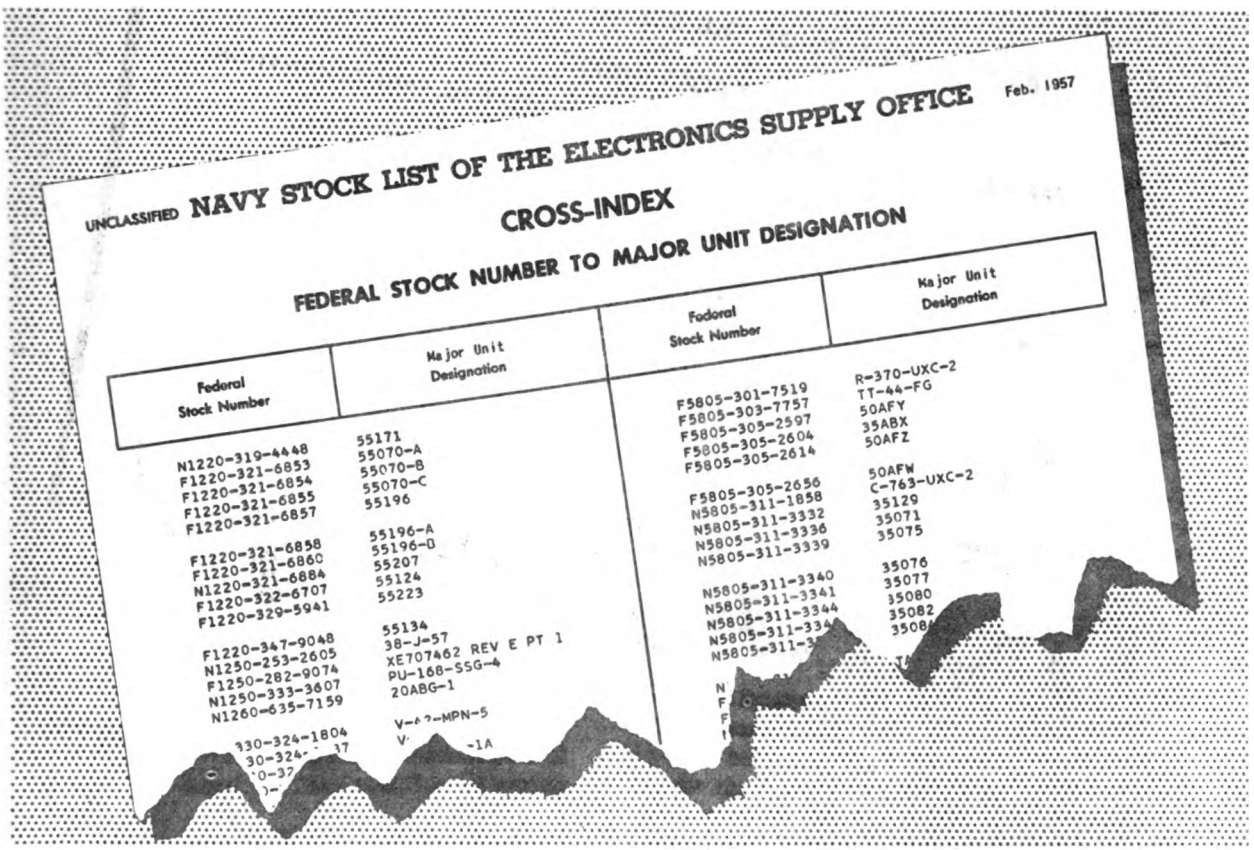


Figure 11-10.—Major Electronic Units Section, Part A.

Major Electronic Units Section (Bureau of Ships Controlled "F" Cognizance)

Issued in two parts (A and B), the Major Electronic Units Section of the NSL of ESO describes major electronic units (Bureau of Ships controlled "F" cognizance) which are issued separate and complete. The units described are currently in use by naval ship and shore facilities. This section furnishes the main military characteristics of the major units, together with other available data such as dimensions, manufacturers' reference numbers, and Federal Stock Numbers.

Major units are listed in alpha-numeric order (Major Unit Designation) and described in Part A, as shown in figure 11-10. Classified units are listed here in their proper sequence, but there will be a sentence stating, "See classified section for full description."



UNCLASSIFIED NAVY STOCK LIST OF THE ELECTRONICS SUPPLY OFFICE Feb. 1957

CROSS-INDEX

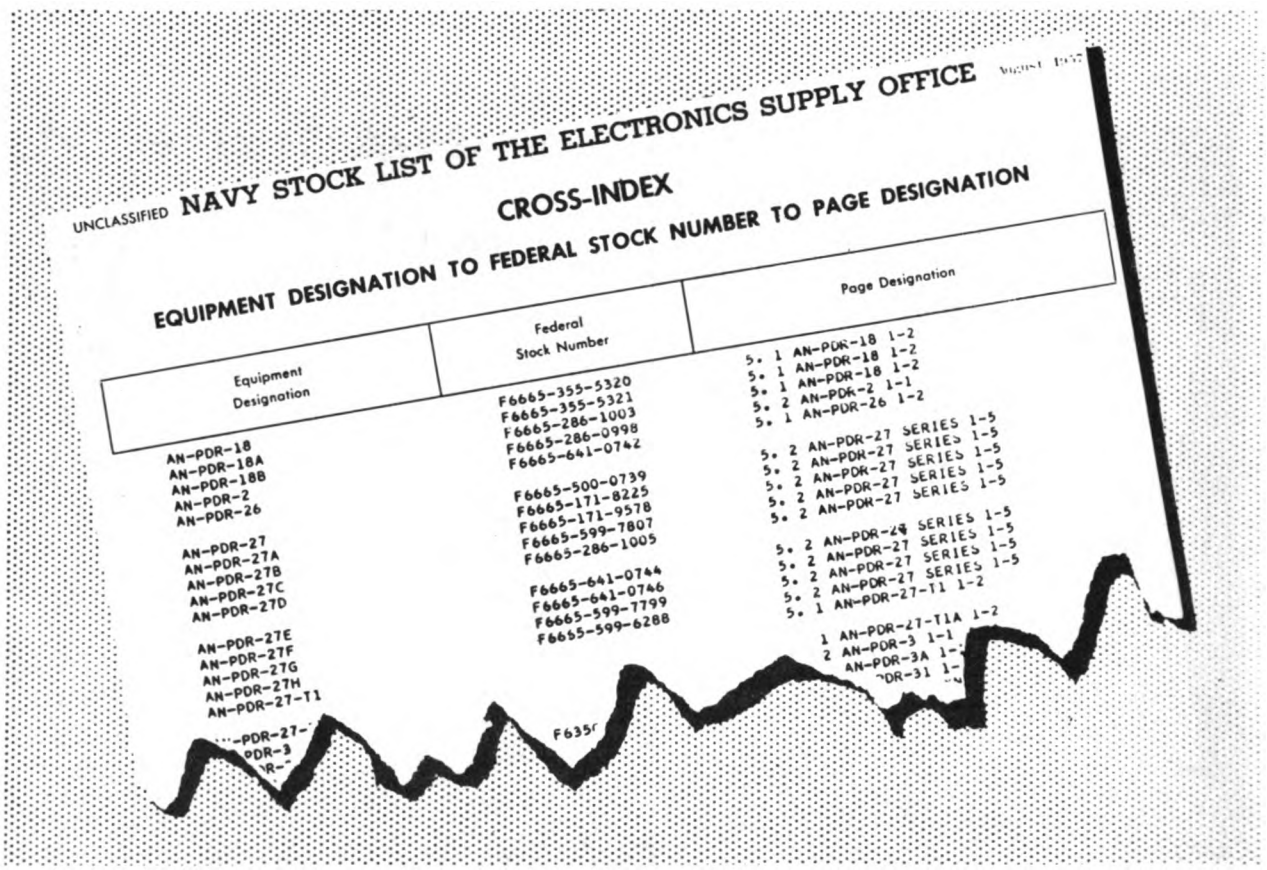
FEDERAL STOCK NUMBER TO MAJOR UNIT DESIGNATION

Federal Stock Number	Major Unit Designation	Federal Stock Number	Major Unit Designation
N1220-319-4448	55171	F5805-301-7519	R-370-UXC-2
F1220-321-6853	55070-A	F5805-303-7757	TT-44-FG
F1220-321-6854	55070-B	F5805-303-2597	50AFY
F1220-321-6855	55070-C	F5805-305-2604	35ABX
F1220-321-6857	55196	F5805-305-2614	50AFZ
F1220-321-6858	55196-A	F5805-305-2656	50AFW
F1220-321-6860	55196-D	N5805-311-1858	C-763-UXC-2
N1220-321-6884	55207	N5805-311-3332	35129
F1220-322-6707	55124	N5805-311-3336	35071
F1220-329-5941	55223	N5805-311-3339	35075
F1220-347-9048	55134	N5805-311-3340	35076
N1250-253-2605	38-J-57	N5805-311-3341	35077
F1250-282-9074	XE707462 REV E PT 1	N5805-311-3344	35080
N1250-333-3607	PU-168-SSG-4	N5805-311-334	35082
N1260-635-7159	20ABG-1	N5805-311-3	3508

Figure 11-11.—Major Electronics Units Section, Part B (cross-index from FSN).

A cross index is furnished as Part B of this section. It cross references the major units from Federal Stock Number to the Major Unit Designation listed in Part A. See figure 11-11.

In those instances where the Major Unit Designation is known, for example, MT-412/U, (fig. 11-10) the user goes directly to Part A, and locates information on the specific unit. If the Federal Stock Number only is known, the user turns to Part B first and locates the Federal Stock Number and its cross reference to the Major Unit Designation. Then, turning to Part A, he uses the Major Unit Designation to locate the Major Unit Description.


UNCLASSIFIED NAVY STOCK LIST OF THE ELECTRONICS SUPPLY OFFICE

CROSS-INDEX

EQUIPMENT DESIGNATION TO FEDERAL STOCK NUMBER TO PAGE DESIGNATION

Equipment Designation	Federal Stock Number	Page Designation
AN-PDR-18	F6665-355-5320	5. 1 AN-PDR-18 1-2
AN-PDR-18A	F6665-355-5321	5. 1 AN-PDR-18 1-2
AN-PDR-18B	F6665-286-1003	5. 1 AN-PDR-18 1-2
AN-PDR-2	F6665-286-0998	5. 2 AN-PDR-2 1-1
AN-PDR-26	F6665-641-0742	5. 1 AN-PDR-26 1-2
AN-PDR-27	F6665-500-0739	5. 2 AN-PDR-27 SERIES 1-5
AN-PDR-27A	F6665-171-8225	5. 2 AN-PDR-27 SERIES 1-5
AN-PDR-27B	F6665-171-9578	5. 2 AN-PDR-27 SERIES 1-5
AN-PDR-27C	F6665-599-7807	5. 2 AN-PDR-27 SERIES 1-5
AN-PDR-27D	F6665-286-1005	5. 2 AN-PDR-27 SERIES 1-5
AN-PDR-27E	F6665-641-0744	5. 2 AN-PDR-27 SERIES 1-5
AN-PDR-27F	F6665-641-0746	5. 2 AN-PDR-27 SERIES 1-5
AN-PDR-27G	F6665-599-7799	5. 2 AN-PDR-27 SERIES 1-5
AN-PDR-27H	F6665-599-6288	5. 2 AN-PDR-27 SERIES 1-5
AN-PDR-27-T1		5. 1 AN-PDR-27-T1 1-2
		1 AN-PDR-27-T1A 1-2
		2 AN-PDR-3 1-1
		AN-PDR-3A 1-
		PDR-31 1-

Figure 11-12.–Electronic Equipment, Cross-Index.

Electronic Equipments Section

The Electronic Equipments Section of the NSL of ESO contains information applicable to electronic equipments and includes all separately issuable equipments in use by naval ship and shore facilities. (Each section of the NSL of ESO has its own foreword which explains its contents and use.) A feature of the Electronic Equipments Section is the "Cross-Index, Equipment Designation to Federal Stock Number to Page Designation," as shown in figure 11-12. This Index permits ready location of descriptive information for a known type designation.

In the Cross-Index the letter "C" preceding the equipment designation indicates that this equipment is classified. The data for classified equipments are found in the classified Electronic Equipments Section.

In the descriptive portion, equipments are grouped by categories, such as radio, radar, sonar, and are arranged in equipment designation sequence. Figure 11-13 shows one first page of the descriptive material for a radio set, equipment designation AN/ARC-38. The description includes frequency, range, tubes and crystals used, brief description of major electronic characteristics, contract number(s), technical manual number, packaging data, and related equipment.

NAVY STOCK LIST OF THE ELECTRONICS SUPPLY OFFICE

UNCLASSIFIED

Radio-Transceivers

August 1957

AN/ARC-38 RADIO SET

FUNCTIONAL DESCRIPTION

The AN/ARC-38 is designed primarily to provide CW and phone, two-way communication between aircraft in flight, aircraft and ship, and aircraft and shore. It provides both transmitting and receiving facilities for high-frequency communication in the 2 to 25 megacycle range.

Twenty preset channels may be selected by Radio Set Controls C-1398/ARC-38 and C-1399/ARC-38, which afford operation of the equipment convenient to the pilot and radio operator. It may also be operated at the Receiver-Transmitter location if the type of emission and channel have been selected previously. When operated at the pilot's control position, only phone emission on the twenty preset channels is available. Full frequency choice and CW emission are made available at the radio operator's control position.

No field changes in effect at time of preparation (28 January 1957).

RELATION TO OTHER EQUIPMENT

Equipment Required but not Supplied: (1) Antenna Coupler CU-351/AR, (1) Mounting MT-1223/AR, (1) Interphone AN/AIC-4 or Equivalent, (1) Headset H-1/AR or H-4/AR, (1) Microphone NAF-213264-6, ANB-M-1, or equivalent, (1) Throttle Switch NAF-1124-17, (1) Antenna 45 to 100 ft. lg, Cable as Required.

ELECTRICAL AND MECHANICAL CHARACTERISTICS

FREQUENCY RANGE: 2 to 25 mc.
TRANSMITTER DATA
  POWER OUTPUT
    2.0 to 14.2495 MC: 100 W min.
    14.250 to 25 MC: 90 W min.
  EMISSION: A1, A3.
  MODULATING LEVEL: 95 to 100% when 1000 cps input voltage is 1.0 v.

RECEIVER DATA
  OUTPUT: 100 mw min with 5 uv input modulated 30% at 1000 cps.
  DISTORTION: 12% max of a 30%, 1000 cps modulated wave with input of 50 to 100000 uv.
  AUDIO RESPONSE: ± 3.5 db relative to 1000 cps output for frequency between 300 to 3500 cps.
POWER REQUIREMENTS: 115 v, 400 cps, 174 va, and 27.5 v DC, 26 amps.

MANUFACTURER'S OR CONTRACTOR'S DATA

Collins Radio Co., Cedar Rapids, Ia.
Contract NOas 55-821, dated 29 August 1956.
Contract NOas 52-670, dated 22 December 1951.
Approximate Cost: $6240.00 with equipment spares.

TUBE AND/OR CRYSTAL COMPLEMENT

(1) 6626/0A2WA	(7) 5654/6AK5W
(5) 5686	(4) 5726/6AL5W
(12) 5749/6BA6W	(6) 5750/6BE6W
(4) 5751	(5) 5814A
(2) 5902	(5) 6159

Total Tubes: (51)

(1) 1N67A	(1) 1N137A

Total Crystals: (2)

REFERENCE DATA AND LITERATURE

NAVER 16-30ARC83-501: Technical Manual for Radio Set AN/ARC-38.

TYPE CLASSIFICATION	
DESIGN COGNIZANCE	BUAER
PROCUREMENT COGNIZANCE	MIL-R-18173 (Aer)
STOCK NO.	

EQUIPMENT SUPPLIED DATA

QUANTITY PER EQUIPT	NAME AND NOMENCLATURE	OVERALL DIMENSIONS (inches)	WEIGHT (lbs.)
1	Radio Receiver-Transmitter RT-311/ARC-38	7-13/16 X 15-5/16 X 23-7/16	63.6
1	Mounting MT-1415/ARC-38	7-1/8 X 16-3/8 X 21-7/16	9.4
1	Dynamotor-Power Supply DY-118/ARC-38	4-7/8 X 6-3/4 X 18-5/16	22.0
1	Mounting MT-1414/ARC-38	3-7/8 X 5-7/8 X 15-7/8	4.0
1	Radio Set Control C-1398/ARC-38	5-3/4 X 6 X 7-3/16	7.0
1	Radio Set Control C-1399/ARC-38	1-7/8 X 3-7/8 X 5-3/4	1.25

Figure 11-13.—Electronic Equipments, Descriptive Section.

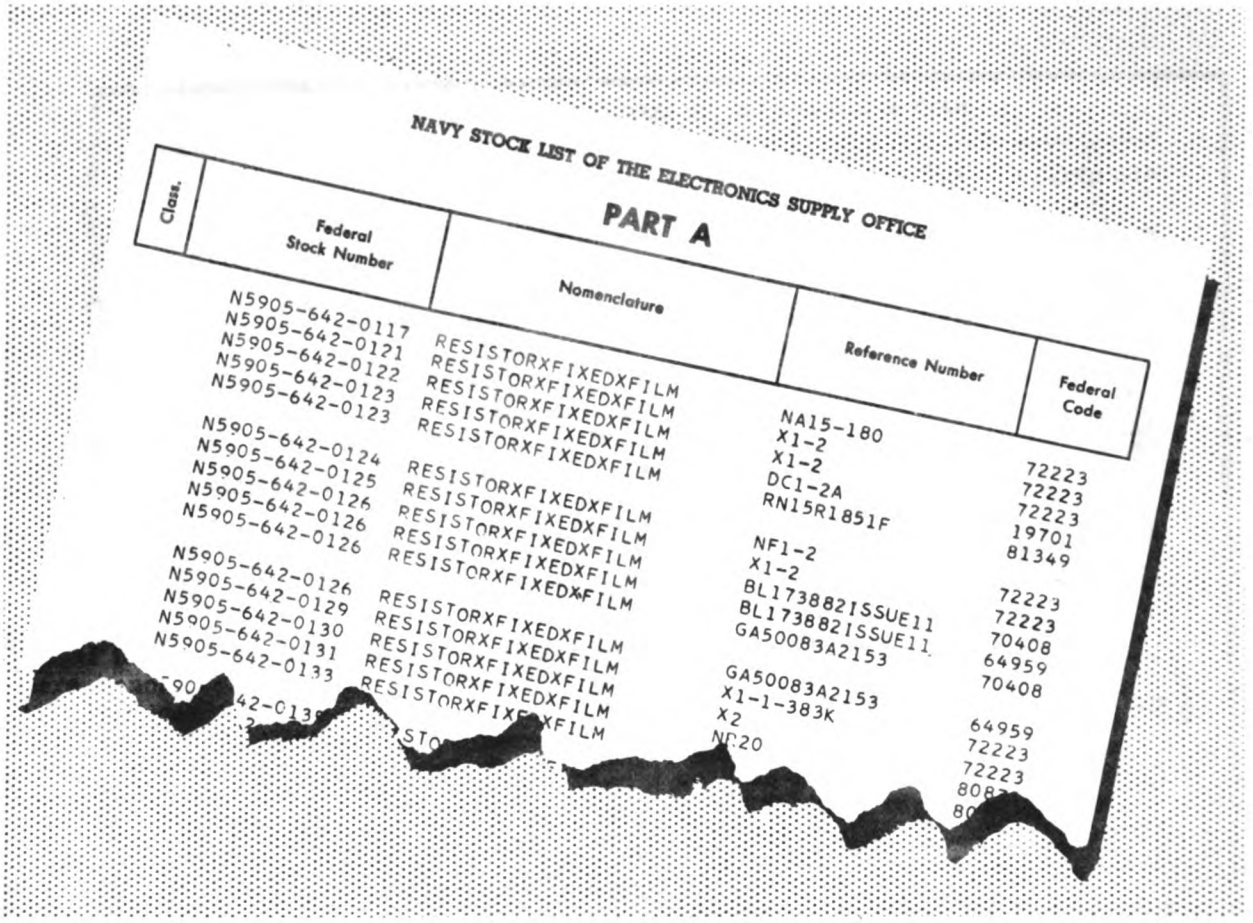


Figure 11-14.—Master Cross Reference List (MCRL), Part A.

Master Cross Reference List (MCRL)

The Master Cross Reference List of the NSL of ESO (MCRL) is in three parts. It is used primarily to identify unknown material and to verify binned stock.

Part A of the MCRL is a Cross Index from Federal Stock Number to Nomenclature to Reference Number and Manufacturer's Code, as shown in figure 11-14. This part shows active "N" cognizance stock numbers in Federal Stock Number sequence, with the item name cross indexed to the applicable manufacturer's reference or part number and to the manufacturer's Federal Code number. To verify a part, the user locates the known Federal Stock Number of the item and notes the reference number. He then inspects the item in question to see if it bears the same reference number that appears in the MCRL. If the numbers do not agree, he looks up in Part B the reference number stamped on the part.

Part B, as shown in figure 11-15, cross references manufacturer's part or type number (reference number) to the applicable Federal Stock Number. (This is especially useful in the identification of unknown material.) When an FSN is found by cross reference from the part or type number, this FSN is the key to locating a complete description of the item in the Repair Parts Section as previously shown in figures 11-8 and 11-9.

Part C, illustrated in figure 11-16, shows reference numbers, including manufacturer's part and type numbers, which, because of their length, were not published in their entirety in Part B (fig. 11-15). The reference numbers shown are cross referenced to the applicable Federal Stock Number. The column headed "Federal Code" refers to a code number assigned to a specific manufacturer.

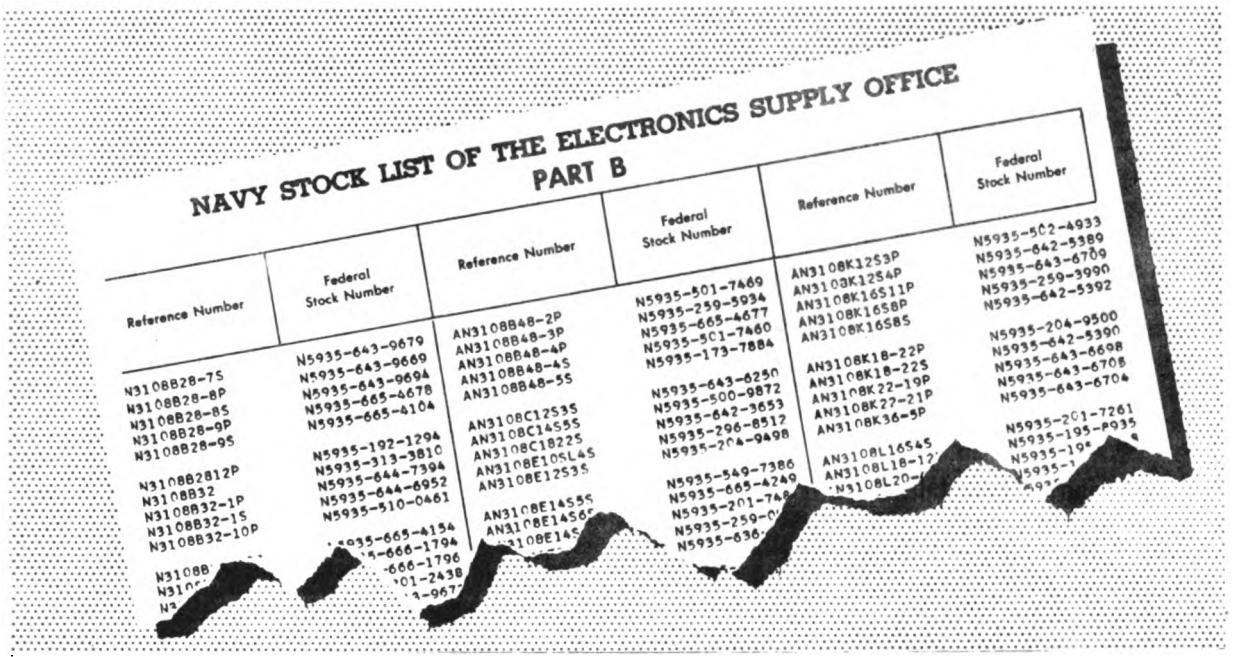


Figure 11-15.—Master Cross Reference List (MCRL), Part B.

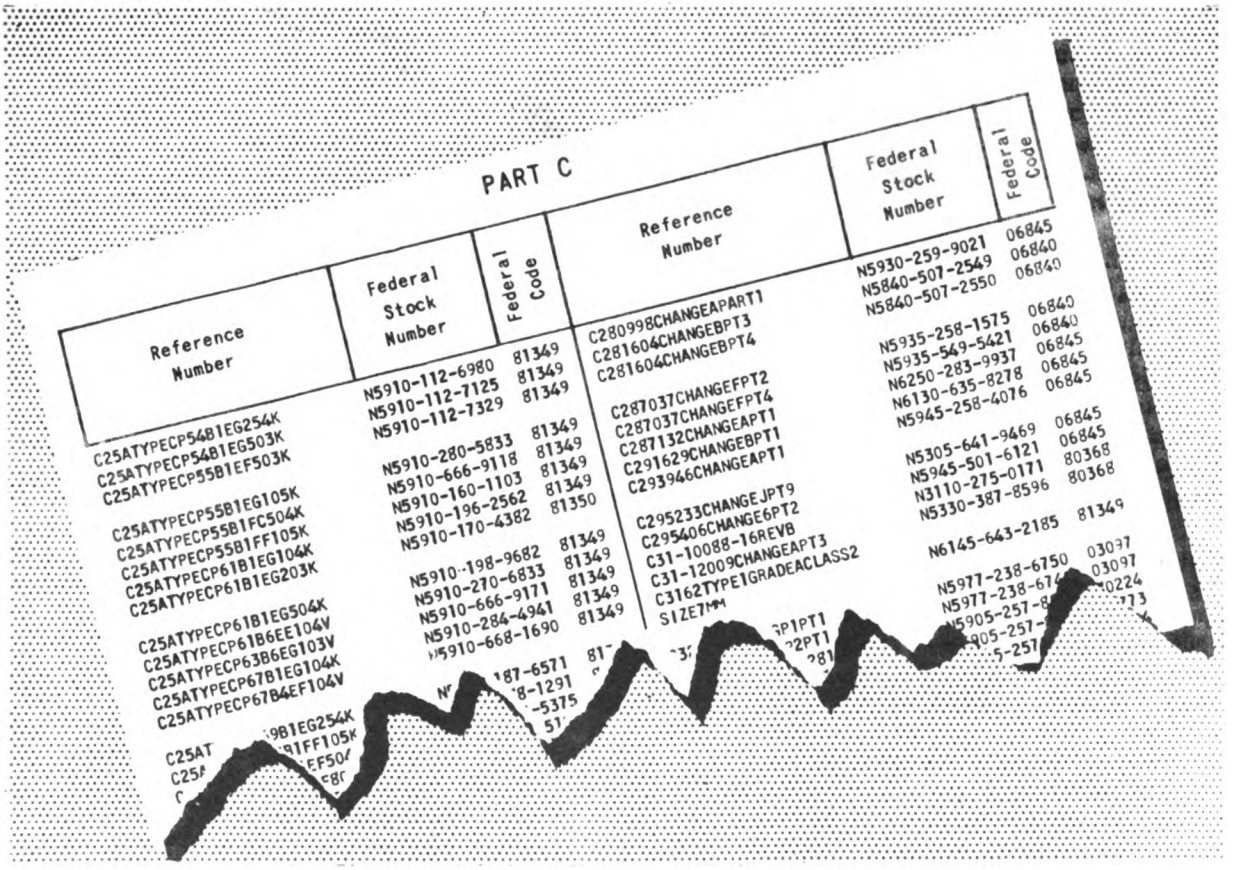


Figure 11-16.—Master Cross Reference List (MCRL), Part C.

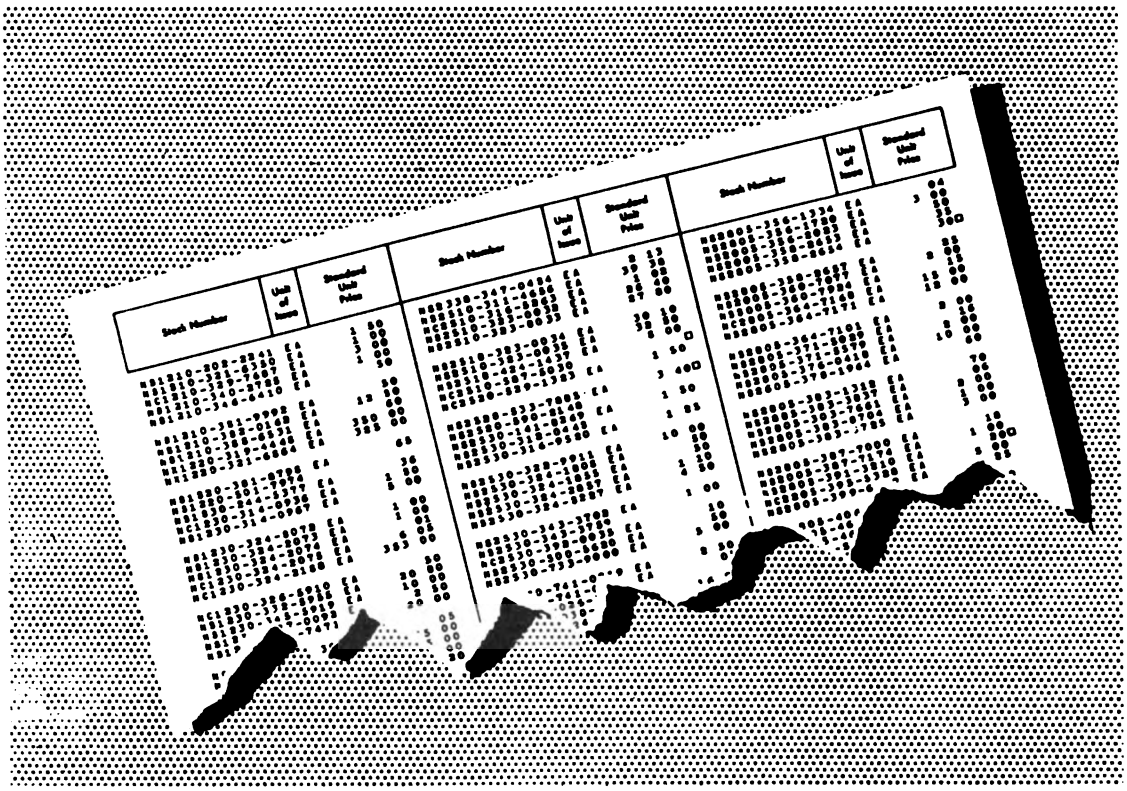


Figure 11-17.—A page from Standard Price Supplement.

Standard Price Supplement

The Standard Price Supplement gives, in Federal Stock Number sequence, the price and unit of issue for all priced electronic repair parts to which Federal Stock Numbers have been assigned. An example of a Standard Price Supplement is shown in figure 11-17.

Letters, such as F, M, S, C, and X, which follow the N cognizance indicator in the stock number listing are called "fraction codes." These codes are established on the basis of stock turnover, technical determination, or other characteristics. The letters F, M, and S are termed velocity codes and represent high quantity demand (fast moving), medium demand (medium moving), and low demand (slow moving) items, respectively. The letters C and X represent technical determinations, C—carrying point and X—production stock.

Revisions to price, unit of issue, fraction code and price additions established since the preceding issue are represented by the symbol □. Changes to the Price Supplement are published in the form of a semiannual addendum.

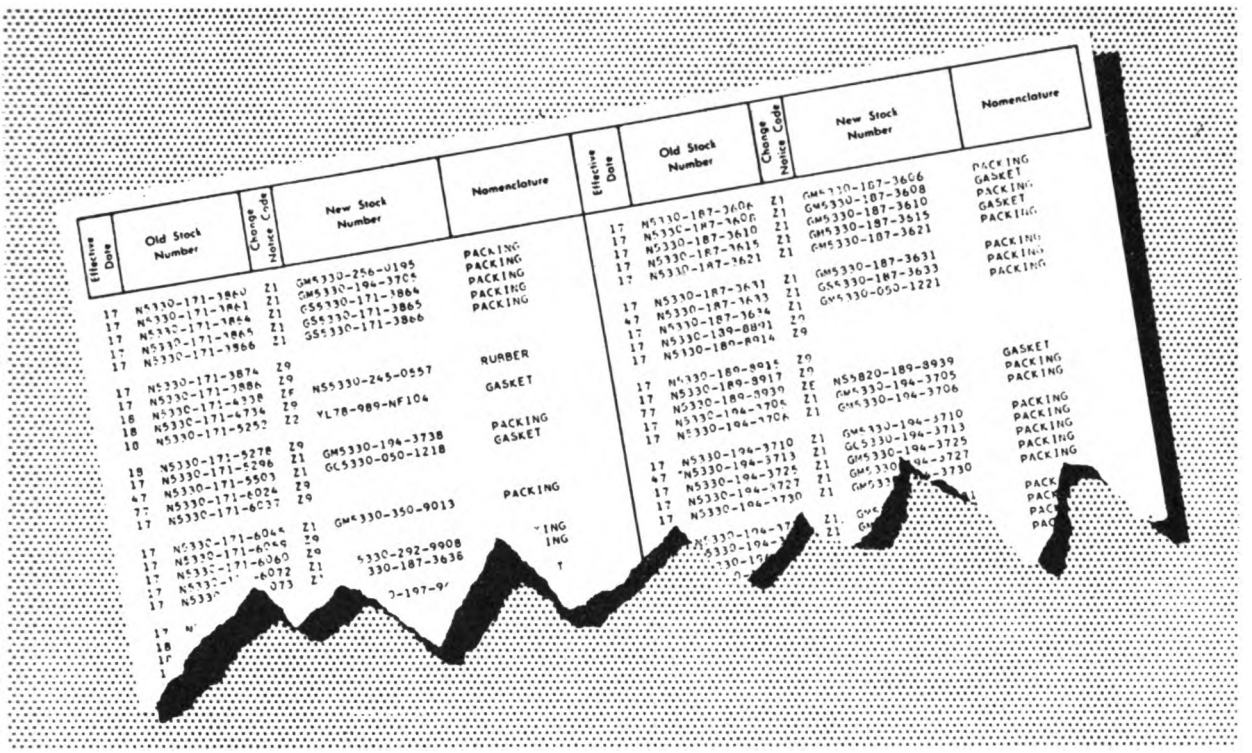


Figure 11-18.—Stock Number Action Bulletin (SNAB).

Stock Number Action Bulletin

The Stock Number Action Bulletin (SNAB) is a quarterly cumulative publication summarizing all "N" cognizance stock number revisions, including transfer of cognizance (transfer of material from the inventory control and management of one SDCP to another) and the withdrawal of interest. One such revision is shown in figure 11-18. Here, the item indicated by the first stock number, N5330-171-3860, has been assigned a new stock number—GM5330-256-0195. The new stock number—because of the "G" cognizance symbol—indicates that the item has been transferred to the inventory control and management of the General Stores Supply Office.

The SNAB provides a cross reference to better items and shows the latest available stock numbers. It should be consulted before placing a requisition, for the item desired may actually be on hand under a new stock number.

At reporting activities the SNAB is used in making cognizance transfers on "N" cognizance material and for making changes in storage, marking stock, disposing of material, and changing supply records.

While the SNAB is basically a supply tool, it also can be used by technical personnel prior to requisitioning. Its use can sometimes save as much as a week's time in receiving required parts.

The SNAB is prepared in two sections. Section I, not illustrated in this text, contains explanatory notes on how to use the SNAB and gives instructions for effecting changes.

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