COMMUNICATIONS YEOMAN 3

BUREAU OF NAVAL PERSONNEL

NAVY TRAINING COURSE NAVPERS 10245

PREFACE

This Navy Training Course was written for men of the Navy and Naval Reserve who are studying for advancement to the rate of Communications Yeoman Third Class. Combined with the necessary practical experience and a thorough study of the related basic training courses, the information in this course will help the reader prepare for Navywide advancement in rating examinations.

This Navy Training Course was prepared by the Education and Training Support Service, Washington, D.C., for the Bureau of Naval Personnel. Technical assistance was provided by the U.S. Naval Schools Command; Communications Yeoman Class A School, Norfolk, Virginia; and the Chief of Naval Operations, Washington, D.C.

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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.

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READING LIST

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Military Requirements for Petty Officer 3 & 2, NavPers 10056-A

OTHER NAVY PUBLICATIONS

DNC 5

Department of the Navy Security Manual for Classified Information, OpNavInst 5510.1B

Navy Correspondence Manual, SecNavInst 5216.5

CHAPTER 1

A STEP FORWARD IN YOUR NAVAL CAREER

The fleet needs capable men in all ratings, for a naval force is only as good as the men who man the ships. Even with the most modern equipment, a naval force is powerless without competent men to operate and maintain their equipment. Good men are plentiful, but their capability depends chiefly upon their training.

In the performance of practical work, proficiency comes with practice and experience, for which no book—however helpful—can be an adequate substitute. On the other hand, much of the knowledge you must have can be gained only through study.

As part of the Navy's training program, this self-study Navy Training Course is written to aid you in your preparation for advancement in rating. The course is designed to help you meet the professional (technical) qualifications for advancement to Communications Yeoman 3.

ENLISTED RATING STRUCTURE

Within the enlisted rating structure, two types of ratings are of concern to you: general and service ratings.

GENERAL RATINGS identify broad occupational fields of related duties and functions. Some general ratings include service ratings; others do not. Both Regular Navy and Naval Reserve personnel may hold general ratings.

SERVICE RATINGS identify subdivisions or specialties within a general rating. Although service ratings can exist at any petty officer level, they are most common at the PO3 and PO2 levels. Both Regular Navy and Naval Reserve personnel may hold service ratings.

COMMUNICATIONS YEOMAN RATING

The rating CYN3 is a service rating of the Yeoman, a general rating in group V, commonly called the administrative and clerical group. As such, the normal path of advancement is SN to CYN3, CYN3 to YN2, YN2 to YN1, and so on. Special consideration is given to Communications Yeomen who qualify for, and desire to advance in, the Radioman rating.

WHY CYN?

The Communications Yeoman rating, although recent in origin, actually combines the duties of the Yeoman and Radioman ratings, both of which have long and honorable histories of naval service. The role of the naval communicator was established in 1778; the Yeoman rating itself is known to have existed as early as 1835. From simple recognition signs and the quill pen, the Navy is able to trace its progress through semaphore and wireless, up to present office equipment and extensive communication gear.

As a Communications Yeoman, you will operate basic communication equipment and process the administrative work required for an efficient communication center. Billets for your rating exist at communication installations ashore and in communication centers afloat. Industrious application to the duties of your rating serves a dual purpose: It permits more extensively trained Radiomen to direct their attention to advanced communication problems. At the same time, it ensures a more accurate administrative organization within your communication establishment. Your place in today's modern Navy is firmly established; it is a unique role that can only be filled by someone as qualified as yourself.

LEADERSHIP

When you advance to CYN3 you will have to exert more leadership principles than you previously needed. Quite often, the difference

between a good petty officer and a mediocre petty officer is found in leadership abilities. The guide for leadership in the Navy is General Order 21, which indicates that the strength of our Nation and of our services depends upon courageous, highly motivated, and responsible individuals. Each command has a training program that provides instruction in leadership principles and practices. It is your duty to take advantage of this instruction, and to apply the principles and practices in your everyday dealings with the men around you—especially those who look to you for leadership.

ADVANCEMENT IN RATING

Some of the rewards of advancement in rating are easy to see. You get more pay. Your job assignments become more interesting and more challenging. You are regarded with greater respect by officers and enlisted personnel. You enjoy the satisfaction of getting ahead in your chosen Navy career.

The advantages of advancing in rating are not yours alone, however, the Navy also profits. Highly trained personnel are essential to the functioning of the Navy. By each advancement in rating, you increase your value to the Navy in two ways. First, you become more valuable as a technical specialist in your own rating. Second, you become more valuable as a person who can train others and thus make far-reaching contributions to the entire Navy.

HOW TO QUALIFY FOR ADVANCEMENT

What must you do to qualify for advancement in rating? The requirements may change from time to time, but usually you must—

1. Have a certain amount of time in your present grade.
2. Complete the required military and professional training courses.
3. Demonstrate your ability to perform all the practical requirements for advancement by completing the Record of Practical Factors, NavPers 760.
4. Be recommended by your commanding officer, after the petty officers and officers supervising your work indicate that they consider you capable of performing the duties of the next higher rate.
5. Demonstrate your knowledge by passing a written examination on (a) military requirements and (b) professional qualifications.

Some of the general requirements may be modified in certain ways. Figure 1-1 gives a more detailed view of the requirements for advancement of active duty personnel. Figure 1-2 furnishes this information for inactive duty personnel.

Remember that the requirements for advancement can change. Check with your division officer or training officer to be sure that you know the most recent requirements.

Advancement in rating is not automatic. After you meet all the requirements, you are eligible for advancement. Actually, you will be advanced in rating only if you meet all the requirements (including making a high enough score on the written examination) and if the quotas for your rating permit your advancement.

HOW TO PREPARE FOR ADVANCEMENT

What must you do to prepare for advancement in rating? You must study the qualifications for advancement, work on the practical factors, study the required Navy Training Courses, and study other material that is required for advancement in your rating. To prepare for advancement, you need to be familiar with (1) the Quals Manual, (2) the Record of Practical Factors, NavPers 760, (3) a NavPers publication called Training Publications for Advancement in Rating, NavPers 10052, and (4) applicable Navy Training Courses. Figure 1-3 illustrates these materials; the following topics describe them and give you some practical suggestions on how to use these publications in preparing for advancement.

Quals Manual

The Manual of Qualifications for Advancement in Rating NavPers 18068-B gives the minimum requirements for advancement to each rate within each rating. This manual usually is called the Quals Manual, and the qualifications themselves are often referred to as the quals. The qualifications are of two general types: (1) military requirements, and (2) professional or technical qualifications.

Military requirements apply to all ratings, rather than to any one particular rating. Military requirements for advancement to third class and second class petty officer rates deal with military conduct, naval organization, leadership, military justice, security, watch

ACTIVE DUTY ADVANCEMENT REQUIREMENTS

REQUIREMENTS *	E1 to E2	E2 to E3	E3 to E4	E4 to E5	E5 to E6	†E6 to E7	† E7 to E8	† E8 to E9
SERVICE	4 mos. service—or completion of recruit training.	6 mos. as E-2.	6 mos. as E-3.	12 mos. as E-4.	24 mos. as E-5.	36 mos. as E-6.	48 mos. as E-7. 8 of 11 years total service must be enlisted. Must be permanent appointment.	24 mos. as E-8. 10 of 13 years total service must be enlisted.
SCHOOL	Recruit Training.		Class A for PR3, DT3, PT3. AME 3, HM 3			Class B for AGCA, MUCA, MNCA.		
PRACTICAL FACTORS	Locally prepared check-offs.	Records of Practical Factors, NavPers 760, must be completed for E-3 and all PO advancements.						
PERFORMANCE TEST			Specified ratings must complete applicable performance tests before taking examinations.					
ENLISTED PERFORMANCE EVALUATION	As used by CO when approving advancement.		Counts toward performance factor credit in advancement multiple.					
EXAMINATIONS	Locally prepared tests.		Navy-wide examinations required for all PO advancements.				Navy-wide, selection board, and physical.	
NAVY TRAINING COURSE (INCLUDING MILITARY REQUIREMENTS)		Required for E-3 and all PO advancements unless waived because of school completion, but need not be repeated if identical course has already been completed. See NavPers 10052 (current edition).					Correspondence courses and recommended reading. See NavPers 10052 (current edition).	
AUTHORIZATION	Commanding Officer		U.S. Naval Examining Center			Bureau of Naval Personnel		
	TARS attached to the air program are advanced to fill vacancies and must be approved by CNARESTRA.							

* All advancements require commanding officer's recommendation.
† 2 years obligated service required.

Figure 1-1.—Active duty advancement requirements.

INACTIVE DUTY ADVANCEMENT REQUIREMENTS

REQUIREMENTS *		E1 to E2	E2 to E3	E3 to E4	E4 to E5	E5 to E6	E6 to E7	E8	E9
	FOR THESE DRILLS PER YEAR								
TOTAL TIME IN GRADE	48	6 mos.	6 mos.	15 mos.	18 mos.	24 mos.	36 mos.	48 mos.	24 mos.
	24	9 mos.	9 mos.	15 mos.	18 mos.	24 mos.	36 mos.	48 mos.	24 mos.
	NON-DRILLING	12 mos.	24 mos.	24 mos.	36 mos.	48 mos.	48 mos.		
DRILLS ATTENDED IN GRADE †	48	18	18	45	54	72	108	144	72
	24	16	16	27	32	42	64	85	32
TOTAL TRAINING DUTY IN GRADE †	48	14 days	14 days	14 days	14 days	28 days	42 days	56 days	28 days
	24	14 days	14 days	14 days	14 days	28 days	42 days	56 days	28 days
	NON-DRILLING	None	None	14 days	14 days	28 days	28 days		
PERFORMANCE TESTS				Specified ratings must complete applicable performance tests before taking examination.					
PRACTICAL FACTORS (INCLUDING MILITARY REQUIREMENTS)		Record of Practical Factors, NavPers 760, must be completed for all advancements.							
NAVY TRAINING COURSE (INCLUDING MILITARY REQUIREMENTS)		Completion of applicable course or courses must be entered in service record.							
EXAMINATION		Standard exams are used where available, otherwise locally prepared exams are used.						Standard EXAM, Selection Board, and Physical.	
AUTHORIZATION		District commandant or CNARESTRA					Bureau of Naval Personnel		

* Recommendation by commanding officer required for all advancements.

† Active duty periods may be substituted for drills and training duty.

Figure 1-2.—Inactive duty advancement requirements.

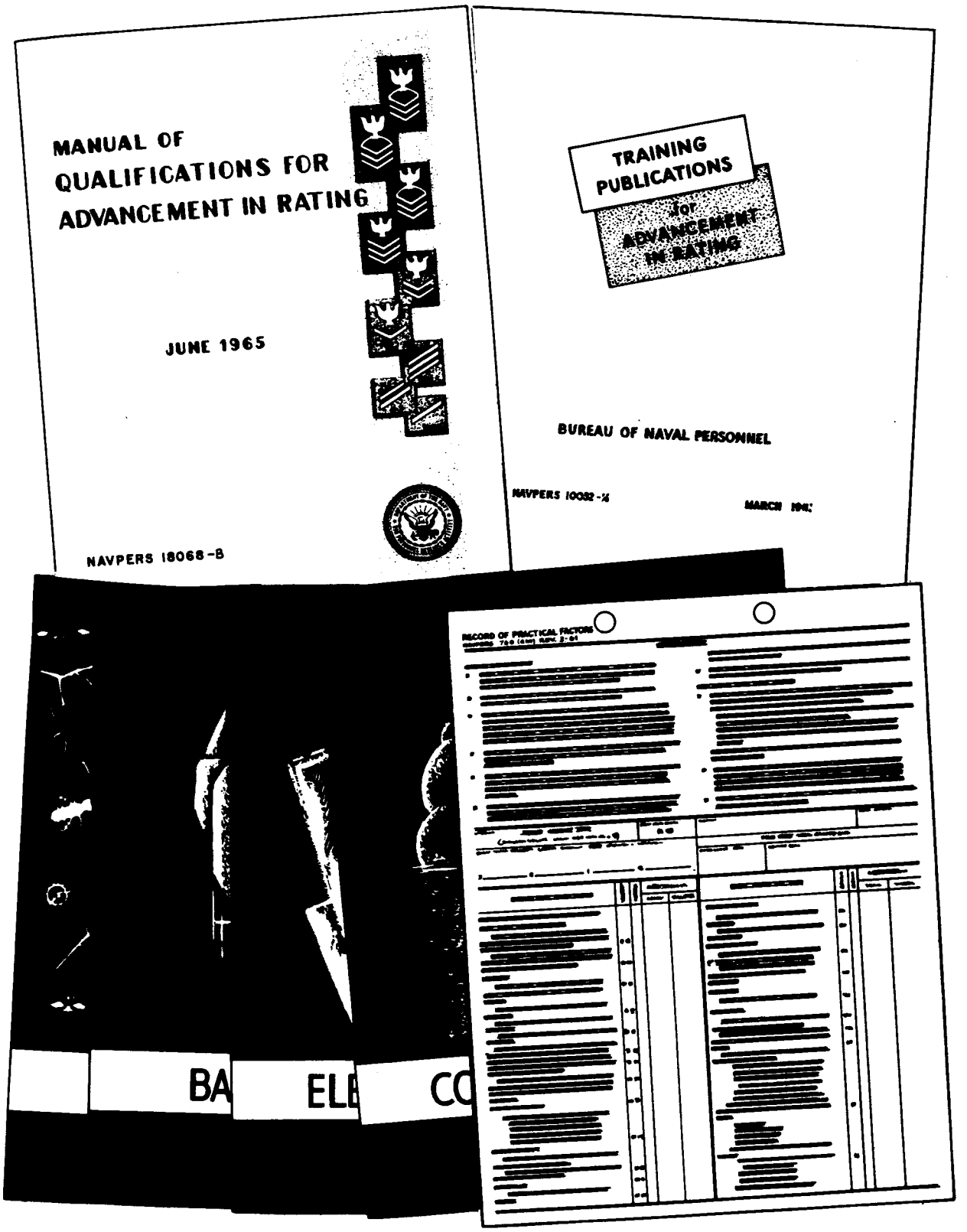

Figure 1-3.—Materials used in preparing for advancement.

standing, and other subjects required of petty officer in all ratings.

Professional qualifications are technical or professional requirements that are directly related to the work of each rating.

Both the military requirements and the professional qualifications are divided into subject matter groups. Within each subject matter group, they are divided into practical factors and knowledge factors. Practical factors are items you must be able to do. Knowledge factors are subjects you must know in order to perform the duties of your rating.

The written examination you must take for advancement in rating will contain questions relating to the practical factors and the knowledge factors of both the military requirements and the professional qualifications.

The Quals Manual is kept current by means of changes. The professional qualifications for your rating, which are covered in this training course, were current at the time the course was printed. By the time you are studying this course, however, the quals for your rating may have changed. Never trust any set of quals until you check it against an up-to-date copy in the Quals Manual.

Record of Practical Factors

Before you can take the service wide examination for advancement in rating, an entry must be made in your service record to show that you have qualified in the practical factors of both the military requirements and the professional qualifications. A special form, known as the Record of Practical Factors, NavPers 760, is used to keep a record of your practical factor qualifications. This form is available for each rating. The form lists all practical factors, both military and professional. As you demonstrate your ability to perform each practical factor, appropriate entries are made in the date and initials columns of the form.

Changes are made periodically to the Quals Manual, and revised forms of NavPers 760 are provided when necessary. Extra space is allowed on the Record of Practical Factors for entering additional practical factors as they are published in changes to the Quals Manual. The Record of Practical Factors also provides space for recording demonstrated proficiency in skills that are within the general scope of the rating but are not identified as minimum qualifications for advancement.

If you are transferred before you qualify in all practical factors, the NavPers 760 form should be forwarded with your service record to your next duty station. You can save yourself a lot of trouble by making sure that this form actually is inserted in your service record before you are transferred. If the form is not in your service record, you may be required to start all over again and requalify in the practical factors checked off already.

NavPers 10052

Training Publications for Advancement in Rating, NavPers 10052 is an important publication for anyone preparing for advancement in rating. This bibliography lists required and recommended Navy Training Courses and other reference material to be used by personnel working for advancement in rating. The NavPers 10052 is revised and issued once each year by the Bureau of Naval Personnel. Each revised edition is identified by a letter following the NavPers number. When using this publication, be sure you have the most recent edition.

If extensive changes in qualifications occur in any rating between the annual revisions of NavPers 10052, a supplementary list of study material may be issued in the form of a BuPers Notice. When you are preparing for advancement, check to see whether changes have been made in the qualifications for your rating. If changes were made, see if a BuPers Notice was issued to supplement NavPers 10052 for your rating.

The required and recommended references are listed by rate level in NavPers 10052. In using NavPers 10052, you will notice that some Navy Training Courses are marked with an asterisk (*). Any course marked in this way is mandatory—that is, it must be completed at the indicated rate level before you can be eligible to take the servicewide examination for advancement in rating. Each mandatory course may be completed by (1) passing the appropriate enlisted correspondence course that is based on the mandatory training course; (2) passing locally prepared tests based on the information given in the training course; or (3) in some instances, successfully completing an appropriate class A school.

Do not overlook the section of NavPers 10052 that lists the required and recommended references relating to the military requirements for advancement. Personnel of all ratings must

complete the mandatory military requirements training course for the appropriate rate level before they can be eligible to advance in rating.

The references in NavPers 10052 that are recommended but not mandatory should also be studied carefully. All references listed in NavPers 10052 may be used as source material for the written examinations, at the appropriate rate levels.

Navy Training Courses

Navy Training Courses are of two general types: rating and subject matter courses. Rating courses (such as this one) are prepared for most enlisted ratings. A rating training course gives information that is directly related to the professional qualifications of one rating. Subject matter courses (or Basic courses) give information that applies to more than one rating.

Navy Training Courses are revised from time to time to keep them up to date technically. The revision of a Navy Training Course is identified by a letter following the NavPers number. You can tell whether any particular copy of a Navy Training Course is the latest edition by checking the NavPers number and the letter following this number in the most recent edition of List of Training Manuals and Correspondence Courses, NavPers 10061. (Actually, NavPers 10061 is a catalog that lists all current training courses and correspondence courses. You will find this catalog useful in planning your study program.)

Navy Training Courses are designed to help you prepare for advancement in rating. The following suggestions may help you to make the best use of this course and other Navy training publications when you are preparing for advancement in rating.

1. Study the military requirements and the professional qualifications for your rating before you study the training course, and refer to the quals frequently as you study. Remember: You are studying the training course primarily in order to meet these quals.

2. Set up a regular study plan. It will probably be easier for you to stick to a schedule if you can plan to study at the same time each day. If possible, schedule your studying for a time of day when you will not have too many interruptions or distractions.

3. Before you begin to study any part of the training course intensively, become familiar with the entire book. Read the preface and the table of contents. Check through the index. Look at the appendixes. Thumb through the book; look at the illustrations and read bits here and there as you see items that interest you.

4. Look at the training course in more detail, to see how it is organized. Look at the table of contents again. Then, chapter by chapter, read the introduction, the headings, and the subheadings. This will give you a pretty clear picture of the scope and content of the book. As you look through the book in this way, ask yourself some questions:

- What do I need to learn about this?
- What do I already know about this?
- How is this information given in other chapters?
- How is this information related to the qualifications for advancement in rating?

5. When you have a general idea of what is in the training course and how it is organized fill in the details by intensive study. In each study period, try to cover a complete unit—it may be a chapter, a section of a chapter, or a subsection. The amount of material that you can cover at one time will vary. If you know the subject well, or if the material is easy, you can cover quite a lot at one time. Difficult or unfamiliar material will require more study time.

6. In studying any one unit—chapter, section, or subsection—write down the questions that occur to you. Many people find it helpful to make a written outline of the unit as they study, or at least to write down the most important ideas.

7. As you study, relate the information in the training course to the knowledge you already have. When you read about a process, a skill, or a situation, try to see how this information ties in with your own past experience.

8. When you finish studying a unit, take time out to see what you have learned. Look back over your notes and questions. Maybe some of your questions have been answered, but perhaps you still have some that are unanswered. Without looking at the training course, write down the main ideas that you have gotten from studying this unit. Don't just quote the book. If you can't give these ideas in your own words, chances are that you have not really mastered the information.

9. Use Enlisted Correspondence Courses whenever you can. The correspondence courses

are based on Navy Training Courses or on other appropriate texts. Completion of a mandatory Navy Training Course can be accomplished by passing an Enlisted Correspondence Course based on the Navy Training Course. You will probably find it helpful to take other correspondence courses, as well as those based on mandatory training courses. Taking a correspondence course helps you to master the information given in the training course, and also helps you see how much you have learned.

10. Think of your future as you study Navy Training Courses. You are working for advancement to third class or second class right now, but someday you will be working toward higher rates. Anything extra that you can learn now will help you both now and later.

SOURCES OF INFORMATION

One of the most useful bits of knowledge you can learn about a subject is how to find out more about it. No single publication can give you all the information you need to perform the duties of your rating. You should learn where to look for accurate, authoritative, up-to-date information on all subjects related to the military requirements for advancement and the professional qualifications of your rating.

Some of the publications described here are subject to change or revision from time to time—some at regular intervals, others as the need arises. When using any publication that is subject to change or revision, make certain that you have the latest edition. When using any publication that is kept current by means of changes, be sure you have a copy in which all official changes were made. Studying canceled or obsolete information will not help you do your work nor advance in rating. On the contrary, it is likely to be a waste of time, and may even be seriously misleading.

BASIC NAVY TRAINING COURSES

As you refer to your quals, you probably will discover certain areas in which you need more basic study. You consequently will need to obtain additional books. The most useful books for this purpose are the training courses listed in the reading list in the front of this manual. These training courses serve three purposes: They give you much of the background you need to prepare for a technical rating; they offer a handy refresher course in subjects you may have forgotten; and they are useful throughout your Navy career as a handy reference library. The training courses are organized in such a manner that they may be used with a minimum of supervision.

The contents of some of the basic courses listed in the reading list are summarized in the following paragraphs.

Basic Electricity, NavPers 10086-A is intended as a basic reference for all enlisted personnel of the Navy whose duties require them to have a knowledge of the fundamentals of electricity. Like the other courses, it starts from the very basics by introducing a broad picture of the electrical characteristics of matter, and proceeds with a discussion of static electricity, electricity in motion, and electrical circuits. It explains the uses of Ohm's law and the power equations, and makes applications to actual circuits. Emphasis is placed on the various types of circuits—series, parallel, and series-parallel—and on the theory of induction as applied to electrical motors and other electrical apparatus. The essentials of generators and motors are explained. The closing chapters include a fundamental treatment of transformers, synchro units, and electrical measuring instruments.

Basic Electronics, NavPers 10087-A is intended as a basic reference for all enlisted men whose duties require that they know the fundamentals of electronics. The first few chapters are concerned with electron tubes and transistors, including their application in electronic circuits. Power supplies also are treated in the early chapters. Communication equipment is covered in the chapters entitled Transmitters, Transmission Line, and Elementary Communication Receivers. One chapter is devoted to electronic test equipment. Appendix II contains the electronic color code and symbols.

TRAINING FILMS

Training films available to naval personnel are a valuable source of supplementary information on many technical subjects. A selected list of training films that may be useful to you is given in appendix I of this training course. Other films that may be of interest are listed in the United States Navy Film Catalog, NavPers 10000 (revised).

SCHOOLS

At the present time one service school has been established to train Communications Yeomen. It is the Communications Yeoman Class A School at Naval Schools Command, Norfolk, Virginia. Successful completion of this school will enhance your qualifications greatly and further your advancement opportunities.

CHAPTER 2

YOUR ROLE IN COMMUNICATIONS

Your role in naval communications is based on a variety of professional skills, all of which demand a thorough understanding of communication organization. Organizational information is presented as the foundation upon which your further study may build. Subsequent chapters contain a detailed discussion that will help you acquire skills and knowledge necessary to become a Communications Yeoman.

PROFESSIONAL KNOWLEDGE AND SKILLS

Yours will be a dual role in communications: operating equipment and administrating a communication office. Let us look first at the administrative qualifications in terms of the areas of skill and knowledge they represent.

LANGUAGE SKILLS

A Communications Yeoman should possess better than average skill in the English language, both in writing and in speaking. He should be able to speak clearly, grammatically, and without a conspicuous accent. In writing he should be proficient in choice of words, grammar, spelling, punctuation, capitalization, and abbreviation.

RECEPTIONIST DUTIES

The billets you will fill aboard ship and at shore stations require some receptionist techniques. In either type of communication center, a CYN is expected to meet visitors pleasantly, learn the purpose of their visit, refer them to the proper persons, or make appointments for later visits. He should also be able to handle telephone calls efficiently and courteously.

PUBLICATIONS AND DIRECTIVES

To perform his administrative duties effectively, the Communications Yeoman should command a detailed knowledge of official publications and directives. He must be acquainted with the main publications by titles and general content. He must know by whom they are originated, the source from which his activity obtains them, how they are revised, and the correct way of making changes. Likewise, he must understand the purposes and organization of the Navy Directives System.

CORRESPONDENCE

To prepare correspondence, the Communications Yeoman must know the forms of writing Navy letters, memorandums, and other types of written communications. He must also know how to write civilian-type business letters correctly for naval purposes, and be able to select the right kind of letter for each occasion.

TYPING

Eligibility for advancement to CYN3 depends upon a striker's ability to typewrite for 5 minutes at the rate of 25 words per minute. Although a higher rate of typing is undoubtedly useful, it should be remembered that accuracy never should be sacrificed for speed.

DUPLICATING MACHINES

Most large communication centers have a Mimeograph or other kind of duplicating machine. Smaller ships, however, may have only one such machine for the entire command, usually located in the ship's office. The Communications Yeoman is expected to be able to operate whatever type of machine is available for his use. Because of the variation in machines from one office to another, this qualification is necessarily more flexible than that for typing.

FILING, ROUTING, AND LOGGING

One of the primary functions of a CYN is maintaining of message files. You must, therefore, know the purpose of standard message files, as well as any additional message files employed at your particular command, and the correct filing procedures for each.

Closely associated with filing is your responsibility in connection with communication logs. Too much stress cannot be given the importance of these continuous records of everything that happens on a communication net. As a Communications Yeoman, you will work directly with radioteletypewriter and radiotelephone logs.

Another of your duties concerns routing messages, a function you will be called upon to perform as your familiarity with communication procedures increases. In this capacity you will determine the officer directly concerned (the action addressee) and those officers or offices that require a message solely for information purposes (the information addresses).

MISSION OF NAVAL COMMUNICATIONS

Naval communications is the "voice of command" because it is the means by which naval command makes known its will. In performing your duties, you will be helping to fulfill the mission of naval communications. This mission, as stated in the effective edition of DNC 5, is to provide and maintain reliable, secure, and rapid communications, based on war requirements adequate to meet the needs of naval command, to facilitate administration, and to satisfy, as directed, JCS-approved Joint requirements.

Communications serves command when it carries battle orders from a fleet commander to his subordinates, forwards docking information from harbor control to an entering vessel, or delivers a storm warning from the senior officer present afloat (SOPA) to all ships in the area. It aids administration when its circuits are used to furnish ship alteration data to an overseas repair facility, or to arrange transportation for a draft of men.

Naval communications is further pledged to assist in such disasters as floods, hurricanes, and earthquakes, when normal communication facilities in the disaster area are out of commission.

POLICY OF NAVAL COMMUNICATIONS

The policy of naval communications is to—

1. Cooperate with the military services and other departments and agencies of the U. S. Government and Allied Nations.
2. Encourage development of the amateur and commercial communication activities of the United States for enhancing their military value and for safeguarding the interests of the Nation.
3. Promote the safety of life at sea and in the air, maintain facilities for adequate communication with the U. S. merchant marine, aircraft over the sea, and appropriate U. S. and foreign communication stations.

FUNDAMENTAL COMMUNICATION PRINCIPLES

Naval communications must always be ready to meet wartime requirements. Its peacetime organization, methods, procedures, facilities, and training must be adequate and capable of shifting to an emergency or war status with a minimum of changes.

Through the years naval communications has been guided by certain basic principles that have been proven under war conditions. Foremost among these essentials are RELIABILITY, SECURITY, and SPEED.

Reliability of communications is always the first requirement. A message must say exactly what the originator means it to say: it must be sent by the best method of communications available; and it must be complete and accurate in every way when finally placed in the hands of the addressee. Reliability cannot be sacrificed to meet the conflicting demands of security and speed, or for mere convenience. There is a variable relationship, however, between security and speed. Modern operating procedures permit security with speed, but sometimes one must be stressed more than the other. In the planning stages of an operation, secrecy must be preserved at all costs, hence security is more important than speed. But, during a critical moment in combat, very urgent messages may be sent in plain language instead of being delayed for encryption and decryption. Here, security is sacrificed for speed, although security may never be disregarded entirely.

TELECOMMUNICATIONS

The word telecommunications refers to communications over a distance. Several methods

of telecommunications are used by the Navy. Of these, at least four—radiotelegraph teletypewriter, and radiotelephone—concern the Communications Yeoman as operator. In your message—handling duties afloat and ashore, you also will work with traffic sent by other methods. Make sure that you know what they are, as listed here.

1. Electrical communications:
   a. Radiotelegraph;
   b. Teletypewriter (wire or radio);
   c. Radiotelephone;
   d. Facsimile (wire or radio).
2. Visual communications:
   a. Flaghoist;
   b. Flashing light;
   c. Semaphore.
3. Sound communications:
   a. Whistles, sirens, and bells;
   b. Sonar.

ELECTRICAL COMMUNICATIONS

Of the various means of communicating, electrical communications is by far the most important to the Communications Yeoman. A brief description of the listed methods of electrical communications follows.

Radiotelegraph

Radiotelegraph (often called CW for "continuous-wave" telegraphy) is a system for transmitting messages by a radio wave. In this system an operator separates the radio wave into the dits and dahs of the Morse code by opening and closing a handkey. Radiotelegraph was in operation by the Navy as early as 1903. Even today, despite the development of faster and more convenient methods of electronic communications, it is one of the most reliable and trustworthy systems used by the Navy.

Teletypewriter

The mental and manual actions performed by an operator in converting letters to Morse code (and vice versa) are replaced in teletypewriter by electrical and mechanical actions. To transmit a message, the operator types on a keyboard similar to that on a typewriter. As each key is pressed, a sequence of signals is transmitted. At receiving stations the signals are fed into receiving machines that type the message automatically.

Teletypewriter signals may be sent either by landline (wire) or by radio. Landline teletypewriter communication is used both by the military services and by commercial communication companies (e.g. Western Union). Radioteletypewriter (RATT) is intended mainly to furnish high-speed automatic communication over ocean areas.

Today the chief shipboard use of RATT is for receiving fleet broadcast schedules, for which it is well-suited. Radioteletypewriter can clear traffic at a rate in excess of 100 words per minute, as compared to the 17- to 29-wpm speed of the CW fleet broadcasts. Because the shipboard operator is freed from manual copying, and hundreds of ships may be receiving a single broadcast, the total saving in trained manpower is considerable.

Other shipboard uses of RATT are for communications between ships and, if the traffic load warrants, between ships and shore communication stations.

Radiotelephone

Radiotelephone (sometimes called voice radio) is one of the most useful military communication methods. Because of its directness, convenience, and ease of operations, radiotelephone is used by ships and aircraft for short-range tactical communication. Its direct transmission of voice makes it possible for a conning officer to have in his hands a means of personal communication with the officer in tactical command (OTC) and with other ships. There is little delay while a message is prepared for transmission, and acknowledgments can be returned instantly. Radiotelephone equipment usually is operated on frequencies that are high enough to have line-of-sight characteristics; that is the waves do not follow the curvature of the earth. This feature limits the usual range of radiotelephone from 20 to 25 miles. Radiotelephone procedure can be learned easily by persons with no other training in communications.

With these advantages of radiotelephone go some disadvantages. Transmissions may be unreadable because of static, enemy interference, or high local noise level caused by shouts, gunfire, and bomb or shell bursts. Wave propagation characteristics of radiotelephone frequencies sometimes are freakish, hence transmissions may be heard from great distances. Most radiotelephone messages are in plain

language, and if information is to be withheld from the enemy, users must keep their messages short, stick to proper procedures, and be careful what they say.

Facsimile

Facsimile (FAX) resembles television in that it is a process for transmitting pictures, charts, and other graphic information. It is unlike TV in that (1) facsimile gives the receiving station a permanent record of the transmission, whereas television does not; and (2) facsimile requires several minutes to transmit a picture approximately the size of this page, but television sends a continuous stream of 30 pictures per second.

Facsimile is very useful for transmitting such matter as photographs and weather charts. The image to be sent is scanned by a photoelectric cell, and electrical variations in the cell output, corresponding to the light and dark areas being scanned, are transmitted to the receiver. At the receiver the signal operates a recorder that reproduces the picture. Facsimile signals may be transmitted either by landline or by radio.

VISUAL COMMUNICATIONS

Visual communication systems have been in use since the beginning of the Navy, and still are the preferred means for communicating at short range during daylight. In reliability and convenience, they are the equal of radio, and are more secure. The types of visual systems are flaghoist, flashing light, and semaphore.

Flaghoist

Flaghoist is a method of communicating whereby various combinations of brightly colored flags and pennants are hoisted to send messages. It is the principal means for transmitting brief tactical and informational signals to surface units.

Flashing Light

Flashing light is a visual telegraphic system that utilizes either visible or infrared light beams, and it may be directional or nondirectional.

Semaphore

Semaphore is a communication medium by which an operator signals with two hand flags, moving his arms through various positions to represent letters, numerals, and other special signs.

SOUND COMMUNICATIONS

Sound systems include whistles, sirens, bells, and sonar. The first three are used by ships for transmitting emergency warning signals such as air raid alerts, for navigational signals prescribed by the Rules of the Road, and, in wartime, for communication between ships in convoy.

Ships equipped with sonar (underwater sound) apparatus may communicate with other ships by this method, although passing messages is not the chief purpose of the equipment. In peacetime it often is used for coordinating exercises between surface vessels and submarines. Sonar communications may be either by voice or by Morse code.

In general, sound systems have the same range limitation as visual methods but are considered less secure.

ELEMENTS OF NAVAL COMMUNICATION

Naval communications is comprised of five major elements:

1. Office of Assistant Chief of Naval Operations (Communications)/Director, Naval Communications (ACNO(COMM)/DNC);
2. Naval Security Group;
3. Naval Communication System;
4. Communication departments of activities of the shore establishment;
5. Communication organizations of the operating forces.

OFFICE OF ACNO(COMM)/DNC

The Office of ACNO(COMM)DNC (Office of Naval Communications) is the headquarters of naval communications, and provides the communication coordination and planning for the entire Naval Establishment. The staff of the ACNO(COMM)DNC assists him in executing his responsibilities. The staff includes two Deputy Directors (one for communications and the other for Naval Security Group matters), five special assistants, and these five communication divisions: plans and policy; programs; operations and readiness; administrative and personnel; and radiofrequency spectrum. The work of these divisions embraces radio and visual communications, landline systems, and liaison with the other services and other Government agencies.

NAVAL SECURITY GROUP

The Naval Security Group, under the direction of ACON(COMM)DNC, performs special functions in connection with communication security and communication and electronic intelligence. These operations usually are handled by security group departments of the naval communication stations and by Naval Security Group activities although some may be performed by special teams assigned to fleet units.

The Naval Security Group administers the Registered Publication System, which includes Registered Publication Issuing Offices (RPIO) and a central shipping and accounting office at the Naval Security Station, Washington, D. C. Most RPIOs are located at a communication activity, but occasionally these activities are not readily accessible to ships. Accordingly, independent RPIOs may be established at places where there are large concentrations of naval ships but no communication activity.

Another function of the Security Group is the operation of certain courier transfer stations. These stations, combined with Army and Air Force courier stations, make up the Armed Forces Courier System (ARFCOS). The ARFCOS transports mail and material requiring officer handling to meet security requirements.

NAVAL COMMUNICATION SYSTEM

The Naval Communication System may be described as the backbone of naval communications. It includes all shore-based communication activities and the landlines and radio circuits that bind them into a worldwide network. It provides the means for transmission of CNO directives and instructions; broadcast of weather, general messages, orders, and similar message traffic to the fleet; and for the reception of essential intelligence from fleet commanders.

The Naval Communication System is comprised of three major types of activities. These activities are the NAVCOMMSTA, the NAVRADSTA, and the NAVCOMMU.

U. S. Naval Communication Station (NAVCOMMSTA)

The NAVCOMMSTA includes all communication facilities and equipment required to provide essential fleet support and fixed communication services for a specific area. The various components of the NAVCOMMSTA are discussed in detail later in this chapter.

U. S. Naval Radio Station (NAVRADSTA)

A naval radio station ordinarily is a component of a NAVCOMMSTA but may be located physically some distance from the NAVCOMMSTA. It is classified as either a transmitting station or a receiving station, depending upon the function performed, and is so designated by the letter T or R added in parentheses. For example, NAVRADSTA (T) Lualualei, Oahu, is a component of NAVCOMMSTA Honolulu, Hawaii, but is located approximately 15 miles from the NAVCOMMSTA.

U. S. Naval Communication Unit (NAVCOMMU)

Naval communication units are assigned limited or specialized missions, which may include some but not all of those assigned a NAVCOMMSTA. For this reason, the NAVCOMMU is much smaller in terms of personnel and facilities than the NAVCOMMSTA. The NAVCOMMUs are identified by geographical location, as NAVCOMMU Seattle.

COMMUNICATION DEPARTMENTS OF SHORE ESTABLISHMENT ACTIVITIES

Communication departments of shore establishment activities are components of the station or activity they serve. Their mission differs from that of NAVCOMMSTAs and other activities of the Naval Communication System in that, primarily, they furnish local support to the shore station mission. They disseminate information and convey reports and similar data to their own local command, although they may (and often do) work into or connect with the worldwide network of the Naval Communication System.

COMMUNICATION ORGANIZATIONS OF OPERATING FORCES

At the level of the operating forces, it is easily seen that communications is the "voice of command." The communication organization aboard ship is under the direct and positive control of the commanding officer. It provides communication services needed to control and employ fleet units. These services include sending and receiving orders, instructions,

reports, and various other forms of intelligence. Facilities are provided for rapid ship-shore and air-surface communications as well as for commnications between ships.

NAVAL COMMUNICATION STATION

The NAVCOMSTAs are located strategically ashore throughout the world to provide complete radio coverage of the major portions of the earth's area. These stations are linked to each other by point-to-point radio and landline circuits. They are linked to the operating forces by broadcasts, ship-shore circuits, and other special circuits.

The principal communication functions and facilities usually provided by NAVCOMMSTAs are as follows:

1. Facilities for fleet support, consisting of—
   a. Fleet and general broadcasts.
   b. Ship-shore radiotelegraph, radiotelephone, and radioteletypewriter circuits.
   c. Point-to-point wire and radio circuits.
   d. Monitoring of distress frequencies.
   e. Interconnection with Army, Air Force, Federal Government agencies, and communication systems.
2. Facilities for air operational support, including—
   a. Air-ground radiotelephone and radiotelegraph circuits.
   b. Monitoring circuits for navigational aids.
   c. Weather intercept or reception.
   d. Radio or wire circuits to air traffic control agencies.
3. Operation and maintenance of teletypewriter tape relay facilities.
4. Radio transmitting and receiving facilities.
5. Facsimile facilities.
6. Visual communication facilities.

In addition to the foregoing tasks, NAVCOMMSTAs provide communication support facilities for the headquarters of naval district commandants, fleet or sea frontier commanders, and the commanders of naval bases, stations, or shipyards. Most NAVCOMMSTAs have facilities for issuing Registered Publication System publications.

The NAVCOMMSTAs maintain fleet broadcasts, which usually have CW, RATT, and FAX components, for sending traffic to ships in their particular ocean areas (fig. 2-1). Ships in the Mediterranean, for example receive traffic from NAVCOMMSTA Morroco; NAVCOMMSTA Washington transmits to ships in the Atlantic and Caribbean. All the major oceans of the world are covered in a similar manner. Some of the broadcasts may be inactivated at times, because of reduced operations in a certain ocean area, resulting in one broadcast area being extended temporarily to include another. For instance, the Honolulu broadcast area often is extended to include the Balboa area, and the San Francisco area is extended to include the Kodiak area.

Provisions are available so that a NAVCOMMSTA in a specific ocean may simultaneously key the transmitters of one or more of the communication stations in the same area with its own. This procedure, called coronetting, results in identical information being broadcast to these areas at the same time.

The RATT component of the broadcast may be utilized to disseminate classified as well as unclassified information to the fleet, in plain language copy, by using cryptographic devices at the sending and receiving ends. This method is called a covered broadcast.

The NAVCOMMSTAs also send out a general broadcast of hydrographic information, weather forecasts, time signals, press news, and messages for Navy-controlled merchant ships. In addition, facilities are provided for ship-shore communication.

Major NAVCOMMSTAs are linked by radio and landline circuits to other NAVCOMMSTAs throughout the world. Each major NAVCOMMSTA maintains the circuits necessary for interconnection with minor NAVCOMMSTAs.

Minor NAVCOMMSTAs serve areas where the traffic volume is not heavy enough to justify a major station. Most minor stations are located in such activities as naval air stations and supply and ammunition depots. They handle local communications, and relay messages between local activities and the major stations with which they are associated.

Each NAVCOMMSTA maintains a tape relay station. Its function is to forward messages in tape form by means of the automatic or semiautomatic teletypewriter tape relay equipment (discussed later in this manual).

A recent addition to the type relay system is the switching center, with fully automatic equipment for routing messages in tape form. Messages are handled within the switching

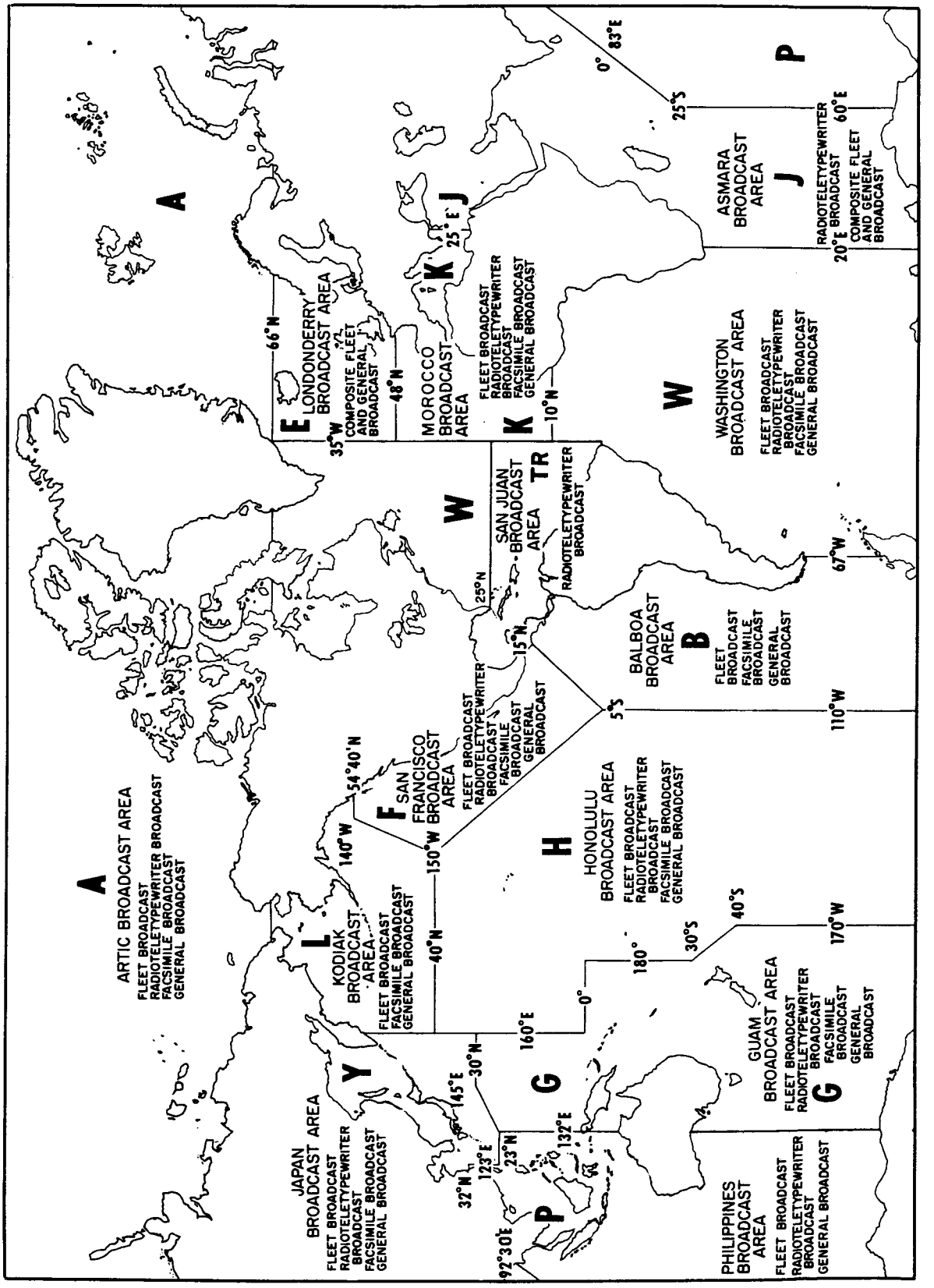

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Figure 2-1.—Fleet broadcast areas.

center at a speed of 200 wpm, thereby speeding up teletypewriter communications while effecting a saving in operating personnel. Presently, five automatic switching centers serve naval activities in the continental United States. They are at Cheltenham, Md., Norfolk, Va. and Trenton, N. J. for service to east coast and midwestern activities, and San Diego and San Francisco for activities in the western area.

NAVCOMMSTA ORGANIZATION

For an example of the organization of a communication activity ashore, let's consider the NAVCOMMSTAs. Such establishments have many billets for Communications Yeomen, and you might well be assigned to one on your next tour of shore duty. Although the organization described is a typical one for NAVCOMMSTAs, the size and scope of operations vary considerably so that no two are exactly alike. All NAVCOMMSTAs however, handle thousands of messages daily, and each person must specialize in one communication job to a far greater extent than aboard ship.

Depending upon its functions and the scope of its operations, a NAVCOMMSTA may have a personnel allowance ranging from a hundred to several hundred officers, men, and civilians. In addition to communication and electronics personnel, there also are personnel for administration, supply, transportation, and other supporting services.

The commanding officer of a NAVCOMMSTA usually is a captain or commander. He establishes policies and procedures for its operations, and initiates and enforces local directives for its upkeep and security. In addition to his station command, the commanding officer of a NAVCOMMSTA normally is the staff communication officer for the naval district commandant or the force or sea frontier commander of the area in which the NAVCOMMSTA is located. He is thereby responsible for coordinating naval communications within his district or area.

Communication Department

The typical NAVCOMMSTA is organized into eight departments, of which the communication department is by far the largest. It is headed by the communication officer, who has supervision over the personnel and work of the department. He serves as manager of the local communication program, and determines its budgetary requirements. Some of his other duties are—

1. Formulating communication plans and directives.
2. Establishing an internal routing and filing system for messages.
3. Providing for physical security of messages and for monitoring facilities.
4. Supervising operation of the publications library by the RPS custodian of the command.
5. Supervising the training of communication personnel and cryptoboard members.
6. Ensuring proper operation and maintenance of electronic and visual communication equipment.

Within the communication department are the radio, traffic, material, and facilities divisions. (See fig. 2-2.)

RADIO DIVISION.—Radio division personnel operates the radio stations of a NAVCOMMSTA. Normally, there are two such stations—a receiving branch and a transmitting branch. Each station is headed by a radio station officer.

TRAFFIC DIVISION.—The traffic division processes incoming and outgoing messages (including facsimile), enforces security, and maintains custody of RPS-distributed matter issued for station use. A traffic and circuit officer is division head. He is assisted by communication watch officers, cryptographers, and a custodian. Their duties are similar to their shipboard counterparts. The following officers may also be attached to this division: a relay station officer, to head the tape relay station; a communication security officer, responsible for monitoring radio circuits and developing communication security measures; and a facsimile officer, to plan and administer operation of facsimile facilities.

MATERIAL DIVISION.—The material division is responsible for the physical functioning of wire circuits and for repair of electronic equipment. In charge are a landline officer and an electronics material officer.

FACILITIES DIVISION.—The facilities division operates the visual station. (Inclusion of this division depends upon whether the NAVCOMMSTA is located where these facilities are required.) The visual station is operated by a signal officer. He is in charge of receiving,

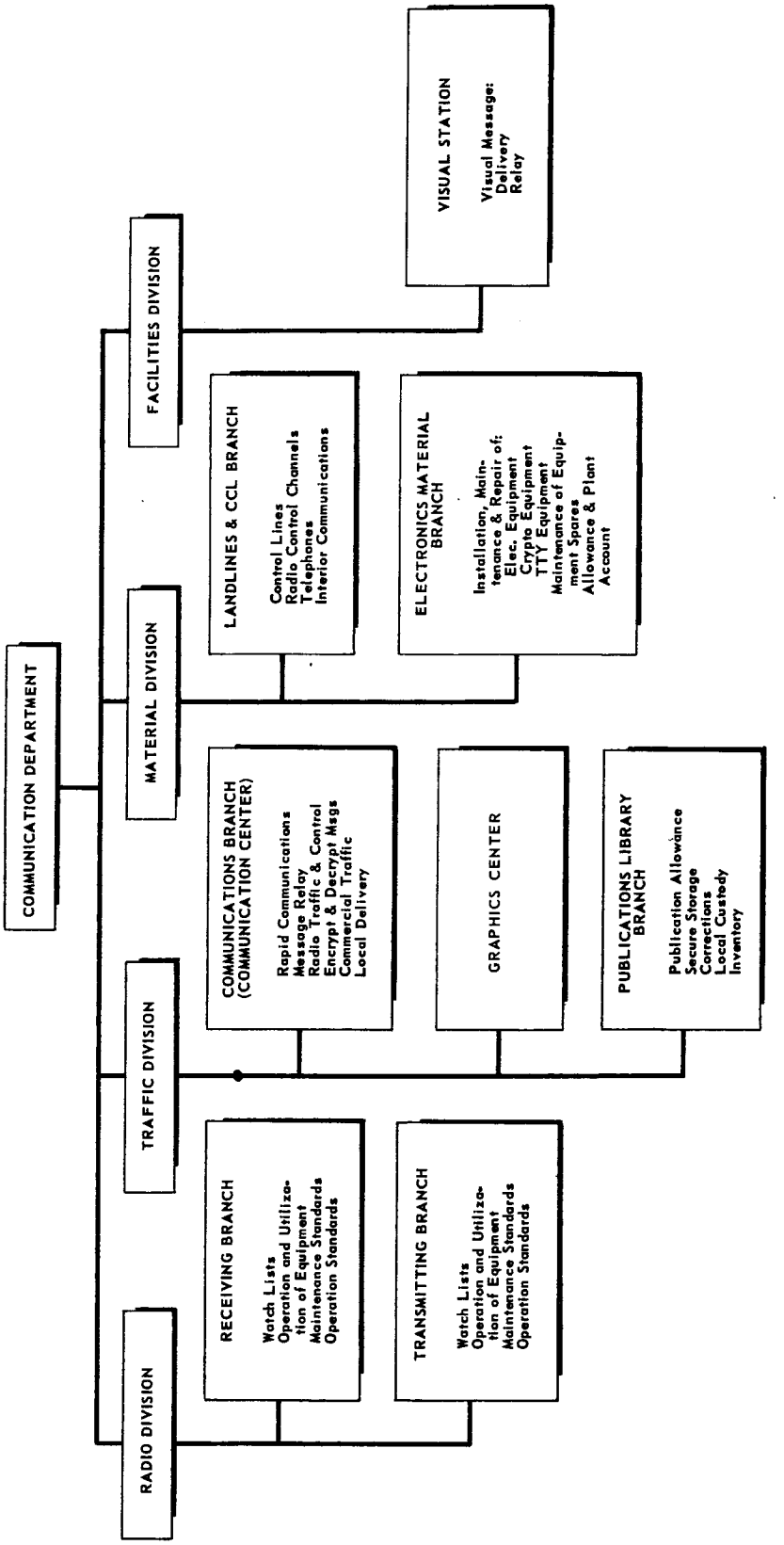

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Figure 2-2.—Communication department of a NAVCOMMSTA.

transmitting, and relaying visual traffic to and from vessels in port or anchorage. His duties parallel those of the shipboard signal officer.

NAVCOMMSTA

The organization of NAVCOMMSTAs varies considerably from station to station. Although physical arrangements differ, the typical shore station includes the following spaces: facility control center, message center, cryptocenter, fleet center, DCS relay center, wire room, visual signal station, graphics center, and radio transmitter and receiver stations.

Figure 2-3 shows the layout of facilities of a typical NAVCOMMSTA. The diagram is schematic, because in practice, buildings and spaces differ so widely in arrangement that generalization is difficult. Usually the elements shown are present, but at some stations they are scattered over many acres. Often transmitting and receiving stations are miles away from the rest of the activity.

FACILITY CONTROL CENTER.—Essentially the facility control center is the master switchboard and monitoring station. All of the equipment of the NAVCOMMSTA is wired through switchboards and patching panels of the facility control center. From the facility control center landlines branch out to other communication spaces, and landlines or radio links lead to the remotely located transmitting and receiving stations serving the communication station. Facility control center personnel connect radio and landline circuits to appropriate

Figure 2-2.—Communication department of a NAVCOMMSTA.

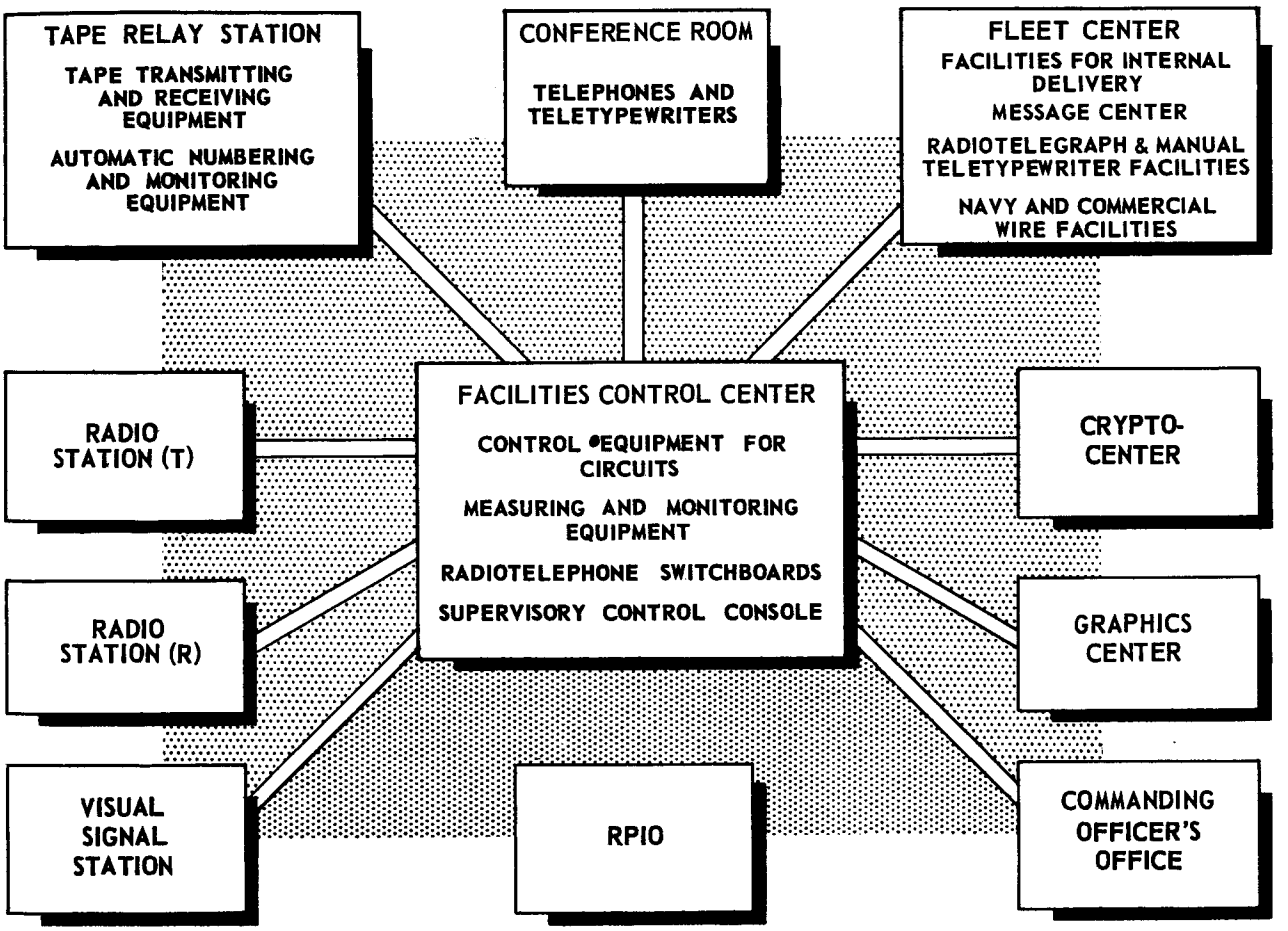

Figure 2-3.—Arrangement of a NAVCOMMSTA.

equipment in the message center, relay center, and other spaces. The facility control center contains control and terminal equipment and built-in monitoring and test equipment. It ties together, electronically, all the spaces of the communication station, and is the electrical outlet from the communication station to other NAVCOMMSTAs.

MESSAGE CENTER.—The message center is the converging point of all messages sent or received by the command it serves. In the message center, messages are logged placed in proper form for transmission, checked for accuracy and security violations, serviced as necessary, written up, distributed internally, and filed in appropriate reference files. The message center operates circuits with the relay station for the reception or transmission of messages.

CRYPTOCENTER.—As its name implies, the function of the cryptocenter is the encryption and decryption of messages. Messages to be encrypted or decrypted are passed from the message center and, after appropriate processing, returned for internal delivery or onward transmission as necessary.

FLEET CENTER.—The primary function of the fleet center is to maintain the ship-shore radio circuits and the fleet broadcasts. The fleet center also operates a ship locator facility integrated with the movement report system. If the Navy Automatic Broadcast Processing and Routing System (NABPARS) is installed, the fleet center must operate it.

DCS RELAY CENTER.—Messages handled by the DCS relay center are in tape form. The relay center is the communication station's linkage with the Defense Communication System Teletypewriter Network. (DCSTTYNET). It contains automatic or semiautomatic teletypewriter tape receiving, tape transmitting, and message numbering and monitoring equipment. This equipment is wired to the facility control center and, through it to other relay centers. Many of the functions of relay centers are now being performed by automatic traffic switching equipment.

WIRE ROOM.—The wire room operates those radio or landline circuits that are not a part of the DCSTTYNET system. Included are circuits to commercial companies, circuits to other Government agencies, fleet and general broadcasts, and certain ship-shore circuits.

GRAPHICS CENTER.—The graphics center operates facsimile facilities, as required, for transmission of photographs, weather maps, charts, and other material conveyed in graphic form.

VISUAL SIGNAL STATION.—A visual signal station is established at a NAVCOMMSTA only when the communication station is within sight of a harbor or anchorage. The visual signal station usually is located in a tower, high above surrounding buildings, so that there is an unrestricted view of the harbor. Messages to and from ships in the harbor are sent by flashing light, semaphore, or flaghoist.

RADIO TRANSMITTER AND RECEIVER STATIONS.—Depending upon the equipment installed, a radio station provides either transmitting or receiving facilities for the communication station of which it is a part. To minimize the interference that results when high-power transmitters are located too near receiving units, radio stations usually are located some distance from the communication station. Additionally, large fields are required for transmitter and receiver antennas, and suitable fields often are difficult to find near the communication station. Transmitters and receivers at the radio station are wired into the facility control center, and from there are patched to remote operating positions or equipment in other communication spaces.

SHIPBOARD COMMUNICATION ORGANIZATION

Each person in the communication division, from the messenger to the watch supervisor, must know the departments aboard his ship and the nature of the work performed by each. Figure 2-4 is representative of a standard shipboard organization, and serves as a guide for type commanders in preparing the organizations of ships under their command. Shipboard organization varies slightly among types. In addition to figure 2-4, study the organization book for your individual ship. If necessary, make exploratory visits to other spaces.

The operations department is one of the five command departments of the ship. Its

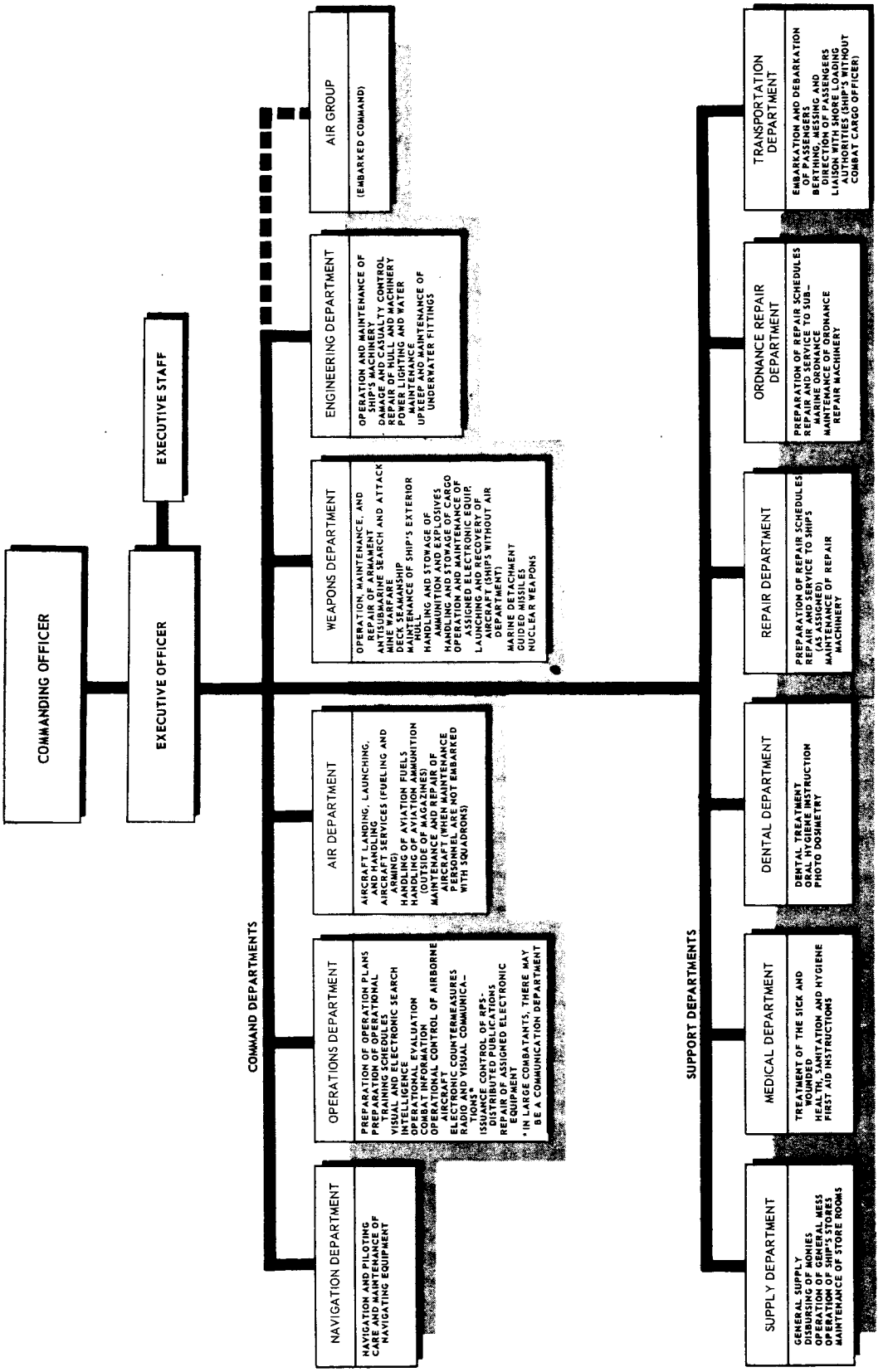

Figure 2-4.—Standard shipboard organization.

functions embrace all external communications, the combat information center, control of aircraft in the air, and repair of electronic equipment.

The effectiveness of the many changes taking place in ships in equipment and in weapons rests more and more heavily upon the capability and output of the operations department. Men who constitute, maintain, and give effect to the components of the operations department exert a marked influence upon the quality and extent of the ship's total capability.

The shipboard communication organization, shown in figure 2-5, is a branch of the operations department. As such, it comes under the cognizance of the operations officer. (The asterisks in figure 2-5 indicate positions that may be filled by Communications Yeomen or CYN strikers.)

OFFICER BILLETS

The communication organization is headed by the communication officer, who is responsible for all communications sent and received by radiotelegraph, radiotelephone, radioteletypewriter, facsimile, and visual means. He is not accountable for the ship's interior communications.

The communication officer is responsible also for (1) the care and maintenance of communication equipment (including landlines and teletypewriter switchboards on ships equipped with these facilities; (2) preparation of communication reports; (3) procurement, custody, correction, distribution of, and reports on publications issued to the ship through the Registered Publication System; (4) supervision and training of the cryptoboard; and (5) cleanliness and upkeep of assigned spaces.

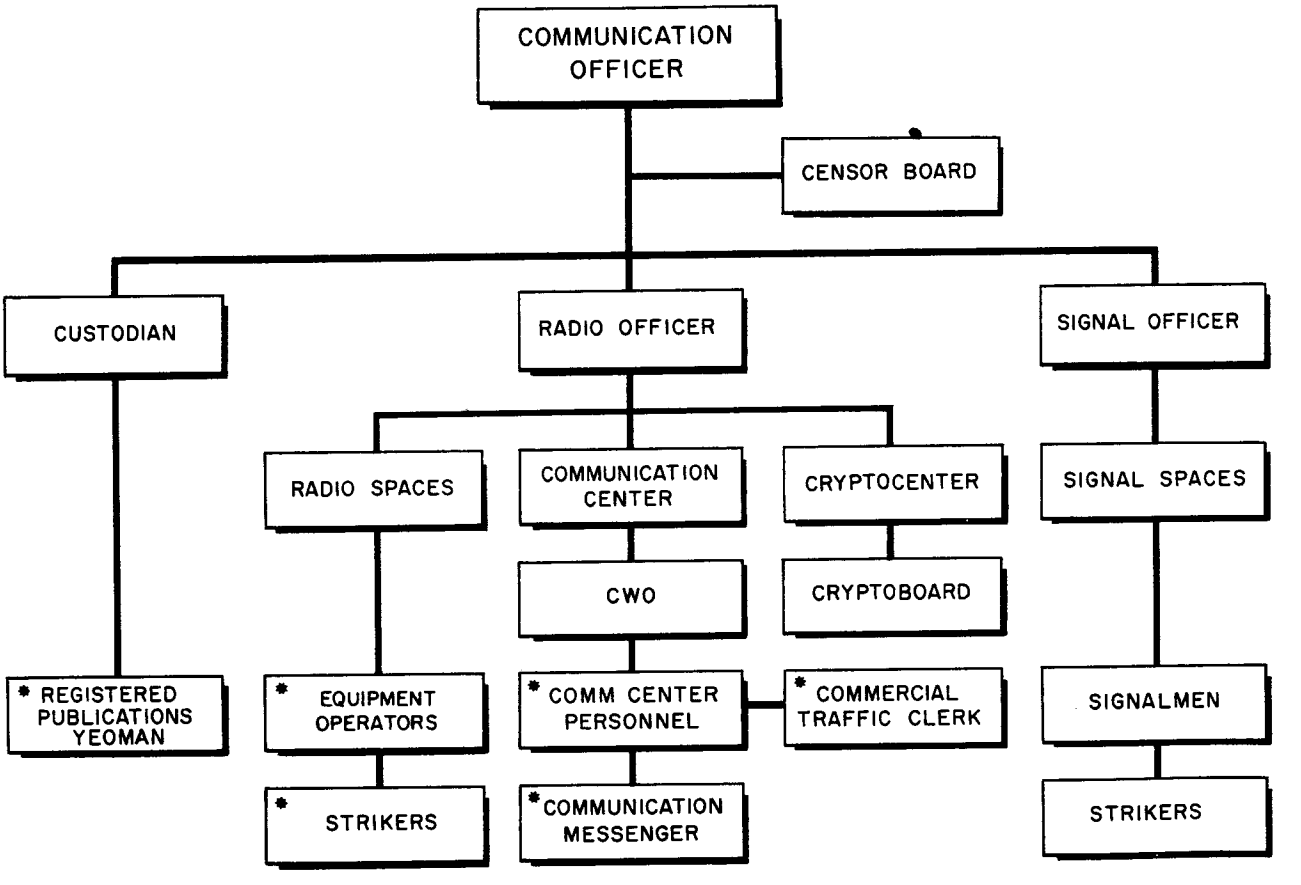

Figure 2-5.—The shipboard communication organization.

In large ships the communication organization is divided into two divisions—the OR (radio) division, headed by the radio officer, and the OS (visual) division, headed by the signal officer. In addition, the communication organization is assigned a custodian of registered publications, communication watch officers, cryptographers, and a cryptosecurity officer.

The radio officer is liable for the work of the OR division and for operation and maintenance of assigned equipment. It is his duty to assure reliable, secure, and rapid handling of radio communications. His responsibilities for the internal handling, routing, and filing of messages are usually delegated to communication watch officers. The radio officer is the communication officer's principal assistant.

The signal officer, heading the OS division, is charged with operation of the ship's visual signaling facilities. His duties in handling visual messages parallel those of the radio officer for radio messages.

The custodian, sometimes called the registered publications officer or RPS officer, is accountable to the commanding officer for keeping a complete, up-to-date, and corrected allowance of registered publications issued to the ship. He handles the drawing, stowage, correction, destruction, reports, and issuance of these publications aboard his ship.

Communication watch officers (CWOs) include the junior officers of the OR division. The CWO on watch is in active and immediate charge of the ship's communications, and during his watch is the personal representative of the communication officer. He sees that incoming and outgoing messages are placed in correct form, delivered promptly and properly to action and information addressees, and that all rules governing the conduct and security of all forms of communication are observed carefully. Communications Yeomen assist the CWO by routing messages, preparing file and routing copies, or serving as messengers or file clerks.

Cryptographers—collectively called the cryptoboard—assist the CWO with encryption and decryption of messages when the traffic load is so heavy he cannot handle it by himself. Members of the cryptoboard are designated in writing by the commanding officer. All cryptoboards have commissioned officers as members but may, in addition, include warrant officers and competent and reliable enlisted personnel.

The cryptosecurity officer is assigned full time only on the largest ships. He is charged with the training, assignment, and detailed performance of the cryptoboard and serves as advisor to the communication officer and the commanding officer in all matters relating to cryptosecurity and the physical security of cryptomaterials. In most ships the custodian, a CWO, or some other communicator is given this responsibility as collateral duty. In small commands the communication officer usually serves as cryptosecurity officer. Other collateral communication duties to which an officer may be assigned include that of Top Secret control officer and membership on the consoring board.

ENLISTED BILLETS

Specific duties of enlisted personnel assigned to communication duties vary according to the size, type, and mission of the ship. The principal duties of standard billets and ratings are outlined below. Remember, however, that although some division between the work of the various ratings is necessary by virtue of the special skills of each, it is more desirable that all personnel work together according to their knowledge and ability to ensure the best possible operation of the communication center.

The senior Radioman, as the leading petty officer, is in direct charge of all enlisted men in the radio division. He prepares the watch lists for Radiomen and makes daily checks of the message files and logs. Another of his most important duties is the training program, which he must organize and conduct so that his operators will be able to perform efficiently any communication function they may be assigned. Additionally, the leading petty officer has responsibilities for the cleanliness and preventive maintenance of all radio and teletypewriter equipment and for the compartments and deck spaces occupied by equipment under his cognizance.

The watch supervisor in radio central must be an experienced Radioman. The proper handling of traffic is his main responsibility. The equipment in use and the personnel on watch are under his direct supervision. He assists the CWO and, in organizations without a communication watch officer, may be designated to act as the CWO insofar as concerns the internal routing and delivery of messages. His other duties include monitoring circuits, enforcing proper circuit discipline, accounting for classified matter in radio central, taking

prompt action to prevent disruption of communications in event of equipment failure, and maintaining a communication status board listing information relative to the nets and circuits in use.

While on watch the operators in radio central are under the authority of the supervisor. They must know and use correct operating procedures for radiotelegraph, radiotelephone, radioteletypewriter, and facsimile circuits; must keep accurate logs; must know how to tune transmitters and receivers and associated equipment; and must be able to patch receivers and transmitters to remote operating positions. Other duties include message writeup and internal and external routing, delivery, and filing.

Radiomen are placed in charge of each additional radio space, such as the transmitter room and emergency radio room. They must be able to tune and calibrate each transmitter to every frequency within the equipment's range, and know the power panels and switches for both normal and emergency power distribution systems. Other duties include patching transmitters and receivers to remote positions, and keeping records relating to equipment tests and inspections.

The Communications Yeoman may be directly responsible to the CWO or he may be under the authority of the watch supervisor in radio central. His exact duties depend mainly on the size and the needs of his command. In addition to keeping accurate logs and files, he must know and use correct operating procedures for radiotelephone and radioteletypewriter circuits. He may act as a receptionist or assist in supply/repair parts procurement. His other duties include typing correspondence and division directives, mimeographing, writing and routing messages, correcting publications, and maintaining equipment and training records.

Signalmen are concerned primarily with visual communications. Their secondary duties include standing quartermaster watches and operating the radiotelephone.

SHIPBOARD COMMUNICATION SPACES

The number, size, and arrangement of the communication spaces of a ship depend upon her size, type, and mission. Most large warships have communication spaces located fore, aft, and amidships (fig. 2-6). Besides scattering

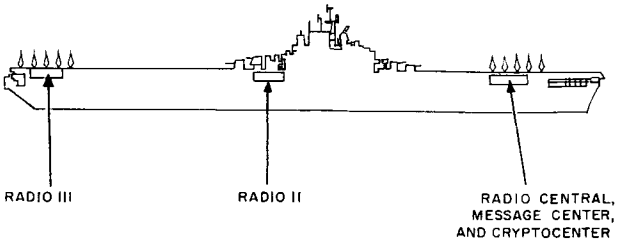

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Figure 2-6.—Location of communication spaces, Forrestal class CVA.

the ship's antennas, thereby helping to reduce interference, this arrangement minimizes the danger of loss of communications by heavy damage to a portion of the ship. Equipment is so distributed that any one space can carry on at least partial communications.

The most important shipboard communication spaces are amidships, where, under normal operating conditions, most radio traffic is handled. Here are located radio central (also called main radio or radio I), the message center, and the cryptocenter. Communication functions also are carried out in other radio spaces, in other battle control locations, and in visual signal stations.

Radio Central

Radio central is the largest and most completely equipped radio space on board ship. It contains local operating positions for radiotelegraph, radiotelephone, radioteletypewriter, and facsimile. Usually, it is where transmitters, receivers, and remote speakers and keying positions are selected and tied together to provide communication channels for the remote operating stations elsewhere in the ship. Radio central is located close to the message center and cryptocenter, and is the duty station of the watch supervisor, most of the ship's Radiomen, and Communications Yeomen assigned chiefly as equipment operators.

Message Center

Convenient to radio central is the message center, where outgoing traffic is prepared for transmission and incoming traffic is readied for local delivery. It is the duty station of the CWO and other personnel of the watch.

An outgoing message is delivered "in rough" to the message center, where it is checked for possible drafting errors. It is then written up "in smooth" and sent to the releasing officer for his approval and signature. If the message is classified, it is passed to the cryptocenter, encrypted, then is given to radio central or the signal bridge for transmission. After incoming messages are received from radio central of the signal bridge, they are logged, decrypted (if necessary), written up, routed, and delivered by messenger. All messages must clear the message center before internal routing or external transmissions. Exceptions to this routine include operational messages received and sent direct from the OOD or CIC.

In ships without space allotted for a message center, the functions of the message center are carried out in radio central.

Cryptocenter

Adjoining the message center is the cryptocenter, where outgoing messages are encrypted and incoming messages are decrypted. Here are located cipher equipment and cryptographic publications (called cryptoaids), safes for the stowage of classified messages, and desks and typewriters as necessary. Files kept in the cryptocenter include a file for classified general messages and one for edited plain language copies of encrypted messages. Access to the cryptocenter is strictly controlled. Admittance is limited to designated cryptographers, and an authorized entry list is posted on the door. The cryptocenter has only one entrance, and it connects with the message center. Ordinarily the door is locked, so that traffic is passed in and out through a window or slot in the bulkhead.

Other Radio Spaces

According to the size of the ship, there may be one or more additional spaces containing special equipment, additional equipment, or duplicate facilities. Depending upon their arrangement and intended use, they may be designated as transmitter room, emergency radio room, auxiliary radio, or other appropriate titles.

Most of the ship's transmitters are located in the forward radio space, called the transmitter room or radio II. It usually is manned by a Radioman in charge, assisted by watch standers. The duties of the watch are to keep transmitters tuned to prescribed frequencies and connected or "patched" to keys, microphones, teletypewriters in radio central, and to remote operating positions in CIC, on the bridge, and in other parts of the ship. Receiving equipment includes one or two emergency receivers and the ship's entertainment receivers.

Originally the larger Navy ships kept their emergency radio room (radio III) in readiness for emergency use only, but in many vessels the increasing demand for radio circuits has turned this space into an active transmitter room. In ships where radio III still is an emergency radio room, watches are stood only when the ship is at general quarters.

Other radio spaces are scattered throughout large combatant ships. Many are small spaces supplementing the three main stations.

Remote Control Facilities

Remote control stations, consisting of receiving outlets and transmitter keying positions, are located on the bridge, in CIC, and other battle control spaces where the need exists for direct radio communications. Receivers in radio central and transmitters in radio II and radio III can be connected to remote control positions as required. Positions on the bridge and in CIC are often paralleled. For instance, a tactical maneuvering net can be controlled from either the bridge or CIC by means of remote control units in these two spaces, which are connected through radio central to the same transmitter and receiver.

Visual Signal Spaces

Equipment and spaces for visual communications are provided in the superstructure of the ship. Signal halyards run from the yardarm to flag bags at the foot of the mast for flaghoist signaling. Signal searchlights and semaphore platforms are positioned where each has the largest arc of vision, and so that their total coverage is 360°. Remote control keys for operating yardarm blinkers are placed in convenient and protected positions.

SMALL SHIP COMMUNICATION ORGANIZATION

Preceding sections outlined the communication organization aboard a large ship, where the specific duties of each officer are more clearly defined and standardized. Communication organizations of smaller ships (DD or DE types,

for example) carry on much the same work, but their personnel allowances are smaller. Each individual in the smaller organizations must accept more varied duties and a heavier workload.

Communications on a DD or DE still is one of the functions of the operations department, but radio and visual signaling personnel are combined into one division—the OC division. The communication officer may not have any commissioned assistant, or perhaps only one, and must himself do work that on a larger ship would fall to the radio officer, signal officer, custodian, or CWOs. On a destroyer the communication officer is an active assistant to the operations officer. He has deck as well as communication duties, and spends many hours daily on the bridge. If this duty is heavy he may have little time to devote to the routine of communications, and must depend on his Chief Radioman or leading Radioman to carry the load.

WATCH, QUARTER, AND STATION BILL

When a Communications Yeoman—or any other man—reports aboard, he is assigned by his division officer to a watch section, duty station, to battle and other emergency stations, and to a cleaning station. This information is posted in his work spaces on the watch, quarter, and station bill (fig. 2-7).

Normally, watches stood by communication personnel are based on the master bill of the ship or station. Watches of communication personnel, however, cannot always be made to conform to the hours or watches of other personnel of the command. Often the peak load of message traffic occurs when other activities of the command are at a comparative lull. Hence, communication personnel often do not stand the usual 4 on 8 off watches.

At most shore communication stations the day, evening, and midwatches last approximately 8 hours each. Communication personnel usually rotate on a 4-section watch list, and stand a series of three watches in a row before rotating from days to evenings, evenings to mids, and mids to day watches. Certain peakload operators customarily are assigned to work during the busiest hours, and rotate watches differently from the rest of the station.

During general quarters men of the OR/OC division are assigned to each radio communication space. Every circuit or net is manned by a battle-efficient operator. Also, standby men maintain duplicate facilities in other radio spaces, keeping duplicate logs of traffic coming into radio central.

Enlisted men (usually petty officers) are placed in charge of cleaning details in each communication space. Available personnel are assigned specific areas for cleaning and upkeep.

Detailed information concerning special stations (such as fire, fire and rescue, collision, and abandon ship) is contained in your ship's organization book.

OTHER COMMUNICATION CONSIDERATIONS

Until now, our commentaries have been restricted to elements of Navy communications. Even though such isolation is possible in a discussion of theory, this separation is impractical in an actual operating situation. Certain organizations and procedures have been instituted which, despite affecting naval communications, are much broader in scope and purpose. A description of these "outside considerations" follows.

DEFENSE COMMUNICATIONS SYSTEM

The Defense Communications System (DCS) was established in 1960 to provide a single communication system within the Department of Defense. The Defense Communications System is supervised and operationally controlled by the Defense Communications Agency (DCA). The DCA consists of a director (an officer of general or flag rank), a headquarters staff, and such other units as are specifically assigned the Agency by the Secretary of Defense or the Joint Chiefs of Staff.

The DCS includes all Department of Defense circuits, terminals, control facilities, and tributaries (regardless of the military department to which assigned) that are required to provide communications from the President, down the chain of command, to the fixed headquarters of the various subordinate commands. This sequence of succession takes in the point-to-point, long-haul, Government-owned or -leased circuits that are a part of the Naval Communication System. Fleet broadcasts, ship-to-shore, ship-to-ship, and tactical circuits within a tactical organization normally are excluded from the DCS.

WATCH, QUARTER, & STATION BILL

SECTION 1 DIVISION OR

BILLET	NAME	BUNK NO.	LKR. NO.	RATE			CLEAN STATION	BATTLE STATIONS			LANDING PARTY	EMERG. GETTING UND'WAY	WATCH DETAIL		SPECIAL SEA DETAIL	FIRE		RESCUE & ASSIST.		COLLISION	ABANDON SHIP		MAN OVERBD.	SPECIAL DETAIL
				COMP.	ALL.	ACT'L.		CONDITION I (GENL. QTRS.)	CONDITION II	CONDITION III			AT SEA	IN PORT		STATION	PROVIDE	PARTY	PROVIDE		STATION	PROVIDE		
C-101	H.J. SAYER	4	4	RMC	RMC	RMC	←	IN CHARGE		→		RAD I				↑		↑		↑	6		↑	
C-102	R.E.L. CLARK	7	7	RM1	RM1	RM2	RAD I	SUPVR	SUPVR	SUPVR		RAD I				STANDBY		STANDBY		STANDBY	4		QUARTERS	
C-103	J.D. BUCKNER	8	8	RM1	RM2	RM2	RAD II	RAD II	RAD II	RAD II		RAD II									2			
C-104	B.A. JOHNSON	12	12	RM2	RM2	RM3	RAD III	RAD III	RAD I	RAD I		RAD II									3			
C-105	M.E. POPE	14	14	RM3	RM3	RM3	RAD II	RAD I	RAD I	RAD I	PORTABLE RAD/GPR	RAD I									4	PORTABLE RADIO		
C-106	W.A. SCRUGGS	17	17	RM3	RM3	RMSN	RAD I	RAD I	RAD I	RAD I		RAD I									6			
C-107	R.J. GILLETTE	20	20	CYN3	CYN3	CYN3	RAD I	JX TALKER	RAD I	RAD I		JX TALKER									5			
C-108	M.L. HAMILTON	15	15	RM3	RM3	RMSA	PSGY.	MSGR.	MSGR.	MSGR.	MSGR.	MSGR.				↓		↓		↓	3		↓	

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Figure 2-7.—Watch, quarter, and station bill.

JOINT COMMUNICATIONS

The need for coordinated and standardized communications among the United States military services was clearly apparent during the early stages of World War II. Army and Navy facilities sometimes were duplicated in one location, so that differences in procedures made efficient interservice communications difficult. Now communication procedures are standardized throughout the Department of Defense, hence the handling of interservice messages creates no special problems. Joint procedures are set forth in Joint Army-Navy-Air Force Publications (JANAPs). You will become familiar with these publications as you study naval communications.

ALLIED COMMUNICATIONS

With worldwide cooperation between friendly nations and the United States, the need arose again for coordinated and standardized communications on an allied basis. To meet this need, Allied Communication Publications (ACPs) were promulgated. The ACP series provides the communication instructions and procedures essential to the conduct of combined military operations and communications in which two or more of the Allied Nations are involved. Your work in communications undoubtedly will require that you be familiar with many of the ACPs.

NAVY MILITARY AFFILIATE RADIO SYSTEMS

The Navy Military Affiliate Radio System (Navy MARS) was established to train amateur radio operators in Navy communication procedures. Through Navy MARS, amateur radio operators maintain an affiliation with the Navy, and provide a source of trained operators for use in a local disaster situation or a general emergency.

The operators, many of them former Navy personnel, usually operate from their own amateur stations with Navy-assigned calls. They handle message traffic of a morale nature that does not qualify for regular transmission over Navy circuits.

Navy MARS is a projection of Navy Department policy to encourage and support amateur radio activity among Regular, Reserve, and Retired personnel of the Navy, Marine Corps, and Coast Guard for morale, recreation, training, international goodwill, and public service.

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CHAPTER 3

GENERAL OFFICE PRACTICES

Most of your duties as Communications Yeoman will be performed in either radio central or the message center. The size of the space and the number of people assigned vary with the individual command. The amount of control you will have over the physical conditions of your working area—furniture and equipment arrangement, for example—will be slight. You will be expected, nevertheless, to assume your share of responsibility for the general neatness and care of the space as well as your own desk. Remember that neatness and efficiency go hand in hand.

In this chapter you are introduced to both standard office practices and explicit administrative procedures employed in smoothly functioning communication activities.

OFFICE PROCEDURES AND BEHAVIOR

Your contribution toward good human relations in your assigned center is fully as important as maintaining its appearance. At this point in your career, your personal influence is expanding because, once you become a petty officer, you not only are responsible for yourself, but are expected to exhibit qualities of leadership.

KNOW YOUR OFFICE

When you begin work in a new billet, one of your first jobs is to learn as much as possible about the organization of which you now are a part. You learned in chapter 2 the purposes of different types of communication facilities. Review those functions prescribed for your particular command, then study the communication center's organization and the chain of command.

After you understand the functions of your assigned center, you will see how your own duties fit into these functions. This knowledge will make your various jobs more interesting to you. Those files, for instance, that you thought so dull, take on new interest when you recognize the importance of the messages they contain.

Look beyond your own job. You should know the name and rank or rate of every person in your division, the specific duties each person performs, and how his work contributes to the overall operational performance.

BEYOND YOUR OFFICE

The next step is to see your communication center as part of a larger plan. You can look two ways at any position to which you may be assigned—as a part of your own ship or station, and as a part of a broad program operating through facilities like yours in all ships and at all stations.

Thinking of communications in relation to your ship or station, you should study the ship or station organization—the names, titles, and ranks of those above you in the chain of command. You also should know the other offices that are closely related to yours in their duties.

To understand the Navywide program of which you are a part, recall the organizational information presented in chapter 2. At which level does your communication center operate? To what extent is it dependent upon other facilities, and what subordinate centers rely on you for support? As you answer these questions, then the role your communication center plays in the Navy should be clearer.

DUTIES OF A RECEPTIONIST

At one time or another in your duties as Communications Yeoman, you will be positioned

to receive visitors and greet official callers at your communication center. The manner in which you conduct yourself—and the impression you make—will determine, to a great extent, the visitor's initial impression of your whole organization.

Your manner will be apparent even before you move or speak, and should be calculated to set the tone for what follows. Let us think for a moment about what we would consider an appropriate attitude for a receptionist.

In the first place, a communication center is a place of business, so the receptionist should show that he is there for work. In most instances you will have other work besides receiving visitors and, when not actually occupied as a receptionist, you should keep busy. If, for a short interval, you actually have no work to do, your supervisors may permit you to study, but you should do no recreational reading nor chat with other communication personnel.

Your desk location may be directly in line for the chronic stop-and-chatter from a nearby office. Give him a pleasant "good morning," but don't encourage him to linger. If you indicate that you have work that requires your attention, most people take the hint.

Be careful, however, that you don't give people coming into your center on business the impression that you are too busy to help them.

A good receptionist makes it clear that he is available to be of help and that no reasonable request is too much trouble. He is polite, pleasant, and considerate at all times. Even with those whose requests seem a bit unreasonable, he retains his composure and good manners.

If you don't already know the visitor, get his name, and be sure you have it CORRECT. It may be well to write his name on a slip of paper to hand to the person to whom you refer him.

Listen carefully to his inquiry. Use intelligence and imagination in your reply. Don't expect him to know all about your center and the people in it (unless you know that he does). If you are referring him to Lieutenant Smith, be sure he knows where Lieutenant Smith's desk is. If convenient take him over and introduce him, stating his errand briefly.

If your communication center does not have the information or help he is seeking, give him the best suggestion you can about a possible source. Do your best to avoid having the visitor depart feeling that he has run into a blank wall.

A good receptionist is, to some extent, a buffer for the other people in the office. Often you can save their time by knowing the simple answers yourself. You should be careful, however, to know just how far to go on your own and when it is better to let someone else take over. Stay within the limitations of your authority.

When the people of your center are especially busy, you should protect them as much as possible without denying legitimate requests or causing visitors unreasonable delays. If delays cannot be avoided, it may be feasible for you to suggest calling him when the person he wishes to see is available.

You may work with officers or senior petty officers whose duties take them in and out of the center. Remember what they tell you about where they are going and when they expect to return. Write down items you may not remember, such as telephone numbers where they may be reached. Sometimes it may be necessary for you to remind them to give you this information before leaving. Be tactful, but don't neglect to ask. People normally appreciate a reminder. If the person the visitor wishes to see is out, find out whether someone else can help him.

TELEPHONE PROCEDURES

When a small child first tries to talk on the telephone, he is likely to nod his head for "yes" instead of speaking. To a lesser degree, many adults make the same mistake. They forget how great a part facial expression and gestures play in face-to-face conversation and that these motions are missing in telephone communications. You remember the old expression "Smile when you say that." Misunderstandings can arise from telephone conversations because the person at the receiving end can't see the speaker's smile.

We sometimes develop telephone voice mannerisms that give a misleading impression. To avoid this mistake, listen to yourself critically now and then, and decide whether you would like to be spoken to by that voice. Is it natural? Is it pleasant? Is it friendly, yet dignified? Among voices to be avoided are the dull, the whining, the pompous, the too formal, and the too sugary.

Remember that a conversational tone is best for telephone use. Speak directly into the transmitter, your mouth about an inch away from it.

Be careful to enunciate distinctly. Be especially careful in your choice of words to ensure that they convey your meaning clearly.

Good Beginnings

Open a telephone conversation with a phrase that identifies your office and yourself. In answering the telephone you might say, for example: Radio One, Communications Yeoman Brown speaking, sir." In initiating a call, you might state: "This is Communications Yeoman Baldwin, in the Naval Station message center.

If the caller fails to identify himself, and you must know his name, ask for it tactfully. You might inquire "May I tell him who is calling, please?" or "May I have your name, please?" Avoid phrases that may sound abrupt or suspicious, as "Who is this? or "Who's calling?"

Taking Calls for Others

If the person called is absent, always offer to take a message. If given one, write it down while the caller is talking. Be sure you get all details correct, especially the name and telephone number of the caller.

Even if no message is given, make a note about the call. As soon as you hang up, place your note where the person for whom it is intended will be sure to receive it.

Remember what was said earlier about keeping data at hand concerning where personnel of your office can be reached and when they expect to return. Offer this information to a telephone caller if it appears appropriate.

When the person called is out, it's often a good idea to say: "Perhaps I could help you." Even if it develops that you can't, the caller will appreciate your good intentions. As you learn more about your duties, there will be more and more times when you can answer a question and avoid a second call.

Some Telephone Do's and Don'ts

Answer the telephone as promptly as possible. It should never be unattended during working hours.

When making a call allow plenty of time (about 10 rings) for the person to reach the instrument. If you must leave the telephone while a conversation is in progress, don't just say: "Hold the line," or "One moment please." Try to give the person a picture of what you are doing by saying: "If you can wait a minute, I think I can find that in the file," or "Commander Briggs may be in the next office. Let me see if I can find him for you.

Remember that time seems very long while you are waiting, so return to the telephone as quickly as you can. If you see it's going to take longer than you thought, go back and explain the difficulty, and ask the caller if he prefers to wait or have you call him back.

Never answer the telephone with only half your mind on what you are doing. Concentrate on everything that is said. Be sure you understand clearly what is said.

Make certain that your telephone conversations demonstrate courtesy, tact, and good judgement.

PROCUREMENT AND CARE OF SUPPLIES

An efficient CYN in a well-organized communication center does not have to send a messenger to other ships or stations in the vicinity to borrow supplies.

You should keep a running inventory of all supplies that your center uses. You must (1) see that necessary articles are on hand, (2) stow them properly, and (3) distribute them as needed. You must be thoroughly familiar with kinds of paper, blank forms, filing materials, pencils, and other supplies used in the "comm center", where and how to procure them, and how to take care of them. When you see that your stock of a certain item is becoming depleted, order it; do not wait until the supply is completely exhausted.

REQUISITIONING

Of the supplies you use, the majority will be standard expendables such as message forms, teletypewriter and typewriter ribbons, paper, and so on. The time spent in reordering these items can be reduced greatly by keeping a list of Federal stock numbers, units of issue, and unit costs. This practice eliminates the necessity of making a trip to the supply office to obtain such information from their catalogs.

Keep your eyes open to note where additional types of supplies or equipment will facilitate the work. If you feel a different item could be utilized for greater efficiency, make your suggestion known to your leading petty officer.

You should be able to fill out a requisition for supplies. For procuring ordinary office supplies, you should use a Request for Issue or Turn-In, DD Form 1150. Figure 3-1 shows the form completely filled out as it would be prepared ashore. Afloat, personnel of the supply department will assist you in filling it out. Note that the requisition requires the signature of your division officer or CPO. Activities ashore sometimes have a local requisition form for procurement within the activity. Find out what is used in your activity.

Check supplies at regular intervals to guard against running out of items. Examine all desks regularly to see that they have the necessary materials. Avoid stockpiling; the supply department normally maintains the stocks you require. An oversupply will be hard to stow and will encourage wasteful habits and waste of forms as they become obsolete.

STOWAGE

Supplies should be stowed where they are readily accessible, and where they will not clutter desks and hinder your normal work. For this purpose closed cabinets are preferable to open shelves. This type of storage protects supplies from dust and disarrangement by drafts or random handling. It also tends to prevent waste by making the supplies less accessible to the casual passerby.

Keep everything of one kind together, and place your most frequently used supplies in the handiest locations. Open only one package at a time of each kind of material. Label the contents of wrapped packages with colored pencil on the wrappings so that people won't be tearing them open to find out what they contain.

Always stow Mimeograph stencils so that the container stands upright on the long edge. They should be kept in moderate temperatures and out of direct sunlight. Nothing should be placed on top of the pack of stencils. Mimeograph inks should be placed away from intense heat and cold.

AVOIDING WASTE

Avoid all forms of wastefulness. All departments are allotted funds for supplies on a quarterly basis. If you are wasteful, your communication center may find itself without needed supplies, and lacking the funds with which to solve this shortage.

Use the proper supplies for your purpose. It is a form of wastefulness to spend time writing a letter about something for which a form or checkoff list is available. Know such distinctions as the difference in grades of paper used for rough drafts, for smooth copy of letters, and for duplicating. If you use the wrong kind, you will be either wasting your expensive stock where it is not required or turning out an inferior product because of unsuitable material.

MAINTAINING OFFICE EQUIPMENT

Your duties as a Communications Yeoman include operating typewriters (communication and conventional) and duplicating machines, but your responsibility in their connection is more extensive. For the machines to function properly, you must give them the routine care they require, as well as make minor adjustments.

CARE OF TYPEWRITERS

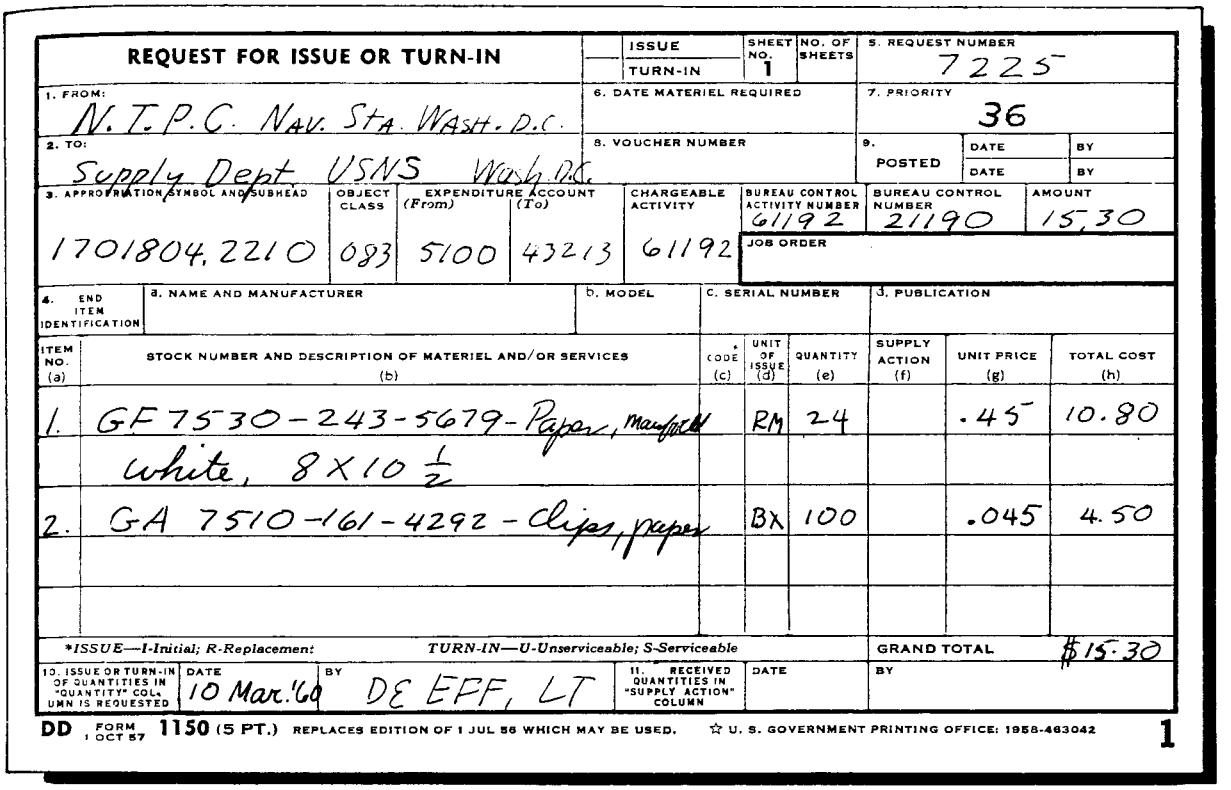
You will have to use both a communication typewriter and a conventional typewriter. The basic difference between these machines is that the communication typewriter prints only in capital letters.

A typewriter that is not abused will give many years of service. With careful normal use, plus regular cleaning and adjustment, typewriters can be counted on for about 10 years of satisfactory service. Remember that a machine in first-class condition is easier and quicker to operate and turns out better looking work.

Make certain that your typewriter is properly placed on the desk, or secured to the well of the desk, so that it will not fall. In lifting a typewriter, grip it by its case, NEVER by its carriage.

Keep your typewriter covered when not in use. No matter how clean the office, a certain amount of dust is always in the air. When the machine is uncovered for long periods, dirt gets into the moving parts of your instrument and causes wear.

A typewriter should be brushed out by the operator at the end of each day. Type should be cleaned with a stiff brush and, at less frequent intervals, it should be treated with art gum or a liquid cleaner. Nothing looks worse than messages written up for delivery with the letters o and e filled up because dirt in the characters is printing through the ribbon.



REQUEST FOR ISSUE OR TURN-IN

ISSUE / TURN-IN | SHEET NO. 1 | NO. OF SHEETS | 5. REQUEST NUMBER 7225

1. FROM: N. I. P. C. Nav. Sta. Wash. D.C.

6. DATE MATERIEL REQUIRED | 7. PRIORITY 36

2. TO: Supply Dept. USNS Wash D.C.

8. VOUCHER NUMBER | 9. POSTED DATE BY / DATE BY

3. APPROPRIATION SYMBOL AND SUBHEAD	OBJECT CLASS	EXPENDITURE ACCOUNT (From)	(To)	CHARGEABLE ACTIVITY	BUREAU CONTROL ACTIVITY NUMBER	BUREAU CONTROL NUMBER	AMOUNT
1701804.2210	083	5100	43213	61192	61192	21190	15.30

JOB ORDER

4. END ITEM IDENTIFICATION	a. NAME AND MANUFACTURER	b. MODEL	c. SERIAL NUMBER	d. PUBLICATION

ITEM NO. (a)	STOCK NUMBER AND DESCRIPTION OF MATERIEL AND/OR SERVICES (b)	* CODE (c)	UNIT OF ISSUE (d)	QUANTITY (e)	SUPPLY ACTION (f)	UNIT PRICE (g)	TOTAL COST (h)
1.	GF 7530-243-5679-Paper, manifold white, 8 X 10 1/2		RM	24		.45	10.80
2.	GA 7510-161-4292-Clips, paper		BX	100		.045	4.50

*ISSUE—I-Initial; R-Replacement; TURN-IN—U-Unserviceable; S-Serviceable

GRAND TOTAL $15.30

10. ISSUE OR TURN-IN OF QUANTITIES IN "QUANTITY" COLUMN IS REQUESTED | DATE 10 Mar. '60 | BY DEEFF, LT | 11. RECEIVED QUANTITIES IN "SUPPLY ACTION" COLUMN | DATE | BY

DD FORM 1 OCT 57 1150 (5 PT.) REPLACES EDITION OF 1 JUL 56 WHICH MAY BE USED. ☆ U. S. GOVERNMENT PRINTING OFFICE: 1958-463042

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Figure 3-1.—Request for Issue or Turn-In, DD Form 1150.

Eraser waste must be cleaned away often if the typewriter is to remain in good condition. It can be removed with a long-handled brush. Periodical vacuuming removes waste in otherwise inaccessible areas. The best way to prevent accumulation of rubber crumbs is to move the carriage far enough to the left or right making erasures. That way, the point of erasure is not over keys or other mechanical parts of the typewriter, and consequently, the waste drops on your desk from where it can be brushed away easily.

At regular intervals you should give the typewriter a more thorough cleaning. The frequency of these cleanings depends on the frequency of usage of the typewriter and the amount of dust in your office atmosphere. In general, it is recommended that the following procedures be carried out weekly.

1. Clean the carriage rails and marginal stop bar, using a cloth moistened slightly with oil. Move the carriage back and forth during the process.

2. Clean the cylinder or roller. Remove, if possible, and rub with a cloth moistened with a small quantity of denatured alcohol or cleaning fluid. Do not wipe off the fluid, allow it to evaporate.

3. Brush type bar segments and dust the interior of the machine. By elevating a few bars at a time, you can reach into the mechanism. Do not force the bars. Using a long-handled brush, brush toward the front of the machine. Alternately, with the brush, use a soft cloth.

4. Clean the sides and back of the machine with a soft dry cloth.

Tyepwriters should be oiled occasionally, but do it carefully. Apply oil at friction points

only, and don't use too much. When finished, wipe off excess oil; otherwise it will drip on other parts and, in time, form a gummy mass with dust and eraser crumbs. Prevent the oil from getting on rubber parts, the ribbon, and any place where it might stain the paper.

When typing mimeograph stencils, use the stencils with a protective cellophane cover to prevent stencil wax from coating your typewriter rollers. If the covers are not in stock, order them. In the meantime, use only one machine for cutting or correcting stencils. This practice frees remaining typewriters for letters, messages, and other routine typing, all of which require a clean machine. Before and after cutting stencils, always clean the type. Move the typewriter ribbon lever to the setting for stencils (usually alongside the white dot or between red and black dots). This procedure ensures sharp print on the stencil and prevents the ribbon from accumulating stencil wax.

If operating instructions for your typewriter are available, they will help you to identify parts and give you additional information about care. If further oiling or repair work is needed the machine should be turned over to a typewriter mechanic.

DUPLICATING MACHINES

Aboard ship and at shore stations you probably will find several types of duplicating machines. You may come into contact with a Mimeograph, "ditto", a Thermofax, or some other type of duplicating machine. Aboard ship you will do the majority of your duplicating work on the Mimeograph. This section is devoted entirely to a discussion of the Mimeograph. If you need to operate other duplicating machines, you should refer to the manufacturer's instructions for operating procedures.

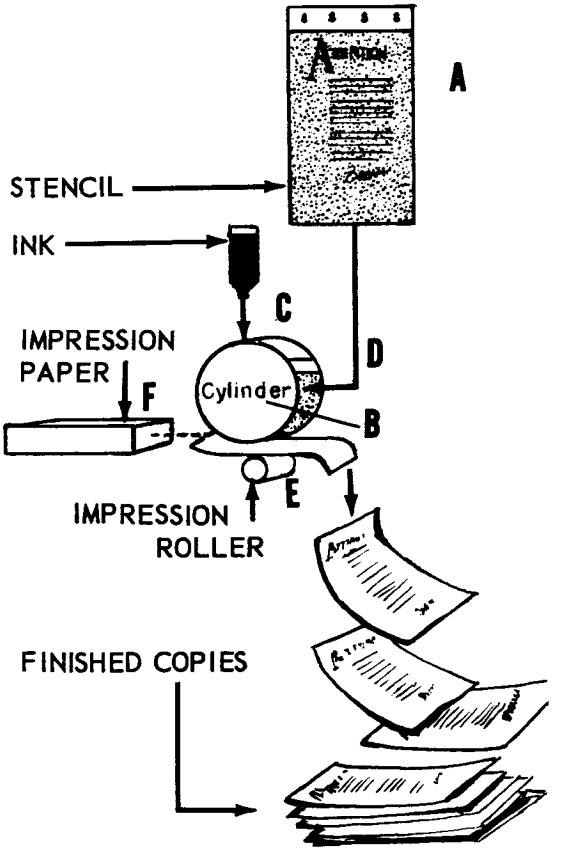
Care and Handling of Mimeographs

Before attempting to operate a Mimeograph, you should obtain and study carefully the operating manual prepared for the model of machine you are using. If you have not run a Mimeograph previously, you should, if possible, receive some instruction from an experienced operator. The principle of operation is relatively simple, but the machine is extremely delicate. A minor mistake in operation or adjustment not only can spoil the appearance of your work, but may cause the machine to stop functioning altogether.

If you are totally unfamiliar with a Mimeograph but still have some responsibility for its care, a brief explanation if its parts and operating principle is in order at this point. This description is not intended to teach you to operate the Mimeograph; as indicated previously, you should learn its operation from an instructor. The intention of the following two paragraphs is merely to give you a rudimentary acquaintance with the parts and their names.

PARTS AND OPERATIONS.—Figure 3-2 illustrates in simplified form the parts and operating principle of the mimeograph. At the top of the picture is the stencil (A) which is prepared on the typewriter. Artwork is drawn on stencils with a hand stylus. The typewriter or the stylus cuts the stencil so that ink passes through in operation.

The cylinder of the Mimeograph is represented at B. Before beginning operation, ink is poured into this cylinder through an opening



6.4

Figure 3-2.—The Mimeograph principle.

(point C). The stencil is attached to the circumference of the cylinder (D), which then is revolved. Below the cylinder is a roller (E), which revolves in the opposite direction from the cylinder. Paper from a stack (F) is aligned and fed into the machine one sheet at a time by the retainer and feed mechanisms. As the paper moves between the roller and the cylinder, it momentarily comes in contact with the stencil, and receives the impression from the ink that flows through the stencil openings from within the cylinder.

CARE OF MIMEOGRAPH.—A mimeograph must receive several items of regular care to stay in good working order. The following directions constitute the minimum.

- Correct idle position: When the Mimeograph is idle, the cylinder should be left with the ink pad side up.
- Removing line: For removing lint from the Mimeograph, use a long-handled brush with soft bristles. Cleaning should be done regularly and frequently.
- Cleaning rolls: Retainer and feed rolls should be washed about once a week in clear, lukewarm water. Using a clean, damp cloth, wipe gently until the pad is clean. Do not immerse pads in water.
- Worn pads: The retainer pad and the feed pad can be removed and reversed if they appear worn. Whether it shows wear or not, the feed pad should be reversed each time it is cleaned.
- Cleaning impression roller: Wash the impression roller regularly with a cloth dampened with a solution of soap and water. Other fluids may cause damage. Never immerse the roller in water. Dust with talcum after washing.
- Care of ink pad: When the machine is not in use, cover the ink pad of the cylinder with two thicknesses of mimeograph paper, and cover all with a stencil backing sheet. The paper absorbs the excess ink; the backing sheet keeps out dust and air. When the machine is not in operation, the cylinder should not be rotated. To do so causes air movement that dries the ink pad. Stowing the machine with the brake locked and the cover in place helps remove the temptation to turn the cylinder.
- Inking the pad: Operate the ink distributor regularly and frequently during runs. This procedure induces more even distribution of ink and cleaner impressions.
- Location of Mimeograph: Machines should not be located in direct sunlight or too near a radiator. Heat tends to cause ink leakage.
- Leveling Mimeograph: Care should be exercised to keep the Mimeograph level. Otherwise, the ink may leak or the copy may be weak on one side of the sheet.

MESSAGE FILES

Every message handled by a ship or station is placed in one or more files. Some files are maintained by all ships and stations. Others are optional, and are maintained only to fill the need of a particular ship or station.

Table 3-1 summarizes the types of commonly used message files. Those marked with an asterisk (*) are required of all ships and stations; the rest are optional. A brief explanation of each type of file is presented in the remainder of this section of the chapter.

COMMUNICATION CENTER AND CRYPTOCENTER FILES

The communication center file contains a copy of every message addressed to or originated by the command. Whether the messages were sent plain or encrypted, or by radio, visual, mail, or other means, all are filed together in DTG order. Classified messages are filed in either of two ways: in encrypted form, or by dummy or filler. A dummy or filler is a form showing only the heading of the message. The communication center file may be subdivided into incoming and outgoing sections.

Plain language translations of classified messages are stowed in the crytocenter file. Top Secret messages are stowed separately. Messages of other classifications usually are filed together.

If you do not know the file location of a message you need, check the communication center file. If the message is unclassified, you will find it there. If the message is classified, you will discover an encrypted or dummy version, indicating that the message is in the cryptocenter file.

Messages in the communication center and cryptocenter files bear the signatures or initials of the drafter, releasing officer, communication watch officer, operator, person(s) to whom the message was routed, and such other information as may be required by the local command.

Table 3-1.—Summary of Message Files

File	Contents	Disposition
*Communication center file.	A copy of every message addressed to or originated by the command. Filed chronologically by DTG. Classified messages are filed by encrypted version, or by filler or dummy.	Messages incident to distress or disaster: destroy when 3 years old. Messages involved in any claim or complaint: destroy when 2 years old, or when complaint or claim is settled, if earlier. Messages of historical or continuing interest: retain. All other messages: destroy when 1 year old.
*Cryptocenter file.	The edited plain language version of each classified message addressed to or originated by the command. Filed by DTG. This file may be subdivided as necessary, in order to comply with stowage requirements for classified matter. In effect, the cryptocenter file is the classified version of the communication center file.	Same as communication center file.
*Radio station file.	Radio circuit copy of each message received, addressed to transmitted, or relayed by radio. Filed in DTG order.	Destroy when 6 months old.
*Visual station file.	Copy of each message received, addressed to, transmitted, or relayed by visual means.	Destroy when 6 months old.
*General message file.	A copy of each general message addressed to the command, segregated by type (ALNAVs, ALCOMs, NAVOPs, etc.). Filed according to serial numbers.	Destroy when canceled or superseded.
*Broadcast file.	Messages received by broadcast method.	For ships over 1000 tons, destroy when 2 months old. For ships 1000 tons or under, destroy when 1 month old.
Tickler file.	Messages awaiting reply or acknowledgment.	Reply or acknowledgment is sent or received.
"Rough" file.	Originator's rough drafts.	Destroy with regular file copy.
Press file.	Copy of daily press, as distributed.	Destroy when no longer of interest.
Awaiting signature file.	Messages awaiting signature by one or more information officers.	When signed for, give to information officer.
Box or 24-hour file.	Messages received since previous midnight (GMT).	Place in regular files.

For convenience of stowage, filing, and referencing, the communication center file may be combined with the station files.

STATION FILES

The radio station file contains copies of messages handled by the command via radio. It includes a copy of each nontactical message received, transmitted, or relayed by the radio facilities of the ship or station. The copies must bear the operators' servicing endorsements. They are filed in chronological order by DTG, and the file may be combined with the communication center file.

The visual station file is a chronological record of all nontactical traffic handled by the command by visual means. It is identical in purpose and description to the radio station file. Communication center personnel do not maintain the visual station file—it is kept by Signalmen.

GENERAL MESSAGE FILE

The general message file is a record of all general messages addressed to the command. Normally, the file is subdivided by type of general message, and each type is filed in serial number order. (Types of general messages are discussed in chapter 8.)

General message files are given the security classification of the highest classified message contained in the files. For convenience of access and stowage, the files may be segregated by security classification, with appropriate cross-references, and the classified portion filed in the cryptocenter or other secure space.

BROADCAST FILE

Ships copying broadcasts are required to have complete broadcast files. Messages actually addressed to the ship are written up on message books for local delivery; after processing, copies are placed in the communication center and radio station files. As they are received on the broadcast, the messages are filed in serial number order in the broadcast file. The broadcast file usually is maintained on a monthly basis because the serial numbers run consecutively and start with number 1 the first day of each month.

When your ship moves from one broadcast area to another, it shifts the broadcast guard accordingly. As a result, more than one broadcast is guarded during the month. A notation is made in the file showing the station from which each broadcast was received, along with the inclusive serial numbers of messages from each station.

Larger ships (over 1000 tons) are required to keep the broadcast file for 2 months. Ships under 1000 tons, such as most classes of minesweepers, net layers, auxiliary ocean tugs, submarine chasers, and patrol craft, are authorized to destory broadcast files when 1 month old. The reason is because of extremely limited storage space aboard these small craft.

TICKLER FILE

The tickler is a temporary file of copies of messages requiring a reply. It usually is kept on a clipboard near the CWO desk.

Assume that your ship just received a BuMed message bearing DTG 081704Z. It reads: REPT QUANTITY PLASMA ABOARD IN EXCESS NORMAL REQUIREMENTS NEXT THREE MONTHS.

The BuMed message is routed to the medical officer for action, and a copy (flimsy) goes into the incoming section of the tickler file. When the medical officer prepares a reply, the tickler copy is removed.

If the ship sends a message requiring a reply from another command, a copy goes into the outgoing section of the tickler, and is removed when the reply is received. If the message requires replies from several addressees, the outgoing section of the tickler reveals who has or has not answered.

ROUGH FILE

Sometimes the drafter of a message says something different from what he meant to say, or leaves out a thought he meant to put in. The rough file which consists of originators' rough drafts, is the communicator's evidence if an originator believes his message did not go out as he wrote it. Some ships file these copies separately; others staple them to smooth copies in one of the permanent files.

At most shore communication centers, the originator's rough draft never enters the shack. Clerical personnel in the originator's office smooth-type outgoing messages and deliver them to the message center properly released and ready to go.

PRESS FILE

Aboard ship, an important source of news is press broadcasts. Press material is copied by CW or RATT, then is duplicated and distributed throughout the ship. One copy is placed in the press file to be retained until no longer timely. One of the commanding officer's responsibilities is to keep himself informed of current events, with particular emphasis on the international situation and on happenings in countries the ship is scheduled to visit. For this reason, a duplicate press file sometimes is maintained for the captain's use.

Press news transmitted on the general broadcasts is purchased by the Navy from the press associations with the provision that it will not be placed in competition with normal newspaper outlets and commercial subscribers. Where disclosure to unauthorized persons is a possibility, particularly at shore activities outside the United States, all copies of press should be marked: "FOR OFFICIAL USE ONLY. DESTROY AFTER IT HAS SERVED ITS PURPOSE. THIS PRESS MUST NOT FALL INTO UNAUTHORIZED HANDS."

AWAITING SIGNATURE FILE

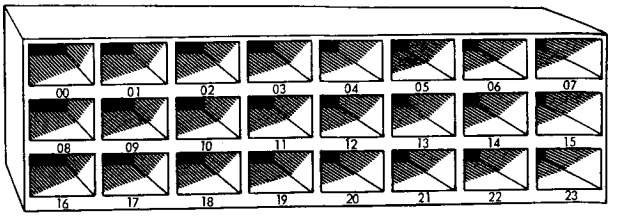
Information officers usually do not need to see a message as promptly as the action officer. If an information officer is asleep or ashore, his copy is placed in the awaiting signature file, to be signed for when he awakens or returns. The file is kept near the CWO desk or on the messenger's clipboard.

BOX OR 24-HOUR FILE

For convenience in locating current traffic, many message centers keep a box file for temporary stowage of messages (fig. 3-3). The box has 24 pigeonholes, each numbered by the hour. Copies of all messages received are stowed temporarily in the appropriate pigeonhole by DTG. A message with DTG 132146Z, for instance, goes in the 21 slot. Messages are cleared from the box file each day and are filed permanently. If justified by the amount of traffic, separate boxes may be maintained for incoming and outgoing messages.

DISPOSAL OF FILES

Stowage space often is a problem, both ashore and afloat. The larger shore communication centers solve the problem of stowage space for message files by reproducing the files on microfilm. Aboard ship, stowage space for message files nearly always is inadequate. Inasmuch as there rarely is occasion to refer to a message more than a few weeks old, SecNavInst P5215.5 authorizes destruction of sections of the files after a certain period of time elapses.



31.57

Figure 3-3.—Box or 24-hour file.

Except for messages pertaining to distress and those of legal or historical interest, the communication center and cryptocenter files are destroyed after 1 year, as indicated in table 3-1. About the first of July, for example, the files for June of the previous year are destroyed. Methods of destruction, such as burning and pulping, are described in chapter 7.

The radio station file is destroyed after 6 months.

General messages must be retained until they are canceled or superseded. Certain general messages (ALNAV, ALNAVSTA, ALSTACON, ALSTAOUT, NAVACT, and NAVOP) are incorporated into the Navy Directives System and are canceled by a superseding message, by a cancellation date indicated in the message text, or automatically after 90 days. Other general messages are incorporated into Registered Publications Memoranda (RPM) and Communications Security Publication Memoranda (CSPM) and are considered canceled when thus published. General messages not incorporated into RPM, CSPM, or the Navy Directives System, and which remain effective at the end of the year, are listed as effective in the first general message of that series for the new calendar year.

COMMUNICATION LOGS

A communication log is a continuous record of all events that take place on a communication

net. Four kinds of communication logs are kept by operators: radiotelegraph, teletypewriter, radiotelephone, and visual. Of these, the Communications Yeoman is directly concerned with logs for radiotelephone and teletypewriter. The visual log, however, is the responsibility of Signalmen.

It is never permissible to erase an entry in any communication log. A necessary change must be made by drawing a single line or by typing slant marks through the original entry and indicating the changed version next to the original entry. Any operator who makes a change must initial it. A log should be kept as neat as possible. It is essential that it be complete and accurate.

RADIOTELEGRAPH LOGS

Of the four types of radio watches (see chapter 9 for a discussion of watches), three of them—guard, cover, and copy—require complete logs. A complete radiotelegraph log must show the following information:

1. All transmissions heard, regardless of origin or completeness, whether addressed to the receiving station or not.
2. Times of opening and closing the station.
3. Causes of delay on the net or circuit.
4. Adjustments and changes of frequency.
5. Any unusual happenings, such as procedure and security violations.
6. Occasions of harmful interference. (When occuring, a report must be forwarded to CNO.)

If the message is addressed to, or is to be relayed by, the receiving station, it must be written in full on a message blank. A good operator always types directly onto the message blank as the transmission is received. After typing the time of receipt (TOR), he removes the message blank from the typewriter and enters sufficient details in the log to identify the message. Normally, he logs the complete heading, followed by the notation "See files." If necessary to write the transmission on a message blank, it must be written out fully in the log.

When opening a net, or when starting a new day's log, the operator writes or types his name in the log. He signs the log when he is relieved and when he secures the net. This procedure is repeated at every change of the watch.

An entry must be made in the radiotelegraph log at least every 5 minutes. If the net is quiet, the operator logs "No signals." If the operator is too busy to log an entry every 5 minutes, he may enter the essential data later, indicating inclusive times. Figure 3-4 shows how a radiotelegraph log should appear.

Radiotelegraph logs are destroyed after 6 months, except when they relate to distress or disaster. Then, they must be kept for 3 years. If the logs are of historical or continuing interest, they must be retained indefinitely.

RADIOTELETYPEWRITER LOGS

The radioteletypewriter log may consist either of page copy or perforated tape. Page copy may be wound on a continuous roll, or it can be cut into pages for insertion into a more accessible file. Perforated tape is wound on a reel. Because of the necessity for unwinding and rewinding the reel each time there is a need to search for a transmission, however, the reel type of log is inconvenient for reference.

Some stations are equipped with automatic timeclocks, which stamp the time on perforated tape and page copies of messages. At stations not equipped with automatic timeclocks, the operator must enter the time on incoming tapes or page copy at least once every 30 minutes.

The disposal schedule for radioteletypewriter logs is the same as for radiotelegraph logs for all stations except tape relay stations. Relay stations are authorized to destroy monitor tapes or page copies of incoming messages after 24 hours. Relay monitor reels or page copies of outgoing messages are retained for 60 days.

RADIOTELEPHONE LOGS

Aboard ship you are likely to discover that men in certain other ratings do more radiotelephone operating than do communication personnel. Radarmen in CIC, for example, control most of the shipboard radiotelephone circuits. Operation of the radiotelephone is also one of the qualifications for Signalmen and Quartermasters, because some radiotelephone circuits are controlled from the bridge. In addition to Radarmen, Signalmen, and Quartermasters, the OOD and the commanding officer send and receive messages by radiotelephone.

RADIO LOG
OPNAV FORM 2810-1 (Rev. 11-58) Recorder from FPSO Cog. "I" Stock

ACTIVITY	OPERATOR	CREW	CIRCUIT	FREQUENCY
USS ENTERPRISE	W.E. SELLERS RM2	3	27	3319 KC

TIME	TRANSMISSION
1245	NO SIGNALS
125Ø	W.E. SELLERS, RM2 OFF TO M.L. HAMILTON, RM3. RCVR CHECKED WITH FREQ METER. NO TRAFFIC ON HAND.
	W. E. Sellers
1254	NFFN NHDY NNQN DE NIQM K
	NIQM DE NFFN K
	NIQM DE NHDY K
	NIQM DE NNQN K
	NFFN NHDY NNQN DE NIQM - R - 131229Z - FM YONA - TO NFFN NNQN - INFO NHDY GR18 BT (SEE FILES)
1258	NIQM DE NFFN R AR
	NIQM DE NHDY R AR
	NNQN DE NIQM INT R K
	DE NNQN AS
	DE NNQN IMI WA SUBMIT K
	DE NIQM WA SUBMIT - EARLPRADATE K
13ØØ	NIQM DE NNQN R AR
13Ø5	NO SIGNALS
131Ø	NO SIGNALS
1313	NNQN DE NHDY K
	NHDY DE NNQN K
	NNQN DE NHDY - T - OJWN - P - 1313Ø8Z - FM NHDY - TO OJWN - INFO NBUV NGTA GR44 BT
	36155 INDIA MIKE NOVEMBER ALFA JULIETT OYIBM
	OJCVH USGRI HXRON YIGVL QOOGY STTHU TGKNV
	HUCHN NEIKE WQYYO QPEAX HXICJ AYPMZ JACIM
	LEZSO CVDAE SXBLW ETSVO PQBHC UBTBN GYFHJ
	PBVDF IAKMB VAPDI XCIRU SVJXN SNLVI JNIUL
	KNCMF BAWXH KFWJR UZPDE RQYNV OEUCI FHADL
	XKCEW 36155 BT K
1319	NHDY DE NNQN INT 22 - LEZSO K
	NNQN DE NHDY C K
132Ø	NHDY DE NNQN R AR
1325	NO SIGNALS
133Ø	NO SIGNALS
1335	NO SIGNALS
134Ø	NO SIGNALS
1342	T T T T T T T T T (AA TUNING XMTR)
1347	NO SIGNALS
1348	NFFN DE NNQN K
	NNQN DE NFFN K
	NFFN DE NNQN - O - 131347Z GR 14 BT
	UNCLAS CARQUAL PLAN CHANGED AS FOLLOWS. 1Ø A/C OVERHEAD 131445Z. 7 A/C OVERHEAD 13153ØZ BT K
135Ø	NNQN DE NFFN R AR
1355	NO SIGNALS

DATE	PAGE NO.
13 NOV 63	7

(OVER)

36.16

Figure 3-4.—Radiotelegraph log.

Radiotelephone circuits manned on the bridge and in CIC, such as the maneuvering, task force command, and combat information nets, are tactical circuits. Complete logs are required on these circuits. For various reasons, the logs differ from those kept in the communication center in that entries are recorded, by pencil, in ledger-type logbooks. Logs maintained by Radiomen or Communications Yeomen are typewritten on the standard Radio Log (OpNav Form 2810-1) shown in figure 3-5.

Radiotelephone logs must meet the same general requirements as radiotelegraph logs. Often, however, messages are dictated at a rapid pace, and shortcuts are necessary if a complete log is to be maintained. You save time by logging equivalent prosigns for the prowords. Thus, EXECUTE TO FOLLOW can be copied as IX, BREAK as BT, and so on. Don't spell out numbers; record them as figures. Use commonly understood abbreviations. Such shortcuts are acceptable as long as your log meets one simple test: It must be understandable.

Retention and disposal requirements of radiotelephone logs are the same as for radiotelegraph logs.

MESSAGE HANDLING

Commands vary widely in message-handling procedures and systems of internal routing. Each has individual requirements concerning what should be shown on message forms. These requirements meet the demands of a particular command; they must be understood, adapted to, and employed for effective message handling.

MESSAGE BLANKS

At most shore communication centers, message blanks are used only for outgoing messages; incoming messages are run off on plain paper on duplicating machines. At sea, message blanks normally are utilized for both incoming and outgoing messages.

Message blanks actually are message "books," each book consisting of a cover and a standard number of flimsies, with sheets of carbon paper inserted. The original (cover) is initialed or signed by recipients of message flimsies. It is retained in the communication center file after distribution is completed.

Figure 3-6 shows two typical message forms. The larger of the two, marked UNCLASSIFIED at the bottom, also is available preprinted with Confidential, Secret, and Top Secret security classifications. The short message blank is the one used most frequently aboard ship. It can serve for both incoming and outgoing messages of any classification. The following discussion concerns the short form.

The upper spaces of the naval message blank are for the security classification, the name of the drafter (for outgoing messages only), precedence, date-time group, and message number (for internal logging). These blocks are followed by spaces for the originator and addressees. About half of the form is left clear for typing the text. Across the bottom are spaces for the releasing officer's signature (for outgoing messages), the time of receipt (if the message is incoming), time of delivery (if outgoing), followed by a block for initialing by the CWO and another for the watch officer or internal router. The day, month, and year are typed in the date block, and the DTG is repeated in the lower right corner. This location of the DTG is a timesaver when filing messages or when looking for a particular message in the files. Space for an additional marking of the security classification is provided at the bottom of the message blank.

The row of numbered blocks across the bottom is utilized for internal routing (distribution) of the message. The commanding officer and executive officer always receive blocks 1 and 2 respectively; the rest are assigned according to the needs of the command. Following is a typical shipboard assignment of the numbered blocks. Notice that assignment is made by functional title instead of by name.

1. Commanding officer;
2. Executive officer;
3. Operations officer;
4. Communication officer;
5. CIC officer;
6. Navigator;
7. Weapons officer;
8. Engineer officer;
9. Meteorological officer;
10. Supply officer;
11. Disbursing officer;
12. Medical officer;
13. Dental officer;
14. First lieutenant;
15. Damage control assistant;
16. Chaplain;

RADIO LOG
OPNAV FORM 2810-1 (Rev. 11-58) Recorder from FPSO Cog. "I" Stock

ACTIVITY	OPERATOR	CREW	CIRCUIT	FREQUENCY
USS LONG BEACH	J.V. PRESTIL, RM3	1	18	2272 KC

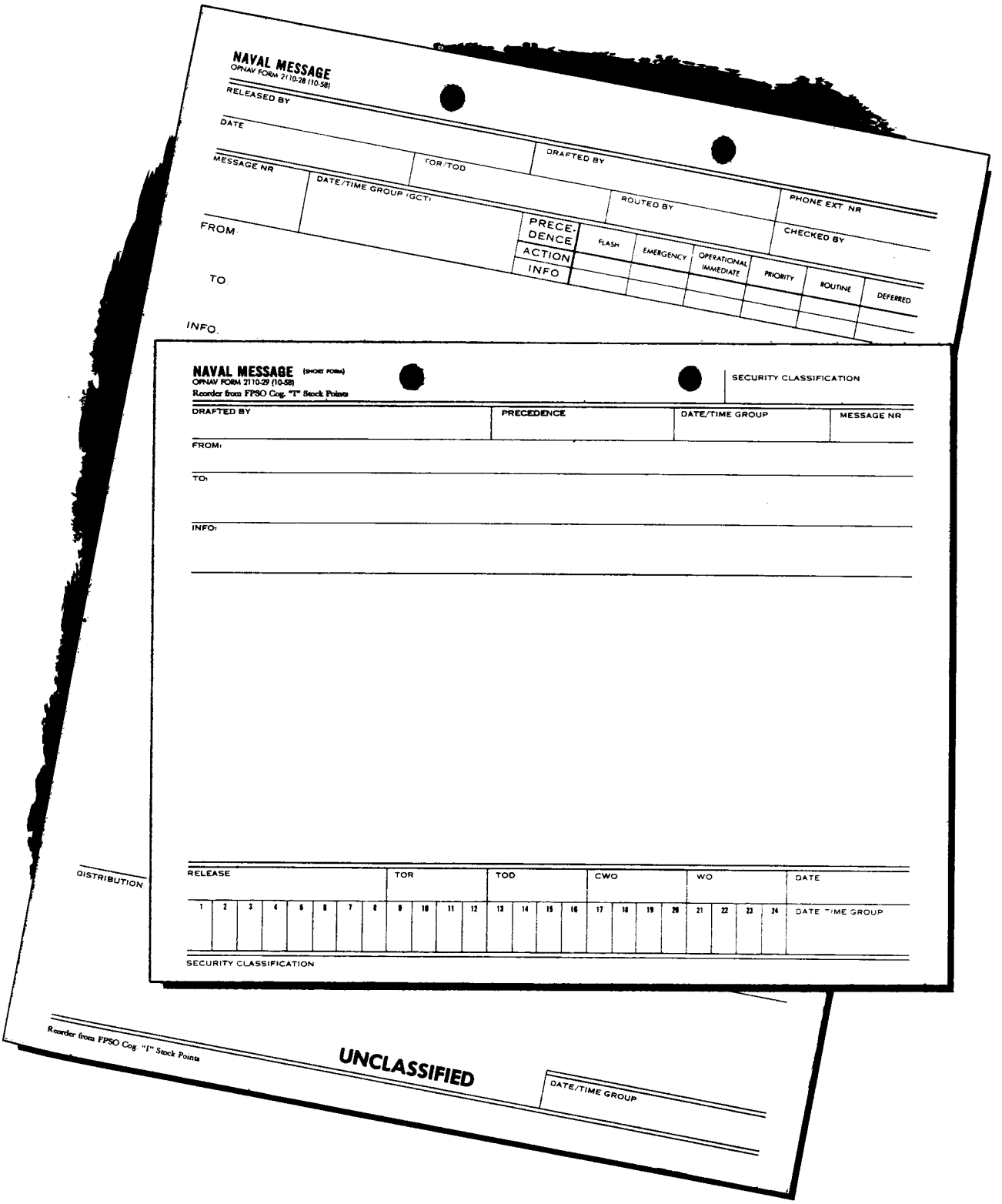
TIME	TRANSMISSION	
15ØØ	SET WATCH--ASSUMED NET CONTROL	
	SHOEBLACK THIS IS GIRLCRAZY	THIS IS A DIRECTED NET OF WHAT PRECEDENCE AND FOR WHOM ARE YOUR MESSAGES OVER
	THIS IS HAYSTACK	NO TRAFFIC OVER
	THIS IS SNOWCAP	1 P FOR YOU OVER
	THIS IS WESTWIND	1 R FOR HAYSTACK OVER
	SUNSHINE SUNSHINE THIS IS GIRLCRAZY GIRLCRAZY OVER	
	THIS IS SUNSHINE	NO TRAFFIC OVER
15Ø2	SHOEBLACK THIS IS GIRLCRAZY	ROGER SNOWCAP SEND YOUR MSG OVER
	GIRLCRAZY THIS IS SNOWCAP	MSG FOLLOWS P TIME Ø71455Z FM SNOWCAP TO GIRLCRAZY INFO BEECHNUT GROUPS 15 BT (SEE FILES)
15Ø6	THIS IS GIRLCRAZY	ROGER OUT
	WESTWIND THIS IS GIRLCRAZY	SEND YOUR MSG OUT
	HAYSTACK THIS IS WESTWIND	R TIME Ø71452Z GROUPS 5 BT REPORT SHACKLE IDPQ RNZT UNSHACKLE BT OVER
15Ø8	THIS IS HAYSTACK	ROGER OUT
1513	NO SIGNALS	
1518	NO SIGNALS	
1523	NO SIGNALS	
1528	NO SIGNALS	
153Ø	J.V. PRESTIL, RM3 OFF TO W. A. SCRUGGS, RMSN--ONE RUTINE ON HAND FOR SNOWCAP.	
		J. V. Prestil
1531	SNOWCAP THIS IS GIRLCRAZY	R TIME Ø7153ØZ FM GIRLCRAZY TO SNOWCAP GROUPS 18 BT (SEE FILES)
	THIS IS SNOWCAP	SAY AGAIN WA AT OVER
	THIS IS GIRLCRAZY	I SAY AGAIN WA AT 183ØZ OVER
1534	THIS IS SNOWCAP	ROGER OUT
1539	NO SIGNALS	
1544	NO SIGNALS	
1549	NO SIGNALS	
1551	GIRLCRAZY THIS IS SNOWCAP	OVER
	THIS IS GIRLCRAZY	OVER
	GIRLCRAZY THIS IS SNOWCAP	BT UNCLAS YOUR Ø7153ØZ AFFIRMATIVE BT TIME 155ØZ OVER
1552	THIS IS GIRLCRAZY	ROGER OUT
1557	NO SIGNALS	
16Ø2	NO SIGNALS	
16Ø7	NO SIGNALS	
1612	NO SIGNALS	
1617	NO SIGNALS	

DATE	PAGE NO.
7 DEC 63	1

(OVER)

36.16

Figure 3-5.—Radiotelephone log.



36.16

31.47

Figure 3-6.—Two typical message blank forms.

17. Custodian (RPS or TPL);
18. Electronics officer;
19. Main propulsion assistant;
20. Fire control officer;
21. Postal officer;
22. Ship's secretary;
23. Command duty officer;
24. Officer of the desk.

INCOMING MESSAGES

All CW, RATT, and FAX traffic addressed to your ship is processed through the message center. Except for tactical signals that must be executed within a few minutes, visual and radiotelephone messages are handled in a similar manner. Typically, an incoming message is processed according to the following steps:

1. On arrival of the message in the message center, the CWO or one of his assistants translates the call signs and address groups in the heading. The CWO checks the message, logs it, signifies action and information officers, and gives it to the communication clerk, who makes a smooth original and as many copies as are required. The original and all copies then are passed back to the CWO.

2. The CWO checks the message again and gives it to the messenger, retaining at least one copy until completion of delivery.

3. The messenger delivers the traffic to the action officer, then to the information officers. They receipt by initialing the original of the copies typed by the communication clerk. The captain, executive officer, and communication officer receive copies of all messages, and for this reason often maintain file boards on which their copies are placed. On large ships the orderlies of the captain and executive officer sign for the messages and make delivery to these officers.

4. After distributing all copies and obtaining initials, the messenger returns the completely initialed original to the message center. There the CWO checks it for completeness of delivery. This master copy becomes a permanent part of the communication center file. The circuit copy is placed in the radio station file.

Internal Routing Afloat

Although the captain has the overall responsibility for taking any action required by a message, he seldom is indicated as the action officer. Customarily, a message is routed for action to the department head who has direct responsibility for the subject matter of the message. The captain (or the executive officer), receiving a copy of all messages, then ensures that the action officer takes the required action.

A message is routed for information to officers who have an indirect interest in its subject matter.

Call signs and address groups in the heading of a message do not indicate who aboard is to receive the message either for action or for information. The CWO must read the text and decide who is principally responsible and who is officially interested. Some incoming messages are borderline cases; that is, more than one department must take some kind of action. The CWO must decide upon the one action officer, keeping in mind that the officer with the GREATER interest in the subject matter is routed action.

It is important to make the proper number of copies of a message. An underrouted message may result in delay and the inconvenience of making additional copies. The other extreme—preparing a copy for everyone who might have even a remote interest in the message—is just as bad; it would take too much time and often would circulate classified information too widely.

An example of internal routing afloat may be helpful. Refer to the incoming message shown in figure 3-7. The routing ("A" for action, "I" for information) is as follows:

Block	Assigned to	Routing	Explanation
1	Commanding officer	I	Receives all messages. Responsible for everything that goes on in his command and, therefore, necessarily must be informed of everything.
2	Executive officer	I	Receives all messages. In charge of administering the ship, hence must also be informed of all pertinent occurrences.
3	Operations officer	A	Acts in matters relating to the ability of the ship to carry out her assigned mission.
4	Communication officer	I	Receives all messages for two reasons: to check for errors, and to be informed if questions arise.
6	Navigator	I	Plots storms and gales; must determine bearing and distance of ship from gale; plots diversionary route, if necessary.
7	Weapons officer	I	Must see that exposed ordnance equipment is covered properly.
8	Engineer officer	I	Responsible for damage control and ship's stability. Must ballast as necessary and be prepared to strike topside weights below; must take precautions against water damage to engineroom power panels; must see that shaft alleys, workshops, and storerooms are ready for heavy weather.
9	Meteorological officer	I	Receives all messages concerning weather. Must advise command in matters relating to his specialty: anticipated storm track, probable state of sea, and the like.
10	Supply officer	I	Must see that galley, messhalls, storerooms, and other spaces assigned his division are rigged for heavy weather; may have to revise his menus to provide food that can be served during periods of high seas.
12	Medical officer	I	Must see that bedridden patients are subjected to a minimum of discomfort caused by roll and pitch of the ship, and that the sick bay, medical storerooms, and other spaces are secure from heavy weather damage.
14	First lieutenant	I	Must see that ground tackle is secured, if not required; that rafts, boats, and other gear on the weather decks are secure from damage.
24	OOD	I	Responsible for safety of the ship during period of his watch. (A message routed "OOD" is seen by all OODs.)

NAVAL MESSAGE (SHORT FORM)
OPNAV FORM 2110-29 (10-58)
Reorder from FPSO Cog. "I" Stock Points

SECURITY CLASSIFICATION: UNCLASSIFIED

DRAFTED BY	PRECEDENCE	DATE/TIME GROUP	MESSAGE NR.
	IMMEDIATE	11Ø4Ø3Z	31

FROM:
FLEAWEACEN WASHDC

TO:
ALL SHIPS COPYING THIS BROADCAST

INFO:
COMEASTSEAFRON / FLEWEAFAC NORVA / FLT HURRICANE FCSTFAC MIAMI

UNCLAS

11Ø4ØØZ GALE WARNING. BETWEEN FORTY TWO AND FORTY FIVE NORTH FROM THIRTY FIVE WEST TO EUROPEAN COAST. WIND WESTERLY TWENTY FIVE TO THIRTY FIVE KNOTS

WR NR3365 WU/JN

RELEASE	TOR	TOD	CWO	WO	DATE
	11/Ø417Z		LV		11 OCT 64

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	DATE/TIME GROUP
I	I	A	I		I	I	I	I	I		I		I										I	11Ø4Ø3Z

SECURITY CLASSIFICATION
UNCLASSIFIED

31.47

Figure 3-7.—Incoming message.

Final responsibility for routing rests with the CWO, even though an enlisted assistant performs the work. Some CWOs do the routing themselves, using a Radioman or Communications Yeoman mainly for clerical assistance. Others delegate the work of routing, but check its accuracy before delivery is made. At small stations, both ashore and afloat, it is not unusual for a Radioman First or Chief to act as CWO and to assume responsibility not only for routing but also for supervising the watch.

Internal Routing Ashore

The principles of internal routing are practically the same everywhere, but routing at a shore station often presents difficulties because

of traffic volume and the number and diversity of activities the station may serve. For some activities, the station may not route at all, but only make delivery in accordance with address groups. Actual routing to action and information officers in such an instance is a function of the addressee. For other activities the station makes internal routing; but the messages usually go to offices, divisions, or sections—not to individuals—for action and information.

In addition to the action/information internal routing commonly used everywhere, another routing symbol, COGNIZANCE (abbreviated COG), is in use at many of the large shore message centers. It is used instead of action routing on messages addressed to the command for information. The purpose of routing for COG is simply to prevent routing for action when the message is not addressed to the command for action. The office that has primary cognizance over the subject matter contained in the message is routed COG. It is responsible for taking any action that may be required within the command, including checking to see that the CWO routing for information includes distribution of copies to other activities that might need the information.

Many stations, especially the larger ones, maintain a routing file based on subject matter of messages. The file consists of cards showing the activities interested in each subject for action and for information.

Messengers from each activity make several trips daily to the communication center to pick up their activity's incoming traffic and to deliver outgoing messages for transmittal. Delivery to some activities may be made by direct teletypewriter drop instead of by messenger.

OUTGOING MESSAGES

Typically, an outgoing message is processed according to these steps:

1. After determining that a message is necessary, the drafter prepares it, assigns appropriate classification and precedence, and sends it to the releasing officer.

2. The releasing officer checks the message for content, precedence, classification, brevity, and clarity, making any changes he see fit. If he thinks the message unnecessary, or that it can go by slower means, he returns it to the drafter. If he approves the message, or approves it with changes, he signs it and sends it to the message center.

3. As soon as the message arrives in the message center, the time of file (TOF) is stamped or penciled on it. The CWO then logs the message in the outgoing message log, which contains the same general type of information as the incoming message log. The CWO determines that all addressees hold copies of any referenced messages listed in the message being processed, or that the references are marked with the abbreviation NOTAL, which the originator uses to indicate that the referenced messages are "not to, nor needed by, all addressees." The CWO also must ascertain that the classification of the message is in accord with the requirements for unclassified references to classified messages. Primarily, these checks are the responsibility of the message drafter, but they are doublechecked by the CWO or one of his assistants.

4. The originator's draft is given to the communication clerk, who makes file and routing copies. On some ships, the originator indicates internal routing for an outgoing message. On others, the CWO performs this duty and routes an outgoing message just as he would an incoming message.

5. If the message is classified, the CWO prepares it for encryption and sends it into the cryptocenter. The encrypted version is passed back to the CWO, who drafts a heading, places it on the encrypted copy, and sends it to the watch supervisor in the radio room for transmission. If the message is unclassified, it is unnecessary of course, to route it through the cryptocenter.

6. In the radio room the message is placed on the air. The time of delivery, accepting station, frequency, and operator's sign are noted on the face of the form, and the message is returned temporarily to the message center for completion of the CWO outgoing message log.

7. The originator's draft goes into the rough file. The original encrypted copy, if any, goes to the radio supervisor for the radio station files. A filler, dummy, or encrypted copy goes into the communication center file. A plain language copy goes in the proper section of the cryptocenter file. If the message is plain language, a copy goes in the radio station file, as before, and another in the communication center file.

Releasing Signature

Before you accept any outgoing message for transmission, be certain that it is properly released. You will find the signature of the releasing officer on the face of the message. Aboard ship the authority to release messages is vested in the commanding officer, but for sake of convenience the authority often is delegated. Following is a typical large ship releasing arrangement.

1. Captain and executive officer: May release any message.
2. Meteorological officer: May release routine weather reports.
3. Navigator: May release routine position reports.
4. OOD: May release visual and radiotelephone messages concerning operations.
5. Communication officer: May release service and class E (personal) messages.

Shore stations maintain a signature file of releasing officers. This file is used in much the same way as a bank's signature file of depositors. Each local command or activity served by the station submits a signature card for every officer authorized to release messages. Besides signatures, the cards also carry information regarding any limitations on the officer's releasing authority. An officer may, for example, be authorized to release messages to shore activities, but not those addressed to forces afloat. When an outgoing message is received over the counter, the releasing officer's signature is compared with that on his card. If he is authorized to release messages of that type and classification, the message is accepted.

REFERENCES

Many messages refer directly to a previous incoming or outgoing message. It saves bother for everyone if half a dozen officers do not need to telephone the message center to have earlier references taken from the files and read to them. Accordingly, if there is a reference in an incoming message, look up the referenced message and show identifying extracts across the face of the routed copies. The same applies to outgoings. It is unnecessary to copy the reference in its entirety, but quote enough so that action and information officers get the gist of it. There are two additional reasons why you must check references in outgoing messages. First, checking references assures accuracy. Second, it is a security measure; unclassified replies to certain types of classified messages are forbidden.

CHAPTER 4

PUNCTUATION, CAPITALIZATION, AND ABBREVIATIONS

A Communications Yeoman needs to be well grounded in the fundamentals of English composition—such matters as spelling, punctuation, capitalization, and abbreviations. In all probability, you will be required to type correspondence and reports or fill out forms. Brush up on your English so that you will not be constantly correcting your work.

Good English is something you cannot acquire simply by reading about it. You probably have studied elsewhere most of the rules in this chapter. How well you apply them is more important. The rules are provided here to refresh your memory and help you improve the quality of material you turn out. To assist you further, appendix II contains a list of words you should be able to spell. They are words in common use. Many of them present spelling problems, so they deserve your careful study.

This textbook does not deal with the rules of grammar nor the general principles of good English word usage. Even in the areas covered by this chapter, there is more to be learned than is given here. For further study you can obtain good textbooks on these subjects by consulting your educational services officer.

PUNCTUATION

To give the proper emphasis and meaning to our words when we speak, we naturally vary our tones of voice and pause between thoughts. Punctuation marks serve the same function for written material. But punctuation doesn't come naturally. It is an art that must be learned according to definite rules. Unless we know the rules and apply them correctly, what we write may fail to convey our meaning.

The present trend is toward less punctuation than was used formerly. This technique cannot be achieved, however, merely by leaving out punctuation marks; it calls for well-planned word order. Punctuation should aid in reading and prevent misreading. The general principles governing the use of punctuation are—

1. If punctuation does not clarify the text, it should be omitted.
2. In the choice and placing of punctuation marks, the aim should be to bring out more clearly the author's thought.

PERIOD

Rules for use of the period are simple and few.

1. A period is used after declarative and imperative sentences. That is, it marks the end of a statement or of a command, request, or entreaty. Examples:
   a. A special court-martial must have at least three members.
   b. Keep containers of volatile liquids tightly closed.
2. A period is used after initials and other abbreviations. Examples:
   Mr. J. C. Johnson; Ph.D.; p.m.

NOTE: As shown later in this chapter, most Navy abbreviations do not require periods. Many other Government agencies (such as FBI, GAO, and FDIC) likewise do not require them.

3. A period may be used after a number or letter at the beginning of a paragraph or subparagraph, as in this chapter, and to mark a division of an outline.
4. A period is used to separate whole numbers from decimals. Examples:
   $3.50; 3.75 percent; 1.25 meters.

COMMA

In contrast to the period, which almost everyone uses properly, the comma frequently is misused. A comma misplaced by a writer or ignored by a reader can completely alter the meaning of

a sentence. Maybe you've heard of the woman whose husband went to sea. Thinking that some prayers might help him, she handed this note to her pastor one Sunday morning: "Lieutenant Joe Jackson having gone to sea, his wife requests that the congregation pray for his safety." But when the near-sighted pastor failed to notice the comma, the congregation heard this: "Lieutenant Joe Jackson having gone to see his wife, requests that the congregation pray for his safety." Not all comma errors are as comical as this one. Some have more serious consequences, but practically all errors arising from the improper or inadequate use of commas can be avoided by heeding the rules set forth here.

1. A comma should be inserted before the conjunction when main clauses are joined by a conjunction (and, but, or, nor, or for (When for is used as a conjunction)). Example:

Take this report to the chief at 3 o'clock, and at 5 o'clock he will send you to the lieutenant with revised estimates.

NOTE: For exceptions to this rule, refer to topic on the semicolon, rules 1 and 2.

2. Words, phrases, and clauses in a series should be separated by commas. Examples:

a. In his work the CYN must make frequent use of pencils, notebooks, dictionaries, and typewriters.
b. In preparing a report, it is necessary to know what to report, how the information is to be assembled, and the office to which the report is to be sent.

NOTE: For exception to this rule, see topic on use of the semicolon, rule 3.

3. Sometimes a comma is used between two short main clauses instead of a conjunction, especially if the verb of the second clause is omitted. (See also semicolon, rule 1.) Example:

Jack is tall, his brother taller.

4. An adverbial clause or a long phrase preceding the main clause in a sentence should be set off by a comma. An adverbial clause or phrase normally tells when, where, or why an action is performed; it may sometimes tell how the action is performed. Example:

While the band plays morning colors, the ensign is hoisted to the peak.

5. A clause or phrase that is nonrestrictive in nature is set off by a comma, or by commas where necessary. A nonrestrictive clause or phrase is unnecessary for complete identification of the person or thing described. A restrictive clause is one that cannot be removed from the sentence without changing the meaning of the sentence. Examples:

a. My brother, who is a GM2, is coming aboard soon. (Nonrestrictive)
b. The one who was a GM3 boarded the ship. (Restrictive)

6. Parenthetical words, clauses, or phrases are set off from the other parts of the sentence by commas. A number of types of parenthetical expressions can be used. Examples:

a. A friend of mine, YN3 Brown, works in the log room.
b. It was, to tell the truth, almost too easy.

7. The name of the person addressed should be set off with a comma or commas. Example:

Jones, stow your gear and report to the chief.

8. A comma is used to set off a contrasting expression introduced by "not." Example:

Low-octane fuel, not gasoline, is used in jet engines today.

9. In an address written in a sentence, commas set off the section of the city (if used), the city, the state, and the nation (if used). Example:

324 Ames Avenue, Southwest,
Des Moines, Iowa, U.S.A.

NOTE: A comma is not used before the postal zip code number. For the use or omission of commas in the addresses of letters, see chapter 5.

10. Commas are used before the abbreviations Jr., Sr., Esq., Ph.D., R.N., etc. Examples:

Henry Smith, Jr.; Peter Johns, Ph.D.; Brown, A.H., Jr. (not Brown Jr., A.H.); but John Smith 2d (or II).

11. A comma is used between the title of a person and the name of his organization in the absence of such words as "of" or "of the." Example:

Chief, Division of Finance.

12. A comma is used between the name and number of an organization. Example:

General U. S. Grant Post, No. 25.

13. In writing a date, a comma is used to set off the day of the week. When the date is written in the civilian order, use a comma to set off the year. Examples:

a. The operation was scheduled for Tuesday, 6 March 1962.
b. March 6, 1962.

14. A comma is used to separate two words or figures that might otherwise be misunderstood. Examples:

a. Instead of hundreds, thousands came.
b. In 1930, 400 men were dismissed.

15. A comma is used to set off the introductory words from a direct quotation. Examples:

a. The educational services officer said, "I will schedule an examination this week."
b. "When you locate that letter," said the lieutenant, "I would like to see it."

SEMICOLON

A semicolon functions as a reinforced comma. Rules for its usage follow.

1. A semicolon is used to separate two main clauses when the conjunction or, and, but, for or nor is omitted between the clauses. Example:

Don't try to do too much the first day; work slowly and carefully.

2. A semicolon is used to separate the clauses when main clauses are joined by the conjunction or, and, but, for, or nor, and one or both of the main clauses is very long or contains other marks of punctuation. Example:

When we finally reached the rendezvous point, we had traveled all day under the blazing sun; but we had to begin the attack without time to rest.

3. When commas have been used with a phrase or clause which is in a series of phrases or clauses, semicolons are used to set off the coordinate phrases or clauses in the series. Example:

Many times you will not know the proper procedure. You will then, if you are careful, analyze your problem completely; check all regulations, directives, and instructions, paying special attention to similar problems; and finally, if you still are in doubt, consult your superiors.

4. A semicolon is used before explanatory abbreviations or words that summarize or explain preceding matter, such as namely, e.g., and i.e. Examples:

a. Three metal producers were involved; namely, Jones & Laughlin, Armco, and Kennecott.
b. In preparing for advancement, you must demonstrate technical competence; i.e., qualify in practical factors and pass a servicewide examination.

COLON

The use of the colon in a Navy letter heading is covered by examples in chapter 5. Two other major uses for the colon are among rules you should know.

1. A colon is used to separate a list from a preceding part of the sentence. It also separates two statements when the latter amplifies or explains the former. Examples:

a. The men were doubly weary: they had been working all day, and their efforts had been in vain.
b. The reasons for his success were Three: hard work, perseverance, and foresight.

NOTE: If a list is an integral part of a sentence, a colon is not used. Example:

The reasons for his success were hard work, perseverance, and foresight.

2. A colon is used to separate an introductory statement from a long direct quotation. Example:

When Lincoln spoke at Gettysburg he said: "Fourscore and seven years ago our fathers brought forth upon this continent . . ."

DASH

The dash is an informal mark of punctuation, used to lend emphasis to certain elements within a sentence and to indicate a break or an unexpected change in thought. Examples:

a. His clothing—torn to shreds—was lying on the deck.
b. We were in New York—a good place for liberty—when the war ended.

NOTE: To make a dash on the typewriter, strike the hyphen key twice; do not leave a space before or after the dash.

QUESTION MARK

The question mark, like the period, seldom is misused. Here is a suggestion regarding its use that may prove helpful: Do not use a question mark after an indirect question. Example:

He asked me why I didn't want to go.

QUOTATION MARKS

The chief purpose of quotation marks is to distinguish the words of another writer or speaker from the text. Present practice is to avoid too frequent use of quotation marks. Quotation marks are of two types—double (" ") and single (' ').

1. Direct quotations should be enclosed in double quotation marks. Example:

> John Paul Jones said, "I have not yet begun to fight."

2. A quotation that is included in another quotation is enclosed in single quotation marks. Example:

> The speaker said, "The Declaration of Independence acknowledges the right of the individual to 'Life, liberty, and the pursuit of happiness'."

3. When a quotation includes several paragraphs, quotation marks are placed at the beginning of each paragraph, but at the end of the last paragraph only. When one quotation extends through several sentences in the same paragraph, quotation marks are used only at the beginning and end of the quotation.

4. Periods and commas marking the end of quoted matter go inside quotation marks, regardless of the length or the nature of the quotation. (See examples for rules 1 and 2.)

5. Question marks and exclamation marks go inside quotation marks if they belong to the quoted material; otherwise, they go outside the quotation marks. Examples:

a. He asked, "Are you going?"
b. Did he say, "I am going"?

6. Titles of pictures, books, and songs may either be put in quotation marks or underlined. Technical words, and words or phrases accompanied by a definition, may also be set off by quotation marks. Examples:

"U.S. Navy Regulations" or U.S. Navy Regulations

NOTE: In naval correspondence, names of ships are typed in capitals but may be underlined if preparing manuscript for printing.

7. Quotation marks rarely are used to enclose a word used as a word, that is, as a combination of letters without reference to the meaning. More commonly, now, such a word is italicized (underlined). Another practice, capitalizing the work, is one used in this chapter. Examples:

a. You have too many "ands" here.
b. You have too many ands here.
c. You have too many ANDs here.

APOSTROPHE

The apostrophe has the following general applications.

1. Use an apostrophe with an s to indicate the plural of numbers and letters. Examples:

Send the 1200's in immediately.
I got all A's on my report card.

2. An apostrophe indicates the omission of a letter in a contracted word. Examples:

It's, don't, couldn't.

NOTE: It's is the contraction of "it is." The possessive of "it" is "its."

3. An apostrophe indicates the possessive case of nouns and indefinite pronouns according to the following rules:

a. If the noun or indefinite pronoun is singular in number, the possessive is formed by adding an apostrophe and s. Examples:

Smith's watch; one day's work; one's home.

b. A plural noun ending in s or es forms the possessive plural by adding an apostrophe after the final s. Examples:

The sailors' caps; the candidates' qualifications.

c. For a word that forms its plural by a change in the word itself, add 's to form the plural possessive. Examples:

Men's clothing; children's games.

d. Possessive pronouns do not take the apostrophe. (Examples: his, hers, its, ours, yours, theirs, or whose.)

e. In compounds, the possessive form usually appears in the last word. Example: Man-of-war's man.

4. The apostrophe no longer is used to form the plural of abbreviations. Examples:

CPOs; OPs; NTCs.

HYPHENS

The following rules will serve only as guides in hyphenation and do not cover all possible circumstances. Many commonly used compound words, such as mother-of-pearl, double-quick, and the like, may be found in any good dictionary. If you are uncertain of any word group, consult a dictionary for correct hyphenation.

1. Use a hyphen between the elements of compound numbers from twenty-one to ninety-nine. Examples:

Sixty-seven; one hundred and thirty-eight.

2. Use a hyphen between the numerator and denominator of a fraction (when spelled), unless a hyphen occurs in either element. Examples:

One-half; fifteen thirty-seconds; ninety-nine one hundredths.

3. Use a hyphen between a numeral and a word when the two form a compound word. Examples:

12-inch rule; 8-hour day.

4. Use a hyphen to unite the words of a compound adjective preceding a noun. Examples:

Low-octane gas; well-educated man; right-hand thread.

5. Use a hyphen to unite the elements of a compound noun. Examples:

Son-in-law; hangar-theater-gymnasium; poncho-tent.

6. Except after short prefixes (co, de, pre, pro, re), which normally are written solid use a hyphen to avoid doubling a vowel or tripling a consonant. Examples:

Cooperation; preexist; semi-impressionist; shell-like, lifelike.

7. Use a hyphen to separate a word and its prefix or suffix when the stress of the thought remains upon the prefix or suffix. Examples:

Ex-director; self-help.

8. Use a hyphen to separate a prefix and a capitalized noun. Examples:

Pre-Christian; un-American; pro-Navy.

9. Use a hyphen to avoid ambiguity. Notice that the statement "We recovered the plane" does not have the same meaning as "We recovered the plane." Also, the expression "Seven foot-soldiers slogged along the road" is much clearer than "Seven foot soldiers slogged along the road."

10. A hyphen is used when a word is divided between syllables at the end of a line. Divisions should never be made except between syllables. Divisions that leave one or two letters on either line should be avoided. Examples:

Edu-cation, NOT e-ducation; administered or adminis-tered, NOT administered or administer-ed.

CAPITALIZATION

Besides a knowledge of the general rules of capitalization that apply to all writing, Communications Yeomen must be familiar also with a number of special rules established for naval correspondence or for filling out Navy forms and reports.

NAVAL DOCUMENTS

The rules applying specifically to naval writing have been developed to suit the naval form letter and to provide necessary emphasis and clarity for Navy purposes. In addition to those given in this section, you will learn others in filling out personnel records and forms. They are given in official instructions for preparing the forms.

• Capitalize all letters; All letters should be capitalized in the words and abbreviations given in the following list.

1. Letter headings that are typed in when printed letterheads are unavailable or unnecessary.

2. The words JOINT LETTER, INSTRUCTION, NOTICE ENDORSEMENT, or MEMORANDUM, when used to designate these naval forms.

3. The words TOP SECRET, SECRET, or CONFIDENTIAL, when used to designate these categories of classification.

4. The words AIR MAIL, SPECIAL DELIVERY, or REGISTERED MAIL, when used to designate special postal service for a particular letter.

5. The names of naval vessels, including the abbreviation USS preceding the names, and the type designation following the name of the ship. Example:

USS TICONDEROGA (CVA14).

6. The typewritten name (but not the title) of the official signing the correspondence.

7. The typewritten signature, usually preceded by /s/, on copied or duplicated correspondence, to indicate the actual signature on the original correspondence.

8. The words STANDARD DISTRIBUTION, when used to indicate distribution.

9. Messages when originally prepared or copied, or when quoted in correspondence.

• Capitalize first letter: The first letter should be capitalized in the words—

To, Attention, Via, Subject, References, and Enclosures

when used to designate these introductory headings, but not when referred to in the body of a letter.

GENERAL RULES

Similar to the modern trend toward use of fewer punctuation marks is the current tendency to reduce the number of capital letters, except where they are needed for a special purpose. In general, the rules given here are observed by the Government Printing Office and by most writers of business letters.

1. Use a capital for the first letter of the first word in a—

Sentence;
Line of poetry;
Direct quotation;
Line or item in a tabulated list following a colon;
Subdivision of an outline.

2. Capitalize the pronoun I and the exclamation O. The exclamation oh is not capitalized in the middle of a sentence.

3. Capitalize all words denoting the Diety, except who, whose, and whom; all names for the Bible and other sacred writings; and all names of confessions of faith and religious bodies and their adherents and words specifically denoting Satan.

4. Capitalize the first letter of each important word in the salutation of a letter, and the first letter of the first word in the complimentary close.

5. Capitalize the first letter of proper names (specific person, place, or thing) and their abbreviations.

6. Capitalize the first letter of each important word in the title of an official, an organization or one of its major subdivisions, an institution, or a shore activity of the Navy or other Government service.

Examples of Proper and Common Nouns

Often it is hard to apply rules 5 and 6 because certain nouns sometimes are used in the specific sense, at other times in the general sense. The following examples will help you understand the principles and provide a reference list:

Academy (if part of proper names or if referring to a specific academy): Naval Academy, the Academy; Coast Guard Academy.

Board (if part of proper name or if referring to a specific board): Aeronautical Board, General Board; Naval Examining Board; Naval Retiring Board, The Board.

Building (if part of a proper name): Navy Building; National Defence Building; but, the building.

Bureau (if part of a proper name or if referring to a specific Government bureau): Bureau of Naval Personnel; Bureau of the Budget; Bureau of Engraving and Printing; but, the bureaus, (not capitalized when used in a sentence but capitalized when used in the "To:" heading).

Cabinet: the President's Cabinet; Cabinet Officer; the Cabinet.

Chief (if referring to a specific official): Chief, Bureau of Ships; the Chief Clerk of the Bureau; the Chief Clerk; but chiefs of the bureaus (used in a general sense).

City (if part of corporate of proper name): Kansas City; but, the city.

Coast Guard: the Coast Guard; but, a coast guardsman.

Congress (legislature): Congress of the United States; 78th Congress; the Congress.

Congressional: Congressional Directory; Congressional Library; but, a congressional system.

Congressman: Congressman Brown; the Congressman; Member of Congress; the Member; but, a member of Congress.

Corps (if part of a proper name): a Marine Corps; Supply Corps; but, the several corps.

County (if part of a proper name): Westchester County; but, county of Westchester; the county.

Department (if part of proper name or if referring to a specific Government department): Navy Department; the Department.

Director (if referring to a specific official in the Federal Government): Director of Civilian Personnel; the Director.

Establishment (if part of a proper name): the Naval Establishment; but, naval establishments (meaning naval activities).

Executive (if part of proper name): Executive Office of the Secretary; but, executive office of the Government.

Federal: Federal District; Federal Government: but federally.

Fleet (if part of proper name): Atlantic Fleet; Pacific Fleet; United States Fleet, the Fleet.

Government (if part of a proper name or if referring to a specific government): Government of the United States; Government Printing Office; but, governmental agencies.

Marine Corps: The Marine Corps Barracks; the U.S. Marine Corps; the Corps; but, a marine; marine lights.

Nation (synonym for United States): the Nation; Nation-wide.

National (only if preceding a proper name). National Guard; but, national welfare.

Naval (if part of proper name): Pensacola Naval Air Station; Naval Air Station, Pensacola; but, naval air stations. Naval Establishment, the Establishment; but, naval establishments. Naval Observatory, the Observatory.

Naval (in a general sense); naval activities; naval communications; naval customs; naval form of correspondence; naval heroes; naval officers; naval ordnance; naval uniforms.

Navy (if part of proper name): the U.S. Navy; the Navy; but, a navy (meaning any navy, not a specific navy); Navy Regulations (book); a Navy regulation (regulation of the Navy).

Office (if part of proper name or if referring to a specific Government office): Executive Office of the Secretary; Office of the Chief of Naval Operations: Office of Naval Intelligence; the Office.

Reserve: Naval Reserve; the Reserves; but, a reserve officer.

State: New York State; a State (official designation); the State, but, state (general sense); church and state; statehood; state's evidence.

ABBREVIATIONS

In an effort to speed up the preparation of the various forms of correspondence, the Navy has developed the practice of using standard abbreviations. Usually these are limited to the names of the Navy commands and activities and Navy terms. Standard Navy abbreviations may be used in the heading of a naval-form letter that is not to be transmitted by window envelope. Common-usage abbreviations may be used in the body of a naval-form letter. The Navy policy on authorized abbreviations is set forth in OpNavInst 2340.1B.

GENERAL RULES FOR ABBREVIATIONS

1. Authorized abbreviations usually utilize those letters of the word to be abbreviated that phonetically indicate the full word. Example:

The abbreviation for commander is Com; for fleet, Flt; for Pacific, Pac; for Atlantic Lant; for Navy, Nav; for bureau, Bu.

2. Compound abbreviations normally are made by combining appropriate authorized abbreviations. Thus, the address in the heading of a message originating in the Bureau of Naval Personnel and addressed to All Naval Stations would look like this:

FROM: BUPERS
TO: ALNAVSTA

NOTE: The above example is typed in capitals because it is a message.

3. All compound abbreviations should be pronounceable. For this reason one letter should be dropped when double letters occur. Example:

The authorized abbreviation for Commander Mine Squadron is written COMINRON.

4. Plurals usually formed by merely adding the letter s. Example:

This message is from Commander in Chief Pacific to the Commander of Destroyer Divisions ONE and TWO.

NOTE: In this example the address in the heading would be arranged thus:

FROM: CINCPAC
TO: COMDESDIVS ONE and TWO

5. Neither simple nor compound Navy abbreviations require periods.

MISCELLANEOUS ABBREVIATIONS

The following abbreviations are used in the naval form of correspondence (except messages). Periods are used after all abbreviations which, in themselves, are complete words. When using an uncommon abbreviation, check it to be certain that it is the correct form. Do not make up your own abbreviations. They may seem perfectly clear and obvious in their meaning to you, but may be confusing to the person receiving the correspondence. When unsure of the correct abbreviation of a word or name, consult the current issue of Parts I and II of

the Standard Navy Distribution List (SNDL) and the Navy Correspondence Manual, SecNavInst 5216.5 to form your compound abbreviations.

amendment	amend.
article	art.
decision	dec
department	dept
dispatch	disp
division	div
letter	ltr
memorandum	memo
number	no.
paragraph	par.
regulations	reg
senator	sen
separate cover	(SC)
serial	ser
subparagraph	subpar
supplement	supp

The following abbreviations are used for headings and notations in the naval form of correspondence (except messages).

Enclosure	Encl:
Endorsement	End:
Reference	Ref:
Subject	Subj:

MONTHS

The following abbreviations may be used in the dateline of Navy correspondence and in the identification of references and enclosures:

January	Jan
February	Feb
March	Mar
April	Apr
May	May
June	Jun
July	Jul
August	Aug
September	Sep
October	Oct
November	Nov
December	Dec

CORPS AND BRANCHES

The following abbreviations are used only when preceded by the name and rank or rating of an individual:

Chaplain Corps	CHC
Civil Engineer Corps	CEC
Dental Corps	DC
Medical Corps	MC
Medical Service Corps	MSC
Nurse Corps	NC
Supply Corps	SC
U.S. Coast Guard	USCG
U.S. Coast Guard Reserve	USCGR
U.S. Marine Corps	USMC
U.S. Marine Corps Reserve	USMCR
U.S. Navy	USN
U.S. Naval Reserve	USNR
U.S. Navy, Retired	USN (RET)
U.S. Naval Fleet Reserve	USNFR

COMMISSIONED OFFICERS

The following are the abbreviations of the ranks of commissioned officers. They should be used only when combined with proper names.

Fleet Admiral	FADM
Admiral	ADM
Vice Admiral	VADM
Rear Admiral	RADM
Commodore	COMO
Captain	CAPT
Commander	CDR
Lieutenant Commander	LCDR
Lieutenant	LT
Lieutenant (Junior grade)	LTJG
Ensign	ENS

WARRANT GRADES

The four warrant officer military grades, listed here, correspond to the various pay grades prescribed for warrant officers.

WO grade	Pay grade
Chief warrant officer, W-4	W-4
Chief warrant officer, W-3	W-3
Chief warrant officer, W-2	W-2
Warrant officer, W-1	W-1

When addressing an individual officer in written orders or in official or unofficial correspondence, his descriptive title is substituted for the words "warrant officer."

Examples are: Chief Boatswain, W-3, Aviation Electronics Technician, W-1. In matters of appointment, promotion, and precedence, military grades are used. For a list of the warrant officer descriptive titles and short titles see BuPers Manual article C-1302.

RATING ABBREVIATIONS

For the current rating abbreviations, refer to Enlisted Rating Structure portion of the Manual of Qualifications for Advancement in Rating, NavPers 18068-B.

CHAPTER 5

CORRESPONDENCE

Every Communications Yeoman must be able to type an official letter correctly and neatly. Any department in which you serve is likely to draft at least an occasional letter.

Official correspondence in the Navy includes all recorded communications sent or received by a person in the Navy in the execution of the duties of his office.

Besides letters, correspondence comprises messages transmitted by telegraph or radio, as well as endorsements attached to letters or memos.

Official correspondence within the Navy usually is prepared in naval form. The naval format also is used when writing to certain other agencies of the United States Government, especially those within the Department of Defense or the Coast Guard. Some civilian firms that deal extensively with the Navy have adopted the naval form also.

Most official letters addressed to persons outside the Navy are written in business form. Many of these business-form letters deal with matters relating to individuals. Others are written to civilian firms or to Government officials or agencies that have not adopted the standard naval form.

NAVAL LETTER FORMAT

The form of the naval letter is very definite, and must be followed to the minutest detail of spacing and punctuation. The first six illustrations in this chapter show examples of the naval letter. The format for these examples is from the Navy Correspondence Manual, SecNavInst 5216.5 series, which you should consult to solve any problem that arises in drafting or typing a naval letter.

STATIONERY

Letterhead stationery of the activity responsible for signing the correspondence generally is used for the first page of a naval letter. If printed letterhead stationery is unavailable, the letterhead is typed or stamped, in the center of the page, 1 inch from the top.

Second and subsequent pages are typed on plain bond paper similar to the letterhead page in size, color, and quality. White and colored tissues are used for carbon copies, with the official file copy always prepared on green.

COPIES

Before beginning to type a letter, you must know the number of copies needed. Requirements for copies of naval letters are determined by such considerations as subject of letter, type and number of addressees, and local filing practices. Although the necessary number of copies must be resolved separately for each letter, they should be kept to minimum requirements. The following listing will help you decide the number of copies needed.

Number	Color	Purpose
1	Green	For official files.
1	White	For each "Via" addressee.
1	White	For each "Copy to" addressee.

Courtesy copies are furnished only when requested or if there is certainty that they are needed. When typing carbons, tissues should be arranged in a pack in the order in which legibility is demanded. The official file copy always is placed immediately after the original, outgoing copies are added next, and copies remaining in the originating office are placed last.

GENERAL STYLE

No salutation or complimentary close appears on a naval letter. Major paragraphs are

typed in block style, that is, without indenting. Periods do not follow the parts of the heading or the close. Abbreviations are used in the following parts of the heading: Subject (Subj); Reference (Ref); and Enclosure (Encl). When referred to in the text, these words are spelled out. A heading entry that is too long to be completed on one line is run over to the next line, flush with the first word following the colon. See figure 5-1 for an example of the heading of a naval letter.

MARGINS

The first page of all naval-form letters, except the directive, has a left and right margin of 1 inch. The bottom margin must be at least 1 inch. On the second and succeeding pages, the top margin is 1 inch, with other margins the same as on the first page.

IDENTIFICATION SYMBOLS

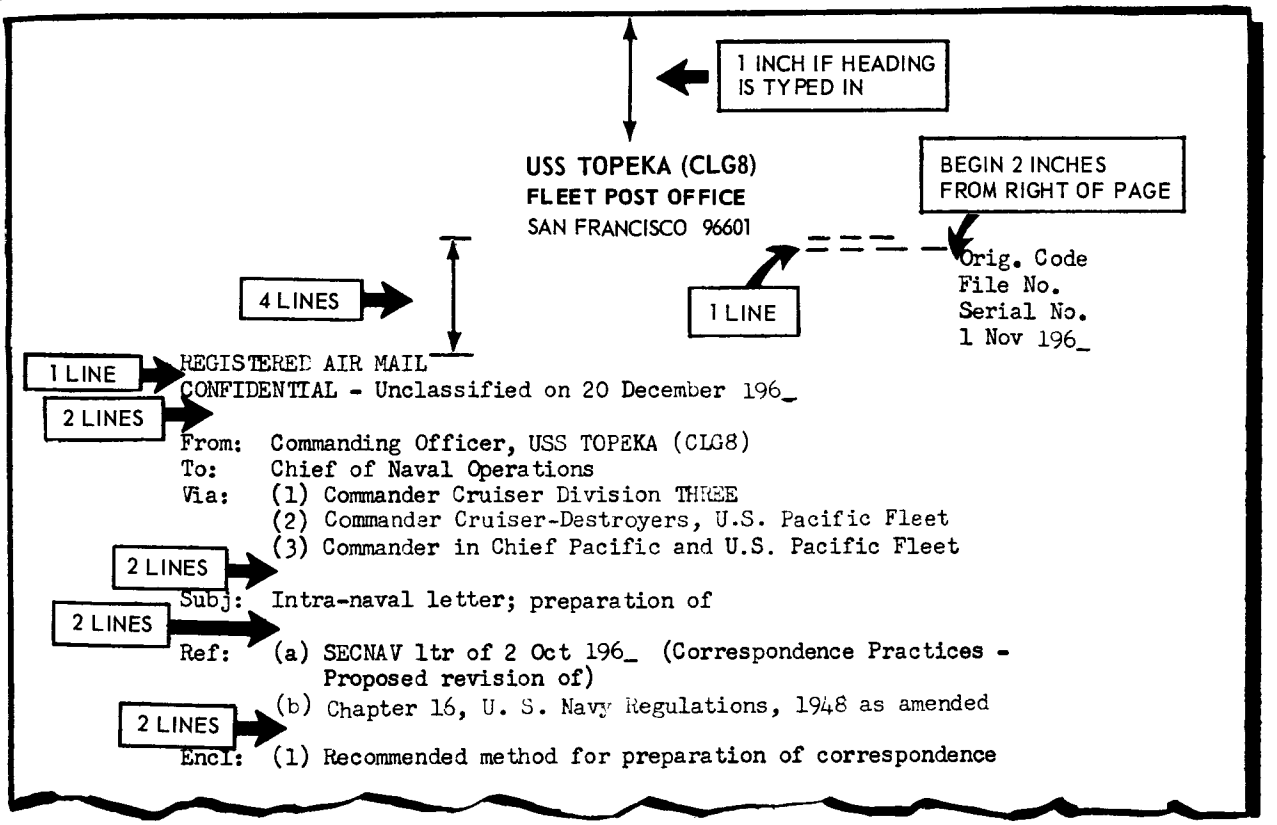
For reference and record purposes, three types of identification symbols may be used on correspondence. They are the originator's code, the file number, and the serial number. Depending on local practice, one or more of these symbols may appear on a letter.

Originator's Code

An originator's code is a system of letters, numbers, or both, used for the sake of brevity. This code indicates the organizational unit within the activity that is preparing the correspondence. An originator's code is not used on correspondence coming from a ship. The ship's hull number may be used instead.

File Number

A file number is a symbol composed of letters and numbers. It is used to indicate the subject or name under which the material is to be filed. The Standard Navy Subject Classification Table and the Name-Title Symbols in the Navy-Marine Corps Standard Subject Classification System, SecNavInst 5210.11 provide the basic classification structure for classifying and filing records.



6.5

Figure 5-1.—Naval letter heading.

Serial Number

A serial number is one of a consecutive group of Arabic numerals assigned to a specific piece of correspondence for identification purposes. Navy Regulations prescribes that classified correspondence must be numbered serially in each calendar year by the originator. Serial numbers for any calendar year start as follows: 01 for Confidential; 001 for Secret; and 0001 for Top Secret. Unclassified mail may be numbered serially if desired.

For the position and spacing of the identification symbols, see figure 5-1. On continuation pages the originator's code begins 2 inches from the right of the page, 6 lines from the top of the page. The file number, if used, is blocked with the originator's code.

DATING THE LETTER

Correspondence is dated with the date on which it is signed. The date may be typed or stamped, according to local practice, and always is placed on the right side of the page, blocked 1 line below the last line of symbols. It is arranged as follows:

1. The day, month, and year are shown in the order named (e.g., 1 June 1964).
2. The day always is expressed by numerals.
3. The month is either spelled out or abbreviated by using the first three letters of the word. If abbreviated, it is not followed by a period.
4. The year is written in four digits.
5. No punctuation is used between the month and the year.

SPECIAL POSTAL SERVICE

If special postal service is to be used, the appropriate designation—AIRMAIL, SPECIAL DELIVERY, REGISTERED MAIL, or CERTIFIED MAIL—is typed in capitals or stamped at the left margin, 4 lines below the last line of the address in the letterhead.

CLASSIFICATION

If a letter is classified, the appropriate designation (TOP SECRET, SECRET, or CONFIDENTIAL) is typed in capitals or stamped at the left margin, 5 lines below the last line of the address in the letterhead, and is repeated 1/2 inch from the bottom aligned as closely as possible with the right margin. When practicable, the stamped lettering is in red.

On succeeding pages, the classification is typed in capitals or stamped at the left margin, 1 inch (6 lines) from the top of the page. The classification is repeated at the bottom of all pages, 1/2 inch from the lower edge aligned as closely as possible with the right margin. For further instruction regarding preparation of classified correspondence, see the Department of the Navy Security Manual for Classified Information, OpNavInst 5510.1B.

When the term Top Secret, Secret, or Confidential is used in the body of correspondence to denote a classification category, only the initial letter is capitalized.

"FROM" LINE

The "From" line identifies by title the official in authority over the activity or other organizational unit having cognizance of the subject covered by the letter. As the addresser of the letter, he is the official to whom reply, if necessary, is directed. The "From" line is typed 2 lines below the designation of postal service or of classification. If there is no such designation, the "From" line is 7 lines below the last line of the letterhead address. Between the colon after "From" and the beginning of the addresser's title, 2 spaces are allowed. Sufficient information must be given in connection with the title to enable the recipient of a copy not on letterhead to identify the originator of the letter.

If a window envelope is to be used, the position of the heading entries on the letter must be adjusted to meet the spacing requirements of the envelope. The "From" line must be no more than 10 line spaces below the top of the page and no more than 4 lines below the last line of the address in the letterhead.

"TO" LINE

The "To" line is placed on the line directly below the "From" entry. There are 4 spaces from the colon after "To" to the beginning of the title of the addressee. When the functional title does not clearly identify the addressee, additional information must be given to assure that the letter is delivered to the addressee. Except in correspondence intended for a ship, the title of the addressee may be followed by the title or the code designation

(in parentheses) of the office having immediate responsibility for the subject matter.

If the letter is to be transmitted in a window envelope, special care must be taken in placing the address. The "To" line is 2 1/4 inches from the top of the page. (See fig. 5-2.) No line of the address may extend more than 5 inches from the left side of the page. Nothing except the title and the address should appear in the window.

"VIA" LINE

The "Via" line (if any) is placed on the line directly below the "To" line. If there is more than one "Via" addressee, each is numbered with an Arabic numeral enclosed in parentheses. These numerals indicate the sequence through which the correspondence is to be sent, the official numbered (1) being the first addressee to receive the letter. If only one addressee is listed, there are 3 spaces from the colon after "Via" to the beginning of the title of the addressee; for more than one, to the beginning of the numbering of the first addressee. A letter containing more than two "Via" addressees is unsuited to transmission in a window envelope.

If there is only one "Via" addressee, such transmission is possible by placing the "From" line nine lines from the top of the page, the "To" line (from which the address is omitted) immediately below the "From" line, and the "Via" line (with the full address) in the position usually occupied by the "To" line.

"SUBJECT" LINE

The topical statement of the subject of the correspondence is introduced by the abbreviation "Subj" placed 2 lines below the preceding line of typing. From the colon after "Subj" there are 2 spaces to the beginning of the subject.

The subject is stated briefly and specifically, with keywords first, followed by necessary explanatory words. Only the first word and proper nouns are capitalized. If explanatory words break the normal sequence of words in the subject, they are separated from key phrases by a semicolon. (Example: "Naval letters; instructions for preparation and use of.") A letter of reply usually repeats the subject of the incoming letter.

On continuation pages, if a file number is not used, the subject (with the caption "Subj:") is placed at the left margin 2 lines below the preceding line of typing.

"REFERENCE" LINE

When previously prepared material is cited, the abbreviation "Ref" (without "s" even though there may be more than one reference) is typed 2 lines below the last line of the subject. Each reference citation begins on a new line. Between the colon after "Ref" and the beginning of the first reference, 3 spaces intervene.

References are designated by small letters enclosed in parentheses, as (a), (b), (c). They are listed in the order in which they are discussed in the text of the communication. An enclosure is never listed as a reference.

When a letter is cited, the reference line includes the abbreviated functional title of the originator of the reference letter; the location of the activity; the abbreviation "ltr"; all identification symbols assigned to the referenced letter; the date, preceded by the preposition "of"; and the functional title of the addressee of the reference letter, if the letter was not addressed to the originator of the communication being prepared. (See fig. 5-2.) The functional title is preceded by the preposition "to". If no identification symbols appear on the letter, the subject is given instead. It is added at the end of the reference, introduced by the abbreviation "Subj" followed by a colon.

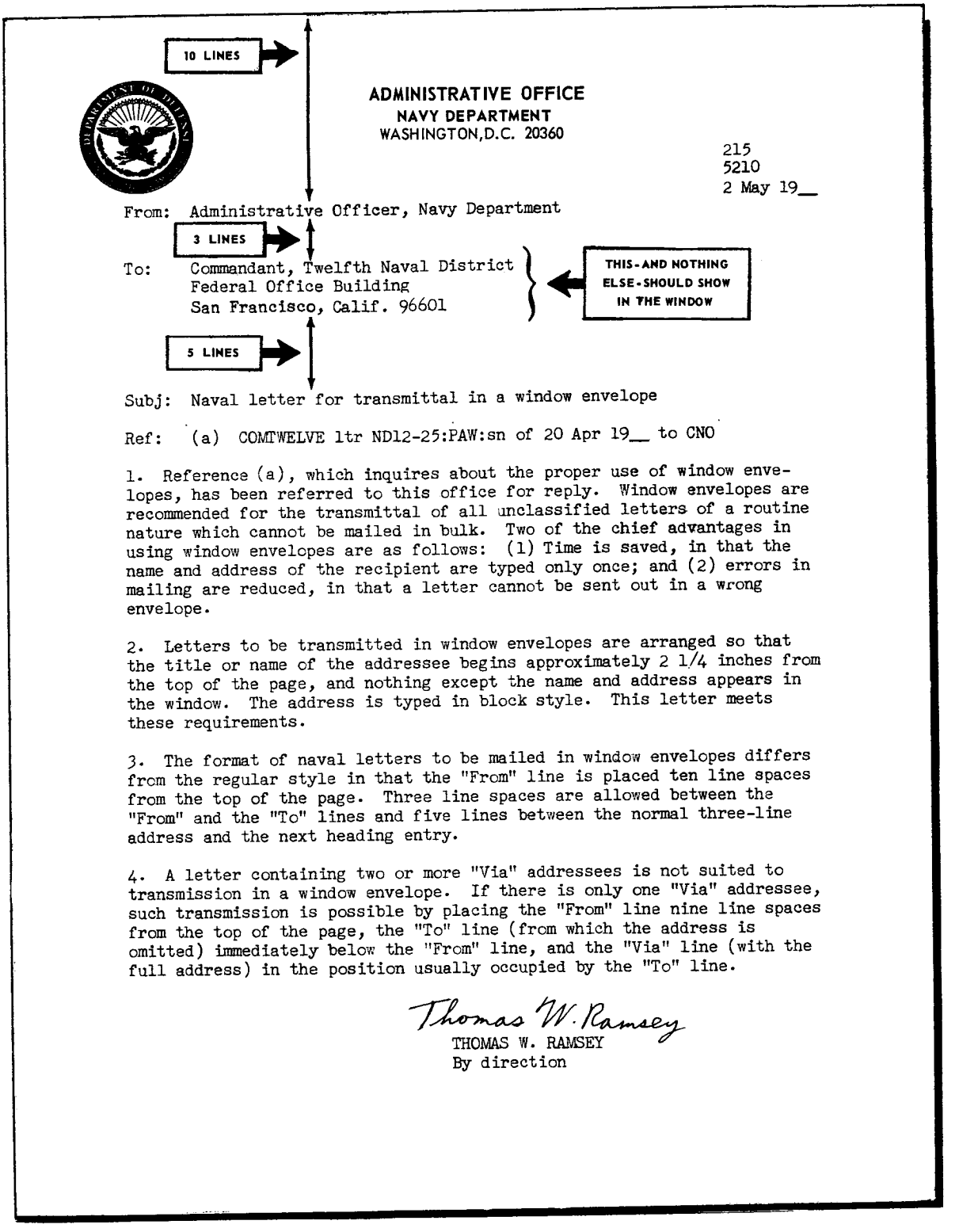
When documents besides letters are listed as references, they are identified fully concerning origin, type, title, and date.

"ENCLOSURE" LINE

The abbreviation "Encl" (without "s" even though there may be more than one enclosure) is used to introduce a listing of material forwarded with the letter. The "Encl" line is 2 lines below the preceding line of typing; 2 spaces follow the colon after "Encl."

Each enclosure notation begins on a new line and is numbered with Arabic numerals in parentheses. When material must go under separate cover, the designation "(SC)" is placed between the number and the description of the enclosure.

Each enclosure that accompanies the letter is identified by typing, stamping, or writing in the lower margin of the enclosure the word "Enclosure" and the number assigned to it in



6.6

Figure 5-2.—Naval letter for window envelopes.

the heading of the letter. An enclosure to be sent under separate cover is identified by placing in the lower margin the word "Enclosure" and the number assigned to it in the heading of the letter; the abbreviated functional title of the addresser; the abbreviated word "LTR"; and the date of the letter. If a carbon copy of the original letter is attached to an enclosure that goes under separate cover, only the word "Enclosure" and the assigned number need be indicated on the transmittal.

Ordinarily, a transmittal of multiple copies of the same material is considered a single enclosure, and only one copy is labeled. The number of copies should be indicated on the "Encl." line.

TEXT

The text (or body) of the letter begins 2 lines below the preceding line of typing.

For a detailed discussion of how the body of the letter should be orgainized when drafting a letter, refer to the Navy Correspondence Manual, edition of 1 November 1955, part two, chapter III.

PARAGRAPHING

Major paragraphs are numbered at the left margin with Arabic numerals, followed by a period. Between the period and the beginning of the first word 2 spaces are allowed. The text of the letter is single-spaced. Double spacing is observed between paragraphs.

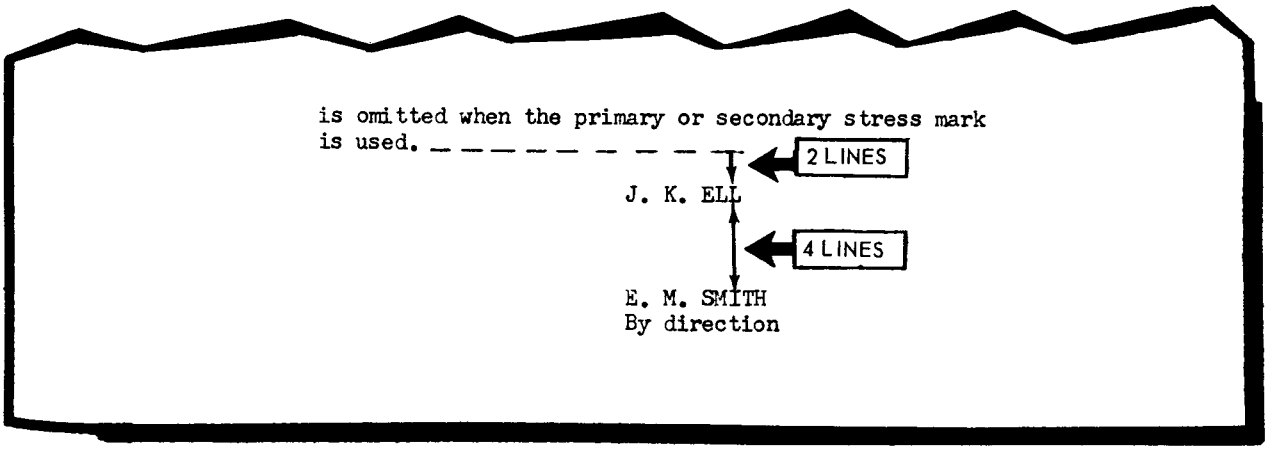
Subparagraphs are indented 4 spaces from the left margin and are lettered with small letters, followed by a period. The second and succeeding lines extend from left to right margins. When tabular stops are used by the typist, subparagraphs may be indented 7 spaces instead of 4, so that they align with the first word in the heading entries.

Each further degree of subdivision is indented subordinately. Sub-subparagraphs are marked by numerals in parentheses; the next degree, by small letters in parentheses; after that come numerals underscored, then letters underscored.

SIGNATURE

The typed or stamped signature, in block style, begins at the center of the page. It is placed 4 lines below the last line of the text, with one exception. When the official whose title follows "From" is not signing the letter but his name is to be shown in the close, it is placed only 2 lines below the text, and the name of the person signing the letter (usually "By direction") is placed 4 lines below the first name. (Refer to fig. 5-3.) All names are typed in capitals in the close of a letter. Neither the rank nor—as a rule—the functional title of the signing official is shown in the signature.

A functional title is added, however, for a chief of staff, a deputy, an assistant chief, or a similar official authorized to sign correspondence without use of the phrase "By



6.6

6.7

Figure 5-3.—Signature when name of CO is used with that of officer signing "By direction."

direction." One may be added also for an executive officer or similar official authorized to sign orders affecting pay and allowances. According to the circumstances under which the letter is signed, one of the following forms of signature is used, as appropriate. Examples:

A.B. SEE	T.U.VEE Acting
A.B. DEE By direction	E.F. GEE Executive Officer By direction of
I. J. KAY Deputy	(appropriate commander) (for orders affecting pay and allwances)
X.Y. ZEE Chief of Staff	

"COPY TO" LINE

The "Copy to" line is placed 2 lines below the last line of the signature information, flush with the left margin. "Copy to" is not abbreviated. Officials receiving copies are listed, with title abbreviated, below the "Copy to" line, flush with the left margin. In naval-form correspondence these addressees may be indicated on the original as well as on all carbons. If copies of any of the enclosures listed in the heading are to be sent with the duplicates, the words "with encl" and the enclosure numbers assigned in the heading are added in parentheses after the title of each recipient. Figure 5-4 shows the placement of the "Copy to" line.

PAGING

The first page of a letter is not numbered. Second and succeeding pages are numbered consecutively with Arabic numerals, beginning with figure 2, centered 1/2 inch from the bottom of the page. Numerals are typed without parentheses or dashes.

The signature page of a letter exceeding 1 page in length should contain a minimum of 2 lines of the text. A paragraph is not begun near the end of a page unless there is space for at least 2 lines of text on the initial page and unless at least 2 lines can be carried over to the next page.

IDENTIFYING PAGES

For identification of second and succeeding pages, the originator's code and the file number (if any) are repeated at the top of each page. They are typed, block style if both are used, on the same side they occupy on the first page, beginning usually 1 inch from the top. If a letter is classified, the identification symbols appearing on the left side (as in a joint letter) begin 1 line below the classification line. When a file number is not used, the subject (introduced by the abbreviation "Subj:") is repeated, beginning at the left margin, 2 lines below the last preceding line of typing (if any), or is the first line of type on the page. The text is continued 2 lines below the subject, or symbols, as applicable.

ASSEMBLING A LETTER

The correspondence file accompanying a letter to be signed is arranged according to the instructions of the signing official. The arrangement that follows is merely a guide, and may be varied to conform to local practices.

1. Outgoing letter, arranged in reverse order, if two or more pages long.
2. Courtesy copy, if required.
3. Enclosures, if any, arranged as nearly as possible in the order listed in the letter.
4. Copies for "Via" addressees, properly checked or arrowed.
5. Envelopes, if required, face up.
6. Copies, and envelopes as appropriate, for "Copy to" addressees, checked or arrowed.
7. File copies, with green tissue on top, protruding 1 inch to one side for initialing or other indication of approval.
8. Incoming letter and previous correspondence, if any.

ENDORSEMENTS

An endorsement is a brief form of naval letter used to approve, disapprove, or comment on the contents of a letter. It should not be used as a reply to a basic communication. It may be stamped, written, or typed. An endorsement is an addition to a communication which, by the nature of its subject matter, must be referred to one or more activities before it reaches its final destination. Endorsements may be added by one or more of the activities through which the original letter is channeled before reaching its final destination.

Op-283/mw
5210
Ser 0123P01
18 May 19__

REGISTERED AIR MAIL
CLASSIFICATION (if any)

FIRST ENDORSEMENT on NAVADMINO ltr OMD-15 5210 ser 0123 of 16 May 19__

From: Chief of Naval Operations
To: Commandant, Twelfth Naval District (DRMO)

Subj: Official correspondence; general instructions and procedures for the preparation of

Ref: (b) United States Navy Regulations, 1948, Art. 1609.1

1. The endorsement is used to approve, disapprove, or comment on the content of a letter that is forwarded, as required by reference (b), through one or more addressees before it reaches its final destination.

2. Generally, if there is adequate space remaining on the page that contains the prior endorsement or the basic letter (if there is no prior endorsement), the endorsement is typed below the preceding communication. When an endorsement is begun on a separate page, plain bond paper is used for the ribbon copy and manifold (tissue) sheets are used for carbon copies including those prepared for the remaining "Via" addressees.

3. Each endorsement is numbered in the sequence in which it is added to the basic letter. The ordinal number (FIRST, SECOND, THIRD) and the word ENDORSEMENT are followed by an identification of the basic letter. The abbreviated name of the originating activity; the abbreviation "ltr"; the identification symbols; and the date preceded by "of" are included, in the same style used to identify a letter in a reference line. When the number of the endorsement and the identification of the basic letter exceed one line, the second line begins at the left margin.

4. References and enclosures listed in the basic letter and in the prior endorsements are not repeated. New references introduced by an endorser are lettered, and new enclosures are numbered, in continuous sequence from the preceding communication. Page numbers also continue the sequence from the preceding endorsement, if any, or from the basic letter.

F. B. Breest.

F. B. BREEST
By direction

Copy to:
NAVADMINO

CLASSIFICATION
(if any)

6.8

Figure 5-4.—Endorsement.

STAMPED OR PRINTED ENDORSEMENTS

Whenever an endorsement is used continually in essentially the same general form, it should be stamped or printed. Blanks are left for such items as place, date, hour of reporting or detachment, and signature.

An example is the type of endorsement on officers' orders to record the various steps in compliance with the orders. Because these steps usually are the same, endorsements are reduced to the briefest possible wording and are either printed or stamped, in skeleton form, on the orders.

TYPED ENDORSEMENTS

In general, a typed endorsement is prepared in the same manner as a naval letter, except that the designation of the endorsement should be placed 2 lines below the preceding line of typing. (See fig. 5-4.) This information should include the number of the endorsement and the identification of the basic letter.

If space permits, an endorsement may be placed on the same sheet as the basic communication or previous endorsement. In either instance it should be separated from the preceding communication by dashes 1 line below the last preceding line of typing and extending across the page from left to right margins.

When an endorsement is placed on a new page, it is prepared on plain paper—not on letterhead.

ENCLOSURES AND REFERENCES

Enclosures and references listed in the basic letter or in previous endorsements are not repeated in endorsements. When a reference or an enclosure is introduced in any endorsement, reference lettering and enclosure numbering follow the sequence, if any, begun in the basic letter.

COPIES OF ENDORSEMENTS

In addition to the requisite file copies of the endorsement, sufficient copies should include one for each remaining "Via" addressee. If the endorsement contains a matter of significance to the originator of the letter or to previous "Via" addressees, copies may be furnished them.

JOINT LETTER

A joint letter deals with a subject or administrative problem common to several activities. It is signed by officials of each. For a sample of a joint letter, and directions for preparing one, examine and read figure 5-5.

MULTIPLE-ADDRESS LETTERS

A multiple-address letter is a naval letter addressed to two or more activities individually identified in the address or addressed as a group. An example of a letter of this type is shown in figure 5-6.

A multiple-address letter may be typed if the number of addressees is small enough that one or two typings will provide sufficient copies. Otherwise, another duplicating process is used.

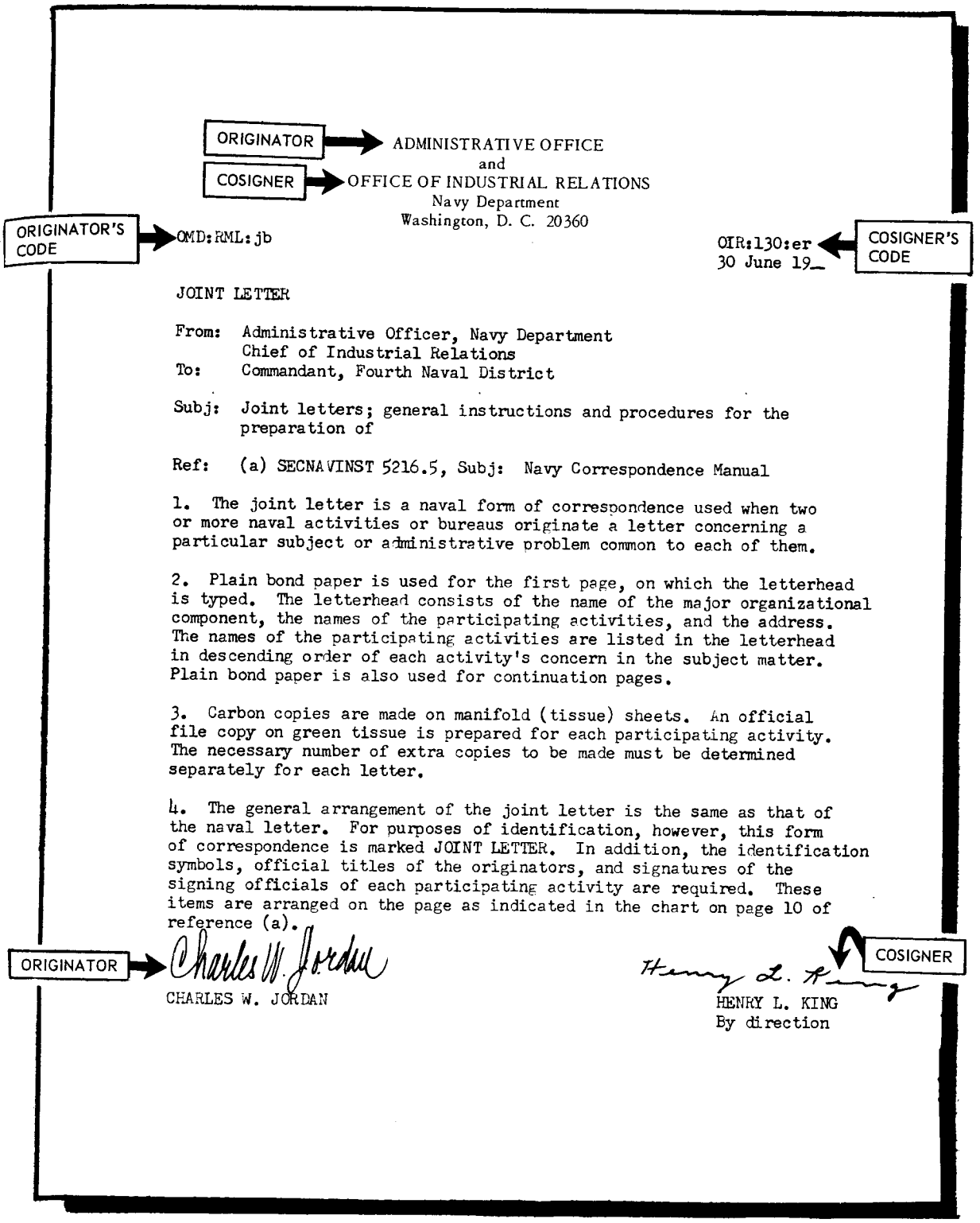
When a multiple-address letter is typed, letterhead tissue (if available) is used for all mail copies. If letterhead tissue is not used, a letterhead is typed or stamped.

The title of the first addressee begins on the "To" line. Titles of other addressees are listed on succeeding lines, each title flush with the first. Instead of this list of titles, the words "Distribution List" may be used after "To" and the addressees listed separately at the end of the letter. If an established distribution list is used, the entry after "To" may be "Distribution List No. " without further identification of addressees.

SPEEDLETTER

A speedletter is a means of communication that can be prepared and released more quickly than the naval-form letter. It combines the brevity of messages with the economy of transmission by mail, and calls attention to the communication so that the recipient will handle it promptly. Speedletters may be used for both routine and urgent correspondence. Use of the speedletter for routine purposes is permitted to provide a more economical form of correspondence. Urgent speedletters concern emergencies that are not so critical as to require a message.

A speedletter is prepared either on Form NAVEXOS 4181 or on letterhead stationery. The format depends on the type of stationery used. See figure 5-7 for a sample speedletter.



6.9

Figure 5-5.—Joint letter.

PREPARATION OF FORM

If the NAVEXOS form is used, the first page of the ribbon copy is typed on a white copy of the form. Second and succeeding pages, if required, are typed on plain white paper. For official files, a carbon copy is prepared on a green form or plain tissue. Information copies are made on white blanks. Blanks of other colors are obtainable for use as needed. Second and succeeding pages should be prepared on tissue of the same color as the first page; or they may be on plain white tissue, if necessary.

Boxes labeled to indicate their use are provided on the form for indicating special mail service, classification, identification symbols, date, address, copy designation, and sender's address.

A subject line is unnecessary. If one is desired, it may be typed in the usual style immediately below the first "fold" line or in the usual position on letterhead. If the letter is long, a subject will aid in filing. Reference to material relating to the subject is made in the text of a speedletter.

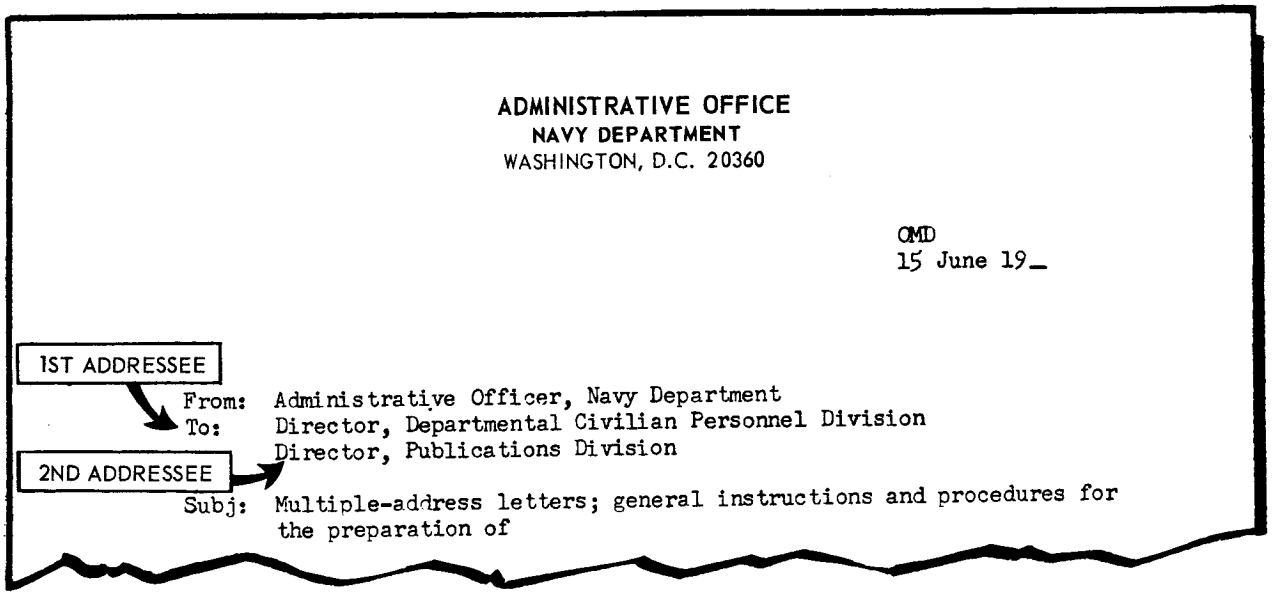
Paragraphs are unnumbered. The body may be written in informal abbreviated style or in the brief phraseology of naval messages, provided the meaning is complete and clear to the recipient. When message style is used, the body may be typed entirely in capitals, but with punctuation marks instead of spelled-out punctuation.

Both the "To" box and the sender's address box are so arranged that the speedletter can be used with window envelopes.

When letterhead is used for a speedletter, the usual format of the naval letter ordinarily is followed. The word SPEEDLETTER is typed or stamped at the left margin, 5 lines below the last line of the address in the letterhead. Usually, the subject line, reference line, and enclosure line are omitted, and paragraphs are unnumbered. Message phraseology may be used in the body of the speedletter.

MARKING FOR PRIORITY

When originated, speedletters were intended only for urgent routine communications. Their use since, however, has been increased to include routine communications that are not urgent. So that priority may be given to pressing matters, speedletters requiring rapid handling must be conspicuously labeled URGENT by means of a stamp or tag. If a stamp is used, the place for it is the upper right corner. Speedletters marked URGENT by the originator are given priority in handling and in reply,



6.10

Figure 5-6.—Heading of multiple-address letter.

NAVEXOS-4181

USE FOR URGENT LETTERS ONLY

NAVAL SPEEDLETTER

DO NOT CLEAR THROUGH COMMUNICATION OFFICE

(One box must be checked)

☒ REGULAR MAIL ☐ SPECIAL DELIVERY

☐ AIR MAIL ☐ REGISTERED MAIL

CLASSIFICATION

IN REPLY REFER TO
OMD-12

DATE
24 June 19__

TO: Commandant, Fifth Naval District
(Code 25)
Naval Base
Norfolk, Va. 23511

(Fold)

NAVAL SPEEDLETTER—

Permits dispatch or informal language.

May be sent (1) with enclosures, (2) in a window envelope (size 8⅝" x 3⅛"), if contents are not classified as confidential or higher, (3) to both naval and nonnaval activities.

Is packaged 500 sheets of white or of one color: yellow, pink, or green.

When originated, speedletters were intended only for urgent routine naval communications. Their use has since been increased to include routine communications that are not urgent. To assure appropriate priority, speedletters dealing with urgent matters should be stamped or tagged URGENT in the upper right corner. Speedletters so marked by the originator are given priority, usually second to that given messages. Routine speedletters receive the same handling as nonurgent naval letters.

JOHN SPENCER
By direction

Code 25
28 June 19__

The speedletter blank is so designed that, if space permits, a reply may be made on the same blank if the originator has supplied an extra copy of the letter. When an extra copy has not been received, the reply may be made on the same form if an official record copy is not required.

CHARLES H. BROWN
By direction

COPY TO

ADDRESS: Administrative Officer
Navy Department
Washington, D. C. 20360

←SENDER'S MAILING ADDRESS

Address reply as shown at left; or reply hereon and return in window envelope (size 8⅝" x 3⅛"), if not classified as confidential or higher.

CLASSIFICATION

U. S. GOVERNMENT PRINTING OFFICE 16—64902-3

Figure 5-7.—Speedletter.

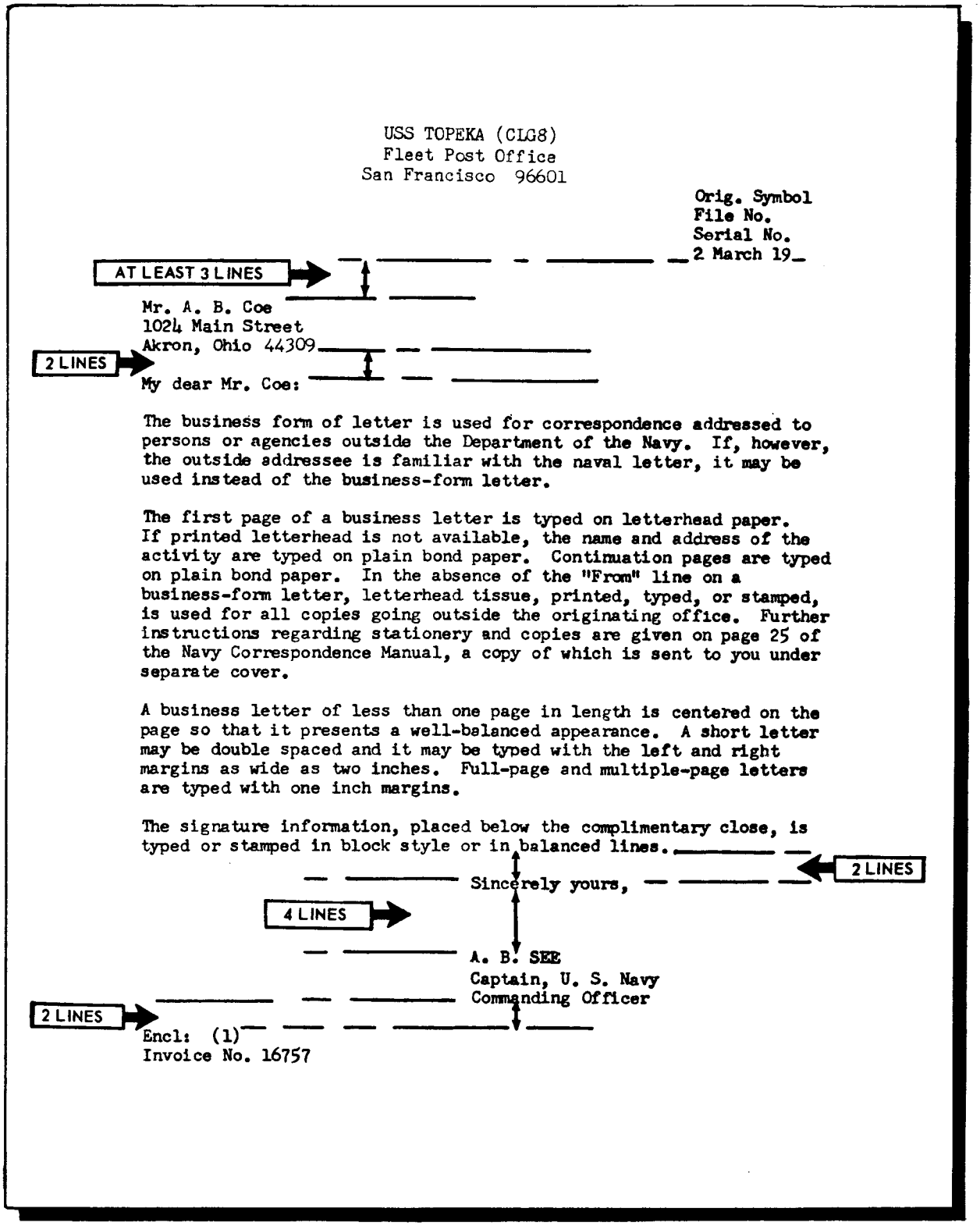


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Figure 5-8.—Business-form letter.

usually second to that given messages. Routine speedletters receive the same handling as nonurgent naval letters.

REPLY TO SPEEDLETTERS

A reply to a speedletter, especially one marked URGENT, usually is made by speedletter. If a blank form is used, and space permits, the reply may be placed on it. If the reply is expected to be made on the same speedletter, an extra white copy must accompany the original.

MEMORANDUMS

A memorandum is an informal means of communication between branches, divisions, sections, or individuals within the same bureau or activity.

A memorandum may be typed or written on letterhead, plain paper, or on a printed form. If it is desired that data contained in a memorandum be given to other organizations, the data must be incorporated into an official naval letter.

If the memorandum deals with a subject of no permanent importance, carbon copies need not be made.

Because a memorandum is an informal communication, the writer may use any form he considers appropriate. Although no complimentary close is necessary, sometimes a junior may prefer to close a memo to a senior "Very respectfully."

BUSINESS LETTERS

A standardized business-form letter is used for correspondence with persons or institutions that have not adopted the naval-form letter. Civilian firms have certain characteristic practices in style and preparation that must be followed. (See fig. 5-8.)

The letter head, originator's symbol, file number, serial number, and dateline should be spaced as they are on the naval letter. Modified open punctuation should be used.

The inside address of the letter should be at least 3 lines below the dateline. In a short letter the address appears lower on the page so that the letter may be centered. If the letter is suitable for transmission in a window envelope, the name and address on the face of the letter should be so spaced that nothing else appears in the window when the letter is inserted for mailing. When a window envelope is used, the name should begin 7 lines below the last line of the letterhead or 16 lines from the top of the page and 1 inch from the left. No part of the name or address should extend more than 5 inches (50 spaces pica, 60 spaces elite) from the left edge of the page.

For the ordinary letter, the salutation should be 2 lines below the last line of the address. The first line of the letter should begin 2 lines below the salutation. For a letter that is to be enclosed in a window envelope, the salutation should begin 8 lines below the first line of the address, so that it will not be visible in the window.

If an "Attention" line is used, it should be placed 2 lines below the address (8 lines below the first line of the address for window envelope use), even with the left margin. The salutation is 2 lines below the attention line.

The body of the letter may be single-spaced or double-spaced, depending upon the length. The right and left margins may be changed, also depending upon the length of the letter. If the body is single-spaced, it should be double-spaced between paragraphs, and the block system used (no indentation for paragraphs). If the body is double-spaced, the first line of each paragraph should be indented 5 spaces. Paragraphs are not numbered.

The complimentary close of a business-form letter should begin at the center of the page, 2 lines below the last line of the letter.

The typed name of the person signing the letter should be placed 4 lines below the complimentary close. If the signature is that of the commanding officer or the officer in charge, his typed name should be followed by his rank and functional title. Business-form letters signed by a subordinate officer should show the name, rank, functional title of the signing officer, and the words "By direction of_____ (the appropriate commander)." The title and "By direction" line should be adjusted in such a way that they occupy 2 lines. The block system and open punctuation should be used in the signature.

If there is an "Encl:" line, it should be typed at the left margin, 2 lines below the last line of the signature.

ADDRESS AND SALUTATION

The title "Honorable" should be used in addressing members of Congress and heads

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of governmental departments, independent agencies, boards, commissions, establishments, and organizations—unless military, scholastic, or professional titles are used instead. Two titles with the same meaning should not be used with one name. For example, choose Dr. John Blank or John Blank, M.D.—NOT Dr. John Blank, M.D.

If the name of an official is unknown, he or she may be addressed by title only, with "My dear Sir" or "My dear Madam" as the salutation (followed by a colon). Although the phrase "My dear Sir" is more formal and is considered more respectful than "Dear Sir", the latter is not inappropriate if preferred by the signer of the letter.

If there is doubt whether the addressee is a man or woman, the title "Mr." should be used with the name. If the marital status of the woman addressed is unknown, the title "Miss" should be used with the name.

All titles in the salutation, except Dr., Mr., and Mrs., should be spelled in full.

If you have occasion to type a letter to a person with a special title, consult the Navy Correspondence Manual for the proper address, salutation, and complimentary close.

Although the naval-form letter should be used when addressing official communications to individuals within the naval service and others who have adopted the naval-form letter, there may be occasions when a more personal form is desired by the originator of the letter. In such instances, the business-form letter is used.

In the inside address of a personal letter to a commissioned officer, the name should be preceded by the rank and followed by the corps (if not a line officer) and the branch of service. Example:

Lieutenant Commander John Blank,
CHC, USN
Lieutenant (jg) John Blank, SC, USN

In the inside address of a personal letter to an enlisted man or woman of the Navy or Coast Guard, the person's name should be followed by the rate and branch of service. The rank of Sergeant, Corporal, and Private (U.S. Army and U.S. Marine Corps) should be written before the name. Example:

John Black, QM7, USN
Sgt. John Blank, USMC

COMPLIMENTARY CLOSE

The form of complimentary close generally preferred for use in the Navy is "Sincerely yours."

ENVELOPES AND MAILING

You may never have given much thought to the size or type of envelope you use. In naval correspondence, however, it is important to know the various types and to use the proper envelope for each occasion.

When selecting an envelope, keep in mind the following pointers:

1. The correct type of envelope should be used.
2. In mailing classified correspondence, the requirements set forth in the Navy Security Manual must be observed.
3. Overall appearance and convenience. The envelope selected should be as small as practicable, but should be suited to its contents in order to avoid unnecessary folding.
4. Window envelopes should be used whenever possible. (For further discussion of the use of window envelopes, read the letter illustrated in figure 5-2.)

PAYMENT FOR NAVY MAIL

In recent years postage for official Navy correspondence has been paid in several ways. Currently, the Post Office Department is reimbursed at the departmental level for all official Navy mail transmitted from the United States, its territories and possessions, and the Army (or Air Force) APO and Navy FPO post offices. This arrangement means that postage stamps are not required on official mail.

This regulation applies not only to regular letter mail but to special mailings, such as airmail, registered mail, special delivery, and to packages as well.

Envelopes, cards, labels, tags, and wrappers for Navy official mail carry the following information in the upper right corner:

POSTAGE AND FEES PAID
NAVY DEPARTMENT

Covers labeled in this way are described as "franked."

TYPES OF ENVELOPES

Several types of both franked and unfranked envelopes are used for transmitting Navy official correspondence.

Franked envelopes bear the frank in the upper right corner and are of the following kinds.

• Regular: Address-type envelopes, in sizes from 3 3/4 by 6 3/4 inches to 12 by 16 inches, with the return address card in the upper left corner.

• Window: Envelopes with a transparent panel, in sizes from 3 7/8 by 8 7/8 inches to 4 1/8 by 9 1/2 inches, with the return address card in the upper left corner.

• Executive: Address-type envelopes, in sizes from 3 7/8 by 8 7/8 inches to 4 1/2 by 10 3/8 inches, with the title of an official and the return address in the upper left corner.

• Airmail: Address-type envelopes with a red and blue border, in size 3 7/8 by 8 7/8 inches, with the return address in the upper left corner.

Envelopes without the franking statement are provided for use as inside envelopes or for correspondence that does not go through the mails. These envelopes may also be used for regular mailing, if the frank is stamped on. The following types are provided.

• Regular: Address-type envelopes, in sizes from 3 3/4 by 6 3/4 inches to 12 by 16 inches, which bear no printing.

• Messenger: Manila envelopes, in varying sizes, which are perforated and carry multiple-address spaces on both sides.

• Airmail: Address-type envelopes with a red and blue border, in size 3 7/8 by 8 7/8 inches, imprinted with the return address but without the frank. (These will probably be found only until present supplies are exhausted.)

Keeping in mind the general considerations outlined previously, let us see which of these envelopes should be used for each type of Navy mail and how they are prepared.

• Regular intra-Navy mail: Letters addressed from a shore activity to naval activities in other geographic areas, except authorized direct communications, generally do not require individual envelopes, because provisions are made for bulk mailing from mailrooms. Window envelopes, if appropriate, or individually addressed franked envelopes are used for authorized direct communications and for other regular mail when facilities for bulk mailing are unavailable.

• Regular extra-Navy mail: The window-type franked envelope is preferable for unclassified correspondence addressed outside the Navy.

• Registered mail: Registered mail is enclosed in the address-type franked envelope on which the designation REGISTERED MAIL is typed in capital letters and underscored, or is stamped, 3 line spaces above and aligned with the address.

Special services, such as a return receipt or delivery to addressee only, are available for use in conjunction with registered mail. Local office practices should be observed in preparing registered mail that requires additional services. Postal fees for these special services are paid with the payment for other mail, hence no stamps need be used for this purpose on franked mail. The special services should not be used unnecessarily, however.

Registered mail intended for transmission by air or by special delivery is enveloped as described in the following appropriate paragraphs, except that window envelopes are not used, and the word REGISTERED precedes the other special postal designation.

• Airmail: Mail to be sent by air is enclosed in a regular airmail envelope, if available. If a regular envelope is used, the designation AIRMAIL is stamped or typed in capital letters and underscored, 3 lines above and aligned with the address.

Regular mail service is used instead of airmail under the following circumstances.

1. When mail dispatched at the close of business on Friday would reach its destination on Monday morning.

2. When relatively short distances are involved and less than 1 day is required for transmission, as between Washington, D.C., and New York.

• Special delivery: Special delivery mail is enclosed in a window envelope, or in the address-typed envelope, on which the designation SPECIAL DELIVERY is typed in capital letters and underlined, or is stamped, 3 line spaces above and aligned with the address.

• Intra-activity mail: Unclassified communications within an activity, which circulate through mailroom or are carried by messanger, are enclosed in chain envelopes or plain envelopes on which the name of the addressee and his office are written or typed. This type of mail may also be forwarded without an envelope, when appropriate, by using route slips or by addressing a plain piece of paper and stapling it to the material.

• Interdepartmental mail in Washington: Mail between Government agencies in the Washington, D.C. area normally is transmitted through the Official Mail and Messenger Service, operated by the City Post Office. Messenger envelopes or plain envelopes, on which the name

of the addressee and his agency are written or typed, are used for this purpose.

• Classified mail: Instructions for the proper transmission of classified mail are contained in the Navy Security Manual, and should be followed in preparing this type of correspondence for forwarding by mail, messenger, or courier. If double-enveloping is required, a plain envelope, on which the classification and other special instructions are typed or stamped, is used for the inner cover. The larger envelope is fully addressed but is not marked with the security classification.

When special postal service is required—such as registered mail, airmail, or special delivery—the outer envelope is prepared in accordance with the foregoing instructions for preparing mail for these services, except that window envelopes are not used.

ZIP CODES

The zip code program was introduced to the U.S. postal system on 1 July 1963 and replaces the old postal zone numbers.

The zip code, a five-digit coding system, identifies each post office and delivery unit and associates each with the sectional center or major office through which mail is routed for delivery. The first digit identifies the geographical area; the second and third digits, together with the first, identify the major city or sectional center; and the fourth and fifth digits identify the post office or other delivery unit.

The primary purpose of the zip code at this time is to make available a standard code for voluntary use by large mailers with mechanical and automatic data processing addressing equipment, so that their outgoing mail can be expidited as a result of presorting prior to deposit in the post office. The zip code also provides for easier manual distribution of mail at all post offices. The zip code is intended for all classes and types of mail.

The zip code should appear on the last line of both the address and return address following the city and state. A space not less than 2/10 inch nor more than 6/10 inch should be left between the last letter of the state and the first digit of the code. For example:

Mr. Harold Jones
3025 Theresa Street
Arlington, Virginia 22207

A comma should not be inserted between the state name and the zip code. When the state name is abbreviated, the use of a period is optional so long as the space precedes the zip code.

The appropriate zip code should be included as a part of the printed address when stationery, envelopes, and forms are ordered. It is placed in the address in the letterhead in the following manner:

DEPARTMENT OF THE NAVY
Office of the Chief of Naval Operations
Washington, D.C. 20350

Commands, activities, and units having a domestic geographical mail address are assigned a zip code for the area in which located. A zip code is assigned to the Fleet Post Office, San Francisco, California (96601), and one to the Fleet Post Office, New York, New York (09501), for use in common by ships, mobile units, and commands not having a geographical location as a part of their official mail address. Applicable zip codes for all naval commands, units, and activities are included in the Standard Navy Distribution List (SNDL), Parts I and II.

NAVAL DISTRICTS

The course in Basic Military Requirements contains a description of the organization and responsibilities of the naval districts. When handling correspondence a Communications Yeoman needs to know the area included in each naval district and the location of its headquarters.

Since 1 January 1965, there are 15 naval districts, each headed by a commandant. (There are no 2d, 7th, or 16th, naval districts.) (Effective that date, the Potomac River Naval Command (PRNC) and the Severn River Naval Command (SRNC) were disestablished by SecNav. The Naval District Washington (NDW) was established and includes the geographic areas formerly comprising the PRNC and SRNC Commands.

Headquarters of the 15 naval districts are listed as follows, and indicated on the map in figure 5-9.

District	Headquarters
1	Boston, Mass
3	New York, N.Y.
4	Philadelphia, Pa.
5	Norfolk, Va.

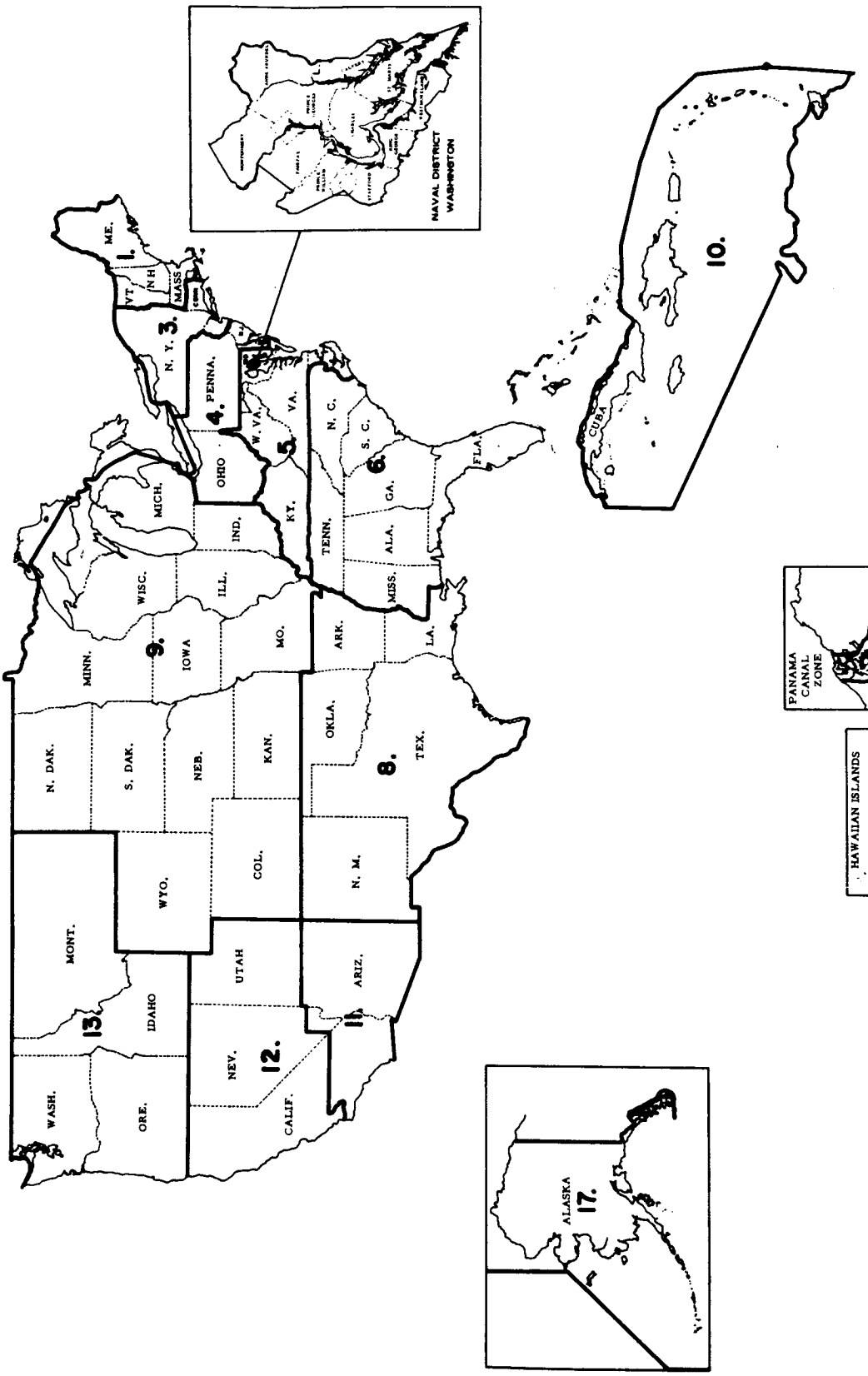

Figure 5-9—Naval districts.

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District	Headquarters	District	Headquarters
6	Charleston, S.C.	13	Seattle, Wash.
8	New Orleans, La.	14	Pearl Harbor, Hawaii
9	Great Lakes, Ill.	15	Balboa, C.Z.
10	San Juan, P.R.	17	Kodiak, Alaska
11	San Diego, Calif.	Naval District Washington (NDW)	Washington, D.C.
12	San Francisco, Calif.		

CHAPTER 6

PUBLICATIONS AND DIRECTIVES

Handling, correcting, and using official publications and directives are routine duties of a Communications Yeoman. Because you become so accustomed to these duties, you may tend to underestimate their importance. But this misappraisal is a serious mistake. Much of the efficiency of any communication office depends on the condition of its official publications and directives, their accessibility, and how well people in the office know how to use them properly and advantageously.

You will be expected to have a general idea of the content of each publication and the uses to which it may be put. If your office is issued a copy, stow it appropriately, and be able to produce it on request. If necessary, put into practice a system for checking out publications to authorized personnel, so that you always will be able to locate the books. For classified or registered publications, you must observe the appropriate handling instructions.

Changes and corrections to publications are made by inserting new pages, removing obsolete pages, or making pen and ink changes in the existing book. A publication that is not up to date, or one that has been changed incorrectly, is worse than useless because it can give wrong directions.

This chapter covers the Navy Directives System, the types and format of directives, and the Navy-Marine Corps Standard Subject Classification System. Described also are the most commonly used official publications, as well as the issuing authority, purpose, content, and format of each.

NAVY DIRECTIVES SYSTEM

The Navy Directives System, SecNavInst 5215.1B of 1 October 1964, provides a uniform method of issuing directives by all activities in the Navy. As set forth in SecNavInst 5215.1B, the provisions relating to the system are contained in these topics:

Part I	Scope and Applicability
Part II	Preparation and Maintenance of Directives
Table 1	Preparation of Letter-Type Directives
Table 2	Preparation of Special-Type Directives

It makes use of the Navy-Marine Corps Standard Subject Classification System, SecNavInst P5210.11, which also is used for filing.

SCOPE

For the purpose of the Navy Directives System, a directive is defined as a written communication that prescribes or establishes policy, organization, conduct, methods, or procedures, and requires action or contains information essential to the administration or operation of activities concerned.

The Navy Directives System may issue Notices not falling into the criteria set up in the previous paragraph. These notices are issued through the Navy Directives System to obtain quick and controlled dissemination. Included are—

1. Requests for comments, approval, or information.
2. Directions for carrying out established operations.
3. Information announcements, such as promotion opportunities.

Navy Regulations, General Orders, Top Secret directives, and registered publications are exceptions, and are not issued by the Navy Directives System. Other directives such as Operation Plans and Orders, technical manuals, and issuances with fewer than six addressees may be issued through the Navy Directives System.

When directed, all naval activities are responsible for installing and administering the Navy Directives System. They are invited to submit recommendations for improving the system to the Administrative Officer, Navy Department via the chain of command.

APPLICABILITY

The following topics discuss the applicability of the Navy Directives System as it applies to the recipients and issuing activities. The types of directives that are issued are discussed also.

Recipients

Navywide use of the Navy Directives System enables each naval activity receiving directives to—

1. Group directives by subject and combine related subjects.
2. Have an easy method for filing directives and describing them as references.
3. Distinguish between directives of a continuing nature and those of brief duration.
4. Obtain complete sets of instructions upon activation or commissioning.
5. Ascertain, by means of periodic checklists, the current status and completeness of its set of directives.
6. Determine, by subject indexes, what directives are in effect on a subject.

Issuing Activities

Provisions of the Navy Directives System enable each naval activity that issues directives to—

1. Reduce the number of directives in effect by: (a) consolidating instructions that cover the same subject, (b) eliminating instructions that duplicate, overlap, or conflict, and (c) promptly canceling obsolete directives.
2. Improve the adequancy and coverage of instructions and identify gaps in policy and procedures so that directives can be issued to cover necessary subjects.
3. Ensure that activities are sent only those directives they need.

Types of Directives

The types of directives making up the Navy Directives System are instructions and notices.

INSTRUCTIONS.—Instructions are directives that contain information of a continuing nature or require continuing action. An instruction remains effective until superseded or until the originator cancels it.

NOTICES.—Notices are directives of a one-time nature or those containing information or action applicable for a brief time only (usually 6 months or less, but never more than 1 year). A notice has the same force and effect as an instruction, but does not have permanent reference value. It therefore contains provision for its own nullification by a cancellation paragraph with the cancellation date always stated. When the exact length of time a notice is to remain in effect cannot be determined at the time of issuance, the specific date for record purposes is set far enough in the future to allow all necessary use of the notice.

PREPARATION AND MAINTENANCE OF DIRECTIVES

The following topics describe how directives are prepared and the procedure used to keep them up to date.

Identifying Directives

Each originating office identifies its directives by: (1) originator's abbreviated title (2) type of directive, (3) subject classification number, and (4) consecutive number, preceded by a decimal point (for instructions only). Example:

(1)	(2)	(3)	(4)
SECNAV	INSTRUCTION	5215	.1

Each directive is assigned a subject number from the Navy-Marine Corps Standard Subject Classification Table.

Consecutive numbers are assigned to instructions of the same subject classification number to show the order of issuance. Example: The subject number for "radio and radiotelephone" is 2302. An originating office assigns numbers to the first, second, and third instructions it issues on radio and radiotelephone as follows: 2302.1, 2302.2, and 2302.3. When there is substantial change in an instruction, it is rewritten, reissued, and carries the date of revision. Each revision is assigned the same subject classification and consecutive number as the superseded instruction. In addition, each

revision is further identified by a capital letter—the first revision A, the second B, and so forth.

Notices are not assigned consecutive numbers because of their one-time nature or brief duration.

Security Identification

The security classification of Confidential or Secret instructions and notices is indicated by prefixing the subject numbers with 0 for Confidential and by 00 for Secret. Regardless of the security classification of the individual instructions, a single set of consecutive numbers is used by each originating office for each subject number. Example: If the first instruction issued on "radio and radiotelephone" were unclassified, the second instruction Confidential, and the third instruction Secret, they would be numbered 2302.1, 02302.2, and 002302.3, respectively.

Format

Collective titles of addressees shown in the "To" line usually are indicated as "All Ships and Stations," the words "Distribution List," or whatever else is appropriate. Established distribution list codes from the Standard Navy Distribution List or special lists appear below the "Distribution" line. When titles are not given in the "To" line, they may follow the codes in the "Distribution" line.

The sequence of paragraphs in directives is at the discretion of the originating office, except as follows:

1. The purpose of each directive is stated in the first paragraph.

2. The second paragraph of a directive contains the statement of cancellation. (Exception: In a notice whose sole purpose is to cancel another directive, the statement of such cancellation may be made in the purpose paragraph.)

3. If applicable, the last paragraph of each instruction (next-to-last paragraph of each notice) indicates any reports required and any forms or records prescribed for use, and also states where the required forms may be obtained.

4. The last paragraph of each notice states when or under what conditions the notice is to be canceled. In all instances, a specific cancellation date (the last day of the month), is provided for record purposes.

5. Paragraph titles are used for all major paragraphs. They may be used also for subparagraphs.

TRANSMITTAL SHEETS

Transmittal sheets may be used by an originating office to distribute directives for consolidated mailings and scheduled distributions.

SUPPLEMENTS

Supplements are issued when an existing instruction needs to be amended and time does not permit issuing a complete revision, or when an existing instruction needs to be supplemented or amended for an interim period, after which the supplement is to be canceled and the instruction is to return to full effect.

Each supplement bears the same number as the instruction it modifies, plus the abbreviation "SUP" and a consecutive Arabic number. Example: If two supplements were to be issued to Change 2 of the Navy Directives System, they would be numbered 5215.1B CH-2 SUP-1 and 5215.1B CH-2 SUP-2.

CROSS-REFERENCE SHEETS

Cross-reference sheets are issued to indicate the location of instructions to which they refer. They are of two types:

1. Book-type instruction cross-reference sheets, known as locator sheets, are filed in the directives binder in place of bulky directives.

2. A subject cross-reference sheet is issued with an instruction if the instruction covers major related subjects that cannot logically be separated into two or more instructions, or if two or more subjects are equally applicable. Subject cross-reference sheets are not assigned a consecutive number.

Cross-reference sheets are reproduced on the same type and size of paper as that used for directives. An originator specifically cancels the cross-reference sheet when the instruction is canceled.

MAINTAINING DIRECTIVES

Because all instructions do not receive the same distribution, there are gaps in both subject classification numbers and consecutive numbers

of instructions held by any ship or station. Each originating office maintains a master set of all their effective outgoing directives. Recipients file instructions in standard three-ring or three-post binders and arrange them in the following sequence: first, in numerical order of subject classification number (capital letter P, wherever appearing, does not influence the filing sequence of book-type instructions); next, by originating office within each subject classification; then by consecutive number for each originating office. Exceptions to the foregoing filing sequence may be made in the following instances:

1. When frequent reference is made to directives from a particular office, copies of such directives (besides those maintained in the activity's master set) may be arranged primarily by originator, or by a combination of subject classification number and originator. Example: A communication officer might maintain together all directives in the 2300 series, or group all directives by originating office, depending on which of the two arrangements is more convenient.

2. Units afloat may file directives issued by the operating forces primarily by originator, or by a combination of subject classification number and originator.

Ordinarily, because of their brief duration, notices need not be filed. When notices are filed temporarily, they are interfiled with instructions. Copies of notices, besides those maintained in the activity master set, may be filed in separate binders.

Each supplement is filed with the instruction it modifies. Cross-reference sheets are interfiled with instructions and are placed in front of instructions of the same subject number issued by the same originator.

Directives are not placed in general correspondence or other activity files, except that copies of instructions and notices may be attached or interfiled in such files when needed to complete a record or to document an action.

STOCKING DIRECTIVES

Additional copies of directives, if required, are obtained from appropriate stocking points. Each originating office ensures that sufficient reserve stocks of effective directives are available at established stocking points.

DISPOSAL INSTRUCTIONS

Each activity maintains the directives it receives only during the period of their effectiveness. Canceled directives, regardless of classification, are destroyed by recipients without notification to the originating office.

CITING REFERENCES

When a directive is referenced or cited, and the referencing document does not clearly indicate in the text or elsewhere the subject of the reference, the citation includes the subject and directive number and may include the date. Example: SecNavInst 5215.1B, CH-1, 4 December 1964, Subj: The Navy Directives System. The date of a notice is always included for identification, inasmuch as notices do not carry a consecutive number.

STANDARD SUBJECT CLASSIFICATION SYSTEM

The Standard Navy Subject Classification Table and the Name-Title Symbols, contained in Navy-Marine Corps Standard Subject Classification System, SecNavInst P5210.11, are prescribed for use in classifying general correspondence and related papers (at the time of filing), numbering instructions and notices, and in assigning report symbols. Provisions of SecNavInst P5210.11 are recommended for use in classifying forms and any other documents to which reference is made by subject.

NUMERICAL SUBJECT CLASSIFICATIONS

Under the Navy Directives System, there are 13 major subject groups. Each group is identified by a four- or five-digit numerical code. They are—

1000 series	Military Personnel
2000 series	Communications
3000 series	Operations and Readiness
4000 series	Logistics
5000 series	General Administration and Management
6000 series	Medicine and Dentistry
7000 series	Financial Management
8000 series	Ordnance Material
9000 series	Ships Design and Ships Material
10000 series	General Material
11000 series	Facilities and Activities Ashore
12000 series	Civilian Personnel
13000 series	Aeronautical and Astronautical Material

The 13 major groups are subdivided into primary, secondary, and sometimes tertiary breakdowns. Primary subjects are designated by the last three digits (the hundred group) of the code number, secondary subjects by the last two digits, and tertiary breaks by the final digit. Example:

2000 Communications
2100 Messages
2110 Military Messages
2112 Navigational Warning Messages
2200 Communication Security
2300 Communication Methods, Procedures, etc.

Some of the smaller subject groups are not subdivided below the primary breakdown, whereas larger groups may have secondary and tertiary divisions, as needed.

NAME-TITLE SUBJECT CLASSIFICATIONS

Material relating solely to specific organizations, transactions, titles, or names may be classified and filed under the pertinent name or title. The name-title symbols are alphabetical or alphabetical-numerical codes for names and titles frequently used by the Department of the Navy. They include symbols for fleet organizations; the U.S. Government; foreign governments; commercial enterprises and firms; classes of personnel; and official symbols for classes and types of aircraft, vessels, and guided missiles.

CODING NAMES AND TITLES

The first letter of the name or title code designates the large organizational group; the second or third letters denote a further breakdown of the larger group. For example, NA designates Naval Air Stations. Letter N is for the Naval Shore Establishment; letter A, for air stations.

An Arabic numeral added to the letter symbol further subdivides the code. Example:

FF Fleets, Forces, Types, Areas, and Sea Frontiers
FF1 U.S. Fleet
FF2 U.S. Task Fleets

Names as Primary or Secondary Subjects

Names or titles may be used as the primary subject or as a further subdivision of a primary, secondary, or other subject. Examples (either is correct):

5910 Space Requirements
5910/EN (Space Requirements of the Navy Department)
EN Navy Department
EN/5910 (Navy Department, Space Requirements for)

Adding Arbitrary Name Codes

Because standard symbols are provided only for names or titles used most frequently, activities so desiring may further subdivide name titles by adding a slant symbol and either (a) assigning an arbitrary symbol or (b) adding the name or title or an abbreviation thereof (arranged alphabetically). To illustrate, the Atomic Energy Commission may be indicated in any of the following ways:

EH/1
EH/AEC
EH/Atomic Energy Commission

Types of shore establishments may be subdivided by geographical location. For example, the Naval Air Station, Norfolk, Virginia would be designated thus: NA/Norfolk.

Vessel types may be subdivided by the name of the vessel or by vessel identification numbers, which may be found in NavShips 18-1, Naval Vessel Register. Vessel identification numbers should be used with the symbols without a slant symbol (BB61). If the name of the vessel is used, it should be preceded by the slant (e.g., CVA/Ticonderoga).

STANDARD PUBLICATIONS

In addition to understanding the systems just described, your work requires a more specific familiarity with certain commonly used publications. Although this section presents only a brief discussion of these standard publications, you should examine each carefully. Ordinarily much of your work can be made easier (and less time-consuming) if you know which publication covers needed material and where in it the material is located.

NAVY REGULATIONS

Foremost in general importance among official publications is United States Navy Regulations, which outlines the organizational structure

of the Department of the Navy and promulgates the principles and policies by which the Navy is governed. Set forth in its 21 chapters are, among other subjects, the responsibility, purpose, authority, and relationship of each bureau and office of the Navy Department and of the most important officer billets.

Navy Regulations is prepared and revised by the Chief of Naval Operations. It is published in looseleaf form, and is kept in an adjustable binder so that changes may be inserted as necessary. Navy Regulations and changes to it are promulgated by the Secretary of the Navy after approval by the President or the Secretary of Defense. If you examine the letter of promulgation on page II of the current edition, you will see that it is signed by SecNav and countersigned by the President. This publication and its changes are distributed by the Chief of Naval Operations. The current edition of Navy Regulations was issued in 1948.

Before changes are issued, and before they are sent to the Secretary of the Navy, they are submitted by the Chief of Naval Operations, for comment, to all Navy bureaus, the Judge Advocate General, and the Commandant of the Marine Corps. Any written comments accompany the suggested change, so that the Secretary has the benefit of all points of view prior to his decision to approve or disapprove the change.

GENERAL ORDERS

Navy Department General Orders are prepared in the Office of the Chief of Naval Operations and are signed by the Secretary of the Navy. They include Navywide orders relating to special ceremonies, commendations, organization, budget and appropriations, Presidential Executive Orders, and similar matter regarding the naval service. Instructions on policy are not issued as General Orders but as changes to Navy Regulations. It is customary to file General Orders in the same binder with Navy Regulations. Periodic reprints revise General Orders to bring them up to date.

CORRESPONDENCE MANUAL

The Navy Correspondence Manual (SecNavInst 5216.5) is published by the Administrative Office, Navy Department (AO). (This publication was discussed in chapter 5.) It contains instructions for preparing all types of naval letters, endorsements, memorandums, and messages. The instructions cover all parts of correspondence: address, subject, references, paragraphing, and signature, together with directions for assembling correspondence for signature and mailing. The manual specifies standards to follow when typing instructions and notices. Also included is a chapter on writing letters in civilian form.

Changes to the Correspondence Manual are issued by the Administrative Office, Navy Department (AO).

SECURITY MANUAL

The Department of the Navy Security Manual for Classified Information (OpNavInst 5510.1B), issued by the Chief of Naval Operations, is the basis security directive relating to safeguarding classified information. Its provisions apply to all military and civilian personnel and to all activities of the Naval Establishment.

The Security Manual contains detailed instructions for classifying, marking, and handling classified information, and for access to and authorized disclosure of the information.

The Security Manual is discussed in greater detail in chapter 7.

OPNAVINST 5510.49A

In much the same way that the Security Manual is the basic security directive for the Navy, the Guide for the Handling and Control of Classified Matter (OpNavInst 5510.49A) is an administrative guide serving as a model for a uniform classified matter control system. It augments the Security Manual, providing for the same interpretation of the rules by all activities.

BUPERS MANUAL

The Bureau of Naval Personnel Manual, NavPers 15791-A contains instructions governing the administration of Navy personnel. It is in five parts:

Part A—Organization, Plans, and Control
Part B—Correspondence, Post Offices, Records, and Reports
Part C—Administrative Regulations and Procedures
Part D—Training and Education
Part H—Instructions Relating to the Naval Reserve

Parts E, F, and G have been canceled or included in other parts of the Manual.

Numbering Articles

You should understand how the various parts of the Manual are designated. From the preceding organizational makup of the BuPers Manual, you see that each part has a capital letter designation. Each part is divided into chapters, each chapter into sections, each sections into articles. Every subdivision of each part of the Manual is identified by number. Article numbers below 10 are preceded by 0, as 04 or 09. You must remember this arrangement, because articles from the BuPers Manual are cited continually in correspondence, reports, and instructions.

Assume that your division officer wants to review current regulations governing enlisted performance evaluation before making up semiannual evaluations (NavPers 792) for the men in his division. The index in the BuPers Manual refers you to its Article C-7821. Applying what you learned in the previous paragraph, you turn to part C, chapter 7, section 8, article 21, and you find these titles:

Part	C—Administrative Regulations and Procedures
Chapter	7—Performance
Section	8—Discipline
Article	21—Enlisted Performance Evaluations

In referring to instructions in the BuPers Manual, only the article need be shown in correspondence because the part, chapter, and section are included; for example, "Art. C-7821."

DNC 5

The effective edition of DNC 5, U.S. Naval Communication Instructions, is one of the most important communication publications for the man at the operating level. This unclassified, nonregistered publication is issued by CNO. It contains several hundred pages of information, advice, and instructions on virtually every phase of naval communications.

About half the total contents of the publication deals with communication procedures. You are required to have a knowledge of the contents of DNC 5. This requirement is not as imposing as it may seem, because some of the information is so basic that you will learn it by just being around a communication office. You also will refer to it frequently in the course of your work, and further your acquaintance with its contents in that manner.

The index of the box is arranged alphabetically by subject matter. References are given for both the page number and the article number. If you are looking for information on radiotelegraph logs, you will find it indexed under the entry for "Logs, radiotelegraph." Then you thumb to the page and article indicated.

In general, the communication procedures explained in DNC 5 are the same as those contained in Allied Communication Publications. You must remember, though, that DNC 5 is distributed only within the U.S. Navy, whereas ACPs are held by all armed services of the United States and allied countries. In occurrences of conflicting communication procedures between DNC 5 and any of the ACPs, DNC 5 is the governing publication for use within the U.S. Navy.

Many test questions in fleetwide competitive examinations are based on information in DNC 5. If you need a considerable amount of study in that publication, you are advised to get an early start.

JOINT AND ALLIED COMMUNICATION PUBLICATIONS

In addition to DNC 5, you frequently will need joint and allied publications or other naval publications that have a direct bearing on communication procedures. Some of these publications are referenced later in connection with specific equipments; others are included in the reading list at the front of this training course.

Long titles for these publications are hard to remember, so a shorter identification system is employed in operating situations. The first part of this designation consists of an abbreviation for the type of publication. Example:

ACP—Allied Communication Publication.
JANAP—Joint Army-Navy-Air Force Publication.
FXP—Fleet Exercise Publication (issued by OpNav).
NWP—Naval Warfare Publication (issued by CNO).

The abbreviation is followed by an Arabic numeral, and this combination comprises the

short title, such as JANAP 119 or FXP 3. Completely revised publications are identified with a capital letter enclosed in parenthesis, A for the first revision, B for the second, and so forth. To illustrate, the short title might be ACP 125 (B) or NWP 16 (A). Supplements, when issued, bear the short title of the publication, followed by the number of the supplement. For example, a second supplement to ACP 125 (B) is referred to as ACP 125 (B), supplement 2.

Because of their classification, these publications require strict accountability. Any publications maintained on an operating station (e.g., radio central) are controlled by a watch-to-watch inventory. A publication custody log (fig. 6-1), signed by each watch supervisor, records this inventory.

REGISTERED PUBLICATIONS SYSTEM

As you learned from chapter 2, the Registered Publications System (RPS) is administered by the Naval Security Group. This system provides maximum protection against loss or compromise of written material by a tightly controlled system of issue, identification, accounting, and stowage. If an item is lost or destroyed, CNO must be informed immediately. Because of the rigid safeguards involved, each command designates an officer to control registered publications. Under ordinary conditions, the closest you will come to handling RPS-distributed material is to enter changes or corrections.

The effective editions of RPS 4 and RPS 36 contain instructions for accountability and destruction of RPS materials.

*TECHNICAL PUBLICATION LIBRARY

The Technical Publication Library (TPL) is an offshoot of the Registered Publications System. The TPL contains publications that must be accounted for and controlled, but which do not justify the very close accounting and supervision necessary for the documents distributed through RPS. Running the TPL may be your job almost anywhere.

Any extended discussion of TPL in this text would only repeat the information contained in OpNavInst 5605.6, 5605.7, and 5605.8; for this reason, our coverage here is kept brief. You will also find complete instructions on TPL operations contained in NWP 0.

*May be referred to as ComTac Library by some Commands.

MAINTAINING TPL CONTROLS

Basically, the reasons for maintaining controls on publications are to ensure that—

1. The full allowance is on board.
2. They are readily available.
3. They are corrected up to date.
4. Security provisions are observed.

The Technical Publication Library is the central control point within the command that makes sure the foregoing requirements are met.

A publication control officer is the official custodian of all publications in TPL, and it is his job to see that the library is operated properly. As publications clerk, your job is the physical preparation and execution of all transactions, as well as the record keeping.

YOUR WORK IN TPL

When a publication arrives on board, you must prepare a Catalog Card, OpNav Form 5070-11, for the custody record file. With a rubber stamp, place the TPL mark on the front cover of the book and on the title page (or another page near the front). Within the rubber stamp markings, and on the catalog card, place the copy number of the publication. (Every copy of each publication is given a number.) If only one copy is received, it becomes number 1. Each time you issue the publication, obtain the signature on the catalog card of the drawee. Each time it is returned, sign the card in the drawee's presence to show its return. If a publication is lost, transferred, or destroyed, the catalog card is retained at least 2 years.

When changes or corrections to publications are received, you enter them in all copies of the publication in the library. For those copies issued to and held by a TPL holder (one who has temporary custody of or "holds" a TPL publication), deliver the change to the holder, along with a change entry certification. The holder himself enters the change, signing the certification, which then is returned to you and retained in your transaction file. The transaction file contains copies of all correspondence dealing with TPL publications.

Immediately before the annual administrative inspection—possibly more often—a local board of two officers is scheduled to inspect TPL. For this purpose you prepare, in advance,

an accurate inventory of all publications on board. The inventory may be checked by the annual inspection party, so be certain that it is correct.

CORRECTIONS TO PUBLICATIONS AND INSTRUCTIONS

In addition to a working knowledge of official publications and directives discussed in this chapter, your Communications Yeoman duties include entering corrections to these items.

Corrections to publications are issued in four ways: errata, changes, memorandums, and messages. Usually instructions are updated with change transmittals, but book-size instructions may be issued with errata sheets. Let's examine each type of correction in more detail.

Errata are corrections, usually mimeographed, distributed with a publication or change to a publication at the time of its initial distribution. Errata are issued to correct printing errors, defects that may affect the status or accountability of a publication, or to amend serious errors in the text that could lead to misinterpretation.

A change to a publication is itself a serially numbered publication, and may consist of pen-and-ink corrections, cutout corrections, or new pages to amend or add to the contents of basic publications. Changes are numbered consecutively (change 1, 2, and so on).

Similar to publication changes are change transmittals, used to distribute a change to a single instruction. The transmittal describes the nature of the change. It is prepared in directive format, and is identified by the same number as the instruction it changes, plus the assigned number. The words "CHANGE TRANSMITTAL" follow the instruction designation, such as SECNAV INSTRUCTION 5215.1B CHANGE TRANSMITTAL. The subject line shows the date of the instruction being changed: "Subj: CH-1 to SECNAVINST 5215.1B of 1 Oct 1964, Subj: The Navy Directives System."

Memorandum corrections are of two kinds: Registered Publication Memorandum Corrections (RPMC) for corrections to RPS-distributed publications, and Navy Memorandum Corrections (NMC) for publications distributed by the Forms and Publications Supply Office of the naval supply system. Memorandum corrections are used when time does not permit the preparation of a serially numbered change. Using a system of two numbers separated by a slant sign, RPMCs and NMCs are numbered serially. The figure before the slant sign indicates the number of the NMC or RPMC; numbers run consecutively until all information has been confirmed by printed change to the basic publication. The figure after the slant sign indicates the change that will confirm the material contained in the NMC or RPMC. For example, NMC 2/1 to ACP 113 is the second NMC issued to ACP 113 and will be confirmed by a forthcoming change 1.

Message corrections to publications are issued by ALCOM general messages (ALCOMLANT, ALCOMPAC when appropriate). General messages are numbered serially on an annual basis. For example, ALCOM 10/65 is the tenth ALCOM promulgated during 1965. Messages corrections are used only when it is absolutely necessary to disseminate the correction by rapid means.

Entering corrections is tedious work. It is a necessary chore, however, and is of such importance that it warrants your most careful attention. Here are some general rules for entering corrections.

1. Read and understand the specific instructions contained in the correction before you begin the actual entry.
2. For pen-and-ink corrections, use any dark ink except red. Red is not visible under the red night lights used aboard ship.
3. Type lengthy pen-and-ink corrections on a separate slip of paper, then paste the paper on the page.
4. When cutouts are provided, use them in preference to pen-and-ink corrections.
5. Cutouts should be cemented flat on the page with rubber cement or mucilage. Rubber cement or mucilage is more satisfactory than cellophane tape, because the tape often sticks pages together or may tear pages if its removal is attempted. If there is insufficient room on the page to insert cutouts, they may be attached to the inner (binding) edge of the page as flaps.
6. Delete, in ink, all subject matter superseded by a cutout before adding the cutout. This method prevents using the superseded material if the cutout becomes detached.
7. Because a correction entered in one section of a publication often affects another section, such as the index, make certain that the corrections are entered in all applicable sections.

PUBLICATION CUSTODY LOG

WATCH-TO-WATCH PUBLICATION INVENTORY FOR Radio Central

Short Title	Reg. Nr.	Day-Month-Year Period of Watch	10 Dec 64 0000-0400	10 Dec 64 0400-0800	10 Dec 64 0800-1200	10 Dec 64 1200-1600	10 Dec 64 1600-1800	10 Dec 64 1800-2000	10 Dec 64 2000-0000	11 Dec 64 0000-0400	11 Dec 64 0400-0800							
ACP 100			✓✓	✓	✓	✓	✓	✓	✓	✓	✓							
ACP 110			✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓							
ACP 112			✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓							
ACP 113			✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓							
ACP 121			✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓							
FXP 3			✓	✓	✓	✓	✓	✓	✓	✓	✓							
JANAP 119			✓	✓	✓	✓	✓	✓	✓	✓	✓							
JANAP 195			✓	✓	✓	✓	✓	✓	✓	✓	✓							
(Full) Signature (in ink)			Purdue	Jack Colbert	Fred Cramer	Purdue	Jack Colbert	Fred Cramer	Purdue	Jack Colbert	Fred Cramer							

I certify that I have personally sighted and inventoried each of the above-listed publications and/or materials. By my signature above I acknowledge responsibility for maintaining security precautions and assume custody for all above-listed publications and/or material during my watch or until properly relieved of their custody. I will report immediately to the custodian or other competent authority any discrepancy in the inventory.

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Figure 6-1.—Publication custody log.

8. After entering pen-and-ink or cutout corrections, note along the margin, opposite the line containing the correction, the identification of the correction (as CH. 1, NMC 1/2, ALCOM 3, etc.).

9. Upon completion of the entry of any change affecting page numbers, and before destroying any superseded pages, make a page check of the publication.

10. After entering the correction, fill in the information required by the Record of Changes page in the front of the publication. This page provides spaces for the correction number and its date, the entry date, your signature and rate, and the name of your ship or station. If a Record of Changes page is not provided, notation of change entry should be entered either on the Title Page or the Letter of Promulgation page.

CHAPTER 7

SECURITY

The security of the United States in general, and of naval operations in particular, depends in part upon the success attained in safeguarding classified information. Every Communications Yeoman must be security conscious to the point that he automatically exercises proper discretion in the discharge of his duties and does not think of security of information as something separate and apart from other matters. In this way, security of classified information becomes a natural element of every task and not an additionally imposed burden.

In his daily work routine the Communications Yeoman learns information of vital importance to the military and to the Nation. Much of the vast amount of intelligence carried in the messages handled by naval communications passes at some point through the hands of Communications Yeomen—data that, if available to an enemy, would enable him to learn the strength and intent of our forces, and to gather a wealth of technical information relating to the procedures and operations of the United States Navy.

You will use many official documents and publications that relate to such communication matters as frequencies, call signs, and procedures. Their content must be protected also, because the more an enemy knows about our communications the better are his chances of deriving intelligence from them.

CLASSIFICATIONS

Security is a protected condition that prevents unauthorized persons from obtaining information of military value. Such information is afforded a greater degree of protection than other material and is given a special designation: classified matter. This term includes all publications, documents, cipher keys and aids, code books, letters, and messages in the three security classifications of Top Secret, Secret, and Confidential (including Confidential—Modified Handling Authorized). Following are examples and definitions of each:

TOP SECRET

The Top Secret classification is limited to defense information or material requiring the highest degree of protection. It is applied only to information or material the defense aspect of which is paramount, and the unauthorized disclosure of which could result in EXCEPTIONALLY GRAVE DAMAGE to the Nation, such as—

1. A war, an armed attack against the United States or her allies, or a break in diplomatic relations that would affect the defense of the United States.
2. The unauthorized disclosure of military or defense plans, intelligence operations, or scientific or technological developments vital to the national defense.

SECRET

The Secret classification is limited to defense information or material the unauthorized disclosure of which could result in SERIOUS DAMAGE to the Nation, such as—

1. Jeopardizing the international relations of the United States.
2. Endangering the effectiveness of a program or policy of vital importance to the national defense.
3. Compromising important military or defense plans, or scientific developments important to national defense.
4. Revealing important intelligence operations.

CONFIDENTIAL

The use of the classification Confidential is limited to defense information or material the

unauthorized disclosure of which could be PREJUDICIAL TO DEFENSE INTERESTS of the Nation, such as—

1. Operational and battle reports that contain information of value to the enemy.
2. Intelligence reports.
3. Military radiofrequency and call sign allocations that are especially important, or are changed frequently for security reasons.
4. Devices and material relating to communication security.
5. Information that reveals strength of our land, air, or naval forces in the United States and overseas areas, identity of composition of units, or detailed information relating to their equipment.
6. Documents and manuals containing technical information used for training, maintenance, and inspection of classified munitions of war.
7. Operational and tactical doctrine.
8. Research, development, production, and procurement of munitions of war.
9. Mobilization plans.
10. Personnel security investigations and other investigations, such as courts of inquiry, which require protection against unauthorized disclosure.
11. Matters and documents of a personal or disciplinary nature, which, if disclosed, could be prejudicial to the discipline and morals of the armed forces.
12. Documents used in connection with procurement, selection, or promotion of military personnel, the disclosure of which could violate the integrity of the competitive system.

NOTE: Official information of the type described in paragraphs 10, 11, and 12 is classified Confidential only if its unauthorized disclosure could be prejudicial to the defense interests of the Nation. If such information does not relate strictly to defense, it must be safeguarded by other means than the Confidential classification.

CONFMOD

The Confidential classification has a subdivision: Confidential—Modified Handling Authorized (CONFMOD). The CONFMOD category may be authorized for matter the originator believes will be protected sufficiently by somewhat less strict stowage and transmission safeguards than are necessary for Confidential. Normally, CONFMOD material is stowed in the same manner as other Confidential material.

Material that may be classified CONFMOD includes, but is not limited to, the following:

1. Training manuals, field and technical manuals, and related materials.
2. Photographs, negatives, photostats, diagrams, and the like.
3. Defense procurement plans, including procurement contracts and related matters.
4. Communication materials, publications, and messages.
5. Charts and maps.
6. Information received from or furnished to foreign nations under international exchange of information, agreements, and policies.

ADDITIONAL MARKINGS FOR CLASSIFIED MATERIAL

You will find other markings on documents in addition to the four security labels mentioned already. Among these markings are such designations as "Restricted Data," NOFORN, and "For Official Use Only."

Restricted Data

All data concerned with (1) the design, manufacture, or utilization of atomic weapons, (2) the production of special nuclear material, or (3) the use of special nuclear material in the production of energy bear conspicuous "Restricted Data" markings. Restricted data, when declassified under the Atomic Energy Act of 1954, must be marked "Formerly Restricted Data, Handle as Restricted Data in Foreign Dissemination, Section 144b, Atomic Energy Act, 1954."

NOFORN Designation

Whenever the handling of classified documents is such that the documents are liable to inadvertent disclosure to foreign nationals, originators should stamp the documents thus: "Special Handling Required, Not Releasable to Foreign Nationals." When this term is used in a message, it is abbreviated NOFORN.

For Official Use Only

The term "For Official Use Only" is assigned to official information that requires some protection for the good of the public interest but is not safeguarded by classifications used in the interest of national defense.

CLEARANCES

No one may have access to classified matter without proper security clearance. A security clearance is an administrative determination that an individual is eligible, from a security standpoint, for access to classified matter. If your duties require you to use classified publications and documents (and they are virtually sure to), the commanding officer is authorized to grant you clearance up to Confidential after ascertaining that you are trustworthy, discreet, and of unquestionable loyalty. Clearance to handle Secret material can be granted only after an additional check of BuPers records and an investigation by the Office of Naval Intelligence. All clearances are authorized by the CO of a man's present command, and only when there is a "need to know." Notation of a man's clearance is made in his service record.

COMPROMISE

No one in the Navy is authorized to handle any classified material except that required in the performance of duty. All other persons are unauthorized, regardless of rank, duties, or clearance.

If it is known—or even suspected—that classified material is lost, or is passed into the hands of some unauthorized person, the material is said to be compromised. The seriousness of the compromise depends on the nature of the material and the extent to which the unauthorized person may divulge or make use of what he learns. Never fail to report a compromise that comes to your attention.

SECURITY AREAS

The shipboard and shore station spaces that contain classified matter are known as security areas. These security areas (sometimes called sensitive areas) have varying degrees of security interest, depending upon their purpose and the nature of the work and information or materials concerned. Consequently, the restrictions, controls, and protective measures required vary according to the degree of security importance. To meet different levels of security sensitivity, three types of security areas have been established: exclusion, limited, and controlled areas.

EXCLUSION AREA

The cryptocenter, RPIO vault, classified conference room, and other spaces requiring the strictest control of access are designated exclusion areas. They contain classified matter of such nature that admittance to the area permits, for all practical purposes, access to such matter.

Exclusion areas are fully enclosed by walls or bulkheads of solid construction. All entrances and exits are guarded, and only those persons whose duties require access and who possess appropriate security clearances are authorized to enter, after being positively identified. Normally, a list of personnel authorized entry, signed by the CO, is posted in the area.

LIMITED AREA

Radio central, the message center, relay station, transmitter rooms, and other communication spaces usually are designated limited areas.

Operating and maintenance personnel whose duties require freedom of movement within limited areas must have proper security clearances. The commanding officer may, however, authorize entrance of persons who do not have clearances. In such instances, escorts or attendants and other security precautions must be used to prevent access to the classified information located within the area.

The entrance and exits of limited areas are either guarded or controlled by attendants to check personnel identification, or they may be protected by automatic alarm systems.

CONTROLLED AREA

Passageways or spaces surrounding or adjacent to limited or exclusion areas are often designated controlled areas.

Although the controlled area does not contain classified information, it serves as a buffer zone of security restriction and provides greater control, safety, and protection for the limited or exclusion areas.

Controlled areas require personnel identification and control systems adequate to limit admittance to those having bona fide need for access to the area.

COMMUNICATION SECURITY PHASES

Communication security (COMSEC) is the protection resulting from all measures designed to deny to unauthorized persons any information of value that might be derived from the possession and study of telecommunications, or

to mislead unauthorized persons in their interpretation of the results of such a study. There are four phases of communication security: physical security, cryptosecurity, transmission security, and censorship.

PHYSICAL SECURITY

The physical security of classified material depends upon proper handling on the part of every user, proper stowage when it is not in use, and complete destruction when necessary.

Handling Precautions

Each individual in the communication organization must take every precaution to prevent intentional or casual access to classified information by unauthorized persons. When classified publications are removed from stowage for working purposes, they must be covered or placed face down when not in use. Unauthorized visitors must not be permitted in communication spaces. Never discuss classified information over the telephone. Rough drafts, carbon paper, worksheets, and similar items containing classified information should be destroyed after they serve their purpose. In the meantime, they must be handled and safeguarded as classified matter.

At the close of each watch or working day, make certain that all classified material that must be passed from watch to watch is inventoried properly and that custody is transferred to your relief. All other classified matter must be locked up. Notes regarding classified matter must not be left on memorandum pads or under desk blotters. Wastebaskets should be checked to see that they contain no classified material such as notes, carbon paper, excess copies, or rough drafts. These items must be placed in burn bags with other classified material and the burn bags properly stowed until destroyed according to a schedule promulgated by the communication officer or custodian.

Vaults, safes, or lockers used for stowage of classified matter must always be kept locked when not under the supervision of authorized personnel. Cryptographic aids and related classified matter must never be left unguarded by the user. You should habitually rotate the dial of all combination locks at least three complete turns in the same direction when securing safes, files, and cabinets. In most locks, if the dials are given only a quick twist, it is possible sometimes to open the lock merely by turning the dial in the opposite direction. Always assure yourself that all drawers of safes and file cabinets are held firmly in the locked position.

If you are working with classified material and are interrupted by a fire alarm or other emergency, you must stow the material in the same manner as at the end of a working day. It is your personal responsibility to safeguard all classified material in your possession.

Stowage

All classified matter not in actual use must be stowed in a manner that will guarantee its protection. The degree of protection necessary depends on the classification, quantity, and scope of the material.

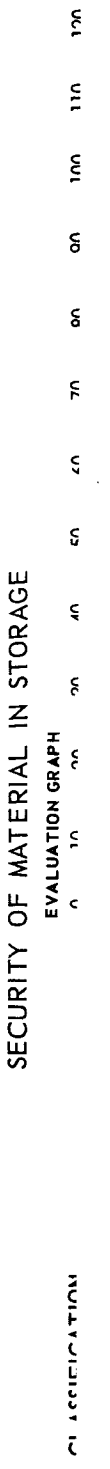
A numerical evaluation system has been developed for determining the relationship between the security interest and the level of protection required. The more secure the stowage facilities, the higher the numerical values assigned.

Figure 7-1 shows the numerical values required for quantity and type of documents of each classification. Table 7-1 is a guide for evaluating stowage facilities. Both the table and illustration must be used together.

For example, a ship stows plain language translations of encrypted messages in a metal container with attached keylock in the cryptocenter. Visitors are not allowed in any of the communication spaces, and only cryptographers may enter the cryptocenter itself or remove anything from its safe. The cryptographer on watch acts as a guard in attendance at the container. From table 7-1 we can assign a numerical value to these facilities as follows:

	Value
Sheltered aboard a commissioned ship	25
Stowed in metal container with attached keylock	5
Military guard in attendance at container	60
Total	90

From the graph in figure 7-1 you can see that stowage facilities with a numerical value of 90 are secure enough for everything but the two most sensitive classes of Top Secret material.



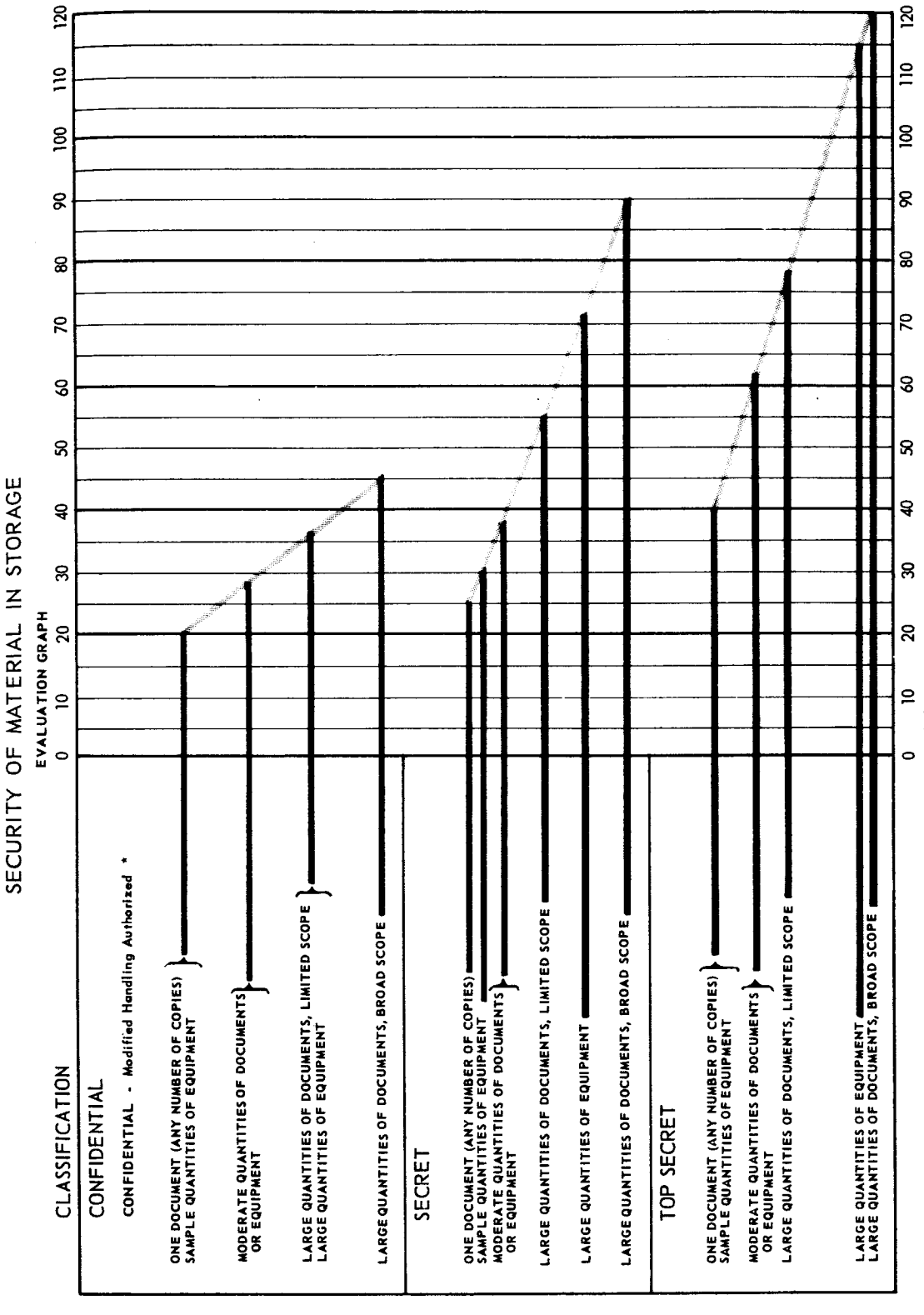


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Figure 7-1.—Numerical values required for quantity and type of documents of each classification.

Table 7-1.—Table of Numerical Equivalents (Simplified)

		Value
1.	SHELTER	
	None	0
	Conventional frame or good quality temporary structure	5
	Heavy structure, such as masonry building	10
	Commissioned ship	25
2.	STOWAGE CONTAINER	
	None	0
	Any portable container	0
	Any wooden container	0
	Metal container, key-lock (built-in)	2
	Metal container, key-lock (attached)	5
	Metal container, combination lock (attached)	10
	Metal container, combination lock (built-in)	15
	Light room vault	15
	Heavy room vault	35
3.	GUARDING	
	Unguarded	0
	Military guard in general area	15
	Military guard checks container every hour	20
	Military guard checks container every 30 minutes	25
	Military guard in attendance at container	60
	No supporting guard force	0
	Military supporting guard force	15
4.	PROTECTIVE ALARM SYSTEM	
	No alarm on container	0
	System to detect opening of container	10
	System to detect tampering with or opening of container	20
	System to detect approach to, tampering with, or opening of container	30
	No general area alarm	0
	System to detect entry into general area	25

Value

0
5
10
25

0
0
0
2
5
10
15
15
35

0
15
20
25
60
0
15

0
10
20
30
0
25

The keys or combinations to safes and lockers containing classified material are made available only to persons whose duties require access to them. The keys or combinations must be changed at least every 6 months. They also must be changed whenever any person having knowledge of them is transferred from the organization, and at any time the keys or combinations are suspected of being compromised.

Any time you find an unlocked and unattended safe or cabinet that contains classified material, report the condition immediately to the senior duty officer. Do not touch the container or contents, but guard them until the duty officer arrives. The duty officer then assumes responsibility for such further actions as locking the safe, recalling the responsible persons, and reporting the security violation to the commanding officer. The custodian must hold an immediate inventory of the contents of the safe and report any loss to the CO.

Consult Chapter 6 of the Department of the Navy Security Manual for Classified Information for further details on stowage of classified matter.

Destruction

The destruction of classified matter falls into two categories: routine and emergency. Destruction, when authorized or ordered, must be complete.

ROUTINE DESTRUCTION.—The destruction of superseded and obsolete classified materials that have served their purpose is termed routine destruction. Routine destruction of publications, message files, and certain cryptomaterials is carried out when authorized by specific directives. These directives are found in the letter of promulgation of the publication itself, in cryptographic instructions and manuals, and in U.S. Naval Communication Instructions (DNC 5 series). Other materials, such as classified rough drafts, worksheets, and similar items, are destroyed, as necessary, to prevent their excessive accumulation.

The most efficient method of destroying combustible material is by burning. It is likely, therefore, that you will be called upon to assist in burning classified material. As a member of the burn detail, you should know exactly what is to be burned and should doublecheck each item before it is burned. To facilitate complete destruction of bound publications, tear them apart, crumple the pages, and feed the pages to the fire a few at a time. If burn material is carried in a bag that is not to be burned, turn the bag inside out to make certain every piece of paper is removed and burned. The material must be watched until it is completely consumed, and the ashes broken up and scattered so that no scraps escape destruction.

When no incinerator is available, which often is true aboard ship, classified material may be burned in a perforated metal drum or container with a cover of wire netting.

EMERGENCY DESTRUCTION.—Emergency destruction of classified material is authorized any time it is necessary to prevent its capture by an enemy. On board ship, classified material is not subjected to the same risks as on land. If a ship is in danger of sinking or is severely disabled, however, action is taken in accordance with the ship's emergency destruction bill (fig. 7-2), the execution of which is an all-hands evolution from communication officer to striker. This bill details the method and the order of destruction of classified matter. Each man in the communication division is assigned responsibilities by duty and watch instead of by name. The bill provides alternates for each billet to ensure effective action despite personnel casualties.

Destruction plans call for the highest degree of individual initiative in preparing for and in actually commencing the required destruction. It is extremely important for all Communications Yeomen to understand that, in emergencies subjecting classified material to compromise through capture, they must start necessary destruction under the plan without waiting for specific orders.

Cryptographic material has the highest priority for emergency destruction. Insofar as humanly possible, it must not be permitted to fall into enemy hands. After cryptomaterial is destroyed, other classified communication material is destroyed in the order of classification—highest classified material first. Next in importance in the destruction plan is classified (noncryptographic) communication equipment, followed (if time permits) by destruction of unclassified material and equipment.

Destruction by fire is the preferred method for all combustible materials. Oil or chemicals may be used to facilitate burning. If the ship is in deep water, and time does not permit burning classified publications, messages, files,

USS JOSEPH K. TAUSSIG
DE-1030
EMERGENCY DESTRUCTION BILL

The following Emergency Destruction Procedures for Classified Material held by this command are effective this date: 10 October 19__

Space	Person Responsible	Alternate	Priority of Destruction
Registered publications safe	RPS custodian	Alternate custodian	1. Emergency keying data. 2. TOP SECRET cryptomaterial. 3. Superseded } Key lists, 4. Reserve } rotors, 5. Effective } and strips. 6. Reg. cipher equipment.
Cryptocenter	General quarters cryptomember	Crypto-security officer	7. Maintenance documents. 8. Operating instructions. 9. Remaining cryptomaterial. 10. Registered publications. 11. Nonregistered classified publications.
Radio I	Supervisor	Circuit operator	1. Aircraft codes; authentication systems; call sign ciphers; recognition signals.
Radio II	Circuit operator	Radio I JX talker	2. Registered publications. 3. Classified records; files. 4. Classified electronic equipment.
Signal bridge	Supervisor	Assistant navigator	5. Classified nonregistered publications.
CIC	Supervisor	JOOD	6. Unclassified publications and electronic equipment.

1. Method of destruction
   a. Deep water (over 100 fathoms)
      (1) Jettison publications in weighted perforated bags.
      (2) Smash crypto equipment beyond recognition if possible and jettison.
   b. Shallow water (less than 100 fathoms)
      (1) Burn publications completely, break up and scatter ashes.
      (2) Smash crypto equipment beyond recognition or reconstruction, taking care to remove all wiring, and scatter component parts over a wide area. Smash remaining electronic equipments so as to render them useless.
2. Record of destruction
   a. All personnel assisting in the execution of this bill will report in writing to the RPS custodian the degree of completion of such destruction. (Use the last watch-to-watch inventory.)
3. Execution of emergency destruction bill
   a. Emergency destruction will be ordered by the Commanding Officer, or, in his absence, by the next senior line officer present. In the event of an emergency, it may be necessary for the personnel designated above to carry out the provisions of this bill without further orders, if their estimate of the situation admits possibility of the loss of the ship.
4. Location of destruction equipment
   a. Sledges, wire cutters, screwdrivers, and weighted perforated bags are located in each communication space.

Approved:

Tolis Lewie, LCDR USN
Commanding Officer

Submitted:

H. T. Crowley, LTJG USN
Classified Material Control Officer

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Figure 7-2.—Typical emergency destruction bill.

and logs, they may be placed in weighted perforated canvas bags and thrown overboard (jettisoned). Classified equipment may also be jettisoned in water deep enough to preclude any possibility of recovery. Water over 100 fathoms is usually considered deep enough to prevent the enemy from conducting successful salvage operations.

If the ship is in shallow water combustible classified material must be burned, it may be jettisoned only as a last resort. Classified communication equipment must be smashed beyond recognition before jettisoning in shallow water. Unclassified communication equipment should be demolished beyond repair.

A sufficient number of perforated canvas bags and tools, including sledge hammers, screwdrivers, and wire cutters, are always kept in communication spaces for use in emergency destruction.

CRYPTOGRAPHIC SECURITY

Cryptography is the science of cloaking information in codes and ciphers.

A code is a system in which arbitrary groups of symbols represent units of plain text of varying length, usually syllables, words, phrases, and sentences.

A cipher is a system in which individual letters of a message are replaced, letter for letter, by other letters instead of complete words, phrases, or numbers. Cipher texts usually are transmitted in five-letter groups.

The cryptoboard, under the direction of the communication officer, is responsible for the proper encryption and decryption of messages. Along with officers, reliable enlisted personnel may be appointed to this board. Members of the board, known as cryptographers, must be proficient in the use of all codes and ciphers held by the command.

Loss of a cryptographic publication or the transmission of faultily encrypted messages endangers the security of the cryptosystem. Such occurrences frequently require the immediate replacement of the key list used, because subsequent transmissions with the same key list might be little better than plain language. The work and expense of superseding a key list, though great, are insignificant compared with the consequences of compromise.

The enemy constantly and painstakingly studied our codes and ciphers in an attempt to discover the keys to our many cryptographic systems. This technique is known as cryptanalysis. The best defense against this type of enemy intelligence is cryptosecurity—the careful use of technically sound cryptosystems.

TRANSMISSION SECURITY

Transmission security is that component of communication security that results from all measures designed to protect transmissions from unauthorized interceptions, traffic analysis, and imitative deception.

Some methods of transmission are more secure than others. In general, the means and types of transmission, in their order of security, are as follows:

1. Messenger;
2. Registered mail (guard mail, U.S. postal system, or diplomatic pouch);
3. Approved wire circuits;
4. Ordinary mail;
5. Nonapproved wire circuits;
6. Visual (semaphore, flaghoist, flashing light);
7. Sound systems (whistles, sirens, bells);
8. Radio

Messenger

Classified matter is transmitted by messenger when security—not speed—is the paramount objective. The principal messenger agency for the Department of Defense is the Armed Forces Courier Service (ARFCOS). This agency is responsible for the safe transmittal of highly classified matter to military addressees and certain civilian agencies throughout the world. The ARFCOS courier transfer stations are located in designated areas. Every item of classified material sent via ARFCOS is in the physical custody and control of a commissioned officer courier from the time of entry into the system until the addressee or his authorized representative receipts for it. Classified material that may go by registered United States mail is not transmitted by ARFCOS.

Guard mail is another type of messenger service for transmitting classified material, although unclassified material is also delivered by this means. Reliable petty officers as well as commissioned officers are appointed as guard mail messengers. Guard mail is used, for instance, in a naval district for delivering mail to other military or Government activities located in the same area, and also in conjunction with ordinary mail service to and from ships in port.

Mail

In addition to transmitting unclassified material, the United States postal system is used to transmit classified material except Top Secret matter and cryptographic aids and devices. Secret and Confidential matter must be sent by registered mail instead of by ordinary mail, and must not enter a foreign postal system. The single exception to this is that material addressed to Canadian Government activities is permitted to pass through the Canadian postal system. Material classified CONFMOD may be sent by ordinary first class mail through both United States and Canadian postal systems. The great bulk of the Navy's administrative traffic is sent by mail, thus reserving radio circuits for operational traffic insofar as possible.

Mailable Secret and Confidential matter is double-wrapped, as shown in figure 7-3. Top Secret matter is prepared similarly, but does not, of course, go through the mails. Use of the inner envelope is not required for CONFMOD material.

Wire Circuits

When available, wire circuits invariably are used in preference to radio, because they are less susceptible to interception. Wire systems are of two types: approved and nonapproved.

An approved circuit is specified by proper authority for the transmission of classified information in the clear. Messages classified Secret and below may be transmitted on such circuits.

A nonapproved circuit is not designated by proper authority for the transmission of classified information in the clear.

Telephone circuits normally are considered nonapproved and are not used to discuss classified data unless specifically designated as approved. Approved telephone circuits are equipped with security devices to minimize the possibility of wiretapping.

Often, wiretapping may be discovered by physical examination or by transmission irregularities. Interception by induction, however, can escape detection completely. Supersensitive devices placed near the wire circuit pick up sounds through a 2-foot wall. Tiny microphones, hidden in telephone receivers, pick up not only telephone conversations but voices anywhere in the room.

Underwater cables also are liable to unauthorized interception, although they are more difficult to tap than landlines. Submarines are able to make successful interceptions through induction. The point where the cable emerges into shallow water is the most vulnerable.

Visual Communications

Visual communication systems are used in preference to radio except at night, when there is a possibility of divulging the ship's position. They are more secure than radio because reception is limited to units in the immediate vicinity of the sender.

Visual communication methods rank, in order of security, according to the distance from which the signals can be seen. In daylight the relative order is semaphore, directional flashing light, panels, flaghoist, pyrotechnics, and nondirectional flashing light. At night the order is infrared, directional flashing light, pyrotechnics, and nondirectional flashing light.

The greatest care must be taken to ensure that signal lights are used only when necessary, and that the minimum of light is employed. An exception is for recognition signals, which must be sent on a light sufficiently brilliant to be seen at once.

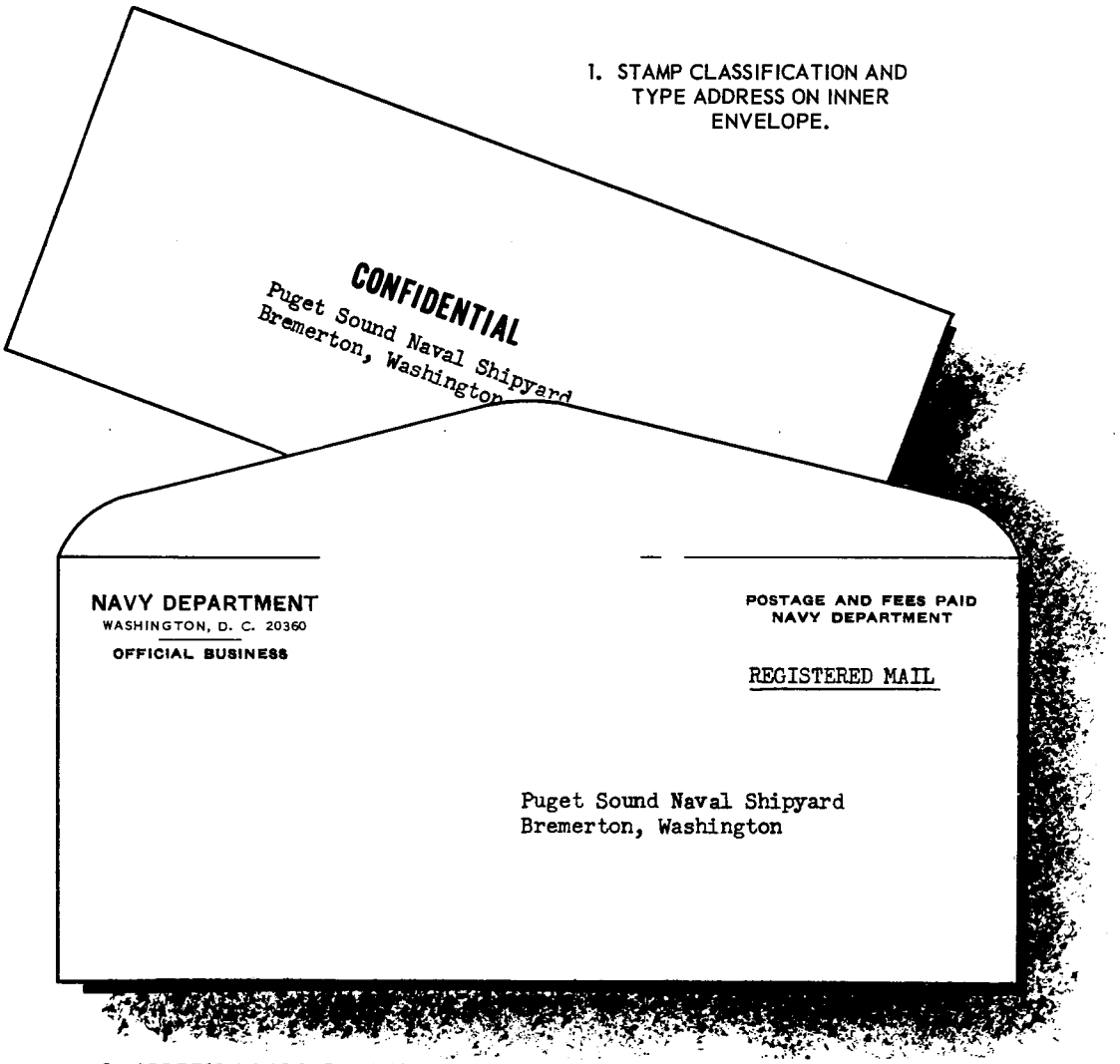
Transmission of plain language messages is kept to a minimum because many persons are adept at reading light's and flags.

Sound Systems

Whistles, sirens, foghorns, bells, and underwater sound devices are common types of sound systems. They are utilized by vessels to transmit emergency warning signals (air raid alerts, mine sighting, etc.) and for signals prescribed by the Rules of the Road. Sound systems have the same range limitations as visual methods and also are less secure. Their use for the most part, is restricted to maneuvering and emergency situations.

Radio

Radio is potentially the least secure means of communication. A message sent by radio is open to interception by anyone who has the necessary equipment and is within reception range. Thus, in addition to obtaining intelligence, the enemy may be able to fix the location of operating forces through direction finding. By



6.1

Figure 7-3.—How mailable classified matter is prepared.

employing deceptive techniques, he could confuse and hamper our communications and, by traffic analysis, forecast the intentions of our forces.

Uses of radio in the ultrahigh frequency (UHF), superhigh frequency (SHF), and extremely high frequency (EHF) ranges normally have security approaching visual means. Experience has proven, however, that transmissions of these frequencies beyond line-of-sight distances have occurred frequently. Consequently, it is important that all users recognize the possibility of interception at distances far beyond the normal usable ranges.

Despite its shortcomings, though, radio still is the primary means of communication. It is fast, reliable, and often the only method of maintaining contact between distant and highly mobile units. A satisfactory degree of security can be obtained only by using it properly and intelligently.

The following five topics describe the ways by which radio communications may be sabotaged by the enemy, and countermeasures that may be applied.

INTERCEPTION AND DIRECTION FINDING.—The best defense against enemy intelligence efforts by interception and direction finding is strict radio silence. It is apparent that the enemy cannot gain intelligence from radio transmissions if none are sent. Radio silence is placed in effect when it is reasonable to assume that the enemy is unaware of the location or impending movements of a ship or force. If it is impracticable to maintain radio silence, the following defensive measures make interception and direction finding more difficult.

1. Avoid unauthorized transmissions and unnecessary testing.
2. Use combinations of transmitters, antennas, and power to produce minimum wave propagation and emission intensity consistent with reliable communications.
3. Use the broadcast method of transmitting traffic in preference to the receipt method.
4. Conceal instructions to shift frequency by using an encrypted message in the absence of a prearranged plan.
5. Adjust transmitters accurately and adhere to frequency tolerances, thereby preventing the need for repeating messages or parts of messages.
6. Maintain strict circuit discipline.

TRAFFIC ANALYSIS.—The enemy may gain valuable information from his study of our communications by traffic analysis. Traffic analysis includes studying message headings, receipts, acknowledgments, relays, routing instructions, and service messages; tabulating the volume, types, and directional flow at each point; and correlating information taken from unclassified messages, noting departures from normality.

Assume that within a short time a radio message is transmitted from point Bravo to Romeo, another to Victor, another to a unit of the fleet operating off Whiskey, and a fourth to a unit off Oscar. The enemy's traffic records show that messages rarely are transmitted to these four addressees simultaneously. They also reveal that previous transmissions of this type were followed by arrival of a convoy at point Romeo. The enemy may logically conclude that a convoy from Bravo to Romeo is planned, and that these transmissions probably are arranging for an escort.

Some measures that can be taken to render traffic analysis by the enemy more difficult and less reliable include—

1. Minimum use of radio.
2. Maintenance of strict circuit discipline.
3. Rotation of frequencies.
4. Rotation of call signs and address groups for encryption.
5. Minimum use of service messages, correction requests, and repetitions.
6. Concealment of originator and addressees in the text of an encrypted message.
7. Avoidance of long, easily associated messages of a recurrent nature.
8. Control of the timing and volume of test transmissions to avoid revealing information about pending operations.
9. Keeping external routing instructions to a minimum.
10. Use of Encrypt for Transmission Only (EFTO) procedure. (See OpNav Instruction 2220.3 for complete details.)

IMITATIVE DECEPTION.—An enemy may attempt to enter communication nets used by the Navy in order to confuse and deceive our forces. This practice is known as imitative deception. There are many deceptive techniques the enemy might use to obstruct our radio communications. He may, for example—

1. Remove a message from one circuit and introduce it on another circuit to waste time, create confusion, and produce service messages.
2. Intentionally garble the text of a genuine message and combine it with the heading of another, then introduce it on a different radio net.
3. Originate and transmit false plain language messages.
4. Call a unit in the hope of taking bearings on the answering transmission.
5. Partly obliterate a false message to conceal lack of knowledge of authenticators or call signs.

The best defense against imitative deception is proper authentication. This security measure is intended to protect communication systems against fraudulent transmissions. An authenticator is a group of characters (usually two randomly selected letters) inserted in a message to prove its authenticity. Any authentication system has accompanying instructions specifying the method of use and transmission procedures. By its correct use, the operator can distinguish between genuine and fraudulent stations or

transmissions. A station may include authentication in a transmitted message. This security measure is called transmission authentication. Another use is known as challenge and reply authentication. In this method the sending station transmits a challenge from which the receiving operator must ascertain the correct reply authenticator. The challenging station must determine the reply to be correct before any exchange of messages commences. Authentication is mandatory when—

1. Suspecting imitative deception on a circuit.
2. Challenging or requesting any station to authenticate.
3. Making contact and amplifying reports in plain language or brevity code.
4. Directing radio silence or requiring a station to break an imposed radio silence.
5. Transmitting a plain language cancellation of an encrypted message by radio or by other methods when sending stations cannot be recognized.
6. Transmitting to a station that is under radio silence.

Authentication is advisable under the following circumstances:

1. When transmitting operating instructions affecting the military situation; for example, closing down a station or shifting frequency.
2. When making initial radio contact. Authenticators should be exchanged to prevent an enemy station from opening a circuit by asking a legitimate station to authenticate.

Good judgment sometimes dictates that an operator accept a message instead of arguing over authentication even though he may doubt its genuineness. Such a message should be delivered promptly to the addressee with the operator's notation that it was not authenticated properly. The decision regarding its authenticity is made by the addressee.

Other effective defenses against imitative deception are—

1. Thorough training in operating procedures, as described in subsequent chapters.
2. Alertness of operators to recognize irregularities in procedure and the minor implausibilities that often characterize enemy deceptive efforts.
3. Direction finding on transmissions of questionable origin.
4. Minimum use of plain language and procedure messages.

Maintaining a high degree of circuit discipline on the part of operators also lessens the chances of enemy deception. Circuit discipline can be attained only through net control, monitoring, and training. It includes adherence to prescribed frequencies and operating procedure. Negligence, inaccuracy, and laxity, as well as lack of circuit discipline and operator training, are some of the common causes of violations that endanger radio transmission security. Circuit discipline is discussed in greater detail in chapter 9.

JAMMING.—Jamming is another method an enemy may use in his efforts to disrupt our communications. It is accomplished by transmitting a strong signal on the victim frequency. You must be able to recognize jamming, cope with it, and simultaneously prevent the enemy from knowing the effectiveness of his efforts. Common forms of jamming are—

1. Several carriers adjusted to the victim frequency, each carrier modulated by an audio-frequency.
2. Simulated traffic handling on the victim frequency.
3. Random noise amplitude-modulated carriers.
4. Continuous-wave carrier (keyed or steady).
5. Several audio tones in rapid sequence, modulating a carrier (called bagpipe, from its characteristic sound).
6. Electrical spark-consisting of numerous jagged peaks of noise of short duration having high intensity and a high repetition rate. Spark jamming will be encountered more frequently than any other type because it is fairly easy to generate and its broad radiofrequency characteristics enable the enemy to cover a number of communication channels with one jammer.

Many measures can be used to counter and minimize the effects of jamming. Some of these measures are to—

1. Route messages via alternate circuits, meanwhile continuing live traffic on the jammed circuit to create the impression that the jamming is ineffective.
2. Use different receivers to take advantage of differences in selectivity. Selectivity is the ability of a receiver to discriminate between signals close together.
3. Make maximum use of the directional effects of available antennas.

4. Request the sending station to increase power or to shift frequency.

5. Take advantage of split-phone reception by copying signals simultaneously keyed on two frequencies.

6. Keep the receiver volume at a low level when copying through jamming. Your hearing is better able to discriminate between signals that aren't too loud.

Each occurrence of jamming must be reported promptly to cognizant authorities. Information concerning these reports is found in NWP 33.

SECURITY OF RADIOTELEPHONE.—Radiotelephone transmissions are the least secure method of radio communication. Anyone within range, who speaks the language used, can understand the transmissions. Circuit discipline and procedure often are poor on radiotelephone circuits because the equipment can be, and often is, operated by someone besides trained radio personnel. Poor circuit discipline and improper procedure slow communications, cause confusion, and may divulge information to the enemy.

Our best defense against enemy intelligence efforts is strict adherence to prescribed radiotelephone procedures. With this knowledge in mind, here are a few precautions to observe when communicating by radiotelephone:

- Use each circuit for its intended purpose only.
- Keep the number of transmissions to a minimum.
- Write the message before transmission, if possible.
- Keep transmissions brief, concise, and clear.
- Transmit no classified information in plain language.
- Avoid linkage between radiotelephone call signs and other types of call signs.

Radiotelephone procedure is discussed in detail in chapter 9.

CENSORSHIP

Censorship is an essential form of protecting military information. It includes censorship of our personal communications as well as official communications. Personal censorship should be cultivated until it becomes second nature.

In the course of your duties, you may possess highly classified information, the knowledge of which is shared oftentimes only by the commanding officer, the communication officer, and yourself. You must be alert against a slip of the tongue that might reveal this information to someone not authorized to know. The Navy Security Manual states that "indiscreet conversation and personal letters constitute the greatest menaces to security." The only safe policy to pursue, concerning classified information, is: Keep your MOUTH SHUT and your PEN DRY. When on duty, discuss classified subjects only as necessary to accomplish your job. When off duty, don't discuss classified matters with anyone—not even your family and best friend. Usually the desire to impress others with the importance of your job is quite strong. Divulging classified information is a very unwise way of trying to impress anyone, particularly when you may be endangering your country and many lives.

Loose talk in public places is even more dangerous. Conversation in restaurants, hotel lobbies, railroad stations, elevators, taverns, and other public places can be overheard easily. Foreign agents are trained scientifically to collect particles of seemingly harmless information from such conversations. Once pieced together and analyzed, these "innocent" bits of talk sometimes reveal military information of incalculable value.

Mail likewise is subject to interception by the enemy. The following topics must not be mentioned in personal correspondence:

- Location, identity, or movement of ships or aircraft.
- The forces, weapons, military installations, or plans of the United States or her allies.
- Casualties to personnel or material by enemy action.
- The employment of any naval or military unit of the United States or her allies.
- Criticism of equipment or morale of the United States or her allies.

Personal censorship also extends to telephone conversations. As we have seen, telephone wires can be tapped, and conversations can be overheard at the switchboard and other points along the circuit. Never discuss classified information over a nonapproved telephone line.

Diaries can be fruitful sources of information for the enemy. They sometimes reveal secrets the enemy laboriously is attempting to extract through cryptanalysis. Even in peacetime, lost

and stolen diaries can cause serious damage to the prestige of our Nation.

CALL SIGN ENCRYPTION

Call signs and address designators are encrypted to conceal the identity of the originator and addressees of certain types of messages. The encryption and decryption of these call signs is part of your job, and hence you must become proficient in using the call sign cipher device. Operating instructions for the device may be obtained from the registered publications custodian. More likely, though, your supervisor will show you how to operate the device.

An operator must exercise extreme care when transmitting a message containing encrypted call signs. From force of habit he may use the unencrypted international call sign in establishing communications, then send the encrypted version in the message. This blunder results in a compromise of the call sign, and gives enemy intelligence a lever with which to break the entire system.

EMCON

Emission control (from which EMCON is derived) is the regulation or restriction of equipment capable of emitting radio waves to reduce the likelihood of interception by the enemy. Included in EMCON are radio communication equipment, radar, navigational aids (beacons), identification devices (IFF), and aerological devices (radiosonde).

The EMCON program, which encompasses control of electromagnetic radiation, is Navy-wide in scope. In peacetime, EMCON restrictions are imposed only if required for operational purposes or for training. The various degrees of restriction are found in NWP 16(A).

SECURITY VERSUS SPEED

A variable relationship exists between security and speed in communications. In the planning stages of an operation, for example, when only a few should know what is planned, security considerations are paramount. As the time of execution approaches, additional persons must know the plan, and preparations cannot be concealed so effectively. Then, speed is increasingly important. In actual combat, plain language transmission of classified information may be authorized, although security cannot be totally disregarded even then.

ADDITIONAL SECURITY INFORMATION

The security precautions mentioned in this Navy Training Course do not guarantee complete protection. Nor do they attempt to meet every conceivable situation.

The man who adopts a commonsense outlook can, however, solve most security problems, in addition to gaining a knowledge of the basic regulations. For information on local security rules, study the security regulations of your ship or station.

The effective editions of the following publications contain additional information on security.

- Department of the Navy Security Manual for Classified Information, OpNavInst 5510.1B
- U.S. Navy Physical Security Manual, OpNavInst 5510.45
- Security, Armed Forces Censorship, OpNavInst 5530.6
- U.S. Navy Regulations, 1948, chapter 15
- Naval Communications Bulletin, published quarterly by DNC (with classified supplement)
- Navy directives in the 2200-2260 series (communication security) and in the 5500-5599 series (administrative security)
- DNC 5, ACP 122, NWP 16(A), and RPS 4 (the last three are classified)

CHAPTER 8

THE MESSAGE

A message is a thought or idea expressed briefly in plain or cryptic language, and prepared in a form suitable for transmission by any means of communication.

CLASSES OF MESSAGES

Messages are of five classes: A, B, C, D, and E. Classes A, B, and C are Government messages, and D and E are non-Government (or private) messages. The purpose of this classification system is to aid administration and accounting.

By far the largest volume of traffic handled by the Navy is class A, consisting of official messages and replies thereto originated by the Department of Defense (including the U. S. Coast Guard when operating as part of the Navy).

Class B is made up of official messages of U. S. Government departments and agencies besides the Department of Defense. (The U.S. Coast Guard is included under class B except when operating as a part of the Navy.)

Class C messages consist of broadcast traffic in special forms, available to ships of all nationalities. Class C messages are concerned with special services, such as hydrographic data, weather, and time.

Class D is composed of private messages for which the Navy collects tolls. The group includes radiotelegrams and press messages sent by correspondents aboard ship.

Class E messages are personal messages to and from naval personnel, handled free of charge over naval circuits. Charges are collected from the sender only when a commercial communication company, such as Western Union, handles the message over part of its route. For example, suppose your ship is in the Atlantic and has a class E message addressed to a man at a naval air station in Guantanamo Bay, Cuba. Your ship transmits the message to Radio Washington, which relays it via San Juan, P.R., to a station at Guantanamo Bay, from which point delivery is made to the naval air station. The message never leaves Navy channels, and the originator pays nothing. But if the message were addressed to Louisville, Ky., Western Union would handle it out of Washington, and the ship would collect tolls from the originator for the distance between Washington and Louisville. Your ship would forward the money to the U.S. Navy Finance Center, Washington, D.C., for payment to Western Union in accordance with instructions in the effective edition of DNC 26.

The class E message privilege is mainly for purposes of morale. It affords naval personnel at sea a means of communication regarding urgent personal matters without incurring prohibitive expense. It is unavailable between points on shore within the United States. In general, the privilege is used sparingly. Subjects ordinarily acceptable for transmittal or delivery are matters of grave personal concern, such as the serious illness of a close relative, birth announcements, important nonrecurring business communications, matters of life and death, and occasional greetings on important anniversaries. Not acceptable are trivial or frivolous messages, those of unnecessary length, and ordinary congratulations.

ORIGINATOR; DRAFTER; RELEASING OFFICER

The originator of a message is the command by whose authority the message is sent. The drafter—usually the communication officer or a department head—is the person who actually composes the message for release. The releasing officer authorizes transmission of the message for and in the name of the originator. Ordinarily the commanding officer is releasing

officer, but he may delegate releasing authority if he wishes.

A Radioman or Communications Yeoman charged with accepting locally originated messages must know who has releasing authority, and should check every message for the releasing officer's signature.

ADDRESSEES

Most messages have at least one addressee responsible for taking action on the contents and for originating any necessary reply. Other addressees with an official concern in the subject of the message, but who do not have the primary responsibility for acting on it, receive the message for information. Do not be confused by the term "information addressee." Even though an information addressee usually is concerned only indirectly with a message, very frequently he must take action of some nature within his own command. Some messages have only information addressees.

Messages may be divided into types, according to the way they are addressed, as—

1. Single-address;
2. Multiple-address;
3. Book;
4. General.

A single-address message is sent to one addressee only.

A multiple-address message is sent to two or more addressees, each of whom is informed of the others. Each addressee must be designated either as action or information.

A book message is sent to two or more addressees, and is of such a nature that no addressee needs to know who the others are—although each addressee is informed whether he receives the message for action or for information.

The station sending a book message divides addressees into groups according to the relay stations serving them. A separate message is prepared and transmitted to each relay station; the message is changed only to drop addressees that are the concern of some other station. Upon receiving a book message, a relay station may further reduce the number of addressees by repeating the process or by making up single-address messages for each of its tributaries addressed. Because many book messages are intended for dozens of addressees, and because some addressees may require delivery by Western Union or commercial teletypewriter services, substantial time and expense are saved by the shortened headings.

General messages are of sufficient importance that they are discussed fully in the next topic.

TYPES OF MESSAGES

In addition to general messages, the Naval Communication System provides for Red Cross messages and special-purpose messages. Each of these types is discussed in the following section.

GENERAL MESSAGES

A general message has a wide standard distribution. General messages are of many types, each of which carries an identifying title and is intended for a certain standard set of addressees. (See table 8-1.) All messages of a given general message title are numbered serially through the calendar year; for example, ALNAV 12-63, signifying the twelfth ALNAV sent during 1963.

You will see other general messages with titles not listed in table 8-1. These messages are originated by sea frontier commanders, commandants of naval districts, and fleet, force, and ship type commanders to publish information within their respective commands.

Maintenance of general message files was discussed in chapter 3. It would be well to review that material at this time. Remember that copies of general messages are kept in the general message file until canceled or superseded.

RED CROSS MESSAGES

The American Red Cross is permitted free use of naval communication facilities for sending and receiving messages regarding emergency welfare in the interest of armed forces personnel. Red Cross messages are handled as class B messages and normally are in plain text.

The Red Cross messages you are most likely to see concern personal hardship, or death or serious illness of relatives of naval personnel. You will copy from the fleet broadcast many such messages addressed to ships at sea.

When emergencies or disasters occur involving Red Cross relief work, Red Cross

Table 8-1. —General Messages

Originator	Title of Series	Description
SECNAV	ALNAV	Messages intended for wide distribution throughout the entire Naval Establishment, including the Marine Corps. They deal with administrative matters, such as fiscal policies, changes in personnel allowances, legislation affecting the Navy, promotions of officers, etc.
	NAVACT	Similar in content to ALNAV, but of no interest to the Marine Corps.
	ALNAVSTA	Administrative information requiring wide dissemination to the shore establishment of the Navy—including shore-based elements of the operating forces—and to the Marine Corps.
	ALSTACON and ALSTAOUT.	Similar to the above but of interest, respectively, to activities inside and activities outside the continental United States.
CNO	NAVOP	Similar in content to ALNAV but distribution list does not include attaches, missions, observers, or minor shore activities.
	ALCOM	Usually used for, but not restricted to, promulgation of communication information throughout the Navy.
	ALCOMLANT and ALCOMPAC.	Subdivisions of the ALCOM series for, respectively, Atlantic-Mediterranean areas and Pacific area.
	MERCAST	The merchant ship equivalent to an ALNAV. Distribution includes ships guarding MERCAST (merchant ship broadcast) schedules, naval port control and naval control of shipping officers, and MSTS commands.
CINCPACFLT	ALPACFLT	Messages for general distribution to commands under CINCPACFLT.
	MERCASTPAC	The merchant ship equivalent to an ALPACFLT.
Commandant, Marine Corps.	ALMAR	Messages for general dissemination to all Marine Corps activities.
	ALMARCON	Messages for Marine Corps activities within the continental United States.

Table 8-1. —General Messages—Continued

Originator	Title of series	Description
CINCLANTFLT	ALLANTFLT	Messages for general distribution to commands under CINCLANTFLT.
	MERCASTLANT	The merchant ship equivalent to an ALLANTFLT.
Communications Electronics Directorate/ Joint Staff.	JAFPUB	Promulgates to holders information pertaining to CED/JS-adopted publications when rapid delivery to all branches of the armed forces is required.
Commandant, Coast Guard	ALCOAST	Messages for general dissemination within the Coast Guard. The Coast Guard equivalent of ALNAV.
	ALDIST	Provide Coast Guard district commanders with policy instructions and other information.
Commander, MSTS	ALMSTS	Messages for all MSTS commands and offices.

messages may be handled over naval circuits whether they are in the interest of armed forces personnel or not.

Red Cross messages normally are not accepted for transmission unless delivery can be effected entirely by naval communications.

SPECIAL-PURPOSE MESSAGES

A number of messages are named for the purpose they serve. They usually contain reports or information of a recurring nature and may follow a specific format. A few of the more common types of special-purpose messages follow.

Contact and Amplifying Reports

A contact report is a message reporting the first contact with an enemy force. Speed of handling such a message is of the utmost importance. Contact reports have priority over every other type of traffic handled by naval communications.

An amplifying report follows up a contact report. It contains further data about the enemy force, such as number, type, position, course, speed, and distriubtion. A contact report may be followed by many amplifying reports as information becomes available and the enemy shows his intentions. Often it is possible to transmit some amplifying data with the contact report.

Movement Reports

The Navy has hundreds of fleet units always on the move. It is necessary both to command and to efficient administration to have an up-to-the-hour knowledge of the location of every vessel. This large-scale change of address work is carried on by the movement report system.

The controlling agency of the entire movement report system is the movement report control center at Washington, D. C. (MRCC WASH-DC). For reporting purposes the world is divided into five zones, of which only four presently are assigned. Each zone is controlled by a movement report center (MRC). Each zone is further subdivided into areas controlled by movement report offices (MROs). An MRC receives information on movements all over the world, but MROs have information only on movements in their own areas of responsibility.

Before getting underway, a ship sends a movement report message stating the time of

departure, destination, route, speed of advance, and any other information the ship may be directed to furnish. The message enters the movement report system through the MRO or MRC controlling the area the ship is in. It then is the responsibility of the MRO or MRC to relay the information to military and civilian activities that have an official interest in the location of the vessel. Included are such activities as supply centers, fleet post offices, fleet broadcast stations, and the customs authorities.

Movement report messages are prepared in accordance with the movement report supplement to NWIP 10-1.

Hydro Messages

The U.S. Navy Oceanographic Office originates messages concerning navigation warnings. These messages are given wide distribution on special hydrographic broadcasts. There are two subdivisions of HYDRO messages: (1) HYDROLANTS contain navigational information relating to the Atlantic, Mediterranean, and Indian Oceans; (2) HYDROPACS furnish such information for the Pacific Ocean areas.

Notices to Airmen

Notices to airmen (NOTAMs) are originated by military activities and civil agencies concerned with the safety of aircraft. The NOTAMs are composed of data relating to aerological facilities, services, and hazards.

Q Messages

The classified portions of the navigational warning systems of Allied Nations are known as Q messages. They contain information affecting navigation that an enemy would find difficult to obtain on this own. Do not confuse Q messages with Q signals, which are explained later in this chapter.

All Ships Present Messages

All ships present messages are originated by the senior officer present afloat (SOPA), and related to such matters as storms, port security regulations, and local liberty policy. The SOPA prescribes local instructions governing the initiation, transmission, and relay of all ships present messages.

Minimize Messages

In an emergency—either actual or simulated—it may be necessary to reduce message and telephone traffic to prevent delay in handling vital messages. This reduction in traffic is accomplished by promulgation (usually by message) of the word MINIMIZE, which has the following meaning: "It is now mandatory that normal message and telephone traffic be reduced drastically in order that vital messages connected with the situation indicated shall not be delayed." The message ordering MINIMIZE consists of the word MINIMIZE, followed by the scope (area affected) and the reason, and the duration of its imposition (when known).

Messages imposing MINIMIZE must be brought to the immediate attention of the communication officer.

MESSAGES INVOLVING TOLLS

Messages involving tolls (or class E messages) were discussed briefly at the beginning of this chapter. Even though they are personal messages, they must meet the requirements for acceptable subject matter and must be released by the commanding officer before transmission, as are all other messages.

Class E messages are of two kinds: those liable to toll charges, and the ones that do not carry tolls. Toll charges are collected from the sender only when the message must be refiled with Western Union for transmission or final delivery. Federal Communications Commission (FCC) regulations prohibit transmission of personal messages by the Navy within the continental United States. These regulations limit the free-of-charge transmission of class E messages to the following: between naval ships in the same ocean area; from ship to shore and shore to ship in the same ocean area outside the United States; and from shore station to shore station outside the United States in the same ocean area. For example, a ship in the Atlantic, Mediterranean, Middle East, or Caribbean can send a class E message free of charge to another ship in any of these same areas. Similarly, ships and stations in the Pacific, Far East, and Alaskan areas are considered to be in the same ocean area.

The form for a class E message not subject to toll charges is shown in the following example. The ships are in direct communication, hence the call serves as the address.

NTAA DE NWKY —
R — 281417Z
GR14
BT
UNCLAS
MSG LTJG DALY REGRET CANNOT MEET YOU PHILADELPHIA THIS WEEK AS PLANNED
LTJG JORDAN
BT

Note the use of the class E message indicator MSG. It always appears as the first word in the text in every class E message.

The next example is of a class E message that is subject to toll charges. The originating station (NFFN) addresses the message to NAVCOMMSTA Washington (address group HAYY) for refile to the addressee named in the text. Station NFFN is not in direct communication with NSS (radio call sign for NAVCOMMSTA Washington), so the operator relays via NHY. Such relays are permitted over naval circuits outside the United States, and the message is handled free of charge as far as Washington. The sender must pay the Western Union charges from Washington (the refile point) to Forestville, Maryland.

NHY DE NFFN —
R — 25143ØZ
FM NFFN —
TO HAYY
GR38
BT
UNCLAS
MSG CK24 NL COMLE MRS MARCELLA CROWLEY 3319 79TH AVE FORESTVILLE MD EXPECT TO BE HOME ABOUT TEN NOV NOW ABLE TO WALK WILL ADVISE YOU EXACT TIME AFTER ARRIVAL IN STATES
HAROLD USS JOSEPH K TAUSSIG
BT

As you can see, the message requiring tolls is slightly more complicated. Following MSG is the check (count) of the chargeable words. Note that the check (CK24) is not the same as the group count (GR 38). The group count, of course, must include all words from BT to BT. The chargeable words counted in the check, however, include only the sender's text plus the name of the ship, which must be added to the signature. The address and the sender's name are not chargeable, thus are not included in the check.

After the CK comes the domestic service indicator NL, showing that the sender desires (and paid for) night letter service—to be delivered by Western Union the next morning. (The sender could have paid a small additional amount to send it as a day letter (DL).) Or, if he wanted the fastest Western Union handling and delivery, he could have sent it as a full-rate telegram, which carries no class-of-service indicator.

Following the class-of-service indicator is the commercial indicator COMLE. This indicator must be included in every class E message to be refiled with the Western Union Telegraph Company.

Class E messages addressed to ships are delivered by fleet broadcast. Persons in the continental United States wishing to send a class E message to a ship at sea must send it by mail or by Western Union to NAVCOMMSTA San Francisco, Stockton, California, if the ship is in the Pacific, Alaska, or the Far East. If the ship is in the Atlantic, Mediterranean, or Caribbean, the message must be sent to NAVCOMMSTA Washington. The message is dispatched to Newport or Norfolk if the ship is in one of those broadcast areas.

If your ship is in port in the continental United States, you can still receive a class E message on the fleet broadcast. You cannot, however, send a class E message addressed elsewhere in the States—the sender must use Western Union facilities ashore.

For inbound class E messages from ships at sea, the authorized refile points are at Newport, New York, Washington, Norfolk, Charleston, Key West, San Diego, San Francisco, and NAS, Whidbey Island Oak Harbor, Washington.

As a general rule, a class E message from a ship in the Atlantic to a ship in the Pacific must be refiled with Western Union at one of the east coast refile points, and toll charges paid for the cross-country transmission to San Francisco. Commercial refile in this instance is required by FCC rules, because the Navy's communication circuits from Washington to San Francisco cannot be used for class E messages. There is, however, one exception to the interarea refile as outlined. The Navy has radio circuits from Washington direct to Honolulu, so that a ship in the Atlantic, in a position to work Washington directly, can send a class E message to a ship in the Pacific copying the Honolulu broadcast or any other Pacific fleet broadcast except the

San Francisco broadcast. The same rule applies if the addressee is at a shore base at Hawaii or beyond.

Persons stationed at overseas bases also are permitted to send class E messages to the United States over DCS teletypewriter circuits. Class E messages sent by DCS teletypewriter circuits are illustrated in chapter 11.

The Communications Yeoman needs to know how to place outgoing class E messages in the proper form. He must know whether the message can be sent free of charge or if it must be refiled with Western Union. Usually, he must assist the sender in filling out the message form explaining the different classes of service, and their different minimum charges and charges for additional words. He must know the rules for counting the chargeable words, and also must be able to compute the toll charges from the rate tables in the effective edition of DNC 26.

The Communications Yeoman or Radioman designated by the commanding officer as commercial traffic clerk handles the money, keeps the records, and makes the required reports. Duties and responsibilities of the commercial traffic clerk are explained fully in DNC 26.

STATION AND ADDRESS DESIGNATORS

Station and address designators are formed of combinations of characters or pronounceable words for use in message headings to identify originators and addressees. The four kinds of station and address designators are call signs, address groups, routing indicators, and plain language address designators.

CALL SIGNS

Call signs are letters, letter-number combinations, or one or more pronounceable words, used chiefly for establishing and maintaining communications that identify some communication activity. They are applicable in both civil and military communications. Call signs are of several categories, with some calls belonging to more than one category. They are described in the ensuing eight topics.

International Call Signs

International call signs are assigned radio stations of all countries—civil and military, afloat and ashore—according to international agreement. The first letter or first two letters of an international call indicate the nationality of the station. The United States has the first half of the A block (AAA through ALZ) and all of the K, W, and N blocks. The United States reserves A calls for the Army and Air Force. The K and W blocks are assigned to commercial and private stations, merchant ships, and others. The N block is only for use by the Navy, Marine Corps, and Coast Guard.

Naval shore communication stations have three-letter N calls. If necessary, these calls may be expanded by adding numerical suffixes. Thus, additional call signs are provided for radio transmitting and receiving facilities located remotely from the parent station. Examples are the following:

NAM . . . . . NAVCOMMSTA, Norfolk.
NAM1 . . . . Headquarters, CINCLANTFLT, Norfolk.
NAM2 . . . . Naval Shipyard, Norfolk.

The call signs for fixed and land radio stations are listed in ACP 100, Allied Call Sign and Address Group System—Instructions and Assignments, and U.S. Supplement 1 thereto.

International call signs assigned to U.S. naval vessels are four-letter N calls which are to be used unencrypted only. They have no security value, hence they are utilized for all nonmilitary international communications. Example:

NWBJ . . . . . USS Renshaw (DD 499).

International call signs for USN, USMC, and USCG aircraft are composed of the service designator N, NM, or NC, respectively, followed by the last four digits of the serial or bureau number of the aircraft.

Military Call Signs

Most ships of the Allied Nations are assigned military call signs in addition to their international call signs. From the military call signs are derived the encrypted call signs for CW and RATT communications. Likewise, military call signs form the basis for both encrypted and unencrypted call signs for voice communications. They are never used in their basic form to address messages. Military call signs consequently, are assigned only to ships capable of encrypting call signs. Both international and

military call signs are listed in ACP 113 Call Sign Book for Ships.

Indefinite Call Signs

Indefinite call signs represent no specified facility, command, authority, or unit, but may represent any one or any group of these. Examples:

NERK. . . . . (To) any or all U.S. Navy ship(s).
NA through NZ. . (From) any U.S. Navy ship.
NQO. . . . . Any or all U.S. Navy shore radio station(s).

Indefinite call signs are used in codress message headings to conceal the identity of originators and addressees. In such instances this information is placed in the encrypted text.

The call NQO might be sent by a ship unable to raise a particular shore station. Any Navy shore station hearing the transmission would answer and accept the traffic.

Collective Call Signs

Collective call signs pertain to two or more facilities, commands, or units. Examples:

NATA. . . . All U.S. Navy ships copying this broadcast.
NIMK. . . . All U.S. submarines copying this broadcast.

Net Call Signs

Net call signs represent all stations within a net. (A net is a group of stations in direct communication with each other on a common channel.) Examples:

NQN. . . . . All U.S. Navy radio stations in the Pacific guarding the ship-shore high-frequency calling series.
OVERWORK . All U.S. Navy stations on this (radiotelephone) circuit.

Tactical Call Signs

Tactical call signs, with the exception of task organization and aircraft call signs, are limited in application. They normally are used in tactical communications only, to identify tactical commands or communication facilities. Tactical call signs are composed of four letters, which are letter-number combinations. They are listed in ACP 110, Tactical Call Sign Book with supplements, and ACP 112, Task Organization Call Sign Book.

Voice Call Signs

Voice call signs are words or combinations of words—such as SUNSHINE or HIGH HAT—limited to radiotelephone communications. Call signs in JANAP 119, Joint Voice Call Sign Book, are only for tactical circuits. On ship-shore administrative circuits, phonetically spelled international call signs are given as ships' voice calls. Under certain conditions, ships' names are used as voice call signs on local harbor circuits. All the various types of voice call signs and the rules for their application in radiotelephone communications are treated in detail in chapter 7.

Visual Call Signs

Visual call signs are groups of letters, numerals, special flags and pennants, or combinations of any of these, for use in visual communications. They are listed in ACP 118.

ADDRESS GROUPS

Address groups are four-letter groups assigned to represent a command, activity, or unit. They are used mainly in the message address, although, in military communications, they can be used in the same manner as call signs to establish and maintain communications. In general, call signs and address groups are used by the Navy in exactly the same way. Address groups never start with the letter N, hence they are easily distinguished from naval radio call signs. Unlike international call signs, address groups follow no distinctive pattern. For example, you learned the difference in call signs for naval ships and shore radio stations. In address groups, however, the arrangement of the four letters conveys no significance whatsoever.

All commands afloat (except individual ships) are assigned address groups. They are assigned also to shore-based commands, authorities, or activities not served by their own communication facilities; for example, (1) senior commands and commanders ashore, such as the Secretaries of

Defense and of the Navy, bureaus and offices of the Navy Department, and district commandants; (2) fleet, type, or force commanders ashore; (3) elements of operating forces permanently ashore who are in frequent communication with forces afloat; and (4) elements of the shore establishment (such as weather centrals) having a need for direct addressing and receipt of the messages.

Among other uses, address groups facilitate delivery of messages when a communication center serves so many activities that its own call sign is insufficient to identify the addressee.

Address groups are contained in ACP 100 and its U.S. Supplement 1.

Address groups, like call signs, are divided into types. They are individual activity, collective, conjunctive and geographic address groups, address indicating groups, and special operating groups.

Individual Activity Address Groups

Individual activity address groups are representative of a single command or unit, either afloat or ashore. Examples:

DTCI . . . . . COMPHIBLANT.
SSMW . . . . . CNO.

Collective Address Groups

Collective address groups represent two or more commands, authorities, activities, units, or combinations of these. Included in the group are the commander and his subordinate commanders. Examples:

DSWN . . . . . DESRON 16.
AMGK . . . . . SIXTHFLT.

Conjunctive Address Groups

You must remember that conjunctive address groups have incomplete meanings. It is always necessary to complete the meaning by the addition of other address groups denoting a specific command or location. It is for this reason that conjunctive address groups are used only with one or more other address groups. The conjunctive address group XZKW, for example, means "All ships present at_____." This particular group must be followed by a geographic address group to complete the meaning.

Geographic Address Groups

Geographic address groups are the equivalent of geographical locations or areas, and are always preceded by conjunctive address groups. Assuming the geographic address group for Newport, R.I., to be DEXL, all ships present at Newport would be addressed XZKW DEXL.

Address Indicating Groups

Address indicating groups (AIGs) represent a specific set of action and/or information addressees. The originator may or may not be included. The purpose of AIGs is to increase the speed of traffic handling. They shorten the message address by providing a single address group to represent a number of addressees, thus eliminating individual designators for each addressee. For example BIOQ is an AIG used to address air defense messages originated by COMEASTSEAFRON to 24 action addressees and 37 information addressees. By using a single AIG, 61 call signs and address groups are eliminated from the heading of the message.

Special Operating Groups

Special operating groups (SOGs) are utilized for passing special instructions in message headings. They are four-letter groups that are identical in appearance to address groups. Special operating groups are not used by the Navy unless specifically authorized by CNO. When they are authorized, they must always be encrypted. A list of the SOGs together with their meanings, is in ACP 100.

ROUTING INDICATORS

Routing indicators are groups of letters whose purpose is to identify stations in a teletypewriter tape relay network. Depending upon the type of station, routing indicators vary in length from four to seven letters. It is easy to distinguish routing indicators from call signs or address groups because routing indicators always begin with either the letter R or U. Routing indicators are never encrypted. A complete discussion of routing indicators and their usage in teletypewriter tape relay operation is included in chapter 11.

PLAIN LANGUAGE ADDRESS DESIGNATORS

Plain language address designators are the official, abbreviated, or short titles of commands

or activities, used instead of call signs or address groups in the headings of messages. Some abbreviated titles are written as single words. Others have conjunctive titles and geographical locations. (Examples: BUSHIPS; NAVCOMMSTA GUAM.)

Plain language address designators have wide application in messages originated and addressed within the shore establishment. They also are used in communications with the Army, Air Force, and the armed forces of Allied Nations. They are not used in the headings of codress messages, nor in radiotelegraph messages originated by U.S. Naval forces afloat.

TIME IN MESSAGES

For reckoning time, the surface of the earth is divided into 24 zones, each extending through 15° longitude. Each zone differs by 1 hour from the zone next to it.

The initial time zone lies between $7\ 1/2^{\circ}$E. and $7\ 1/2^{\circ}$W. of zero meridian, which passes through the town of Greenwich, England. The time in this zone—zone zero—is called GMT (Greenwich mean time). You may hear some oldtimers call it GCT (Greenwich civil time); both names have the same meaning. Each zone, in turn, is indicated by the number that represents the difference between the local zone time and Greenwich mean time.

Zones lying in east longitude from zone zero are numbered from 1 to 12 and are designated minus, because for each of them the zone number must be subtracted from local time to obtain Greenwich mean time. Zones lying in west longitude from the zero zone are numbered from 1 to 12 also, but are specified plus, because the zone number must be added to local zone time to obtain GMT. In addition to the time zone number, each zone is further designated by letter. Letters A through M (J omitted) indicate minus zones; N through Y, plus zones. (See fig. 8-1.) The designating letter for GMT is Z.

The 12th zone is divided by the 180th meridian, the minus half lying in east longitude and the plus half in west longitude. This meridian is the international date line, where each worldwide day begins and ends. A westbound ship crossing the line loses a day, whereas an eastbound ship gains a day.

The number of a zone, prefixed by a plus or a minus sign, constitutes the zone description. Often zones crossing land areas are modified to agree with boundaries of countries or regions using corresponding time.

The approved method of expressing time in the 24-hour system is with the hours and minutes expressed as a four-digit group. The first two figures of the group denote the hour; the second two, the minutes. Thus 6:3Ø a.m. becomes Ø63Ø; noon is 12ØØ; and 6:3Ø p.m. is 183Ø. Midnight is expressed as ØØØØ—never as 24ØØ—and 1 minute past midnight becomes ØØØ1. The time designation 1327Z shows that it is 27 minutes past 1:ØØ p.m., GMT. Numbers are prefixed to the time to indicate the day of the month; in other words, to form a date-time group (DTG). The DTG 171327Z means the 17th day of the current month plus the time in GMT. Dates from the 1st to the 9th of the month are preceded by the numeral Ø.

A date-time group is assigned to a message by the message center at the time the message is prepared for transmission. For standardization, the time expressed by a date-time group normally is GMT. The date-time group in a message heading serves two purposes: It indicates the time of origin of the message, and it provides an easy means of referring to the message.

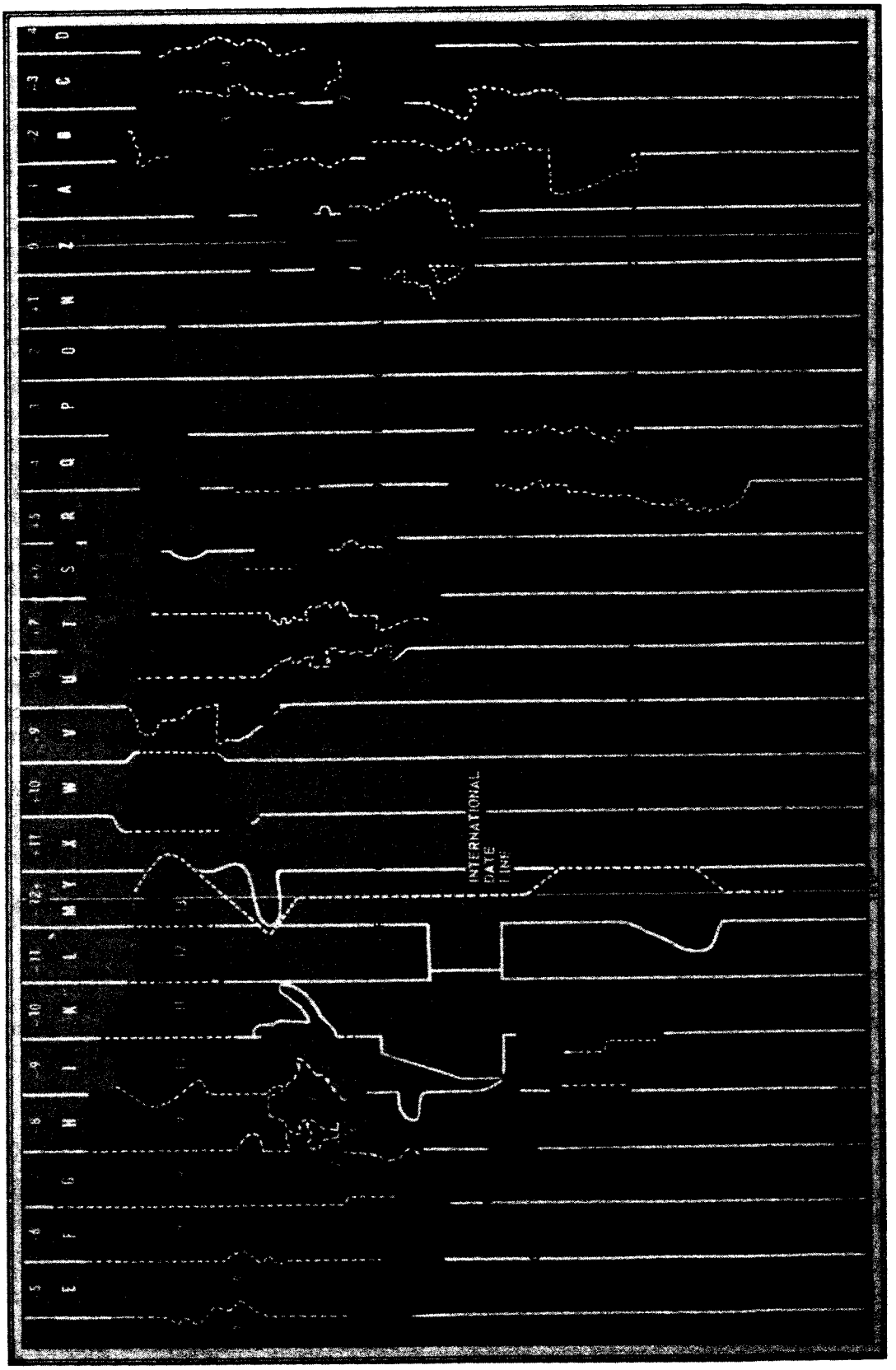
In addition to the external DTG, an encrypted message has a DTG buried within the text. This group is called the true date-time group (TDTG), and it is inserted by the cryptocenter. The TDTG is used when referring to a message that has been encrypted.

The DTG assigned to a general message always has a slant sign (/) and additional digits added to the DTG. The additional digits represent the general message sequential serial number. Example: 1Ø2347Z/35.

Local time is used sometimes to indicate date and time in the text of a message, but must be accompanied by the zone designating letter—as in 17Ø812Q. When local time is referred to frequently in the text, the suffix may be omitted if a covering expression is used, such as ALL TIMES QUEBEC.

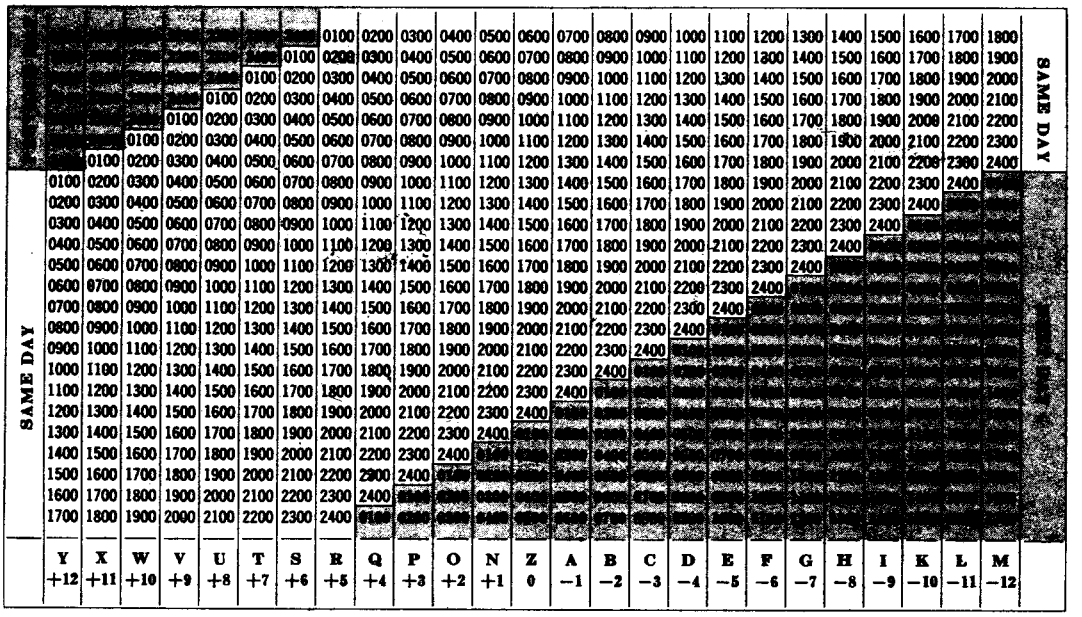
TIME CONVERSION TABLE

The time conversion table (fig. 8-2) is useful for converting time in one zone to time in any other zone. Vertical columns indicate the time zones. Zone Z is GMT. Time in each successive zone to the right of zone Z is 1 hour later, and to the left of zone Z is 1 hour earlier. Time in each successive shaded area to the right is 1 day (24 hours) later; to the left it is 1 day (24 hours) earlier. For example, to calculate the time in



13.76

Figure 8-1.—Time zone chart of the world.



31.48

Figure 8-2.—Time conversion table.

zone U when it is Ø5ØØ hours in zone I, proceed as follows: Find Ø5ØØ in column I and locate the time (12ØØ) in the corresponding line in column U. Inasmuch as 12ØØ is not in the shaded area, the time is 12ØØ hours yesterday.

PRECEDENCE

Precedence is an important concept in naval communications. To communication personnel, it indicates the relative order in which a message must be handled and delivered. To the addressees, precedence shows the relative order in which the contents are to be noted. Precedence is assigned by the originator on the basis of message content and how soon the addressee must have it. No message is assigned a precedence higher than that required to ensure that it reaches all addressees on time.

Multiple-address messages having both action and information addressees are often assigned two precedences, called dual precedence. One precedence is for the action addressees, and a precedence is for information addressees.

Use of higher precedences is limited to certain types of urgent traffic. Standards for handling each precedence are prescribed by DNC. The rules governing precedence are set forth in table 8-2.

In addition to the precedences given in table 8-2, precedences of EMERGENCY and DEFERRED are assigned messages originated by NATO and other Allied Nations. Messages introduced into U. S. Military Communications Systems carrying an EMERGENCY (Y) precedence are handled before IMMEDIATE and after FLASH messages of the United States. Messages carrying a DEFERRED (M) precedence are handled after ROUTINE messages of the United States.

PROSIGNS

Procedure signs, or prosigns, are letters or combinations of letters that convey in short, standard form certain frequently sent orders, instructions, requests, reports, and the like, relating to communications. In radiotelegraphy, an overscore means that the prosign is sent as one character, that is, without the normal pause between the letters. Overscores are ignored in teletypewriter work.

Although some prosigns seem to be abbreviations of their assigned meanings, prosigns are never referred to as abbreviations. Prosign $\overline{\text{IMI}}$, used internationally for many years by military radio operators, means "repeat."

Table 8-2. —Precedence of Messages

Pro-sign	Desig-nation	Definition and use	Handling requirements
Z	F L A S H	FLASH precedence is reserved for initial enemy contact messages or operational combat messages of extreme urgency. Brevity is mandatory. Examples: (1) Initial enemy contact reports. (2) Messages recalling or diverting friendly aircraft about to bomb targets unexpectedly occupied by friendly forces; or messages taking emergency action to prevent conflict between friendly forces. (3) Warnings of imminent large-scale attacks. (4) Extremely urgent intelligence messages. (5) Messages containing major strategic decisions of great urgency.	FLASH messages are hand-carried, processed, transmitted, and delivered in the order received and ahead of all other messages. Messages of lower precedence will be interrupted on all circuits involved until handling of the FLASH message is completed. Time standard: Not fixed. Handled as fast as humanly possible with and objective of less than 10 minutes.
O	I M M E D I A T E	IMMEDIATE is the precedence reserved for messages relating to situations that gravely affect the security of national/allied forces or populace, and require immediate delivery to the addressee(s). Examples: (1) Amplifying reports of initial enemy contact. (2) Reports of unusual major movements of military forces of foreign powers in time of peace or strained relations. (3) Messages that report enemy counterattack or request or cancel additional support. (4) Attack orders to commit a force in reserve without delay. (5) Messages concerning logistical support of special weapons when essential to sustain operations. (6) Reports of widespread civil disturbance. (7) Reports or warnings of grave natural disaster (earthquake, flood, storm, etc). (8) Requests for, or directions concerning, distress assistance. (9) Urgent intelligence messages.	IMMEDIATE messages are processed, tranmitted, and delivered in the order received and ahead of all messages of lower precedence. If possible, messages of lower precedence will be interrupted on all circuits involved until the handling of the IMMEDIATE message is completed. Time standard: 30 minutes to 1 hour.

Table 8-2. —Precedence of Messages—Continued

Pro-sign	Desig-nation	Definition and use	Handling requirements
P	P R I O R I T Y	PRIORITY is the precedence reserved for messages that require expeditious action by the addressee(s) and/or furnish essential information for the conduct of operations in progress when ROUTINE precedence will not suffice. Examples: (1) Situation reports on position of front where attack is impending or where fire or air support will soon be placed. (2) Orders to aircraft formations or units to coincide with ground or naval operations. (3) Aircraft movement reports (messages relating to requests for news of aircraft in flight, flight plans, or cancellation messages to prevent unnecessary search/rescue action). (4) Messages concerning immediate movement of naval, air, and ground forces.	PRIORITY messages are processed, transmitted, and delivered in the order received and ahead of all messages of ROUTINE precedence. ROUTINE messages being transmitted should not be interrupted unless they are extra long and a very substantial portion remains to be transmitted. PRIORITY messages should be delivered immediately upon receipt at the addressee destination. When commercial refile is required, the commercial precedence that most nearly corresponds with PRIORITY is used. Time standard: 1 to 6 hours.
R	R O U T I N E	ROUTINE is the precedence to use for all types of messages that justify transmission by rapid means unless of sufficient urgency to require a higher precedence. Examples: (1) Messages concerning normal peacetime military operations, programs, and projects. (2) Messages concerning stabilized tactical operations. (3) Operational plans concerning projected operations. (4) Periodic or consolidated intelligence reports. (5) Troop movement messages, except when time factors dictate use of a higher precedence. (6) Supply and equipment requisition and movement messages, except when time factors dictate use of a higher precedence (7) Administrative, logistic, and and personnel matters.	ROUTINE messages are processed, transmitted, and delivered in the order received and after all messages of a higher precedence. When commercial refile is required, the lowest commercial precedence is used. ROUTINE messages received during nonduty hours at the addressee destination may be held for morning delivery unless specifically prohibited by the command concerned. Time standard: 3 hours—start of business following day.

Some veteran operators would have you believe that IMI derived from the words "I missed it."

Following is a complete list of authorized prosigns. Memorize them now. It may be helpful to prepare a number of small cards, with the prosign on the front and its meaning on the back. Use the cards for self-drill.

1. Precedence prosigns:
   - Z. . . . . FLASH.
   - O. . . . . IMMEDIATE.
   - P. . . . . PRIORITY.
   - R. . . . . ROUTINE.
2. Prosigns that identify portions of a Transmission:
   - AA. . . . . All after.
   - AB. . . . . All before.
   - WA . . . . . Word after.
   - WB . . . . . Word before.
3. Ending prosigns:
   - K. . . . . Go ahead; or, this is the end of my transmission to you and a response is necessary.
   - AR. . . . . End of transmission; no receipt required.
4. Pause prosigns:
   - AS. . . . . I must pause for a few seconds.
   - AS AR . . . . . I must pause longer than a few seconds; will call you back.
5. Separation prosigns:
   - BT. . . . . Break. (Separates text of message from heading and ending.)
   - II (written in messages as a short dash) . . . Separative sign. (Used to separate parts of the message heading. Not to be used as punctuation to represent a hyphen or dash in message texts.)
6. Prosigns always followed by one or more call signs and/or address groups:
   - DE. . . . . From (in call).
   - FM . . . . . Originator's sign.
   - TO. . . . . The addressee designations immediately following are addressed for action.
   - INFO . . . . . The addressee designations immediately following are addressed for information.
   - XMT . . . . . Exempt. (Used to exempt addressees from a collective call or address.)
7. Prosigns used in transmission instructions of a message:
   - T. . . . . Transmit this message to all addressees or to the addressee designations immediately following.
   - G. . . . . Repeat this entire transmission back to me exactly as received.
   - F. . . . . Do not answer.
8. Group count prosigns:
   - GR plus numerals. Group count.
   - GRNC. . . . . The groups in this message have not been counted.
9. Prosigns used with the executive method:
   - IX. . . . . Action on the message or signal that follows is to be carried out upon receipt of "Execute."
   - IX plus 5-second dash. . . . . "Execute" — carry out the purport of the message or signal to which this applies.
10. General:
    - AA. . . . . Unknown station.
    - B. . . . . More to follow.
    - C. . . . . Correct.
    - EEEEEEEE. . . . . Error.
    - EEEEEEEE AR . . This transmission is in error. Disregard it.
    - HM HM HM . . . . . Emergency silence sign.
    - IMI . . . . . Repeat.
    - INT . . . . . Interrogative.
    - J. . . . . Verify with originator and repeat.

NR. . . . . Station serial number.
R. . . . . I received your last transmission satisfactorily.
CFN. . . . . Confirmatory material to follow. (Used in teletypewriter operation only.)

OPERATING SIGNALS

Radio operators and teletypists frequently exchange routine advice and operating information, and occasionally relay emergency communication instructions or reports to other ships and stations and to aircraft. Traffic of this nature is transmitted in condensed standard form by means of operating signals consisting of three-letter groups beginning with Q or Z. These signals—of which there are several hundred—represent words, phrases, or complete sentences, and are a form of shorthand, eliminating time-consuming plain language transmissions. The Q signals are employed in both military and civil communications, and are understood by ships and shore stations of any nationality. The Z signals are for use only in the United States and Allied military communications, and represent meanings not found in the Q code. Both Q and Z signals can be used together, when necessary, in military communications. Operating signals are published in ACP 131. It has decode sections for both Q and Z signals, indexed alphabetically, and an encode section tabbed by subject matter.

USE OF OPERATING SIGNALS

Operating signals are prescribed for every form of electrical telecommunication except radiotelephone. Instead of using the customary operating signals, the radiotelephone operator transmits operating information in brief spoken phrases. An exception is made to this rule when a message containing an operating signal is relayed by radiotelephone; the the operator transmits the group phonetically.

Many operating signals may be used in either of two ways—as a question or as a statement. The prosign INT before the signal places it in the form of a question. Example: USS Epperson (DD 719) asks USS Renshaw (DD 499): NWBJ DE NTGT INT QRU K, meaning "Have you anything for me?"

Renshaw replies: NTGT DE NWBJ QRU AR, meaning "I have nothing for you."

When communicating with nonmilitary stations, the prosign IMI, after the Q signal, is employed instead of INT ahead of the Q signal to give an interrogatory meaning.

Some signals must be accompanied by a numeral suffix that completes, amplifies, or varies the basic meaning. Example: A teletypewriter operator checks circuit operation with the query INT ZBK, meaning "Are you receiving my traffic clear?" The receiving station has a choice of replies: ZBK1 means "I am receiving your traffic clear," or ZBK2, "I am receiving your traffic garbled."

Many operating signals contain blank portions in their meanings that are filled in to convey specific information. To illustrate, INT ZRE means "On what frequency do you hear me best?" In ACP 131 the declaratory meaning listed for ZRE is "I hear you best on _____kc (mc)." The operator fills in the necessary information thus: NTGT DE NWBJ ZRE 8578, which means "I hear you best on 8578 kc."

Other signals, in their meanings, have blanks enclosed in parentheses. Filling in such a blank is optional. For example, INT ZHA means "Shall I decrease frequency very slightly (or_____kc) to clear interference?" The operator receiving the signal INT ZHA without the frequency added knows it means "Shall I decrease frequency very slightly?"

During wartime, operating signals often are encrypted, especially those revealing—

1. Specific frequencies.
2. Cryptographic data.
3. The organization of networks.
4. Ship movements (estimated times of arrival, departure, and kindred data).

Unless they are encrypted, operating signals possess no security and must be regarded as the equivalent of plain language.

Some of the most commonly used operating signals are listed in table 8-3. Remember that the Q code is used internationally, and speaks of "telegrams" whereas a U. S. Navy communicator would say "messages."

BASIC MESSAGE FORMAT

With a few exceptions, military messages sent by electrical telecommunications are arranged according to a standard joint form called the basic message format. The form is substantially the same whether the message goes

Table 8-3. —Operating Signals

Signal	Question	Answer, advice, or order
QCB	. . . . .	Delay is being caused by____((1) your transmitting out of turn; (2) your slowness in answering; (3) lack of your reply to my____).
QRA	What is the name of your station?	The name of my station is___ .
QRG	Will you tell me my exact frequency (or that of___)?	Your exact frequency (or that of___) is kc (or mc).
QRK	What is the readability of my signals (or those of___)?	The readability of your signals (or those of___) is (1 to 5).
QRM	Are you being interfered with?	I am being interfered with.
QRN	Are you troubled by static?	I am troubled by static.
QRO	Shall I increase power?	Increase power.
QRP	Shall I decrease power?	Decrease power.
QRQ	Shall I send faster?	Send faster. (___wpm.)
QRS	Shall I send more slowly?	Send more slowly. (___wpm.)
QRT	Shall I stop sending?	Stop sending.
QRU	Have you anything for me?	I have nothing for you.
QRW	Shall I inform___that you are calling him on___kc (or mc)?	Please inform___ that I am calling him on kc (or mc).
QRX	When will you call me again?	I will call you again at___(hours) on ___kc (or mc).
QRZ	Who is calling me?	You are being called by____on ___kc (or mc).
QSA	What is the strength of my signals (or those of__)?	The strength of your signals (or those of___) is ___(1 to 5).
QSO	Can you communicate with direct or by relay?	I can communicate with ___ direct (or by relay through ___).
QSV	Shall I send a series of Vs on this frequency (or kc (or mc)?	Send a series of Vs on this frequency (or _____kc (or mc)).
QSY	Shall I change to transmission on another frequency?	Change to transmission on another frequency (or on ___kc (or mc)).

Table 8-3. —Operating Signals—Continued

Signal	Question	Answer, advice, or order
QSZ	Shall I send each work or group more than once?	Send each word or group twice (or___ times)
QTC	How many telegrams have you to send?	I have ___telegrams for you (or for___).
ZAA	. . . . .	You are not observing proper circuit discipline.
ZAR	. . . . .	This is my ___ request (or reply). ((1) First, (2) second, (3) third, etc.)
ZBK	Are you receiving my traffic clear?	I am receiving your traffic ___((1) clear, (2) garbled).
ZFO	. . . . .	Message ___is being delivered as a basegram message.
ZIA	. . . . .	This message (or message ___) is being (or has been) passed out of proper sequence of station serial numbers.
ZII	What was___of your (or___'s) number ___? ((1) date-time group, (2) filing time).	My (or___'s) number ___ had following ((1) date-time group, (2) filing time).
ZKA	Who is controlling station (NCS) on this frequency (or on___ kc (or mc))?	I am (or___is) controlling station (NCS) on this frequency (or on___ kc (or mc)).
ZKI	. . . . .	Set watch on ___ kc (or mc) ___((1) continous, (2) until further notice).
ZKP	Are you (or is___) radio guard for (on___.kc (or mc))?	I am (or___is) radio guard for___ (on _____ ___kc (or mc)).
ZNB	What is authentication of___((1) message___, (2) last transmission, (3))?	Authentication (of ___) is ___((1) message ___, (2) last transmission, (3) ___).
ZOC	. . . . .	Station(s) called relay this message to addresses for whom you are responsible.
ZOI	. . . . .	Pass this message to the nearest (or___) weather central control.
ZON	. . . . .	Place this message (or message ___) on broadcast indicated by numerals following ___(numeral may be followed by specific broadcast designator) ((1) NSS; (2) NPG; (3) NPM; (4) NBA; (5) NPN; (6) NPO; (7) NHY; (8) NAM; (9) NAF; (10) NPL; (11) NDT).

Table 8-3. —Operating Signals—Continued

Signals	Question	Answer, advice, or order
ZOU	How should traffic for___ be routed?	Route traffic for ___through ___(on ___kc (or mc)). '
ZOV	. . . . .	Station designation preceding this operating signals is the correct routing for this message rerouted by___.
ZOY	. . . . .	Relay this message only to the station(s) whose designation(s) precede this operating signal.
ZUE	. . . . .	Affirmative (Yes).
ZUG	. . . . .	Negative (No).
ZUI	. . . . .	Your attention is invited to ___.
ZUJ	. . . . .	Standby.
ZWL	. . . . .	No forwarding action to the addressee designation(s) immediately following is required.
ZFO	. . . . .	Message ___is being delivered as a basegram message.
ZIA	. . . . .	This message (or message ___) is being (or has been) passed out of proper sequence of station serial numbers.
ZII	What was ___of your (or___'s) number___ ? ((1) date-time group, (2) filing time).	My (or___ 's) number___ had following _____ ((1) date-time group, (2) filing time).
ZKA	Who is controlling station (NCS) on this frequency (or on ___kc (or mc))?	I am (or___ is) controlling station (NCS) on this frequency (or on___kc (or mc)).
ZKI	. . . . .	Set watch on ___kc (or mc) ___((1) continuous, (2) until further notice).
ZKP	Are you (or is___) radio guard for (on ___ kc (or mc))?	I am (or___ is) radio guard for___(on _____ ___kc (or mc)).
ZNB	What is authentication of ___((1) message ___ , (2) last transmission, (3))?	Authentication (of___) is___((1) message___ _, (2) last transmission, (3)___).
ZOC	. . . . .	Station(s) called relay this message to addressees for whom you are responsible.

Table 8-3. —Operating Signals—Continued

Signal	Question	Answer, advice, or order
ZOI	. . . . .	Pass this message to the nearest (or ___) weather central control.
ZON	. . . . .	Place this message (or message ___) on broadcast indicated by numerals following ___ (numeral may be followed by specific broadcast designator) ((1) NSS; (2) NPG; (3) NPM; (4) NBA; (5) NPN; (6) NPO;(7) NHY; (8) NAM; (9) NAF; (10) NPL; (11) NDT).
ZOU	How should traffic for ___ be routed?	Route traffic for ___ through ___ (on ___ kc (or mc)).
ZOV	. . . . .	Station designation preceding this operating signal is the correct routing for this message rerouted by ___.
ZOY	. . . . .	Relay this message only to the station(s) whose designation(s) precede this operating signal.
ZUE	. . . . .	Affirmative (Yes).
ZUG	. . . . .	Negative (No).
ZUI	. . . . .	Your attention is invited to ___.
ZUJ	. . . . .	Standby.
ZWL	. . . . .	No forwarding action to the addressee designation(s) immediately following is required.

by radiotelegraph, radiotelephone, manual teletypewriter, or by automatic tape equipment. The format exists in four versions, one of which is adapted to the special requirements of each of these primary transmission media. At this point, we will study the radiotelegraph message format. You will read about the other formats in later chapters, but if you learn the one given here you will have little trouble understanding any message.

All messages in joint form have three parts: HEADING, TEST, and ENDING. (Of the three the most complex is the heading, which often uses as many as 10 of the format's 16 lines.) Heading, text, and ending are divided into COMPONENTS. Each component, in turn, contains one or more ELEMENTS. From left to right in table 8-4, the message is divided into its parts, components, and elements. The heading, for example, consists of the following components: beginning procedure, preamble, address, and prefix. Elements of the beginning procedure (see "Elements" column) consist of the call, transmission identification, and transmission instructions. Contents of the call are station(s) called, prosign XMT and exempted calls (if required), and the prosign DE and designation of calling station.

Table 8-4. —Radiotelegraph Message Format

Parts	Components	Elements	Format line	Contents
H	Beginning procedure	Handling instructions.	1	Not used in radiotelephone and radiotelegraph.
E A		a. Calls	2 3	Station(s) called; prosign XMT (exempt) and exempted calls. Prosign DE (from) and designation of station calling.
		b. Transmission identification. c. Transmission instructions.	4	Station serial number. Prosign T (relay); G (repeat this transmission back to me exactly as received); F (do not answer); operating signals; call signs, address groups, plain language.
	Preamble	a. Precedence; date-time group; message instructions.	5	Precedence prosign; date-time group and zone suffix; operating signals; prosign $\overline{\text{IX}}$ (execute to follow).
D	Address	a. Originator's sign; originator.	6	Prosign FM (originator of this message is); originator's designation expressed as call sign, address group, or plain language.
I		b. Action addressee sign; action addressee(s).	7	Prosign TO; action addressee designation(s) expressed as call signs, address groups, address indicating groups, or plain language.
N G		c. Information addressee sign; information addressee.	8	Prosign INFO (this message addressed for information to); information addressee designation(s) expressed as call signs, address groups, or plain language.

Table 8-4.—Radiotelegraph Message Format—Continued

Parts	Components	Elements	Format line	Contents
HEADING		d. Exempted ad-adressee sign; exempted addressee(s).	9	Prosign XMT; exempted addressee designation(s) expressed as call signs, address groups, or plain language.
	Prefix	a. Accounting information; group count; SVC.	10	Accounting symbol; group count; SVC (this is a service message).
SEPARATION			11	Prosign $\overline{BT}$ (break).
TEXT	Text	a. Subject matter . .	12	Internal instructions; basic idea of originator.
SEPARATION			13	Prosign $\overline{BT}$.
END	Ending procedure	a. Time group	14	Hours and minutes expressed in digits and zone suffix, when appropriate.
		b. Final in-	15	Prosigns B (more to follow); $\overline{AS}$ (I must pause); C (I am about to correct a transmission error in some foregoing part of this message); operating signals.
		c. Ending sign	16	Prosign K (go ahead and transmit), or $\overline{AR}$ (end of transmission).

It is well to consider each item in the heading separately, for each has a special meaning and its relative position is significant. Prosigns, call signs, address groups, and other contents that make up a typical heading must always appear in the order specified for the means of transmission.

It should be understood that there is no relationship between format lines and typed or handwritten lines. Format line 12, for example, is the text of the message and may consist of many written lines.

The form of the message and its transmission requirements dictate which components, elements, and contents will be used in the heading. Format line 1 is used only in teletypewriter and tape relay work, but is omitted in radiotelephone and radiotelegraph. The abbreviated plaindress heading (discussed later) may omit any or all of the following: precedence, DTG, and group count. Many messages not in abbreviated plaindress omit such elements as transmission instructions, information addressee data, and final instructions because

there is no occasion for them. The messages themselves are, for this reason, much simpler than the basic message format, which must provide for everything. You seldom see a message with every format line, and you may never see one that uses all the contents. But remember that the sequence actually appearing in any one message must be in accordance with the proper message format.

It is impossible in a training course such as this to show you how to construct headings to meet every eventuality. Your Chief or senior Radioman has handled thousands of messages, and can explain a greater variety of message examples for you. Make it your rule to read every message you handle. Take a good look through the message files in your ship or station. Doctrinal communication publications, which are available on the job, provide you with valid, up-to-date sources of operational communication information.

PRELIMINARY CALL

A preliminary call is for the purpose of establishing radiotelegraph communications before transmitting a message. The preliminary call also alerts the receiving operator to prepare to copy a message.

A simple preliminary call consists of the station called, the prosign DE, the calling station, and the prosign K. If desired, the precedence of the message may be included. Following are two examples of a preliminary call.

NCFX DE NAUC K
NCFX DE NAUC P K

From the earlier discussion of call signs, it is apparent that transmission of the preliminary call is sent from one U.S. Navy ship to another. A check of the call sign book shows that NCFX is USS Radford (DD 446) and NAUC is USS Philip (DD 498). In the second example, Philip's operator indicates that he has a priority message for Radford. When ready to copy the message, Radford's operator gives the go-ahead by transmitting: NAUC DE NCFX K.

RADIOTELEGRAPH MESSAGE ANALYSIS

With communication established, Philip commences clearing traffic. The message is analyzed as follows:

Format line	Transmission	Explanation
2 and 3	NCFX DE NAUC	Radford from Philip.
5	— P — 222345Z	PRIORITY precedence. DTG, indicating that this message was originated at 2345 GMT, on the 22d day of the month.
10	GR8	Group count. This message has 8 groups in the text. (A plain language word counts as 1 group.)
11	$\overline{\text{BT}}$	Break. Separation between heading and text.
12	UNCLAS. GUARD MAIL FOR YOU AT FIRST LIGHT.	Text.
13	$\overline{\text{BT}}$	Break. Separation between text and ending.
16	K	Go ahead and transmit.

On receiving the prosign K, Radford's operator checks the message and counts the groups in the text. If he missed some of the message, or doubts that he received a portion correctly, he requests and obtains a repetition of the missed or doubtful portions. When certain that he has the message complete and correct, he so informs the Philip by transmitting: NAUC DE NCFX R $\overline{\text{AR}}$. This transmission is called a RECEIPT.

In the preceding example, two ships were in direct communication, and Radford's call sign served to address the message to that ship. A message that must undergo relay to reach the addressee requires a somewhat longer and differently constructed heading.

It must be apparent to every station handling the message (1) who originated the message, (2) who receives the message for relay, and (3) to whom the message ultimately is destined.

Assume that USS Ranger (CVA 61), steaming off Cristobal, Panama, completes her mission of qualifying carrier pilots and wishes to so report to COMNAVAIRLANT (in Norfolk) and to the Jacksonville (Fla.) Naval Air Station. Communication is established with NAVCOMMSTA Balboa, the nearest U.S. Naval shore radio station, and transmission of the message commences. Note the use of the information addressee prosign.

Format line	Transmission	Explanation
2 and 3	NBA DE NHKG	NAVCOMMSTA Balboa from Ranger.
4	T	Relay this message to all addressees.
5	R - Ø11324Z	ROUTINE precedence. DTG.
6	FM NHKG	Originator, USS Ranger.
7	TO YONA	Action to COMNAVAIRLANT.
8	INFO OJWN	Information to NAS Jacksonville.
10	GR6	Group count of text groups.
11	$\overline{\text{BT}}$	Break.
12	UNCLAS. CAR-QUALS COMPLETED. ETA GTMO Ø314ØØZ	Text. Certain authorized abbreviations, standard throughout the services, are used in messages for sake of brevity. The version as sent is 62 percent shorter than the expanded text, which reads: CARRIER QUALIFICATION LANDINGS COMPLETED ESTIMATED TIME OF ARRIVAL GUANTANAMO BAY CUBA Ø314ØØZ.
13	$\overline{\text{BT}}$	Break.
16	K	Go ahead and transmit.

Radio Station NBA gives Ranger a receipt for the message, and by doing so assumes responsibility for relay.

Here is an example of a type of message you will see often. This is a fleet broadcast message from NAVCOMMSTA Washington, originated by CNO. Note the exempted addressee prosign. Fleet broadcast messages via CW repeat each element of the heading, except when the addressees are designated by plain language. Plain language designators are transmitted only one time.

Format line	Transmission	Explanation
2 and 3	NERK NERK NERK DE NSS NSS NSS	Any or all U.S. Navy ships from NAVCOMMSTA Washington. (This call is sent with the first message of each hourly schedule; omitted thereafter.)

Format line	Transmission	Explanation
4	W NR522 W NR 522 -	NAVCOMMSTA Washington broadcast serial number 522—that is, the 522d message placed on this broadcast schedule since the beginning of the current month.
5	PP -	PRIORITY precedence to action addressees.
5	RR -	ROUTINE precedence to information addressees.
5	11Ø847Z 11Ø847Z -	DTG.
6	FM FM	Originator's prosign.
6	CNO -	Originator.
7	TO TO	Action addressee prosign.
7	All ships NAVAIRLANT	Action addressee(s).
8	INFO INFO	Information addressee prosign.
8	NAS GTMO—	Information addressee.
9	XMT XMT	EXEMPTED addressee prosign, meaning that stations or addressees that follow are exempted from foregoing collective address—in this instance, the action addressee.
9	USS Saratoga	Exempted addressee.
10	GR156 GR156	Group count.
11	$\overline{\text{BT}}$	Break.
12	(156 groups text)	Text.
13	$\overline{\text{BT}}$	Break.
16	$\overline{\text{AR}}$	This is the end of this transmission and no receipt is required or expected.

PLAIN LANGUAGE TEXT

A standard textual format is prescribed for plain language messages. The format is designed to make maximum use of the capabilities of teletypewriter equipment, thereby eliminating much of the processing formerly required for incoming messages. It also decreases the originator's preparation time and the addressee's comprehension time.

Exempt from the standard format are messages with very short texts, such as tactical messages, and messages employing a firmly established format, such as standard "reporting type" messages that use letters of the alphabet to indicate a prearranged subject matter. For messages received for relay by other means than DCS (for example, those received via a CW circuit), the communication center accepting the message is responsible for assuring that the elements are in proper sequence before relaying. If all of the elements are required, they must appear in the following order:

1. Classification or the abbreviation UNCLAS.
2. Special category markings (EXCLUSIVE, COSMIC, and the like).

3. Special handling security markings (NOFORN, RESDAT, and so on).
4. Exercise identification (EXERCISE MAIN BRACE).
5. Code name or nickname of special projects or operations.
6. Flag word (EXPRESS, REDLINE, etc.).
7. Passing instructions and other indications of message distribution (FOR_____ _____).
8. Subject line, concise and untitled.
9. References, identified by letter(s).
10. Text:
    a. Paragraphs are numbered.
    b. Subparagraphs are indented and lettered or numbered as appropriate.
    c. In a one-paragraph message, any subparagraphs are lettered.
    d. If a message is classified, proper downgrading/declassification markings are included.

Following is an example of a message employing most of the elements of the standard text format.

CONFIDENTIAL NOFORN
COMTWELVE PASS TO FADM SMITH
REVISED CONFERENCE SCHEDULE
A. MY Ø917ØØZ
B. COMTHIRTEEN 13153ØZ
1. REQUEST DESIGNATED COMMITTEE ARRIVE COMTWELVE 24 HOURS PRIOR CNO
2. AGENDA:
   A. ADD "LOGISTICS OF PROJECT."
   B. DELETE "POSSIBLE LOCATION FACILITIES."
3. CNO ITINERARY, 19 AUG, TIMES UNIFORM:

ETA	ETD	LOCATION
ORIG	13ØØ	NAS SEATTLE
1515	18ØØ	NAS ALAMEDA
23ØØ	TERM	CHICAGO-OHARE

SCP 4

If a message does not require all of the elements, the format is adjusted accordingly by omitting the nonessential elements. Certain other exceptions are allowed when using the standard format.

The subject line may be omitted if it necessitates that an otherwise unclassified message be classified, noticeably increases the length of what would be a brief message, or increases commercial charges when the message is addressed to activities served by commercial communication facilities.

If a short message consists of only one paragraph, the paragraph is not numbered. When there is only one reference, the reference identification is included in the body of the paragraph. For example:

UNCLAS
YOUR 1ØØ915Z. BUDGET APPROVED SUBJECT CNO CONCURRENCE

The number of characters and spaces on each teletypewriter line is limited to 69.

MESSAGE PARTS THAT MAY NOT BE CHANGED

Certain portions of a message are fixed by the originator and may not be changed by anyone else. This rule is necessary to ensure the reliability of communications. No one knows better than the originator what the message should say, to whom it should be delivered, or what precedence it should carry. Changes in these message parts are forbidden: (1) preamble, (2) address, (3) prefix, and (4) text.

MESSAGES BETWEEN COMMUNICATION PERSONNEL

Procedure messages and service messages between communication personnel are for the purpose of expediting the handling of message traffic. These messages make maximum use of prosigns and operating signals to shorten message length and transmission time. Although procedure messages, and service messages are in everyday usage in handling messages, you are likely to hear friendly argument among communication personnel about their differences.

PROCEDURE MESSAGES

Procedure messages obtain and provide corrections, verifications, and/or repetitions. The text of a procedure message contains only prosigns, operating signals, address designations, identification of messages or parts of messages, and any necessary amplifying data. A procedure message may contain any of the components shown in the basic format, except that the break prosign (BT) is used only if the DTG is included. The DTG, in turn, is employed only when it is necessary to show time of origin, or when further references may be

made to the procedure message. You will find the most common use of procedure messages in radiotelegraph circuit operation.

SERVICE MESSAGES

Service messages pertain to any phase of traffic handling (including requesting and giving corrections and repetitions of messages), communication facilities, or circuit conditions. Most service messages are concerned with the handling of messages. Less frequently they deal with communication facilities or circuit conditions, which accounts for the occasional confusion between procedure messages and service messages. The majority of both types are used to obtain corrections and repetitions of messages or parts of messages. Service messages, however, are prepared and transmitted as regular messages, and contain all the necessary format lines, including the DTG and BT. They may even be encrypted, but in an encrypted service message, you cannot recognize it as a service message—purposely so, for security reasons. It is identified as a service message only within the encrypted text. You can recognize plain language service messages easily by one or more of the following:

1. Reference to another service message;
2. The abbreviation SVC in the prefix or as the first word of the text;
3. That it is addressed specifically to a communication station.

In teletypewriter tape relay operations, if the minor station is not in direct communication with any station but its own relay station, service messages are used when necessary to question the originating station about a message. Examples are given in chapter 11.

BASEGRAM SYSTEM

The basegram system of delivery is for general messages of insufficient operational importance to warrant immediate delivery to ships by the fleet broadcast method. Originators of general messages decide which messages may be designated basegrams. The purpose of basegram delivery is to keep the fleet broadcast free for operational traffic. Strategically located shore stations, acting as basegram delivery authorities, furnish copies of basegrams to ships in ports from which U.S. Navy ships normally operate.

Basegrams and all other general messages are delivered by teletypewriter throughout the shore communication system. Broadcast stations, although they receive basegrams by rapid means, normally do not broadcast the actual basegrams. Instead, they originate and broadcast a procedure message, indicating that the general message is being delivered as a basegram. The operating signal ZFO (Message is being delivered as a basegram) is transmitted, along with the message identification. Example:

WR NR34Ø4
M 11Ø254Z
FM NSS
TO NERK
BT
UNCLAS
ZFO ALNAV 1Ø192ØZ/Ø5
BT
AR

Broadcast stations are permitted to send basegrams on the fleet broadcast if all other traffic is cleared and free circuit time exists.

All ships are required to keep a general message receipt log. Usually, a standard ledger-type book is used for this purpose, with columns ruled and labeled to indicate the general messages that were received and the basegrams for which only the procedure messages (ZFOs) were received. The ZFO procedure message is always placed in the appropriate general message file until it is replaced by the actual general message basegram.

Aboard ship, your leading Radioman will send you ashore to pick up basegrams as soon as you arrive in port, at frequent intervals while in port, and immediately before getting underway. Be sure to take along the general message logbook, because the basegram office has no other way of knowing which general messages your ship lacks.

When you obtain copies of basegrams from the basegram office, you will notice the word BASEGRAM near the beginning of the text. Additionally, the message heading bears the operating signal ZFP, meaning BASEGRAM, following the DTG.

Upon receipt, basegrams are written up and routed the same as any other general message.

FORMS OF MESSAGES

A military message may be drawn up in any one of the following forms: plaindress, abbreviated plaindress, or codress.

PLAINDRESS

A plaindress message has originator and addressee designations in the heading. Unless the call serves as the address, the message contains all the components (but not necessarily the elements) prescribed by the message format—with one exception: The prefix may be omitted. All foregoing examples of radiotelegraph messages are in plaindress form. Call signs and address groups in plaindress messages may be encrypted for a degree of security.

ABBREVIATED PLAINDRESS

Operational requirements for speed on handling—of contact reports, for example—may dictate the abbreviation of plaindress message headings. At such times, any or all of the following may be omitted from the heading: precedence, date, DTG, and group count.

CODRESS

Codress is an encrypted message form in which originator and addressee designations (as well as additional passing instructions, if any are buried in the encrypted text. Codress is a valuable security device in that it conceals the identity of units and prevents an enemy from making inferences from originator-addressee patterns.

Plaindress and codress forms may be compared from the following message prepared in both versions. Assume that Task Group (TG) 66.1 is conducting exercises in the Mediterranean. Commander Task Group (CTG) 66.1 wishes to order the beginning of a new phase of operations, the message to be addressed action to TG 66.1, information to COMCRUDESLANT and COMASDEFORLANT. The USS Joseph K. Taussig (DE 1030), although a part of the task group, is on detached duty and not participating. The following are the call signs and address groups:

CTG 66.1	E2L4
TG 66.1	K3M3
COMDESLANT	HAPA
COMASDEFORLANT	SNDS
USS Joseph K. Taussig	NFFN

1. For the PLAINDRESS version, the call signs are encrypted in accordance with current instructions. Example:

K3M3 - XMT - NFFN DE E2L4 -
P - 18Ø934Z -
FM E2L4 -
TO K3M3 -
INFO HAPA
SNDS -
XMT NFFN
GR35
BT
15268 ALFA BRAVO CHARLIE DELTA ECHO
MNPTXWQLTP . . .etc.
(code groups—1Ø groups in each line)
BT
K

The message will also go, with a slightly different heading, on a separate circuit to the nearest shore radio station, for relay to the information addressees.

2. In the CODRESS version, NERK and NA are indefinite ships' call signs. Example:

NERK DE NA -
P - 18Ø934Z
GR57
BT
15268 ALFA BRAVO CHARLIE DELTA ECHO
RLPZC . . .etc.
(code groups—1Ø groups in each line)
BT
AR

The only information an enemy might recover from the codress message is that it (1) was sent from one U.S. Navy ship to another; (2) is of PRIORITY precedence; and (3) originated at 18Ø934Z. Moreover, this is the only information available to bona fide recipients, who must decrypt the message to learn for whom it is intended. (Joseph K. Taussig needs to break the message only far enough to learn she is exempted.)

Codress message texts are somewhat longer than their plaindress counterparts, because the originator and addressees are in the text. The originator and addressees are designated within the text by plain language, not by call signs or address groups.

READDRESSING MESSAGES

At times an originator or an addressee wants to readdress a message to other ships or activities not included in the original address. The following rules apply:

1. All format lines preceding line 5 (precedence, DTG) of the original message heading are deleted.
2. With a single exception, no alteration can be made to the original message from the precedence to the end of the text. If the message to be readdressed carries a DTG besides the current month, the

abbreviation of the month of origin is added following the original DTG.

3. A supplementary heading is inserted in front of the original heading.
4. The precedence indicated in the supplementary heading pertains to the supplementary address only.
5. The DTG of the original message is used for purposes of reference, reply, and filing.

Assume that, on receipt of the following plain-dress message, NTAA readdresses it to NUYO for information. Here is the original message received from NTSY:

NTAA DE NTSY -
P - 281634Z -
FM NTSY -
TO NTAA -
INFO NBFJ
GR32
BT
TEXT
BT

Station NTAA adds his supplementary heading and transmits to NUYO the following message:

NUYO DE NTAA -
R - 281832 Z -
FM NTAA -
INFO NUYO -
P - 281634Z -
FM NTSY -
TO NTAA -
INFO NBFJ
GR32
BT
TEXT
BT

ADDITIONAL MESSAGE EXAMPLES

Additional message examples are described in later chapters of this manual. Radiotelephone messages and operating procedure are treated in chapter 9. Chapter 11 is devoted to teletypewriter communications.

CHAPTER 9

RADIOTELEPHONE

We learned in chapter 7 that radio is potentially the least secure of all the various means of communication. One way in which Communications Yeomen can improve transmission security is by observing strict circuit discipline.

Circuit discipline is the part of transmission security that includes the proper use of radio equipment, net control, monitoring and training, adherence to prescribed frequencies and operating procedure, and remedial action. Lack of circuit discipline and lack of operator training, as well as negligence, inaccuracy, and laxity, are responsible for the violations that endanger radio transmission security.

Although circuit discipline is discussed here in connection with radiotelephone procedure, you must understand that the requirement for circuit discipline applies as well to all communication circuits—not just radiotelephone.

Every operator must recognize and avoid the following malpractices that endanger communication security.

1. Linkage or compromise of classified call signs and address groups by plain language or association with unclassified call signs.
2. Linkage or compromise of encrypted call signs and address groups by association with other call signs, address groups, or plain language. For example, use of encrypted call signs in the call and unencrypted call signs in the message address.
3. Misuse and confusion of call signs, routing indicators, address groups, and address indicating groups. This abuse may result in the nondelivery of an important message, a compromise, or the linking of classified and unclassified call signs and address groups.
4. Violation of EMCON conditions of radio silence.
5. Unofficial conversation between operators.
6. Transmitting in a directed net without permission.
7. Transmitting the operator's personal sign.
8. Excessive repetition of prowords.
9. Use of plain language in place of applicable prowords.
10. Use of unauthorized prowords.
11. Unnecessary transmissions.
12. Incorrect and unauthorized procedure.
13. Identification of unit locations.
14. Identification of individuals belonging to an organization.
15. Excessively long calls. When a station is called and does not answer within a reasonable time, presumably because a condition of radio silence prevails, the message may be transmitted blind or by some other method.
16. Failure to maintain radio watches on designated frequencies and at prescribed times.
17. Use of excessive transmitting power.
18. Tuning transmitters with antenna connected.
19. Excessive time consumed in tuning, testing, changing frequency, or adjusting equipment.
20. Use of profane, indecent, or obscene language.

NETS

A net is an organization of two or more stations in direct communication on a common channel. One station in the net—the net control station (NCS)—is in charge. Usually the station serving the senior commander is designated as net control, although it may be another station if that station is in better position to control the net.

The duties of the net control station are to speed flow of traffice on the net, to maintain circuit discipline, to limit transmissions to the

essential minimum, to settle disputes incident to traffic handling, and to monitor the net so that corrective action can be taken against poor operating practices.

An alternate net control station ordinarily is designated to take charge of the net when the normal NCS is inoperative for any reason. When in control of the net, the alternate NCS assumes all the responsibilities of the NCS.

DIRECTED AND FREE NETS

Large nets and nets handling many messages usually operate as directed nets, which means that no station may transmit a message without calling and obtaining permission from net control. Nets not requiring strict control may operate as free nets. As such, the controlling station authorizes member stations to send their messages without obtaining prior permission.

COMMAND, COMMON, FUNCTIONAL NETS

Nets are classified into three types, according to mission or purpose: (1) command, (2) common, and (3) functional.

A command net links a commander with his immediate subordinates in the chain of command, and with any other units that may be designated. For example, a task force command net is activated by the task force commander and is guarded by the task group commanders.

A common net links all ships (and in amphibious operations, troop units) of the same task organization. For example, a task group common net is activated by the task group commander and is guarded by all ships and troop units in the task group.

A functional net is for direct communication between personnel in charge of the specific task for which the net is provided. An example of a functional net is a picket reporting net guarded by anti-air warfare picket vessels and controlled by a sector AAW ship.

TYPES OF RADIO WATCHES

As a CYN3, you will stand four types of radio watches. The requirements of each type, as prescribed in the effective edition of DNC 5, follow:

1. Guard: A continuous receiver watch is required, with a transmitter ready for immediate use. A complete log must be kept.

2. Cover: A continuous receiver watch is kept, with transmitter calibrated and available, but not necessarily for immediate use. Requires a complete log.

3. Copy: A continuous receiver watch is maintained, and a complete log is kept.

4. Listen: A continuous receiver watch is maintained. A complete log is optional.

The four types of watches, however, do not provide you a choice. The communication plan under which your ship or station is operating directs the type of watch to be stood.

MICROPHONE TECHNIQUE

The following is a guide that you should use in developing good microphone technique. Practice the do's and avoid the don'ts. Remember, though, that nothing can take the place of good commonsense.

DO:

1. Listen before transmitting. Unauthorized break-in causes confusion and often blocks the transmission in progress to the extent that neither transmission gets through.

2. Speak clearly and distinctly. Both slurred syllables and clipped speech are hard to understand. A widespread error among untrained operators is failure to emphasize vowels sufficiently.

3. Speak slowly. Unless the action officer is listening, he must rely on the copy being typed or written. Give the recorder a chance to get it all down. That way, you avoid repetitions, thereby saving time on the circuit.

4. Avoid extremes of pitch. A high voice cuts through interference best, but is shrill and unpleasant if too high. A lower pitch is easier on the ear, but is difficult to understand through background noises if too low.

5. Be natural. Maintain a normal speaking rhythm. Group words in a natural manner. Send your message phrase by phrase instead of word by word.

6. Use standard pronunciation. Speech with sectional peculiarities is difficult for persons from other parts of the country to understand. Talkers who use as a model the almost standard pronunciation of a broadcast network announcer are easiest to understand.

7. Speak in a moderately strong voice, in order to override unavoidable background noises and prevent dropouts.

8. Keep correct distance between lips and microphone. A distance of about 2 inches is correct for most microphones. If the distance is

too great, speech is inaudible, and background noises creep in; if too small, blaring and blasting result.

9. Shield your microphone. Keep your head and body between noise-generating sources and the microphone while transmitting.

10. Keep the volume of a handset earphone low.

11. Keep speaker volumes to a moderate level.

12. Give an accurate evaluation in response to a request for a radio check. A transmission with feedback or a high level of background noise is not "loud and clear," even though the message can be understood.

13. Pause momentarily, when possible, and interrupt your carrier. This method allows any other station with higher precedence traffic to break in.

14. Adhere strictly to prescribed procedures. Up-to-date radiotelephone procedure is found in the effective edition of ACP 125.

15. Transact your business and get off the air. Preliminary calls waste time when communications are good and the message is short. It is unnecessary to blow into a microphone to test it, nor to repeat portions of messages when no repetition is requested.

DON'T:

1. Transmit while surrounded by other persons loudly discussing the next maneuver or event. It confuses receiving stations, and a serious security violation can result.

2. Hold the microphone button in the push-to-talk position until absolutely ready to transmit. Your carrier will block communications on the net.

3. Hold a handset in such a position while speaking that there is a possibility of having feedback from the earphone added to other back ground noises.

4. Hold a handset loosely. A firm pressure on the microphone button prevents unintentional release and consequent signal dropout.

5. Tie up a circuit with test signals. Usually 10 seconds is sufficient for testing.

PRONOUNCING NUMERALS

Care must be taken to distinguish numerals from similarly pronounced words. Pronounce numerals as follows:

Numeral	Pronounced
Ø	Zero
1	Wun
2	Too
3	Thu-ree
4	Fo-wer
5	Fi-yiv
6	Six
7	Seven
8	Ate
9	Niner

The numeral Ø is always spoken as "zero"—never as "oh." Decimal points are spoken as "day-see-mal."

In general, numbers are transmitted digit by digit, except that exact multiples of hundreds and thousands are spoken as such. Examples:

Number	Pronounced
44	Fo-wer fo-wer
90	Niner zero
136	Wun thuh-ree six
500	Fi-yiv hun-dred
1478	Wun fo-wer seven ate
7000	Seven thow-zand
16,000	Wun six thow-zand
16,400	Wun six fo-wer hundred
812,681	Ate wun too six ate wun

A few special instances, however, require procedures different from the normal pronunciation—digit by digit. Let us examine the prescribed rules for these exceptions. Notice how some of the examples given differ from the general rule for pronouncing numerals.

1. Ranges, distances, and speeds given in mile units are always transmitted as cardinal numbers. Examples:

Number	Pronounced
10	Ten
13	Thur-teen
25	Twen-ty fi-yiv
50	Fif-ty
110	Wun hun-dred ten
300	Thu-ree hundred

2. Altitude is always expressed in feet (except for weapons orders, which are always expressed in yards) and spoken in cardinal numbers. Examples:

Number	Pronounced
700	Seven hun-dred
1100	Eleven hun-dred
5500	Fif-ty fi-yiv hun-dred
10,500	Ten thow-zand fi-yiv hundred
20,000	Twen-ty thow-zand

3. Altitude in weapons orders and information concerning gunfire support are always expressed in yards and are transmitted digit by digit, except that exact multiples of hundreds and thousands are spoken as such. Examples:

Number	Pronounced
10	Wun zero
25	Too fi-yiv
100	Wun hun-dred
1000	Wun thow-zand

4. Bearings are always given in three digits and are transmitted digit by digit. Examples:

Number	Pronounced
090	Zero niner zero
180	Wun ate zero
295	Too niner fi-yiv

5. Position angles, always less than 100°, are expressed in two digits and are pronounced as cardinal numbers. The phrase "position angle" must precede the numerals. Examples:

Number	Pronounced
5	Position angle fi-yiv
10	Position angle ten
15	Position angle fif-teen
27	Position angle twen-ty seven

PHONETIC ALPHABET

Many letters of the alphabet sound alike. For this reason, the standard phonetic equivalents of the letters of the alphabet are used in radiotelephone communications. Correct pronunciation of the phonetic alphabet is important and should be practiced at every opportunity.

Letter	Phonetic equivalent	Pronounced
A	ALFA	AL FA
B	BRAVO	BRAH VOH
C	CHARLIE	CHAR LEE
D	DELTA	DELL TAH
E	ECHO	ECK OH
F	FOXTROT	FOKS TROT
G	GOLF	GOLF
H	HOTEL	HOH TELL
I	INDIA	IN DEE AH
J	JULIETT	JEW LEE ETT
K	KILO	KEY LOH
L	LIMA	LEE MAH
M	MIKE	MIKE
N	NOVEMBER	NO VEM BER
O	OSCAR	OSS CAH
P	PAPA	PAH PAH
Q	QUEBEC	KEH BECK
R	ROMEO	ROW ME OH
S	SIERRA	SEE AIR RAH
T	TANGO	TANG GO
U	UNIFORM	YOU NEE FORM
V	VICTOR	VIK TAH
W	WHISKEY	WISS KEY
X	XRAY	ECKS RAY
Y	YANKEE	YANG KEY
Z	ZULU	ZOO LOO

PROWORDS

Prowords (procedure words) are the radio telephone equivalents of prosigns. They are words and phrases that have predetermined meanings, and are used to expedite message handling on radiotelephone circuits. Many prowords and prosigns have exactly the same meaning. Also, they are used in the same manner. A list of the prowords (except for precedence prowords), together with an explanation of each and the corresponding prosign (if one exists), is given in table 9-1. Learn them now, because you will use them often. The precedence of a radiotelephone message is indicated by the actual word(s) of the precedence. For example: PRIORITY, IMMEDIATE, and so on.

RADIOTELEPHONE MESSAGES

Radiotelephone uses a 16-line message format that is comparable to the formats in radiotelegraph and in teletypewriter communications. It also has the same three military message forms: plaindress, abbreviated plaindress, and codress. By far the most common message form in radiotelephone traffic is the

Table 9-1.—Radiotelephone Prowords

Proword	Meaning	Corresponds to
ALL AFTER	All after	AA
ALL BEFORE	All before	AB
BREAK	Separation of text from other portions of the message. (Used only when confusion between text and heading or ending is likely.)	$\overline{BT}$
CORRECTION	Error	EEEEEEEE
DISREGARD THIS TRANSMISSION	This transmission is in error. Disregard it.	EEEEEEEE $\overline{AR}$
DO NOT ANSWER	Do not answer	F
EXECUTE	Carry out the meaning of the message or signal to which this applies.	$\overline{IX}$ (5-second dash)
EXECUTE TO FOLLOW and IMMEDIATE EXECUTE.	Action on the message or signal that follows is to be carried out upon receipt of EXECUTE. EXECUTE TO FOLLOW is used with the normal and delayed executive methods. IMMEDIATE EXECUTE is used with the immediate executive method.	$\overline{IX}$
EXEMPT	Exempt following addressees from the collective call.	XMT
FIGURES	Numerals or numbers follow	——
FROM	Originator's sign	FM
GROUPS	Group count	GR
GROUP NO COUNT	The groups in this message have not been counted.	GRNC
INFO	The addressee designations immediately following are addressed for information.	INFO
INITIAL	The following phonetic equivalent is to be recorded as a single letter initial of a name.	——
I READ BACK	The following is my response to your instructions to read back.	——
I SAY AGAIN	I am repeating transmission or portions indicated.	——
I SPELL	I shall spell the next word phonetically.	——

Table 9-1. — Radiotelephone Prowords — Continued

Proword	Meaning	Corresponds to
I VERIFY	I have verified with originator and am repeating.	C
MESSAGE FOLLOWS	A message that requires recording is about to follow.	——
MORE TO FOLLOW	More to follow	B
NUMBER	Station serial number	NR
OUT	End of transmission; no response required.	$\overline{AR}$
OVER	Go ahead; or, this is the end of my transmission and a response is necessary.	K
READ BACK	Repeat this entire transmission back to me exactly as received.	G
RELAY (TO)	Transmit this message to all addressees or to the addressee designations immediately following.	T
ROGER	I have received your last transmission satisfactorily.	R
SAY AGAIN	Repeat	$\overline{IMI}$
SERVICE	The message that follows is a service message.	SVC
SIGNALS FOLLOW	Groups that follow are taken from a signal book. (This proword need not be used on nets primarily employed for conveying signals. It is intended for use when tactical signals are passed on nontactical nets.)	——
SILENCE	Emergency silence sign (spoken three times).	$\overline{HM}$ $\overline{HM}$ $\overline{HM}$
SILENCE LIFTED	Resume normal transmissions	——
SPEAK SLOWER	Your transmission is at too fast a speed. Reduce speed of transmission.	——
THAT IS CORRECT	Correct	C
THIS IS	From	DE
TIME	The following is the time or data-time group of this message.	——
TO	Action Addressee	TO

Table 9-1.—Radiotelephone Prowords—Continued

Proword	Meaning	Corresponds to
UNKNOWN STATION	Unknown station	$\overline{AA}$
VERIFY	Verify with originator and repeat.	J
WAIT	I must pause a few seconds	AS
WAIT OUT	I must pause longer than a few seconds.	$\overline{AS}$ $\overline{AR}$
WILCO	I have received your message, understand it, and will comply.	——
WORD AFTER	Word after	WA
WORD BEFORE	Word before	WB
WORDS TWICE	Communication is difficult. Transmit (or transmitting) each phrase twice. (Can be used as an order or request.)	——
WRONG	Your last transmission was incorrect. The correct version is_____.	——

abbreviated plaindress. Often it is so abbreviated that its resemblance to the basic message format is barely detectable. But the three major message parts still are there: heading, text, and ending. Each of these parts can be reduced to components, elements, and contents.

Table 9-2 shows the correct arrangement of a radiotelephone message. Not all the parts, components, elements, or contents are necessarily included in any one message, but, when one of them is used, it must be placed in the message in the order in which it appears in the table.

HEADING

The heading of a radiotelephone message may include any or all of the first 10 procedural lines shown in table 9-2. More often than not, though, it includes only the call, preceding the text. One explanation for such general use of the abbreviated form is that radiotelephone communication nearly always is conducted with the station originating and the station addressed in direct communication.

TEXT

The text of the message is the basic thought or idea the originator wishes to communicate. It may be in the form of plain language, code words, cipher groups, or numerals.

Difficult words or groups within the text of a plain language message are spelled out in the phonetic alphabet. Groups or words to be spelled are preceded by the proword I SPELL. If the operator can pronounce the word, he should do so before and after spelling it.

ENDING

Every radiotelephone message ends with the proword OVER or OUT. With OVER, the sender tells the receiver to go ahead and transmit; or, "This is the end of my transmission to you and a response is necessary." With the proword OUT, the sender tells the receiver: "This is the end of my transmission to you and no response is required." The two ending prowords never are used together.

CODE AND CIPHER MESSAGES

Code words (such as LIBRA in the text EXECUTE PLAN LIBRA) are sent as plain language

Table 9-2. —Radiotelephone Message Format

Parts	Components	Elements	Format line	Contents
			1	(Not used in radiotelephone.)
H	Procedure	a. Call	2 and 3	Station(s) called (proword EXEMPT, exempted calls). Proword THIS IS and station calling.
		b. Message follows		Proword MESSAGE FOLLOWS.
E		c. Transmission identification.		Proword NUMBER and station serial number (when authorized).
A		d. Transmission instructions.	4	Prowords RELAY TO; READ BACK; DO NOT ANSWER. Operating signals; call signs; address groups; address indicating groups; plain language.
D	Preamble	a. Precedence; date-time group; message instructions.	5	Precedence designation. Proword TIME; date and time expressed in digits and zone suffix; operating signals.
I	Address	a. Originator's sign; originator.	6	Proword FROM; originator's designation as address group(s), call sign, or plain language.
N		b. Action addressee sign; action addressee.	7	Proword TO; action addressee designation as address group(s), call sign, or plain language.
G		c. Information addressee sign; information addressee.	8	Proword INFO; information addressee designation(s) as address group(s), call sign(s), or plain language.
		d. Exempted addressee sign; exempted addressee.	9	Proword EXEMPT; exempted addressee designation(s) as address group(s), call sign(s), or plain language.
	Prefix	a. Accounting information; group count; SVC.	10	Accounting symbol; group count; proword SERVICE.

Table 9-2. — Radiotelephone Message Format — Continued

Parts	Components	Elements	Format line	Contents
SEPARATION			11	Proword BREAK.
TEXT	Text	a. Subject matter	12	Internal instructions; throught or idea as expressed by the originator.
SEPARATION			13	Proword BREAK.
ENDING	Procedure.	a. Time group	14	Proword TIME. Hours and minutes expressed in digits and zone suffix, when appropriate.
		b. Final instructions . . .	15	Prowords WAIT, CORRECTION; station designation.
		c. Ending sign.	16	Prowords OVER; OUT.

words. Encrypted groups such as BAXTO are spelled phonetically: BRAVO ALFA XRAY TANGO OSCAR.

The phonetic alphabet is applied not only to letters of the alphabet but also to the names of the signal flags. Flag A is ALFA, flag B is BRAVO, and so on. Signal flags are combined into code groups that have meanings of their own. ECHO KILO TWO, for example, means "anchor is dragging." The meanings of such code groups are given in appropriate signal publications.

It may sound strange to you that flag signals are sent by radiotelephone, but they are; this is done often. You must be able to recognize whether you are hearing a flag signal or a word or group spelled phonetically. Here is how you will know: If the phonetic alphabet is used, the proword I SPELL precedes it, and each phonetic letter is to be recorded as a letter. If you hear I SPELL, followed by DELTA OSCAR, you would write it as DO. Without that proword, you can assume the alphabet flags are intended, and record the transmission as DELTA OSCAR.

SIGNAL FLAGS AND PENNANTS

The Communications Yeoman need not be an expert in visual signaling, but should be acquainted with the names of flags and pennants. Flag signaling makes use of the alphabet flags already mentioned, and also numeral flags, numeral pennants, and a set of additional flags and pennants with special meanings. The alphabet flags represent letters; the numeral flags, numbers. Numeral pennants are used only in calls. Special flags are used to direct changes in speed, position, formation, and course in tactical maneuvers; to indicate units; to identify units, and for other specialized purposes. The names of the special flags or pennants and their spoken and written equivalent are given in the accompanying list.

Flag or pennant	Spoken	Written
CODE or ANSWER	CODE or ANSWER	CODE ANS
BLACK PENNANT	BLACK PENNANT	BLACK
CORPEN	CORPEN	CORPEN
DESIGNATION	DESIG	DESIG
DIVISION	DIV	DIV
EMERGENCY	EMERGENCY	EMERG
FLOTILLA	FLOT	FLOT
FORMATION	FORMATION	FORM
INTERROGATIVE	INTERROGATIVE	INT

Flag or pennant	Spoken	Written
NEGATIVE	NEGAT	NEGAT
PREPARATIVE	PREP	PREP
PORT	PORT	PORT
SPEED	SPEED	SPEED
SQUADRON	SQUADRON	SQUAD
STARBOARD	STARBOARD	STBD
STATION	STATION	STATION
SUBDIVISION	SUBDIV	SUBDIV
TURN	TURN	TURN

In addition to the flags and pennants already mentioned, there are the 1st, 2nd, 3rd, and 4th SUBSTITUTE flags. They are used only for flag communication, however, and are of no concern to the radiotelephone operator.

Separations in flag signals are indicated by the TACKLINE, spoken and written TACK.

The PREPARATIVE, INTERROGATIVE, and NEGATIVE pennants are known as governing pennants. In flag signaling they are hoisted either above or below a signal, whereas in radiotelephone operation they are transmitted as the first or last part of a signal. In either usage their meanings are as follows:

Preceding the signal	Pennant	Following the signal
Prepare to - - - - - .	PREP	My present intention is to- - - -.
Questions or inquiries.	INT	Request permission to- - - - -.
Cease, do not - - - .	NEGAT	Action is not being carried out.

OPERATIONAL BREVITY CODE

Your duties as a radiotelephone operator require that you know and use correctly the special "language" developed for tactical maneuvering, air control, anti-air warfare, naval gunfire support, electronic countermeasures, antisubmarine warfare, and other specialized uses. The words, phrases, and abbreviations employed in radiotelephone for these specialized uses are called operational brevity codes.

For a complete list of operational brevity code words, refer to the effective edition of ACP 165. ACP 165 is divided into sections, according to subject area. Following are the major section headings, along with representative code words from each section. They are presented here to acquaint you with the type of information contained in the publication.

Section 1—General. (Includes surveillance, warning, reporting aircraft control, airborne early warning, search and rescue, and electronic readiness conditions and duties.)

ANGELS: Height of friendly aircraft in thousands of feet; or fly or am flying at height indicated in thousands of feet.

BOGEY: An air contact that is unidentified but assumed to be enemy.

CHICKS: Friendly fighter aircraft.

SKUNK: A surface contact that is unidentified but assumed to be enemy.

YELLOW JACKET: Survivor in the sea wearing a lifejacket.

Section 2—Antiaircraft coordination.

GUNS FREE: Fire may be opened on all aircraft not recognized as friendly.

WARNING RED: Attack by hostile aircraft is imminent.

Section 3—Carrier deck conditions and flight operations.

ASSUME DECK: Carrier prepare deck for emergency landing of aircraft as soon as possible.

SLINGSHOT: Launch by catapult.

Section 4—Aircraft conditions of readiness and missions.

AUTOCAT: Automatic relay plane (radio).

SHECAT: Mine-laying plane.

Section 5—Undersea warfare.

BROTHER: Attacking ship of surface antisubmarine unit.

COLD: ASW contact has been lost and measures are being taken to regain contact.

SINKER: Disappearing radar contact.

SPOOK: Unidentified surface contact that is possibly an enemy submarine.

WOLF: Visually identified enemy submarine.

Section 6—Small surface craft control and direction.

BULLY: Concentrate attack on my target or target designated.

Section 7—Minesweeping operations.

DAISY: Moored mine.

Section 8—Electronic warfare.

CHATTER: Communications jamming.

GADGET: Radar equipment.

HOOTER: Jammer.

SCRUB: Erase the contact designated from all plots.

The final section of ACP 165 is an alphabetical decode listing of the code words.

You should understand that the words and phrases of the brevity code provide no communication security. The purposes of the codes are to (1) standardize the vocabulary, (2) increase the accuracy of transmission, and (3) shorten the transmission time.

RADIOTELEPHONE CALL SIGNS

Call signs employed in radiotelephone are more commonly known as voice call signs. They consist of spoken words, which can be transmitted and understood more rapidly and more effectively than the actual names of the ships, afloat commands, or the phonetic equivalents of the international radio call signs. Under certain circumstances, however, the phonetically spelled international call sign is used in radiotelephone for station identification; at other times, the ship's name serves as the call sign. These usages are explained in later paragraphs. First, let us consider the voice call signs contained in the JANAP 119 series.

JANAP 119 VOICE CALLS

The voice call signs in JANAP 119 are pronounceable words taken from the English language. They are tactical in nature, and are designed to facilitate speed on tactical radio nets.

A method of deriving voice call signs from the military call signs listed in the ACP 113 series is in preparation at the time of writing this training course. Because it may be some time before this method is implemented, the voice call signs used in this chapter to illustrate radiotelephone procedure are the type found in JANAP 119.

USE OF INTERNATIONAL CALL SIGNS

Administrative shore activities are not assigned call signs in JANAP 119. Consequently, a ship cannot use her voice call sign on administrative ship-shore circuits. When operating on ship-shore radiotelephone circuits, ships must use their international call signs, spoken phonetically. Example: international call sign NHDY is spoken NOVEMBER HOTEL DELTA YANKEE.

LOCAL HARBOR VOICE CIRCUITS

As may be seen from the preceding example, the use of phoneticized four-character call signs is extremely cumbersome for voice circuit operation. It tends to overload voice circuits, particularly in busy harbors, and provides absolutely no security. For these reasons, a separate and simplified procedure is prescribed in DNC 5 (effective edition) for local harbor voice circuits when the security of the message address is not a requirement.

In U.S. ports and U.S.-controlled ports overseas, names of ships and abbreviations of administrative activity titles serve as voice call signs. As a general rule, the USS prefix, hull designations and numbers, and first names or initials of ships need not be included in the voice call unless they are essential for clarity. Even when essential for clarity, it is unnecessary to use the phonetic equivalents for letters and initials.

Port authorities controlling local harbor voice circuits are identified by the word CONTROL. On local harbor circuits established for specific purposes, such as for degaussing, tug, and shipyard services, CONTROL is preceded by the appropriate word describing the service. The following examples illustrate the simplified voice call procedure. (Words in parentheses in the examples should not be used unless essential for clarity or to avoid confusion. Portions of examples marked with an asterisk (*) are spoken without phonetics.)

(NORFOLK) CONTROL THIS IS (*USS) ROANOKE COMDESRON TWELVE THIS IS (NORFOLK)

DEGAUSSING CONTROL (NEWPORT) CONTROL THIS IS (*TJ) GARY (PORTSMOUTH) SHIPYARD CONTROL THIS IS (*USS) FORRESTAL (FRANKLIN *D) ROOSEVELT THIS IS (CHARLESTON) CONTROL (NEW YORK) TUG CONTROL THIS IS *LSM ONE SIX ZERO (NORFOLK) FUEL CONTROL THIS IS (*USNS) PECOS

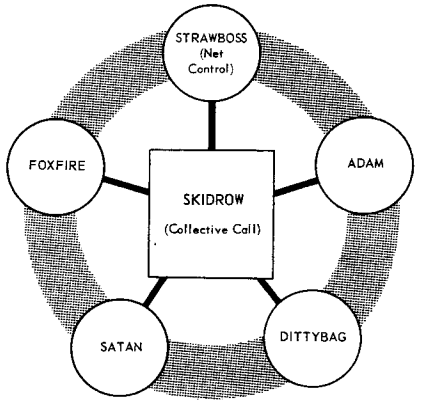
It is important to remember that the simplified type of call is authorized only in U.S. ports or U.S.-controlled ports. If your ship is in a port that is not under U. S. control, you must conform to the international practice of using phoneticized international call signs on radiotelephone circuits.

RADIOTELEPHONE PROCEDURE

A radiotelephone circuit would soon become very confusing if everyone on the circuit failed

to follow the same rules and procedures. The remainder of this chapter is devoted to proper operating procedures applicable to radiotelephone communication.

The examples of radiotelephone transmissions are assumed to pass over the net shown in figure 9-1. The dashes in the examples indicate natural pauses.



41. 31

Figure 9-1.—Radiotelephone Net.

CALLING AND ANSWERING

Radiotelephone communication is established by a preliminary call and the answer thereto. A preliminary call may be made to individual station(s) or to a group of stations collectively. In certain instances, the reply to a preliminary call may be abbreviated.

Single Call

The single call takes the following form:

FOXFIRE— . . Call sign of station called.
THIS IS— . . . From.
STRAWBOSS— Call sign of station calling.
OVER . . . . . Go ahead; transmit.

The reply is in the same form: STRAWBOSS—THIS IS FOXFIRE—OVER. In this instance a single station was called; if two or more were called, they would reply in alphabetical order of call signs.

Collective Call

When stations on the net are assigned a collective call, the collective call is used if all stations are addressed. When necessary, the collective call contains the proword EXEMPT, followed by the call sign of station(s) exempted from the collective call.

SKIDROW— . . Net call.
EXEMPT . . . Exempt.
DITTYBAG— . Call sign of exempted station.
THIS IS . . . . . From.
STRAWBOSS— Call sign of station calling.
OVER . . . . Go ahead; transmit.

ADAM, FOXFIRE, and SATAN now answer in alphabetical order of call signs.

Abbreviated Call

The call sign of the called station may be omitted when the call is part of an exchange of transmission between stations and when no confusion is likely to result. For example, FOXFIRE and SATAN receive a preliminary call from STRAWBOSS and reply:

THIS IS FOXFIRE—OVER
THIS IS SATAN—OVER

CLEARING TRAFFIC

With communication established, STRAWBOSS commences clearing traffic, as follows:

Transmission	Meaning
FOXFIRE—.	Call signs of receiving stations
SATAN—	
THIS	From.
STRAWBOSS—. . . .	Call sign of sending station.
MESSAGE FOLLOWS-	A message that requires recording is about to follow.
ROUTINE	Precedence.
TIME	Time of origin is ---.
ONE TWO ONE SIX FIVE NINE ZULU—	DTG.
FROM—	Originator of this message is-----.
STRAWBOSS—. . . .	Call sign of originator.
TO—	Action addressee is -----.
SATAN—	Call sign of action addressee.
INFO—.	Information addressee is-----.

FOXFIRE—.	Call sign of information addressee.
GROUPS EIGHT. . .	Group count.
BREAK—	Separation of text from other portions of message.
UNCLAS GO ALONGSIDE FOXFIRE AND EFFECT PERSONNEL TRANSFER— . .	Thought or idea conveyed by message.
BREAK—	Separation of text from other portions of message.
OVER—	Go ahead; transmit.

On hearing the proword OVER, receiving stations check the message to see that it was received fully and correctly. When assured that it was, they receipt by sending the proword ROGER, which means "I received your last trnamission satisfactorily."

THIS IS FOXFIRE—ROGER—OUT
THIS IS SATAN—ROGER—OUT

TRANSMITTING INITIALS OF NAMES

The proword INITIAL is authorized for use on radiotelephone circuits within the U.S. Navy. Presently, however, this proword is not authorized for communicating with the Army or Air Force (joint communications), or with the allied forces (combined communications).

When transmitting names containing initials, the name for which the initial stands, if known, should be spoken instead of the phonetic equivalent. Example: USS F.D. ROOSEVELT is transmitted as UNIFORM SIERRA SIERRA FRANKLIN DELANO ROOSEVELT.

If the name for which the initial stands is not known, each initial is spoken by the phonetic equivalent preceded by the proword INITIAL. Example: LT H.J. SAYER is transmitted as LIEUTENANT INITIAL HOTEL INITIAL JULIETT SAYER.

The proword INITIAL applies only to initials of names. The proword I SPELL must be used when transmitting phonetic equivalents of other single letters.

REPETITIONS

When words are missing or are doubtful, repetition is requested by the receiving station. The proword SAY AGAIN (along or with ALL BEFORE, ALL AFTER, WORD BEFORE, WORD AFTER, and —— TO ——) is for this purpose. In complying with such requests, the transmitting station identifies that portion to be repeated. Examples: DITTYBAG sent a message to SATAN. SATAN missed the word following "ship."

SATAN transmits:

DITTYBAG—THIS IS SATAN—SAY AGAIN WORD AFTER SHIP—OVER

DITTYBAG replies with:

SATAN—THIS IS DITTYBAG—I SAY AGAIN—WORD AFTER SHIP—SIGHTED—OVER

After receiving the doubtful portion, DITTYBAG receipts for the entire message.

You may give repetitions in plain language messages by natural phrases or by individual words. In encoded or encrypted messages, make them by individual characters.

CORRECTING AN ERROR

When an error is made by a transmitting operator, the proword CORRECTION is sent. The operator then repeats the last word, group, proword, or phrase correctly sent, corrects the error, and proceeds with the message. Example:

ADAM—THIS IS STRAWBOSS—TIME ONE ZERO ONE TWO ZULU—BREAK—UNCLASS—CONVOY ROMEO THREE—CORRECTION—CONVOY SIERRA ROMEO THREE—SHOULD ARRIVE—ONE SIX THREE ZERO LIMA—OVER

If the error is not discovered until the operator is some distance beyond it, he may make the correction at the end of the message. He must be careful to identify the exact portion he is correcting. Example:

ADAM—THIS IS STRAWBOSS—TIME ZERO SIX THREE ZERO ZULU—BREAK—UNCLAS—ARE YOU RIGGED FOR HEAVY WEATHER—CORRECTION—TIME ONE FOUR ZERO SIX FOUR ZERO ZULU—OVER

CANCELING A MESSAGE DURING TRANSMISSION

During transmission of a message and before transmitting the ending proword OVER or OUT,

the message may be canceled by sending the proword DISREGARD THIS TRANSMISSION. (A message already transmitted can be canceled only by another message.) For example, during the transmission of a message, STRAWBOSS discovers he is giving it to the wrong station:

FOXFIRE—THIS IS STRAWBOSS—ROUTINE—TIME ZERO SIX ZERO TWO ZULU—UNCLASS—COMMENCE UNLOADING AT DAWN SIXTEENTH—PROCEED—DISREGARD THIS TRANSMISSION—OUT.

DO NOT ANSWER

When it is imperative that called stations do not answer a transmission, the proword DO NOT ANSWER is transmitted immediately following the call or the proword MESSAGE FOLLOWS, if used. The complete transmission is sent twice. Example:

SKIDROW—THIS IS STRAWBOSS—DO NOT ANSWER—IMMEDIATE—TIME ONE SIX THREE ZERO ZULU—BREAK—NOVEMBER YANKEE DELTA PAPA—I SAY AGAIN—SKIDROW—THIS IS STRAWBOSS—DO NOT ANSWER—IMMEDIATE—TIME ONE SIX THREE ZERO ZULU—BREAK—NOVEMBER YANKEE DELTA PAPA—OUT

VERIFICATIONS

When verification of a message is requested, the originating station verifies the message with the originating person, checks the cryptography (if the message is encrypted), and sends the correct version.

Example 1:

STRAWBOSS—THIS is ADAM—VERIFY MESSAGE—TIME ONE ZERO ZERO EIGHT ZERO ONE ZULU—ALL BEFORE BREAK—OVER

STRAWBOSS transmits:

THIS IS STRAWBOSS—ROGER—OUT

STRAWBOSS, after checking with the originating officer, finds the heading correct as transmitted previously. STRAWBOSS then sends:

ADAM—THIS IS STRAWBOSS—I VERIFY—MESSAGE—TIME ONE ZERO ZERO EIGHT ZERO ONE ZULU—ALL BEFORE BREAK—PRIORITY—TIME ONE ZERO ZERO EIGHT ZERO ONE ZULU—FROM—STRAWBOSS — TO—ADAM—INFO—DITTYBAG—GROUPS ONE SEVEN—BREAK-OVER

ADAM receipts for the transmission:

THIS IS ADAM—ROGER—OUT

Example 2:

STRAWBOSS—THIS IS SATAN—VERIFY MESSAGE—TIME ZERO EIGHT FOUR FIVE ZULU—WORD AFTER PROCEED—OVER

STRAWBOSS transmits:

THIS IS STRAWBOSS—ROGER—OUT

STRAWBOSS, after checking with the originating officer, finds that he means HONGKONG instead of SHANGHAI as the word after PROCEED. STRAWBOSS transmits:

SATAN—THIS IS STRAWBOSS—CORRECTION—MESSAGE—TIME ZERO EIGHT FOUR FIVE ZULU—WORD AFTER PROCEED—HONGKONG—OVER

SATAN receipts:

THIS IS SATAN—ROGER—OUT

READ BACK AND WORDS TWICE

Further checks on transmission accuracy can be made by the prowords READ BACK and WORDS TWICE. Send READ BACK when you want your message (or a portion of it) repeated back to you as received. Rmember to identify the message or portion you want read back. Transmit the READ BACK proword immediately after the call or the proword MESSAGE FOLLOWS, is used. Example:

ADAM—THIS IS STRAWBOSS—READ BACK TEXT—TIME ONE SIX THREE ZERO ZULU — BREAK — UNCLAS — CONVOY DELAYED ONE TWO HOURS—BREAK—OVER

ADAM replies:

THIS IS ADAM—I READ BACK TEXT—UNCLAS—CONVOY DELAYED ONE TWO HOURS—OVER

STRAWBOSS then sends:

THIS IS STRAWBOSS—THAT IS CORRECT—OUT

NOTE: When READ BACK is employed, the proword ROGER is not necessary to indicate receipt of the message.

If a message is repeated back incorrectly, it may be corrected by sending the proword WRONG, followed by the correct version. In

the foregoing example, assume that ADAM made a mistake when he read the message back.

THIS IS ADAM—I READ BACK TEXT—UNCLAS—CONVOY DELAYED TWO ONE HOURS—OVER

STRAWBOSS corrects ADAM:

THIS IS STRAWBOSS—WRONG—UNCLAS—CONVOY DELAYED ONE TWO HOURS—OVER

ADAM reads back again:

THIS IS ADAM—UNCLAS—CONVOY DELAYED ONE TWO HOURS—OVER

STRAWBOSS ends the exchange with:

THIS IS STRAWBOSS—THAT IS CORRECT—OUT

WORDS TWICE is the proword used when communication is difficult. First, the call signs are transmitted twice. Then phrases, words, or groups are spoken twice. Indicate your intention by transmitting WORDS TWICE after the call or the proword MESSAGE FOLLOWS, if used. Do not repeat the proword THIS IS. Example:

FOXFIRE—FOXFIRE—THIS IS STRAWBOSS—STRAWBOSS—OVER—OVER

FOXFIRE replies:

STRAWBOSS—STRAWBOSS—THIS IS FOXFIRE—FOXFIRE—OVER—OVER

STRAWBOSS sends his message:

FOXFIRE—FOXFIRE—THIS IS STRAWBOSS—STRAWBOSS—WORDS TWICE—WORDS TWICE—ROUTINE—ROUTINE—TIME ONE FOUR ONE SIX THREE ZERO ZULU—TIME ONE FOUR SIX THREE ZERO ZULU—BREAK—BREAK—UNCLAS—UNCLAS—MAIL FOR YOU—MAIL FOR YOU—RECEIVE AT FIRST LIGHT—RECEIVE AT FIRST LIGHT—BREAK—BREAK—OVER—OVER

FOXFIRE receipts:

STRAWBOSS—STRAWBOSS—THIS IS FOXFIRE—FOXFIRE—ROGER—ROGER—OUT—OUT

EXECUTIVE METHOD

The executive method is employed to execute tactical signals when two or more units are to take action at the same time. Executive method messages are usually in abbreviated form and contain the proword EXECUTE TO FOLLOW or IMMEDIATE EXECUTE, whichever is applicable, immediately following the call. The signal to carry out the meaning of the message is the proword EXECUTE. It may be sent shortly after transmission of the message (normal executive method), much later (delayed executive method), or if urgent, as a part of the final instructions of the message itself (immediate executive method). In any event, a warning STANDBY precedes the proword EXECUTE.

1. In our first example the OTC sends a message to the task group by the normal executive method over a nontactical net. (The proword SIGNALS FOLLOW need not be used on nets primarily employed for conveying signals. It is intended for use when tactical signals are passed on nontactical circuits.)

SKIDROW—THIS IS STRAWBOSS—SIGNALS FOLLOW—EXECUTIVE TO FOLLOW—BREAK—CORPEN THREE FIVE SEVEN—OVER

All ships reply in alphabetical order:

THIS IS ADAM—ROGER—OUT
THIS IS DITTYBAG—ROGER—OUT
THIS IS FOXFIRE—ROGER—OUT
THIS IS SATAN—ROGER—OUT

When STRAWBOSS is ready to execute, he sends the executive signal. To save time, only one station (ADAM) is to receipt.

SKIDROW—THIS IS STRAWBOSS—STANDBY—EXECUTE—BREAK—ADAM—OVER

ADAM replies:

THIS IS ADAM—ROGER—OUT

2. A delayed executive method message is handled in exactly the same way as a normal executive method message except that, as a memory refresher, the text of the message is repeated just before STANDBY—EXECUTE is given. Assume that the foregoing message is sent by the delayed executive method. The message is transmitted and all stations receipt for it as before. But this time STRAWBOSS is not ready to execute until several minutes elapse. When ready, he sends:

SKIDROW—THIS IS STRAWBOSS—CORPEN THREE FIVE SEVEN—STANDBY—EXECUTE—BREAK—ADAM—OVER

ADAM replies:

THIS IS ADAM—ROGER—OUT

3. In the immediate executive method, the text of the message is transmitted twice, separated by I SAY AGAIN. The warning proword IMMEDIATE EXECUTE replaces the proword EXECUTE TO FOLLOW in the message instructions. The executive signal itself is in the final

instructions of the message. Because only one transmission is made, the immediate executive method message does not allow stations to obtain verifications, repetitions, acknowledgements, and cancellations before the message is executed. Example:

SKIDROW—THIS IS STRAWBOSS—SIGNALS FOLLOW — IMMEDIATE EXECUTE BREAK—TURN NINE—I SAY AGAIN—TURN NINE—STANDBY—EXECUTE—BREAK—SATAN—OVER

SATAN receipts:

THIS IS SATAN—ROGER—OUT

ACKNOWLEDGMENT

An acknowledgment is a reply from an addressee indicating that he received a certain message, understands it, and can comply with it. Note the difference between an acknowledgment and a receipt. The receipts means only that the message was received satisfactorily. Remember that only the commanding officer or his authorized representative can authorize you to send an acknowledgment.

The request for acknowledgment is the word ACKNOWLEDGE (not a proword) as the final word of the text. The reply is the proword WILCO. If the commanding officer can acknowledge at once, the operator may receipt for the message with WILCO, because the meaning of ROGER is contained in WILCO. If the acknowledgment cannot be returned immediately, the operator receipts for the message with ROGER, and WILCO is sent later. The return transmission to a request for an acknowledgment is either ROGER or WILCO--never both.

In the following example, the OTC sends a tactical signal. He desires acknowledgment from two ships.

SKIDROW—THIS IS STRAWBOSS—SIGNALS FOLLOW—EXECUTE TO FOLLOW—BREAK—TANGO BRAVO—TACK—ONE FIVE—TACK—ZERO ZERO ZERO—TACK—ONE TWO—FOXFIRE—DITTYBAG—ACKNOWLEDGE—OVER

The commanding officer of FOXFIRE wishes to consider the message before acknowledging. His operator transmits:

THIS IS FOXFIRE—ROGER—OUT

The commanding officer of DITTYBAG heard the message, understands it, and can comply. He directs his operator to acknowledge:

THIS IS DITTYBAG—WILCO—OUT

When the commanding officer of FOXFIRE is ready to acknowledge, he has two choices of reply. The first choice is:

STRAWBOSS—THIS IS FOXFIRE—WILCO—YOUR LAST TRANSMISSION—OUT

The alternative is:

STRAWBOSS—THIS IS FOXFIRE—WILCO—YOUR EXECUTE TO FOLLOW—BREAK—TANGO BRAVO—TACK—ONE FIVE—TACK—ZERO ZERO ZERO—TACK—ONE TWO—OUT

When ready to execute the signals, the OTC transmits:

SKIDROW—THIS IS STRAWBOSS—STANDBY—EXECUTE—ADAM—OVER

ADAM receipts as directed:

THIS IS ADAM—ROGER—OUT

RELAY

The proword RELAY indicates that the station called is to relay the message to all addressees. Example:

FOXFIRE—THIS IS STRAWBOSS—RELAY PRIORITY—TIME ZERO NINE ONE ZERO ZULU—FROM—STRAWBOSS—TO ADAM—BREAK — UNCLAS—REPORT NUMBER ROUNDS EXPENDED LAST RUN—BREAK—OVER

After FOXFIRE receipts for the message, he relays it to the action addressee:

ADAM—THIS IS FOXFIRE—PRIORITY—TIME ZERO NINE ONE ZERO ZULU—FROM—STRAWBOSS—TO-ADAM-BREAK—UNCLAS—REPORT NUMBER ROUNDS EXPENDED LAST RUN—BREAK—OVER

The proword RELAY TO, followed by an addressee, means that the station called is to relay the message to the station indicated. When more than one station is called, the call sign of the station to relay precedes the proword RELAY TO. Example:

DITTYBAG—SATAN—THIS IS STRAWBOSS—BOSS—SATAN—RELAY TO FOXFIRE—MESSAGE FOLLOWS—ROUTINE—TIME ZERO ONE TWO TWO ZULU—FROM—STRAWBOSS—TO—FOXFIRE INTO—DITTYBAG—SATAN—BREAK—UNCLAS—PROCEED ON MISSION ASSIGNED—BREAK—OVER

SATAN receipts and relays as instructed:

FOXFIRE—THIS IS SATAN—MESSAGE FOLLOWS—ROUTINE—TIME ZERO ONE TWO TWO ZULU—FROM—STRAWBOSS—TO—FOXFIRE— INFO —DITTYBAG-SATAN—BREAK— UNCLAS —PROCEED ON MISSION ASSIGNED—BREAK—OVER

Occasionally, it is necessary to relay by radiotelephone a message received by some other means of communication. In our final example, NOLT (FOXFIRE) received a radiotelegraph message from NAAT (STRAWBOSS) for relay to NRTK (DITTYBAG):

NOLT DE NAAT - T - P - 241632Z-FM NAAT - TO NRTK GR4 BT UNCLAS RETURN TO BASE BT K

FOXFIRE places the message in radiotelephone form and relays:

DITTYBAG—THIS IS FOXFIRE—MESSAGE FOLLOWS — PRIORITY — TIME TWO FOUR ONE SIX THREE TWO ZULU—FROM—STRAWBOSS—TO DITTYBAG—GROUPS FOUR—BREAK—UNCLAS—RETURN TO BASE—BREAK—OVER

OPENING A NET

The procedures described here are either for opening a net for the first time or for reopening a net secured temporarily. Procedures for both free and directed nets are described.

Free Net

In the following example, STRAWBOSS opens a free net by transmitting:

SKIDROW—THIS IS STRAWBOSS—OVER

SKIDROW (a collective call) answers in alphabetical order of stations:

STRAWBOSS—THIS IS ADAM—OVER
STRAWBOSS—THIS IS DITTYBAG—OVER
STRAWBOSS—THIS IS FOXFIRE—OVER
STRAWBOSS—THIS IS SATAN—OVER

STRAWBOSS then calls the net and informs all stations that their transmissions were heard:

SKIDROW—THIS IS STRAWBOSS—OUT (or proceeds with message).

If a station does not reply to a collective call within 5 seconds, the next station answers. The delinquent station then answers last, if able to do so. If the station is having difficulty and is unable to answer the call, the operator reports in to the net when he can. In the preceding example, assume FOXFIRE had equipment failure and could not answer. SATAN waits 5 seconds and answers as usual. When FOXFIRE is able to transmit, he calls STRAWBOSS:

STRAWBOSS—THIS IS FOXFIRE—REPORTING IN TO NET—OVER

STRAWBOSS replies:

THIS IS STRAWBOSS—ROGER—OUT

Directed Net

In the next example, STRAWBOSS calls member stations and announces that the net is directed. He requests the precedence and addressees of traffic to be transmitted.

SKIDROW—THIS IS STRAWBOSS—THIS IS A DIRECTED NET—OF WHAT PRECEDENCE—AND FOR WHOM—ARE YOUR MESSAGES—OVER

SKIDROW replies, each station indicating the traffic on hand:

STRAWBOSS—THIS IS ADAM—I HAVE ONE IMMEDIATE AND ONE ROUTINE FOR YOU—OVER
STRAWBOSS—THIS IS DITTYBAG—NO TRAFFIC—OVER
STRAWBOSS—THIS IS FOXFIRE—I HAVE ONE PRIORITY FOR DITTYBAG—OVER
STRAWBOSS—THIS IS SATAN—NO TRAFFIC—OVER

STRAWBOSS informs all stations that their transmissions were received, and commences to clear traffic in order of precedence:

SKIDROW—THIS IS STRAWBOSS—ROGER—ADAM—SEND YOUR IMMEDIATE—OVER

When ADAM transmits, and obtains a receipt for his message, net control gives the station with next highest precedence message permission to transmit.

FOXFIRE—THIS IS STRAWBOSS—SEND YOUR PRIORITY—OUT

DITTYBAG, hearing the authorization, tells FOXFIRE to go ahead. This procedure saves FOXFIRE the trouble of making a preliminary call.

THIS IS DITTYBAG—OVER

FOXFIRE goes ahead with his message at once:

DITTYBAG—THIS IS FOXFIRE—MESSAGE FOLLOWS—(ETC.)

When STRAWBOSS hears the proword OUT that ends the exchange between DITTYBAG and FOXFIRE, he directs ADAM to send the ROUTINE that still is outstanding.

As operators are handed messages to be sent out, they call net control and request permission to transmit. SATAN, for example, has a ROUTINE for ADAM:

STRAWBOSS—THIS IS SATAN—I HAVE ONE ROUTINE FOR ADAM—OVER

STRAWBOSS replies (assuming no other station wishes to send a message of higher precedence):

THIS IS STRAWBOSS—SEND YOUR MESSAGE—OUT

SATAN then sends his message. If, however, higher precedence traffic awaits transmission, STRAWBOSS sends:

THIS IS STRAWBOSS—WAIT—OUT

When traffic conditions permit, STRAWBOSS then calls SATAN and gives him permission to transmit:

SATAN—THIS IS STRAWBOSS—SEND YOUR ROUTINE—OUT

ADAM answers, thereby saving a preliminary call, and SATAN clears his message.

SIGNAL STRENGTH AND READABILITY

A station is understood to have good readability unless otherwise notified. Strength of signals and readability are not exchanged unless for good reason.

When it is necessary to inform another station of his signal strength and readability, it is done by means of a concise report of actual reception. Examples: "Weak but readable," "Loud but distorted," "Weak with interference," and so on. Reports such as "Five by five," "Four by four," and the like, which are derivatives of the numerals used with operating signals QSA and QRK, are forbidden.

The following prowords are for exchanging information concerning signal strength and readability. They were not included in the previous list of prowords (table 9-1), because their meanings apply only to signal strength and readability.

RADIO CHECK	What is my signal strength and readability?
ROGER	I have received your last transmission satisfactorily. (The omission of comment on signal strength and readability is understood to mean that reception is loud and clear.)
NOTHING HEARD	Used when no reply is received from a called station.
LOUD	Your signal is strong. Interference will not bother my copying.
GOOD	Your signal is good.
WEAK	I can hear you only with difficulty.
VERY WEAK	I can heard you only with great difficulty.
CLEAR	Excellent quality (readability).
READABLE	Quality good—no difficulty reading you.
DISTORTED	Having trouble reading you.
WITH INTERFERENCE	Having trouble reading you because of interference.

To illustrate two stations exchanging information on signal strength and readability, a ship (FOXFIRE) and a plane (CATFISH ONE) establish communications as follows:

FOXFIRE—THIS IS CATFISH ONE—RADIO CHECK—OVER

CATFISH ONE—THIS IS FOXFIRE—ROGER—OVER

THIS IS CATFISH ONE—OUT

Had FOXFIRE not received CATFISH ONE loud and clear, the transmissions could have been:

CATFISH ONE—THIS IS FOXFIRE—WEAK BUT READABLE—OVER

THIS IS CATFISH ONE—ROGER—OUT

With communications established firmly, there is no need for further checks of the foregoing nature unless equipment difficulty or other adverse conditions develop.

OPERATOR ENDORSEMENTS

In connection with the transmission and reception of a message, several minor details are important and necessary. For instance, the operator's endorsement, placed on the original of each message he handles, is written record of exactly how, when and where he disposed of that message. If a question arises concerning the handling of a particular message, the operator's endorsement is there to

supply the answer. Placing the endorsement on a message is called "servicing the message."

Before discussing the contents of an operator's endorsement, here are some terms you should know.

1. Time of delivery: The TOD is the time the transmitting station completes delivery of the message. (Do not confuse this term with time of file (TOF), which is the time an outgoing message is delivered to the communication center for processing and onward transmission.)

2. Time of receipt: The TOR is the time the receiving station completes receipting for a message.

3. Personal sign: Each operator and supervisor is assigned a two-letter personal sign, usually his initials, for use in message endorsements to indicate individual responsibility. Initials cannot be used in all instances, however, because of possible conflict with prosigns or channel designations, and because of the requirement that no two signs can be alike within a particular station. Personal signs never are transmitted.

Operator endorsements are of two types: servicing for outgoing messages and for incoming messages. Now let's take a look at the two types of endorsements.

OUTGOING ENDORSEMENT

Servicing for an outgoing message is penciled on the face of the message blank, as shown in figure 9-2. Normally, the supervisor makes the crossed lines and fills in the two upper spaces with the following information:

1. Call sign of the ship or station to be called.
2. Circuit frequency (in kilocycles or megacycles) or channel number.

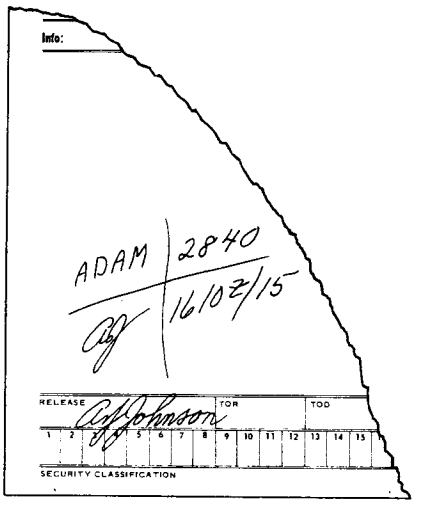
After transmitting the message, the circuit operator adds the following data in the two lower spaces:

1. Operator's personal sign.
2. The TOD, expressed in Greenwich mean time, and the date delivery is completed.

A complete endorsement must appear on the station file copy of each outgoing message.

INCOMING ENDORSEMENT

For incoming messages, the receiving operator enters the following service data below the text on the message blank:



31.47

Figure 9-2.—Servicing an outgoing message.

1. The TOR in Greenwich mean time.
2. Operator's personal sign.
3. Circuit frequency (in kilocycles or megacycles) or channel number.

Whereas servicing information for an outgoing message is penciled on the message 1 blank, servicing for an incoming message is typed on the message blank. The information is typed because the receiving operator keeps the message blank in his typewriter until after he receipts for the message. Slant signs separate the portions of the endorsement.

Example: 161ØZ/AJ/2134KCS

AUTHENTICATION

A radiotelephone message must be authenticated when there is any possibility that the message is of enemy origin. Be alert! Sometimes (but not always) you can spot an enemy deceptive message by the operator's mistakes in procedure or by his mistakes in English grammer or pronunciation. The security reasons for authentication were discussed in chapter 7.

COMMERCIAL RADIOTELEPHONE SERVICES

During peacetime, fleet commanders usually authorize naval vessels to utilize commercial radiotelephone services. Such services provide two-way telephone conversations through commercial land radiotelephone stations between ships at sea and any telephone on land. Naval

vessels using this service are limited to calls originating aboard ship. Incoming calls to the ship cannot be accepted.

COASTAL HARBOR RADIOTELEPHONE SERVICE

The Coastal Harbor Radiotelephone Service meets the needs of ships operating within a few hundred miles of the shore. Stations are established at most of the seaports on the Atlantic, Pacific, and Gulf coasts, and also at Honolulu, Hawaii.

HIGH SEAS RADIOTELEPHONE SERVICE

High Seas Radiotelephone Service stations are located at New York, Miami, and Oakland. They provide long-range radiotelephone service. Ordinarily, service through High Seas stations is used by ships operating beyond the normal range of the Coastal Harbor stations.

CHARGES FOR SERVICES

The charge for service depends upon the location of the ship as well as the land telephone, and, of course, upon the time length of the call. For Coastal Harbor Service, only the coastal waters are divided into rate areas. For High Seas Service, the United States is divided into three land rate areas by groups of states, and the oceans are divided into three ocean rate areas defined by latitude and longitude. You will find the land and ocean rate areas, the station call signs, and the operating frequencies listed in DNC 26 (effective edition).

TRANSMITTING AND RECEIVING EQUIPMENT

Practically all standard Navy medium-high frequency transmitters and receivers designed for amplitude modulation are suitable for commercial RT service. The transmitter must be on the exact frequency specified; otherwise, the carrier does not actuate the automatic calling device at the telephone company marine operator's position, and the call is unanswered. It is best to tune the transmitter before coming into range to prevent the calling device from becoming actuated unintentionally.

The recommended type of microphone is the push-to-talk (release to listen) type. Remember that most users know nothing about radio equipment, so you should demonstrate operation of the microphone to the user before he goes on the air.

PLACING A CALL

Assume that your ship (USS Rowe) is an authorized radiotelephone subscriber and the equipments are tuned properly. You listen to ascertain that the circuit is not busy. If the circuit is clear you call the marine operator by voice:

NORFOLK MARINE OPERATOR THIS IS USS ROWE

When the marine operator responds, he (she) is given the name of the ship, the coastal rate area in which the ship is located, the city and telephone number desired, and, if the call is person-to-person, the name of the individual called. He then is requested to quote the rates for the call. Example:

THIS IS USS ROWE—RATE AREA 2B—CALLING WASHINGTON DC—LUDLOW 4-5400—PERSON TO PERSON LAURENCE K RICE—QUOTE TIME AND CHARGES

When the marine operator makes the necessary telephone connections, the circuit is ready for the caller. Best results are obtained by speaking plainly and naturally. Instruct the caller to not speak until the other person finishes. When the conversation is over, you must notify the marine operator:

THIS IS USS ROWE—CALL COMPLETED

The marine operator then quotes the time and charges. Actually the Coastal Harbor and High Seas channels are like party lines and are shared by a large number of ships. A single incoming passenger liner such as SS United States may have hundreds of calls to clear. Courtesy and discretion are necessary if everyone is to share the service equally.

BE SECURITY CONSCIOUS

As pointed out in chapter 7 (Security), radiotelephone is potentially the least secure method of radio communications. You must ever be alert to avoid disclosure of classified information when transmitting on radiotelephone circuits. This precaution applies to military voice circuits as well as to the commercial circuits just discussed.

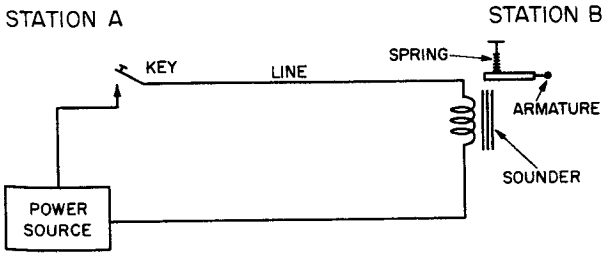
CHAPTER 10

TELETYPEWRITER EQUIPMENT AND OPERATION

BASIC TELETYPEWRITER CIRCUIT

To see how intelligence is sent by teletypewriter, consider one of the simpler devices for electrical communications: the manual telegraph circuit. In this circuit, shown in figure 10-1, we have a telegraph key, a source of power (battery), a sounder, and a movable sounder Armature. If the key is closed, current flows through the circuit and the armature is attracted to the sounder by magnetism. When the key is opened, the armature is retracted by a spring. With these two electrical conditions of the circuit—closed and open—it is possible, by means of a code, to transmit intelligence. These two conditions of the circuit may be thought of as MARKING and SPACING. Remember: Marking occurs when the circuit is closed and a current flows; spacing occurs when it is open and no current flows.

When a circuit operates on current and no-current basis, as in figure 10-1, it is called a NEUTRAL circuit. This type is generally used to operate teletypewriters, although the Navy's machines sometimes operate on a line condition called POLAR OPERATION. This refers to the system whereby marking signals are formed by current impulses of one polarity, and spacing signals by current impulses of equal magnitude but opposite polarity. The following discussion is based on neutral circuit operation.



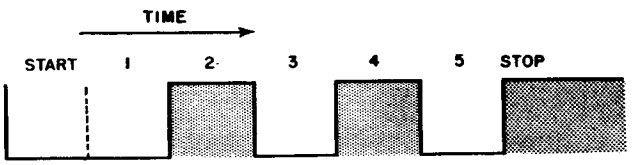
1.196

Figure 10-1.—Manual telegraph circuit.

TELETYPEWRITER SIGNAL CODE

If a teletypewriter signal could be drawn on paper, it would resemble figure 10-2. This is the code combination for the letter R. Shaded areas show intervals during which the circuit is closed (marking), and the blank areas show the intervals during which the circuit is open (spacing). There are a total of seven units in the signal. Five of these are numbered, and are called INTELLIGENCE units. The first and last units of the signal are labeled START and STOP. They are named after their functions: the first starts the signal and the last stops it. These are a part of every teletypewriter code character; the START unit is always spacing and the STOP unit is always marking. This method of teletypewriter communication—the so-called START-STOP method—gets its name from these units.

The start-stop method keeps teletypewriter machines and signals in synchronization with each other. With this method the selecting mechanism in the receiving machine comes to a complete stop after each character.



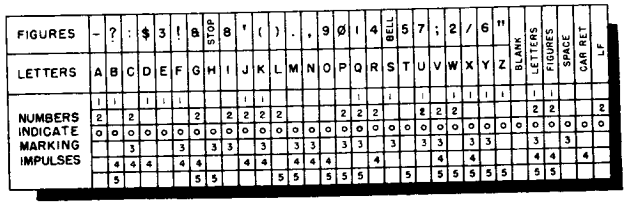
1.197

Figure 10-2.—Mark and space signals in the teletypewriter character R.

Different characters are transmitted from the keyboard by an automatic process that selects various combinations of marking and spacing in the 5 intelligence units (fig. 10-3). When you come to tape reading, you will see that the mark and space units match the holes and blank spaces on the tape. This is because holes in the tape allow the transmitter distributor pins to rise, sending a marking pulse. No holes mean no pulses—that is, spacing intervals. The machine, without benefit of tape perforations, automatically takes care of start and stop elements.

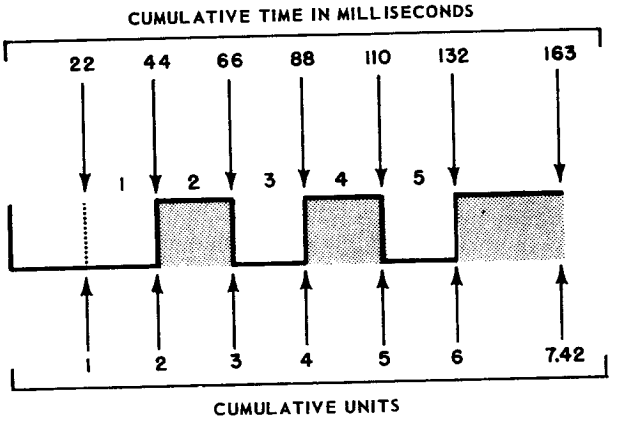
A total of 32 combinations can be obtained from the five intelligence units, but, by using uppercase and lowercase, the number of characters obtainable is nearly doubled. When a teletypewriter printing mechanism is shifted to uppercase as a result of receiving a FIGS shift character, all succeeding characters received before a LTRS shift character print in uppercase—as numerals and punctuation marks. The machine does not, however, make such double use of all 32 possible combinations, because 6 are used for the functions of carriage return, line feed, figures shift, letters shift, space, and for one normally unused blank key. This leaves 26 of the 32 that can be employed in both uppercase and lowercase. When the 6 special functions are added, the total is 58, which is the number of characters and functions that can be sent from a teletypewriter keyboard.

Examine figure 10-2 once more. This is theoretically a perfect signal. The quality of each element remains the same during its transmission, and the shift from marking to spacing (and vice versa) is instantaneous. These changes are called TRANSITIONS. They occur at the beginning and end of each of the solid blocks. Some are mark-to-space transitions, and others are space-to-mark transitions. For some other character combination a transition may occur between "start" and intelligence unit 1, but in any transmitted character there can be only 2, 4, or 6 transitions. Notice that the first 6 units of the signal are the same length, but the 7th (stop) unit is longer. Each of the first 6 units requires 22 milliseconds of circuit time for transmission. This is based on a transmission speed of 60 words per minute. (In teletypewriters operating at 75 or 100 wpm the times for all 7 units are reduced proportionally.) The stop unit requires 31 milliseconds. If you assign a value of 1 to each of the first 6 units, then the stop unit has a value of 1.42. The total number of units in the letter R (or any other teletypewriter character) is 7.42, requiring a transmission time of 163 milliseconds. There is no allowance for transition time, for a transition has zero time duration. See figure 10-4.



1.198

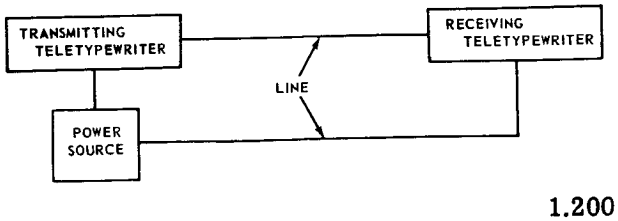
Figure 10-3.—Mark and space combinations for characters on the teletypewriter keyboard.



1.199

Figure 10-4.—The 7.42-unit teletypewriter signal.

The telegraph circuit in figure 10-1 can be converted to a simple teletypewriter circuit by substituting a transmitting teletypewriter for the key at station A, and a receiving teletypewriter for the sounder at station B. This arrangement is shown in figure 10-5.



1.200

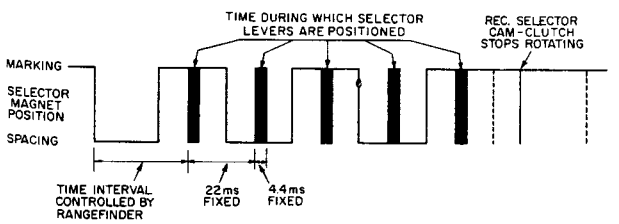
Figure 10-5.—Simple teletypewriter circuit.

Transmitter contacts are actually a set of mechanically controlled switches that can produce a different combination of the 7.42-unit signal for any letter or function lever depressed. As we have just seen, each character consists of a 22-millisecond spacing unit functioning as a start pulse to release the receiving mechanism, plus five 22-millisecond intelligence pulses—either marking or spacing—and a 31-millisecond marking pulse used to stop the receiving mechanism.

The selector magnet of the receiving teletypewriter mechanically releases a start lever when the start pulse is received, thus allowing the selector cam-clutch to rotate through 1 revolution. During this revolution, 5 selector levers in the selector unit are positioned by the operation or release (marking or spacing) of the selector magnet armature as determined by each intelligence pulse received. The time required to position each selector lever is approximately 20 percent of the time of 1 intelligence pulse, or 4.4 milliseconds. This time, again, is based on a teletypewriter running at 60 wpm. Cams on the selector cam-clutch are so located that the time between each selector lever operation is fixed at 22 milliseconds. During 4.4 milliseconds of the first pulse the first selector lever is positioned; during 4.4 milliseconds of the second pulse the second selector lever is positioned, and so forth, until all 5 selector levers are positioned (see fig. 10-6). These selector levers control the internal mechanism of the teletypewriter so as to select and at the proper time print the correct character.

BAUDS AND WORDS-PER-MINUTE

Heretofore most discussions of teletypewriter speed have been in terms of how many words-per-minute are transmitted. Now a more technically accurate term "baud" is being used.



1.201

Figure 10-6.—Selecting intervals for letter Y.

The baud is officially designated as the unit of modulation rate. One baud corresponds to a rate of 1 unit interval per second. Hence, to find the modulation rate of a signal in bauds, the figure 1 is divided by the time duration of the shortest unit interval present in the signal. For example, 22 milliseconds (.022) is the time interval of the shortest unit in the 7.42-unit code at 60 words-per-minute (wpm). To find the number of bauds corresponding to 60 wpm, we divide .022 into 1. Rounding off the results of our division, we arrive at the figure 45.5, which is the baud equivalent of 60 wpm.

At 100 wpm, the teletypewriter operating speed is increased, and the signal unit time interval is decreased. An operating speed of 100 wpm is 74.2 bauds, and a speed of 107 wpm is 75 bauds—the ultimate goal for Navy teletypewriter operation.

Conversion formulas for baud operations are as follows:

$$\text{Baud} = \frac{1}{\text{Unit interval}}$$

$$\text{WPM} = \frac{\text{Baud}}{\text{Unit code X 0.1}}$$

DISTORTION

An ideal teletypewriter circuit reproduces signals at the receiving end exactly as they are impressed at the sending end. Unfortunately, this seldom happens under actual operating conditions, for signal units have a way of lengthening and shortening as they travel along the circuit. This lengthening and shortening of marks and spaces occurring during transmission reduces the quality of the signal, and is called distortion.

Four fundamental types of distortion adversely affect fidelity of teletypewriter signals.

1. Bias distortion is the uniform lengthening or shortening of the mark or space elements, one at the expense of the other. This means that the total time for one mark and one space never changes; only the length of the mark or space element changes. If the mark is lengthened, the space is shortened by the amount the mark is lengthened. Bias distortion may be caused by maladjusted teletypewriter line relays, detuned receivers, or a drift in frequency of either the transmitter or receiver.

2. Fortuitous distortion is the random displacement, splitting, or breaking up of the mark

and space elements. It is caused by cross-talk interference between circuits, atmospheric noise, power line induction, poorly soldered connections, lightning storms, dirty keying contacts, and such similar disturbances.

3. End distortion is the uniform displacement of mark-to-space signal transitions with no significant effect on space-to-mark transitions. It is caused by the combination of resistance, inductance, and capacitance in the circuit.

4. Characteristic distortion is a repetitive displacement or disruption peculiar to specific portions of the signal. It normally is caused by maladjusted or dirty contacts of the sending equipment. It differs from fortuitous distortion in that it is repetitive instead of random. An example would be the repeated splitting of the third code, element of a teletypewriter signal.

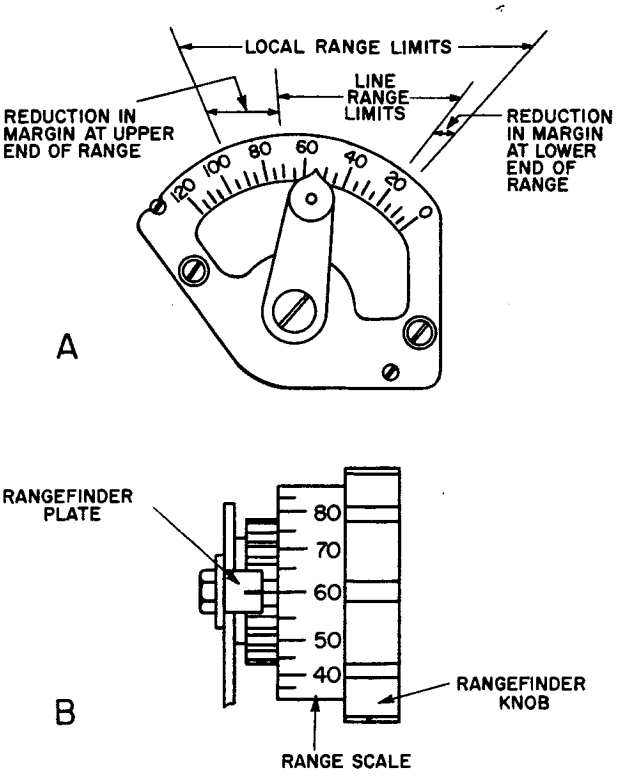
The components of distortion, with their causes and effects, have been only briefly defined here. The proper recognition, identification, and correction of signal distortion is a job for maintenance personnel, using special test equipment designed for the purpose.

ORIENTATION RANGEFINDER

Every teletypewriter has an orientation rangefinder. By means of the rangefinder scale, the operator can set the machine at the range of best signal reception. Low equipment range indicates only a lowered operating margin. It does not clearly indicate whether the cause is distortion or a badly adjusted teletypewriter.

Refer again to figure 10-2, illustrating the signal for the letter R. Each unit or element is perfect in every respect. To print the letter R, the selector mechanism could be set to operate on any 20-percent portion of each unit, and perfect copy would result. Under actual conditions, a signal is never this perfect, nor is a teletypewriter expected to operate over the entire range of the rangefinder scale. Rarely is more than 70 percent of the scale usable by the selecting mechanism. This means that the selection point of the rangefinder scale must be positioned so that the best portion of the element is used by the selecting mechanism.

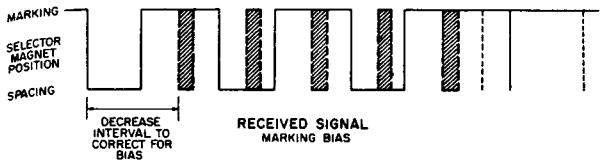
The rangefinder shown in part A of figure 10-7 is located at the left side of model 15 and 19 teletypewriters, and at the top of model 14 reperforators. It has a scale and a movable finder arm. The rangefinder in part B of figure 10-7 is located on the right side of model 28



1.202

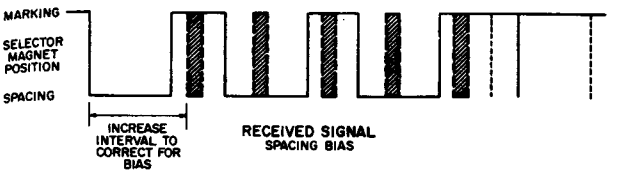
Figure 10-7.—Two types of orientation rangefinders.

page printers and at the right front of model 28 reperforators. In this type of rangefinder, the range scale is moved by rotating the rangefinder knob. The indicator mark on the rangefinder plate is the reference point for reading the scale. The following discussion applies to both types of rangefinders. Points on the scale—0 to 120—divide the first unit of the signal only, not the entire signal. When you adjust the rangefinder, you shift the selection point of the first unit with respect to the starting unit. Figures 10-8 and 10-9 illustrate this. Because all other units of the signal follow at 22-millisecond intervals, this amounts to adjustment or orientation of the entire signal to the start pulse. Shifting the point of selection simply means you are moving the first black bar shown in figure 10-6 back and forth across the first signal unit, looking for the most suitable position. The scale goes up to 120, hence you can shift far enough so that the selection interval moves entirely off the unit. Even if the signal were perfect, you could still shift the finder far enough to produce errors. The object is to place the selection interval on



1.203

Figure 10-8.—Signal with marking bias.



1.204

Figure 10-9.—Signal with spacing bias.

that portion of the unit that will give the selecting mechanism a maximum margin of safety while selecting that unit and the four that follow. With the selection point midway between the transitions, there is the least chance of error.

To determine the range limits, the finder is adjusted at the two extreme positions—at the lower and the upper end of the scale. In each, observations are made of the typed record and a reading is taken when about one error is typed per line of copy. This means about one error in 69 characters. Orientation ranges on properly adjusted teletypewriters for different degrees of signal distortion are as follows:

	Points
Very little distortion	80
Moderate distortion	60-70
Average distortion	50
Large distortion	Less than 40

As shown in figure 10-7(A), the orientation range limits with practically perfect signals and a teletypewriter in good condition should be 15 and 95. In this instance, best operating results are obtained when the finder arm of the receiving teletypewriter is set at the midpoint (55) of this range.

Actually, the orientation range is determined twice: First, range of the machine (local range) is determined, then range of machine when connected to the line (line range) is determed. Setting of the finder arm is the midpoint of the sum of these two ranges.

The orientation range is obtained locally by using keyboard signals or running a test tape through the transmitter distributor. Normally, the letters R and Y are used because they give a complete reversal of impulses. Letter R is S-M-S-M-S and Y is M-S-M-S-M. (Other characters, such as S and G, can be selected and will also give a complete reversal of impulses.) If the range is not less than about 70 points (from about 20 to 90 on the scale), it may be assumed that the machine is satisfactory.

The difference between the range determined by local test, and the corresponding range obtained when receiving signals over a line, represents the reduction in margin due to signal distortion. The reduction, as illustrated in figure 10-7(A), is a direct measure of total signal distortion. This illustration shows the line range limits to be 20 and 70 on the scale. The line range represents a reduction of local range limits by 5 points on the lower end and 25 on the upper.

The manner in which typed errors occur in the neighborhood of the orientation limits may give indication of the nature of the distortion. If limits are fairly definite—the copy changes from good to bad when the rangefinder is moved only a small distance—bias, or distortion due to speed variation or faulty apparatus, is present. If there is a certain range at each limit over which certain characters are consistently in error, this is due to characteristic distortion. If limits are not definite—that is, there is a range over which errors occur, and errors do not occur consistently on certain characters—this is an indication of fortuitous distortion. As a general rule, characteristic and fortuitous distortion cause reduction of the range at both limits. On the other hand, bias affects one range more than the other. Marking bias reduces the upper range limit, and spacing bias reduces the lower range limit.

Maintenance men sometimes test distortion tolerance of a teletypewriter by applying predistorted signals. This predistortion ranges from zero to 40 percent. A well-adjusted machine types correctly when signals from a test set are distorted as much as 35 percent.

Normally, rangefinding a teletypewriter is not an everyday occurrence. It usually is performed in conjunction with maintenance of the machine. Unless something goes wrong with the circuit, rangefinding is done during maintenance periods. When rangefinding a machine, care must be taken that the machine is in good adjustment, and range limits are read accurately.

CIRCUIT TYPES

The word "circuit" is used in two senses in the Communications Yeoman's work. First, in the electrical sense: a continuous conductor for the flow of electrons; second, in the communication sense: a path between two or more points, capable of providing one or more channels for the transmission of intelligence. In the discussion of teletypewriter operation we shall concentrate on the communication sense of the word.

A duplex circuit is a circuit between two stations that permits uninterrupted exchange of information by employing two separate electrical paths. Each station may transmit and receive simultaneously. The term full-duplex sometimes is substituted for the term duplex.

A half-duplex circuit is a single electrical path used for transmitting information from one station to another. The circuit has no provision for the exchange of information, but may comprise any number of receiving stations. Each station receives only or transmits only, depending on its intended function. The fleet broadcast is an example of a half-duplex circuit.

A simplex circuit embraces features of both the duplex and half-duplex type circuits. The simplex circuit consists of a single electrical path over which two or more stations may exchange information. Any station may transmit and receive, but not simultaneously.

Whenever a carrier is modulated, two sideband frequencies are produced that carry the intelligence present in the audiofrequency. Only one sideband is necessary for transmission of the signal, and a transmitter in which the carrier has been suppressed may be used to send a separate message on each of the sidebands. The messages from the two audio channels are made to modulate the same carrier, but modulation takes place in different modulators.

The output of the two modulators contains sidebands formed by heterodyning the individual audio signals with a common carrier suppressed in the output. The filters remove the lower sideband from one modulator output and the upper sideband from the other. Thus, each of the two sidebands conveys a separate message and may be used as a separate channel. At the receiving end, the carrier frequency is reinserted and the intelligence recovered.

As used in the Naval Communication System, up to 16 teletypewriter channels are transmitted on one sideband of each SSB circuit through a frequency multiplexing system. Frequency multiplexing is a process for including multiple sets of transmissions on a single bandwidth by crowding, or "stacking" the individual frequencies.

To give added range to landline transmissions, repeaters are inserted in the line to renew the strength of weak signals as they pass through the wire. Repeaters are of two kinds. First, there is the "straight" repeater, which strengthens (amplifies) the signal just as it is received. Unfortunately, this type also amplifies any interference the signal may have picked up along the wire.

The other repeater is the "regenerative" type. It builds, or regenerates, an entirely new signal from one that is worn out or distorted, and eliminates the interference. Both types of line repeaters retransmit signals automatically, using a local source of power. They may be placed at the end of the line (terminal) or at an intermediate point along the line.

Repeaters cannot be used with RATT transmissions. Radioteletypewriter is further handicapped by the same atmospheric disturbances that sometimes hamper radiotelegraph communications. Although RATT transmits on radio waves instead of wires, the basic equipments are the same as those used in landline teletypewriter operation. The difference is that RATT requires transmitters and receivers to send and pick up signals.

THE TELETYPEWRITER

The teletypewriter, of course, is little more than an electrically operated typewriter. The prefix "tele" means "at a distance." Coupled with the word "typewriter" it forms a word meaning "typewriting at a distance." By operating a keyboard similar to that of a typewriter, signals are produced that print characters in page form, called hard copy.

The characters appear at both sending and receiving stations. In this way, one teletypewriter will actuate as many machines as may be connected together. An operator transmitting from New York to Boston will have his message repeated in Boston, letter by letter, virtually as soon as it is formed in New York. The same will apply at all receiving stations that tie into the network. One commonly used machine is the model 28 page teletypewriter, also called the model 28 printer, a machine widely used by both military and commercial communication systems.

MODEL 28 TELETYPEWRITERS

Model 28 is a manufacturer's designation applied to a complete line of teletypewriter equipments. Compared with some of the older models that we will discuss, the components of the model 28 series feature smaller size, lighter weight, increased speeds, quieter operation, and less maintenance. They are also better suited for shipboard use under severe conditions of roll, vibration, and shock.

One component of the model 28 line (designated TT-48/UG) is the keyboard-sending and page-receiving teletypewriter shown in figure 10-10. Let us look at some of the external features of this machine. The numbers following correspond to those shown in figure 10-10.

1. POWER SWITCH—When turned ON, this switch starts the motor in the teletypewriter, and makes the machine operative. To secure the machine, turn the power switch OFF.
2. KEYBOARD—Described in next section.
3. BULLETIN HOLDERS—There are two on the machine. Used as necessary for recording any information an operator needs to have at his fingertips.
4. COVER RELEASE PUSHBUTTON—Releases cover of machine for raising.
5. COVER—Raised for access to typing unit. It is hinged at the rear and is counterbalanced by a mechanism that aids in lifting and holding it open.
6. COPYHOLDER AND LINE GUIDE—The copyholder holds the message to be typed. The line guide helps the operator follow the lines as he types.
7. END-OF-LINE INDICATOR LIGHT—A red lamp that lights about six characters from the end of the line. The machine is

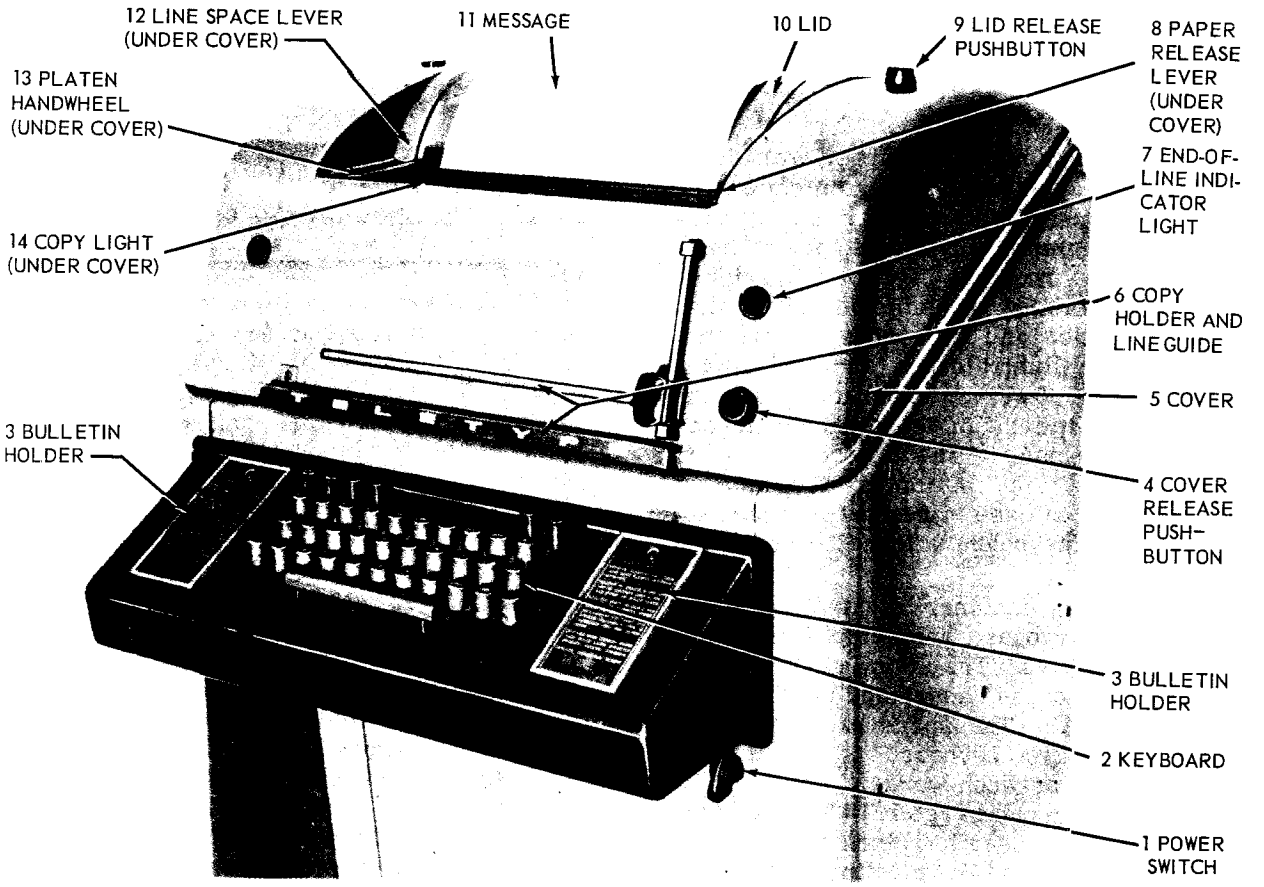


Figure 10-10.—Model 28 teletypewriter (TT-48/UG).

adjusted to type 69 characters to the line, including spaces between words or groups.

8. PAPER RELEASE LEVER—Located under cover. When pushed back, this control frees the paper for adjustment. When pulled forward, it holds the paper tight.
9. LID RELEASE PUSHBUTTON—When pushed, releases lid of machine for raising.
10. LID—When raised, provides access to the paper, paper release lever, and line space lever.
11. MESSAGE—In the form of hard copy.
12. LINE SPACER LEVER—Located under cover. Pull forward to single space, push back to double space.
13. PLATEN HANDWHEEL—Located under cover. When depressed and turned, feeds paper in direction in which turned, up or down.
14. COPY LIGHT—A clear lamp that is lit while the teletypewriter is on, illuminating the copy.

KEYBOARDS

The model 28 printer is equipped with either of two types of keyboards: communication and weather. The first contains letters and punctuation marks common to the standard typewriter, and the weather keyboard provides necessary symbols for transmission of weather data. Similarities and differences in the two keyboards are illustrated in figure 10-11. Observe that the lowercase characters are the same, and that letters of the alphabet appear in the same positions. The difference lies in the uppercase of the bottom two rows. A trained operator can use either the communication or weather keyboard without loss of speed or efficiency.

Figure 10-12 is another illustration of the communication keyboard with emphasis placed on the function keys. The action performed by the function keys is described as follows:

1. SPACE BAR—The space bar, located at the front of the keyboard, is used to send spaces (as between words).
2. CAR RET(carriage return)—The carriage return key is used to return both the type box carriage and the printing carriage to the left to start a new line of typing.
3. LINE FEED—When depressed, this key causes the paper to feed upward one or

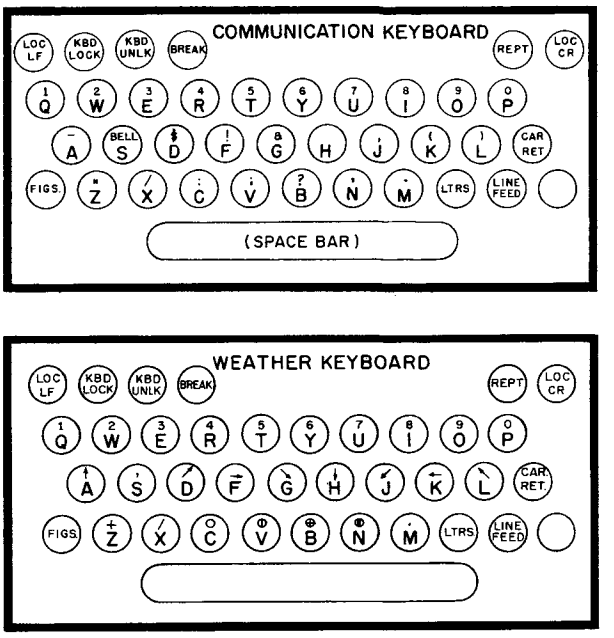


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Figure 10-11.—Two types of teletypewriter keyboards.

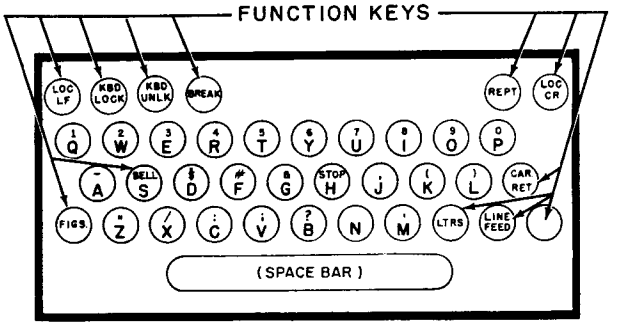

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Figure 10-12.—Model 28 keyboard with emphasis on function keys.

two spaces depending upon the position of the single-double line feed lever located on the typing unit.

4. FIGS (figures)—The figures key is pressed to condition the machine for printing figures, punctuation marks, or other uppercase characters.
5. LTRS (letters)—The letters key is used to condition the machine for printing the letters (lowercase) characters.

6. BELL—Operation of the BELL key (which is uppercase action of the S key) causes a signal bell to ring locally and at distant stations.
7. BLANK (unlabeled key in bottom row)—Depressing the blank key twice (effective in either uppercase or lowercase) locks all keyboards in the circuit and renders them inoperative by setting up the receive condition. Restoration to the send condition is accomplished, under individual circumstances, through operation of the KBD UNLK key by the operator desiring to send from his keyboard.
8. BREAK—To stop (break) another station's sending, depress the BREAK key for about 3 seconds. This causes the KBD LOCK key to drop and lock keyboards on both sending and receiving machines. After a break it is necessary to operate the KBD UNLK key to free the keyboard for sending.
9. REPT (repeat)—To repeat a character, depress the character key and the REPT key. The character will be repeated automatically at line speed as long as both keys are held down.

The four keys described next perform their functions only on the machine on which the key is operated (referred to as "local machine"), without affecting any other machine on the line.

10. LOC LF (local line feed)—To feed the paper up in the local machine, depress the LOC LF key, which feeds the paper up automatically and rapidly as long as it is held down. This key is for use in locally feeding up paper to tear off a message not fed up far enough by the transmitting station. It also is used when inserting a new supply of paper in the machine.
11. KBD LOCK (keyboard lock)—To lock the keyboard on the local machine, depress the KBD LOCK key. The keyboard is now inoperative until released by the KBD UNLK (keyboard unlock) key. The KBD LOCK key also drops automatically when the power switch is turned OFF, when the BREAK key is operated, or when a break is received.
12. KBD UNLK (keyboard unlock)—To unlock the keyboard on the local machine, depress the KBD UNLK key. This action raises the KBD LOCK key, making the keyboard operative. Operate this key after turning on the power switch and after sending or receiving a BREAK.
13. LOC CR (local carriage return)—To return the type box to the left margin on the local machine, depress the LOC CR key. This key is for use in omission of carriage return at the end of a transmission from another station.

TYPING UNIT

The model 28 typing unit is shown in figure 10-13. Printing is produced by the type box, which contains the characters and symbols shown on the key tops. Operation of keys and space bar moves the type box across the platen from left to right. On each key stroke the type box is moved into position for the printing hammer to strike the proper type pallet, printing the character on the paper. Operation of the CAR RET key returns the type box to the left margin, and operation of the LINE FEED key moves the paper up to the next line.

The force of the printing blow is controlled by the printing spring adjusting bracket, which is set for the individual service requirement according to number of carbon copies required. Notch 1 is for one to three copies, and notch 2 for four or five copies. If copies are either too light or too dark, the force of the printing blow can be adjusted by moving the printing spring adjusting bracket, taking care not to make the printing blow any heavier than necessary to produce satisfactory copies.

Type pallets are arranged in four rows. The type box moves up and down in selecting the row in which each character to be printed is located. Lowercase characters are in the left half of the box and uppercase characters are in the right half. The type box moves left and right on shifting and unshifting operations, rather than in the familiar up-and-down motion of carriage shifting on the typewriter and older teletypewriters. This combined vertical and horizontal motion brings the character to be printed into line with the printing hammer. There are two pointers on the type box, the LTRS pointer on the left and the FIGS pointer on the right. When typing stops, the pointer at which the printing hammer is aimed indicates where the next character will be printed. If the printing hammer is aimed at the LTRS pointer, the type box is in lowercase. If the printing hammer is aimed at the FIGS pointer, the type box is in uppercase. An operation shifting the type box to uppercase

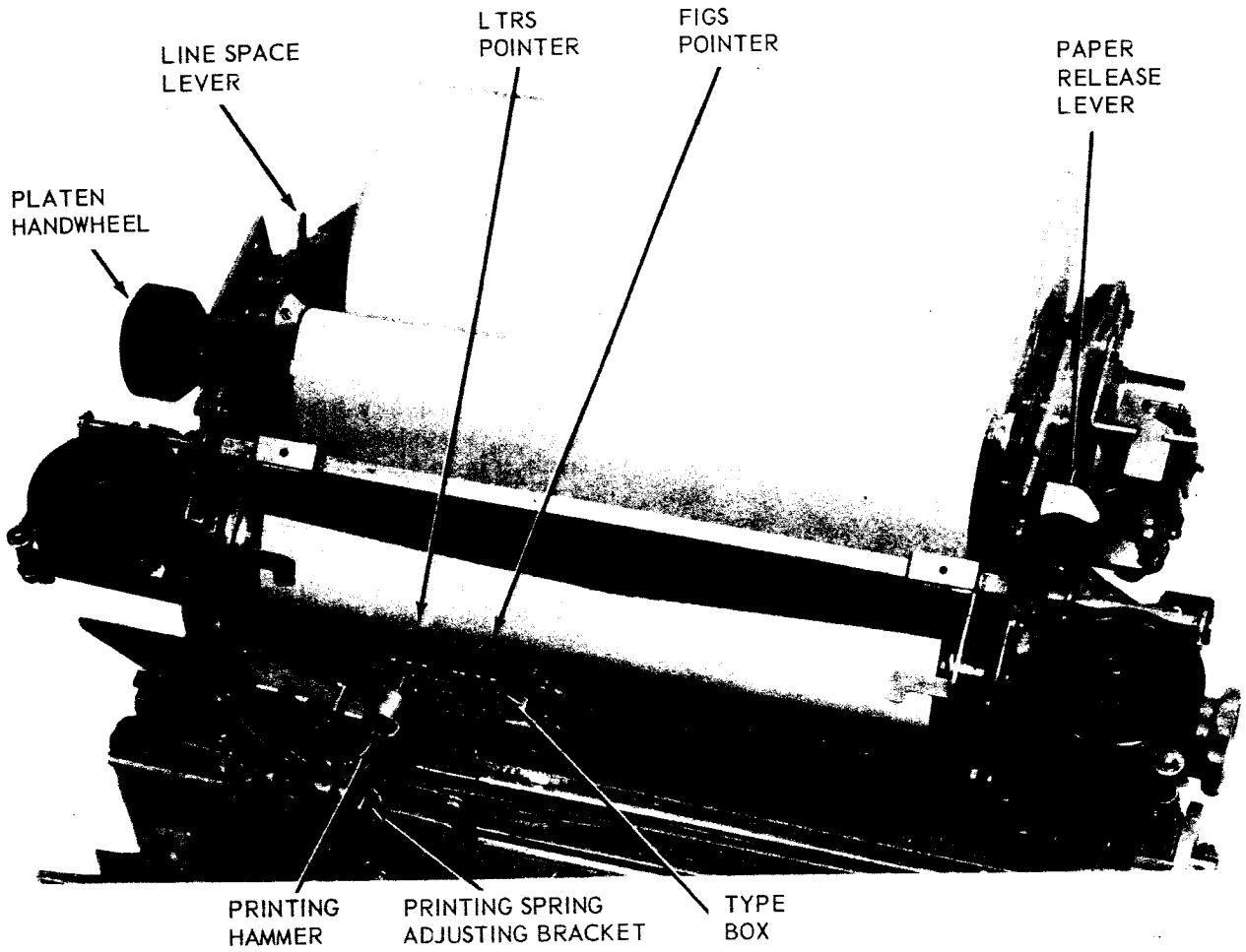

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Figure 10-13.—Model 28 typing unit.

or lowercase moves the corresponding pointer to the typing location.

OPERATING THE MODEL 28 TTY

The controls and parts used to operate the model 28 printer are illustrated in figures 10-10 and 10-12. You will find frequent reference to these illustrations helpful in comprehending the instructions for operating this equipment.

Assuming that the printer is functioning properly and is connected to an incoming signal, the only action necessary to commence receiving traffic is to apply power to the equipment. This is accomplished by rotating the power switch (located slightly below and to the right of the keyboard) upward to the ON position. Do not be alarmed if the first few characters are garbled, because the printer's driving motor requires several seconds to attain running speed.

Conditioning the machine for transmitting is a simple process. After applying power and allowing the motor to attain running speed, depress the BREAK key and hold it down for at least 2 seconds. This locks the keyboards of all stations on the circuit. Additionally, depressing the BREAK key starts the motors of those machines in which the motor shutoff mechanism is utilized. (Model 28 printers have a mechanism that shuts off the motor when no signal is received for approximately 2 minutes, but the mechanism often is disabled by stations not desiring this feature.) After releasing the BREAK key, press the KBD UNLK key to unlock your keyboard. The machine now is ready for transmitting to other stations.

Transmission begins at the keyboard. With the touch system, use the CAR RET key as a guide for the right hand and the A key for the left hand. The little finger of each hand is used on the guide key. It is important that you use a light, quick, even touch on the keys. Force is unnecessary because the machine is operated electrically. Teletypewriter manual operation requires accuracy, rhythm, confidence, and speed in their proper relation. Although a light touch is essential to speed, each key must be pressed in a positive manner. Otherwise you may be writing the word FOR and have FR appear on the page simply because the letter O was pressed without allowing sufficient time for printing the letter F. To become a skillful teletypist, proficiency in the touch system of typing is, of course, a "must."

The function keys represent "functional operations," or nontyping selections; that is, when pressed, they do not print anything on the page. Each function key was described in our discussion of the keyboard, but let us review the ones used most commonly in transmitting messages. These are the figures (FIGS) key, the letters (LTRS) key, space bar, carriage return (CAR RET) key, and LINE FEED key.

To shift the machine to the uppercase for typing numerals, punctuation marks, and special characters indicated on the upper part of the keys, press FIGS. To UNSHIFT the machine, press LTRS, and type the letters of the alphabet.

The space bar is used to space between either words or characters. On Navy printers the space bar functions the same whether uppercase or lowercase characters are transmitted. Some commercial machines, however, have a feature called "unshift on space," which means the printer returns to lowercase after each space. In fact, all printers have this feature, but on Navy machines it is purposely disabled. The operating procedure explained in the next chapter requires that you press the FIGS key before each group of uppercase characters so that the distant machine will print characters in the proper case whether it is adjusted to unshift on space.

The CAR RET key is used to return the carriage to the beginning of the line. Usually the machine is adjusted to print a line 69 characters in length. This includes the spaces between the typed words. The end-of-line indicator lamp lights about six characters before the end of the line.

The LINE FEED key feeds the paper up, one to two lines at a time, thus preventing overlining.

The latter two functions, carriage return and line feed, also are performed automatically by the printer upon printing the 69th character on each line. This prevents characters piling up at the end of a line when the normal carriage return and line feed functions are not received.

MISCELLANEOUS OPERATING FEATURES

To raise the cover for access to the typing unit to change paper and ribbon or to clean type, press the cover release pushbutton and lift the cover. To raise the lid for access to the paper, press the lid release pushbutton and lift the lid. To turn the paper up or down, raise the cover, and press and hold down the platen handwheel (so that it engages the platen ratchet wheel) while turning it in the desired direction. Do not attempt to hold down or operate the platen handwheel while the teletypewriter is operating. To adjust the paper, raise the lid, push back the paper release lever to free the paper, straighten the paper, and pull the lever forward to its normal position. To set the line spacing for single or double space, raise the lid, press the line space lever to the left and pull it forward for single space or push it back for double space. To space to a desired location for typing, space the type box over until the LTRS pointer is at the desired typing location. Then, if uppercase is desired, operate the FIGS key.

Changing Paper

To insert a new roll of paper in the model 28, first shut off the power. Press cover release pushbutton and lift cover. (Refer as necessary to figs. 10-14 and 10-15.) Push back paper release lever, lift paper fingers, and pull paper from platen.

Lift the used roll from machine and remove spindle from core of used roll. Insert spindle in new roll. Replace spindle in spindle grooves with paper feeding from underneath roll toward you. Feed paper over paper-straightener rod, down under platen, and up between platen and paper fingers. Pull paper up a few inches beyond top of platen, and straighten it as you would straighten paper in a typewriter. Then lower paper fingers onto paper and pull paper release lever forward.

While inserting paper, care should be taken not to disturb the ribbon or the type box latch.

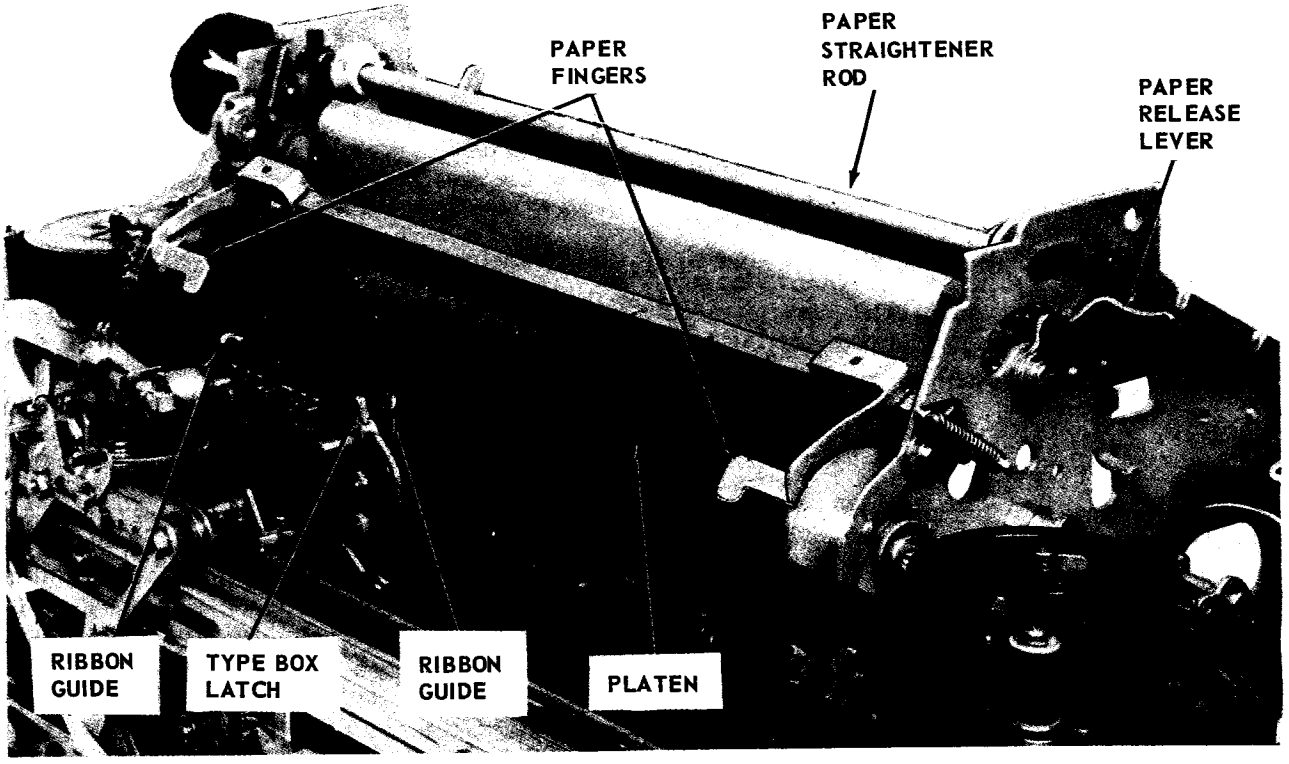

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Figure 10-14.—Paper roll removed.

After paper is in place, check to see that the ribbon still is properly threaded through the ribbon guides. Also check to make certain the type box latch has not been disengaged. It should be in a position holding the type box firmly in place. Close cover. Open lid by pressing lid release pushbutton, bring up the end of the paper, and close lid with paper feeding out on top of it.

Changing Ribbon

To replace a worn ribbon, press cover release pushbutton and lift cover. (Refer as necessary to figs. 10-16 and 10-17.) Lift ribbon spool locks to a vertical position, and remove both spools from ribbon spool shafts. Remove ribbon from ribbon rollers, ribbon reverse levers, and ribbon guides. Unwind and remove old ribbon from one of the spools. Hook end of new ribbon to hub of empty spool and wind until reversing eyelet is on the spool. If the ribbon has no hook at the end, the spool will have a barb that should be used to pierce the ribbon near its end.

Replace spools on ribbon spool shafts, making sure they go down on spool shaft pins, and that the ribbon feeds from the outside of the spools. Turn down ribbon spool locks to a horizontal position, locking spools in place. Thread ribbon forward around both ribbon rollers, through the slots in the ribbon levers and ribbon guides. Take up slack by turning free spool. After slack has been taken up, check to make certain that ribbon still is properly threaded through ribbon guides, and that the reversing eyelet is between spool and the reverse lever. Also see that the type box latch has not been disengaged. It should be in position, holding the type box firmly in place.

Turn the paper up a few inches by pressing down and turning platen handwheel. Close cover. Open lid, bring up the end of the paper, and close lid, with paper feeding out on top of it.

Cleaning Type

When printing is smudged, the type should be cleaned. You must remove the type box from

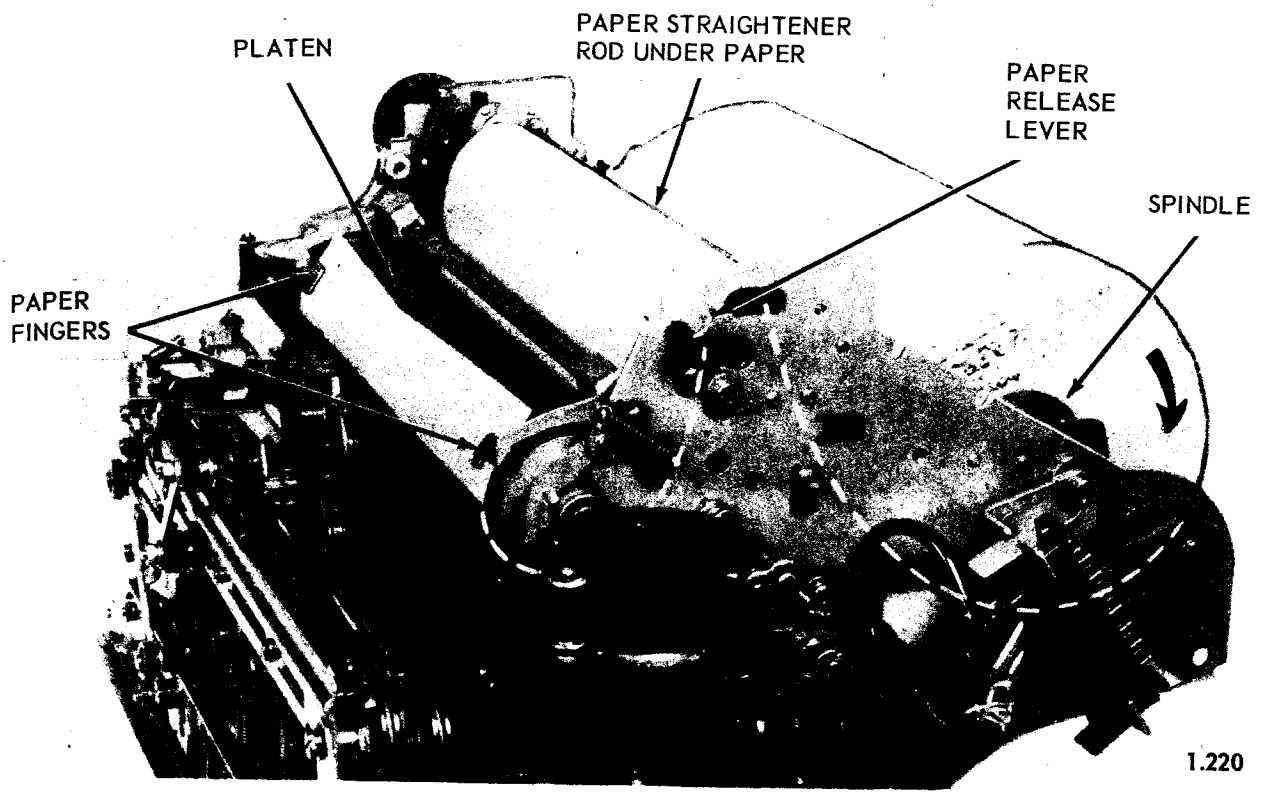

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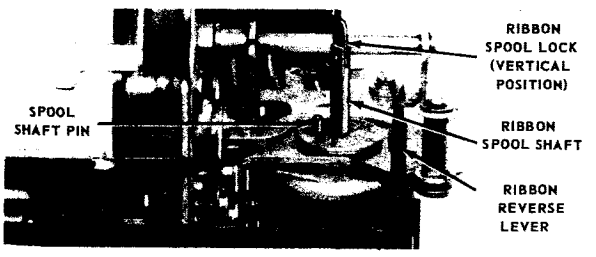
Figure 10-15.—Paper roll inserted.



1.221

Figure 10-16.—Ribbon spool mechanism.

the machine. Open cover and unlock type box latch by moving it to the right (see fig. 10-18). Grasp handle on right side of type box, and raise that side up and to the left until the type box unhooks on the left side and can be freed from type box carriage. Turn type box over to side with type (fig. 10-19) and clean with a dry, hard-bristle brush. DO NOT use type cleaning solution.

To replace type box, hold it with type toward platen and the large hook on the left. Slip this hook under stud in front of left type box roller, and push smaller hook on right side down into place on stud in front of right type box roller. Hold type box latch in horizontal position and move to left over latching notch as far as it will go. Raise latch to vertical, and press to left until it locks into latching notch. Check to see that the ribbon still is threaded properly.

TELETYPE TAPE

Before discussing equipment that produces and handles messages on tape, let's get squared away on the two types of tape used for messages. The first type is the fully perforated, or CHAD, tape (fig. 10-20). (Incidentally, "chad" is the confetti (small paper disks) punched from the tape to make the holes.) On chad tape the teletypewriter code is completely punched, and no printing appears. The other type, only partially perforated, is called CHADLESS. There is, however, more than one kind of chadless tape.

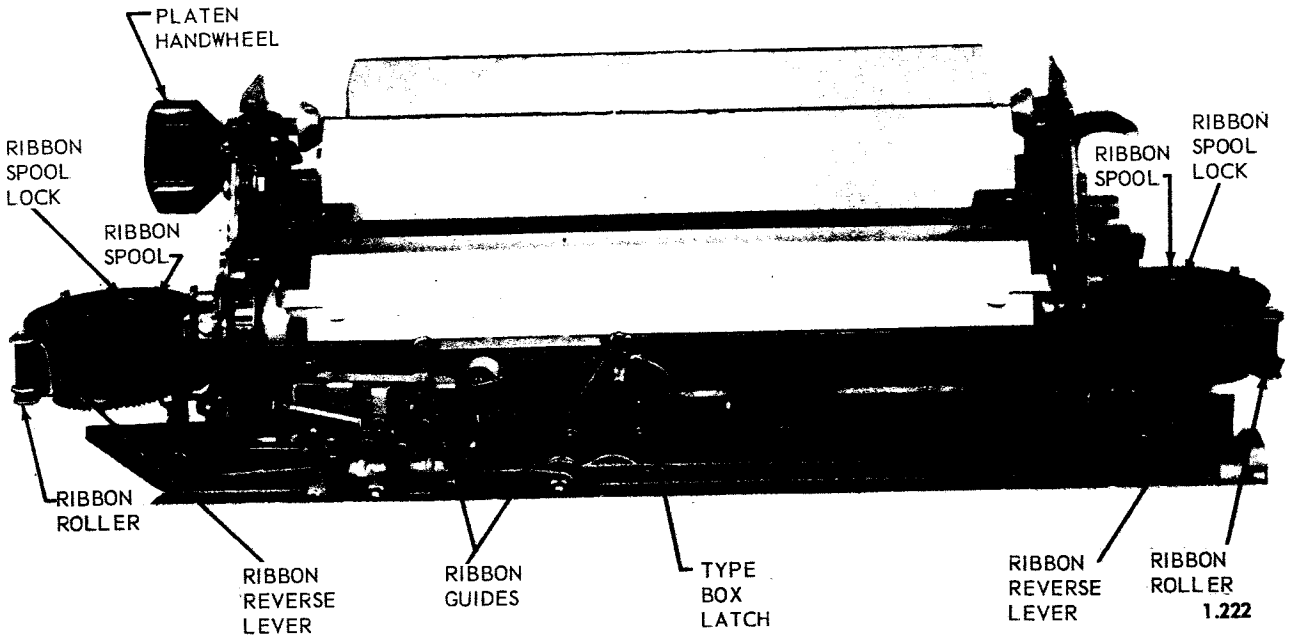


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Figure 10-17.—Ribbon inserted.

The center tape in figure 10-20 is produced by newer models of perforators and reperforators and carries the printed message in addition to the perforations. The printing always lags the perforated code by six spaces. In other words, the pattern of holes representing letter A may be punched as the first letter of a message, and six spaces later (to the right) the letter A is printed on the tape. The reason for this is that both printing and perforating occur at the same time. Because of their simultaneous action, printing and perforating must necessarily occur at different locations on the tape. Accordingly, the machines are designed to print the character six spaces to the right of the corresponding perforation.

The partial perforations of chadless tape remain hinged to provide enough surface for the printed word, which eliminates need for reading the perforations, at the same time permitting the transmitter distributor sensing pins to penetrate the perforations and transmit the message. When a tape is completely perforated—as is chad tape—the remaining surface is not sufficient for printed characters.

Older teletypewriter reperforators, such as the model 14, similarly produce a chadless tape different only in that the alphabet characters print along the upper edge of the tape, whereas the figures and other uppercase characters print along the lower edge.

A third kind of chadless tape has the same type of partial perforations but does not have any printing whatsoever (lower tape in figure 10-20). The teletypewriters and high-speed reperforators used on cross-office circuits at the automatic relay centers produce this kind of chadless tape.

The continued widespread use of chad tape, and chadless tape without printing, make it necessary for the operator to learn to read tape. We will have a lesson in tape reading at the end of the chapter.

MODEL 28 SEND-RECEIVE CONSOLE (AN/UGC-6)

The AN/UGC-6 teletypewriter (fig. 10-21) is a versatile communication equipment. It receives messages from the signal line and prints them on page size copy paper. In addition, it can receive messages and record them on tape in both perforated and printed form. With page-printed monitoring, the teletypewriter transmits messages that are originated either by perforated tape or by keyboard operation. It mechanically prepares perforated and printed

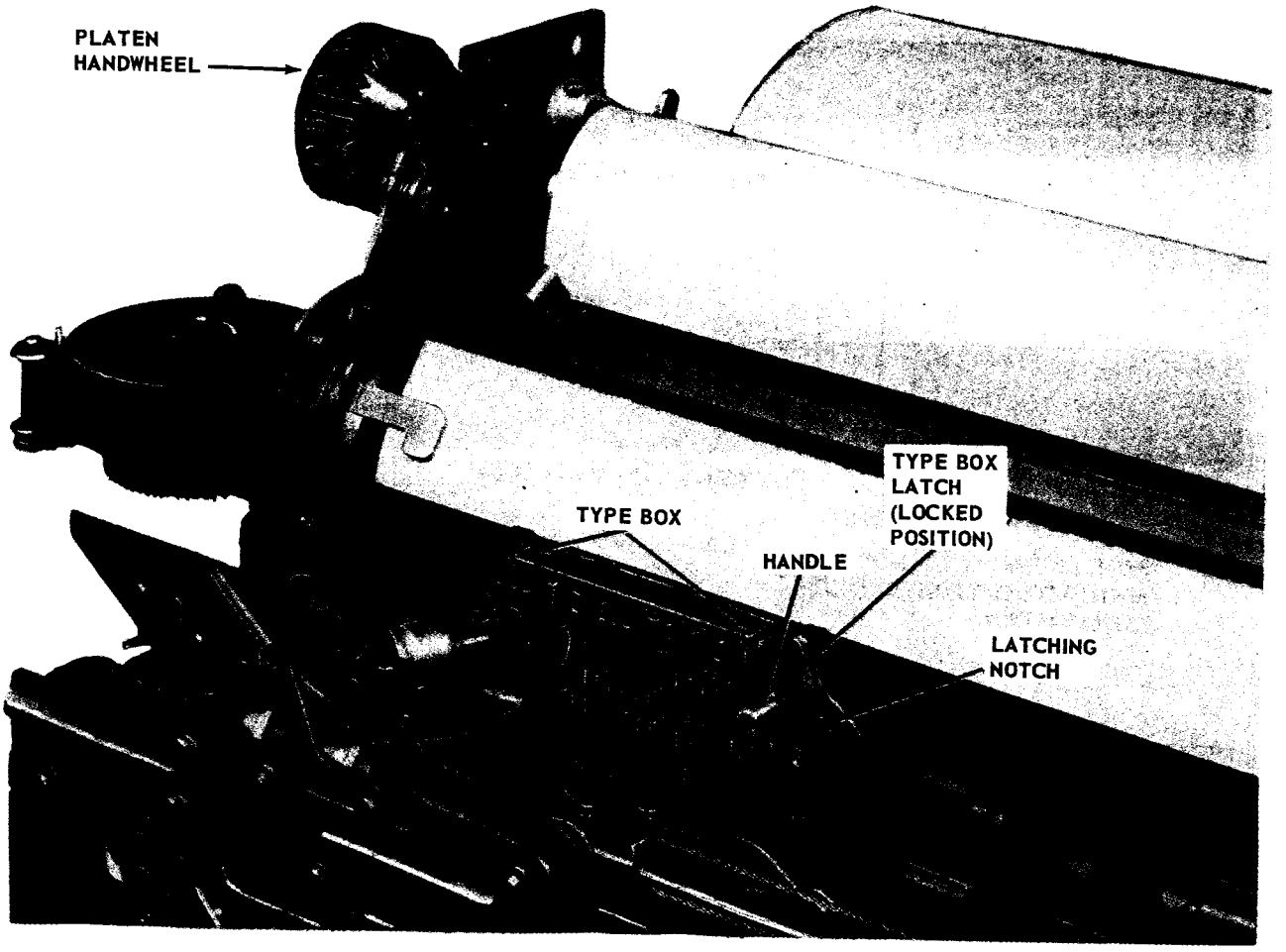

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Figure 10-18.—Type box in place.

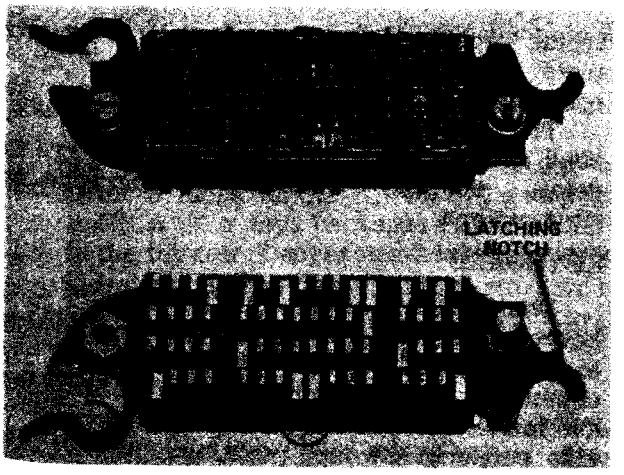

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Figure 10-19.—Type box, front and back.

tape for separate transmission with or without simultaneous transmission and page-printed monitoring.

The teletypewriter set is composed of the following components: a cabinet, a keyboard, an automatic typer, a typing perforator, a transmitter distributor (TD), a typing reperforator, and power distribution panels.

In operation, the components are linked together by electrical or mechanical connections to offer a wide range of possibilities for sending, receiving, or storing teletypewriter messages. All equipment components are housed in the cabinet. Transmission signals are initiated through the keyboard or the transmitter distributor. Signals are received, and local transmission can be monitored, on the automatic typer. The typing perforator and typing reperforator are devices for preparing tapes on

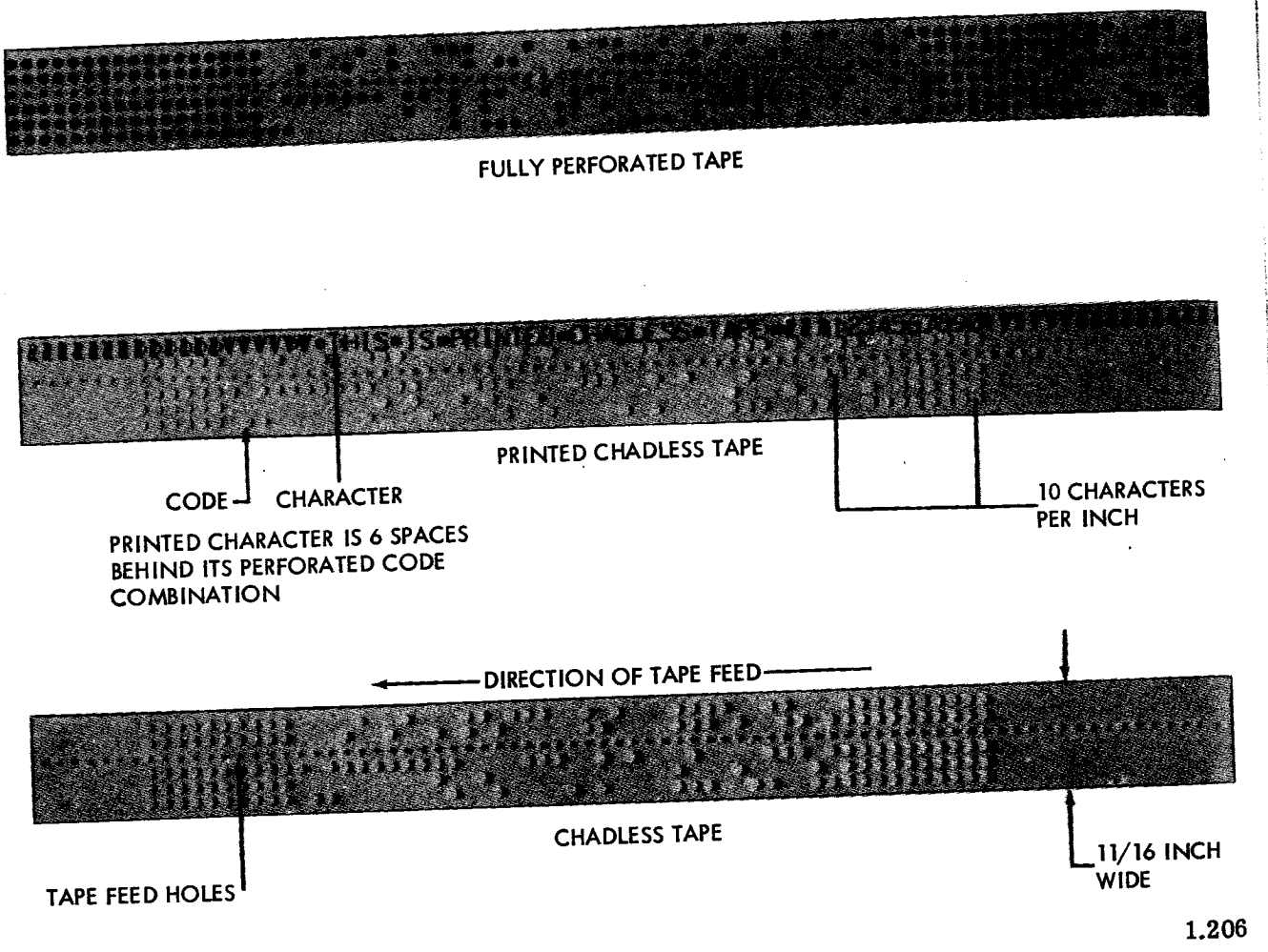


Figure 10-20.—Chad and chadless tape.

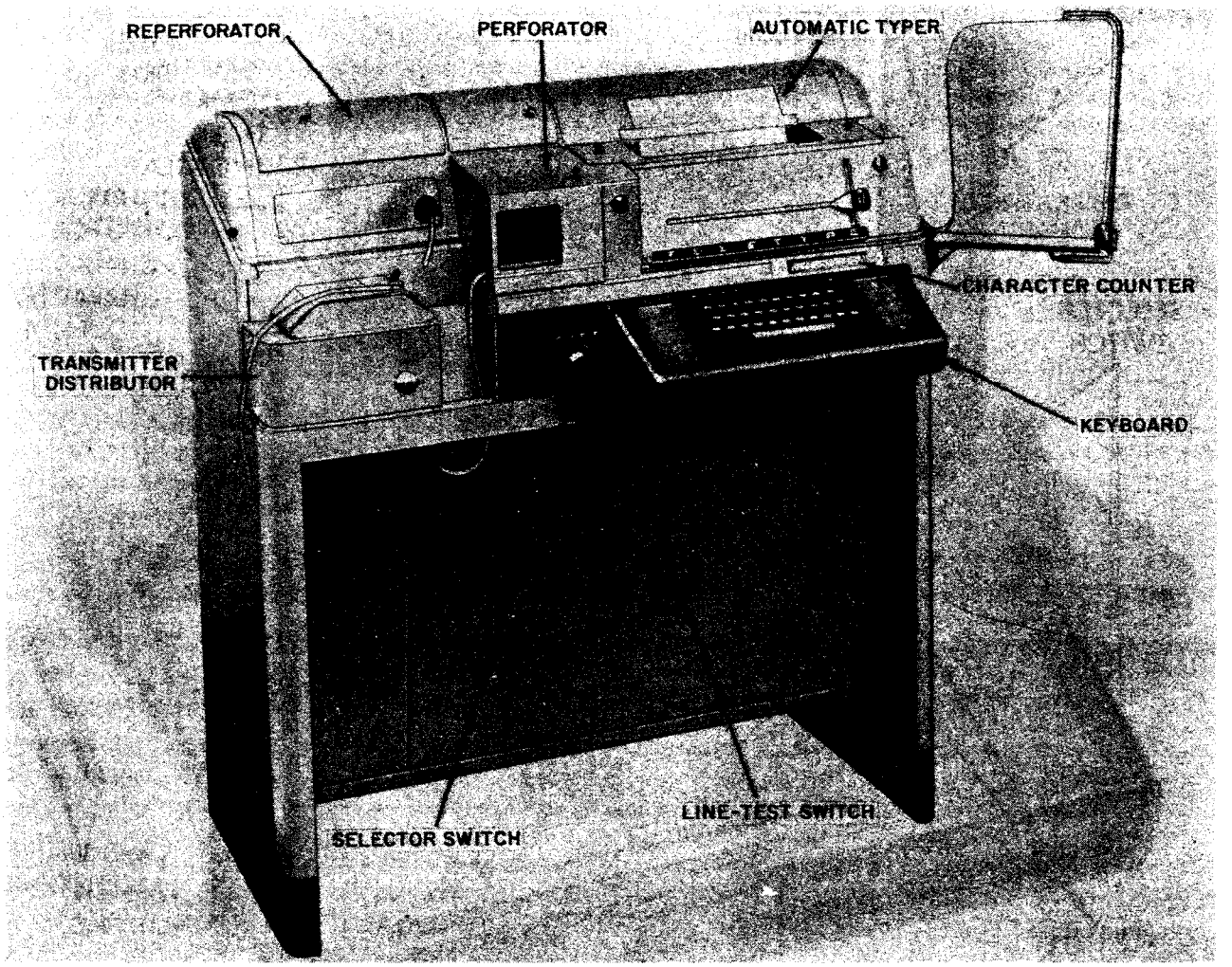
which locally initiated or incoming teletypewriter messages can be stored for future transmission through the transmitter distributor.

The keyboard, typing perforator, automatic typer, and transmitter distributor are operated by the motor mounted on the keyboard. Selection of these components for either individual or simultaneous operation is by the selector switch whose knob is located at the front of the cabinet, to the left of the keyboard. All these components are connected in series in the signal line, but the selector switch has provisions for excluding various components from the line. The external signal line is connected to the equipment through a line-test switch located below the selector switch on the front of the cabinet. This provides a means of disconnecting the equipment from the line for local testing of the components. The typing reperforator is operated by a separate motor and power distribution system. It also is connected to a separate external signal line.

The major components of the AN/UGC-6 send-receive console are described in greater detail in the following paragraphs and illustrations.

KEYBOARD

The keyboard (fig. 10-22), similar to the keyboard of the TT-48/UG that we discussed earlier, actually is a keyboard and a base combined. It provides a foundation for the motor, automatic typing unit, and typing perforator. It also supports the tape container and character counter used in connection with the typing perforator, gears for operating the automatic typer, flexible connections for operating the



31.29A

Figure 10-21.—The AN/UGC-6 teletypewriter.

typing perforator and transmitter distributor, and a three-position selector switch for choosing the mode of operation of the equipment.

The keys on the AN/UGC-6 keyboard are identical to those on the TT-48/UG, except for the addition of a tape backspace (TAPE B.SP.) key in the top row. Depressing this key reverses the direction of tape feed in the perforator by one space. It is used when correcting errors in tape preparation.

AUTOMATIC TYPER

Automatic typer is just another term for the typing unit described in our discussion of the TT-48/UG teletypewriter set. Except for minor changes in operating features, all model 28 typing units (or automatic typers) are identical in appearance and function. They convert electrical impulses into printed matter on a page form.

TYPING PERFORATOR

Tape perforation by operation of the keyboard is accomplished by the typing perforator (fig. 10-23). The perforator is controlled by mechanical linkages to the keyboard, and is powered through flexible connections and a shaft by the a-c motor mounted on the keyboard. The tape produced by the perforator is a chadless, perforated tape with printed characters corresponding to the perforated code. Printing and perforating occur simultaneously, but the characters are printed six spaces to the right of the corresponding code combinations. Tape is

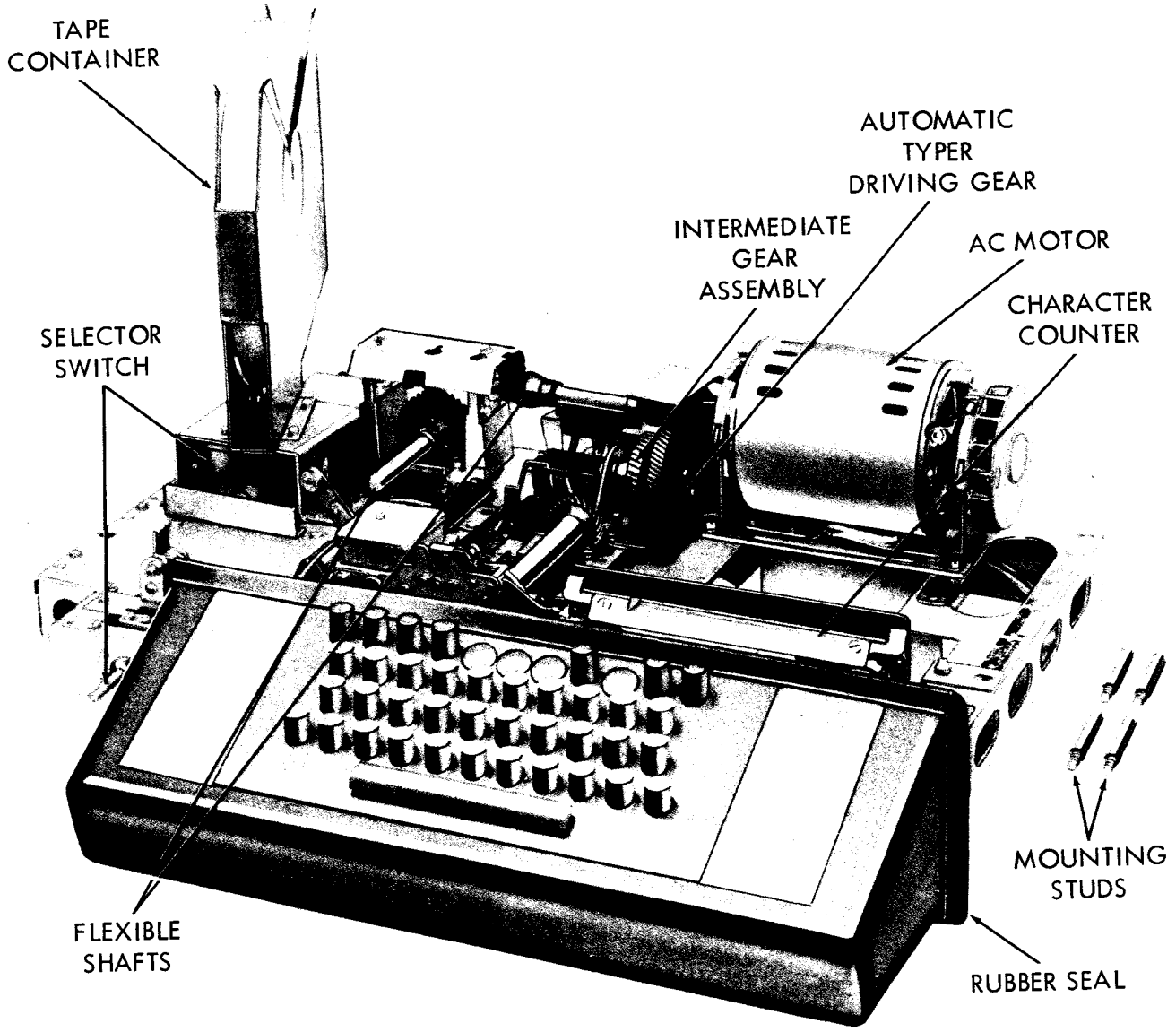


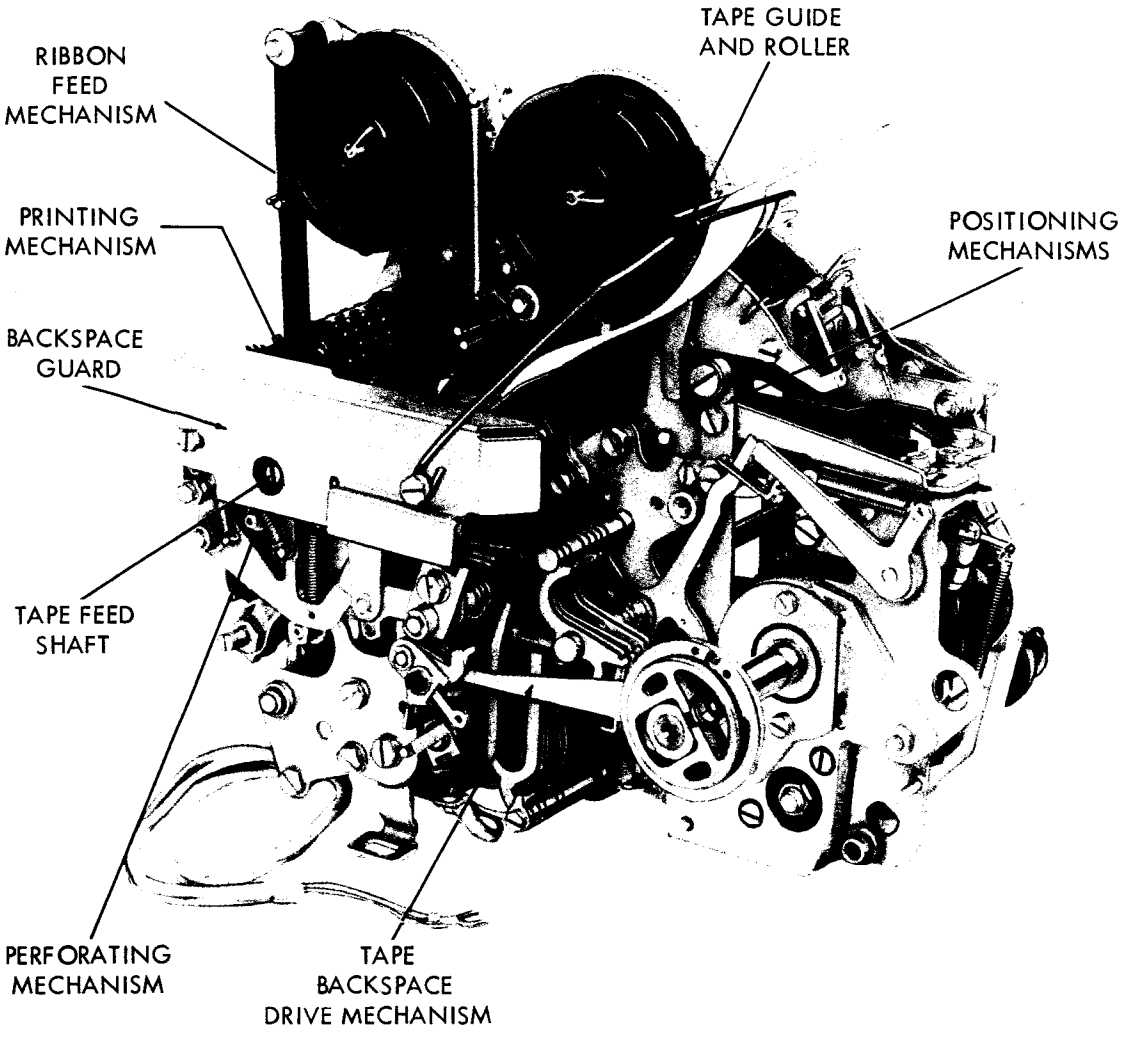
Figure 10-22.—Keyboard unit.

supplied from a container mounted at the left rear corner of the keyboard.

Printing is accomplished by a type wheel that is controlled by positioning mechanisms and a hammer for driving the tape and an inked ribbon against the type wheel to imprint the selected characters. The positioning mechanisms select the proper characters by moving the type wheel in accordance with mechanical arrangements in the keyboard. The type wheel is retracted at the end of each operation, so that the last printed character is visible to the operator.

A perforating mechanism stops the tape, rolls in feed holes, and perforates chadless code holes corresponding to the code selected in the keyboard.

A backspace mechanism is wired electrically to the B.SP. key on the keyboard. Depressing the backspace key energizes a magnet that actuates the mechanism and backs the tape out of the perforator a distance of one character



50.98

Figure 10-23.—Typing perforator (front view).

space. This facilitates correcting errors in tape preparation.

TYPING REPERFORATOR

The typing reperforator (located in the top left compartment of the cabinet) is similar to the typing perforator, with identical subassemblies for the typing and perforating mechanisms. (See fig. 10-24.) The main difference between the perforator and the reperforator is that the reperforator is not controlled by the keyboard. Instead, it has its own selector unit (similar to the one on the automatic typer) and normally responds only to a line signal received on a different line from the one serving the basic teletypewriter. This feature permits duplex operation of the AN/UGC-6 console. That is, the reperforator can be receiving traffic from a station on one circuit, while the other components in the console are transmitting traffic to the same station on another circuit.

Additional features of the reperforator that are uncommon to the perforator are the signal bell, low tape alarm, a mechanical variable speed drive mechanism, a blank tape feed-out mechanism, and a tape threading feed wheel.

TRANSMITTER DISTRIBUTOR (TD)

The transmitter distributor (fig. 10-25) is mounted on its own base in the front of the

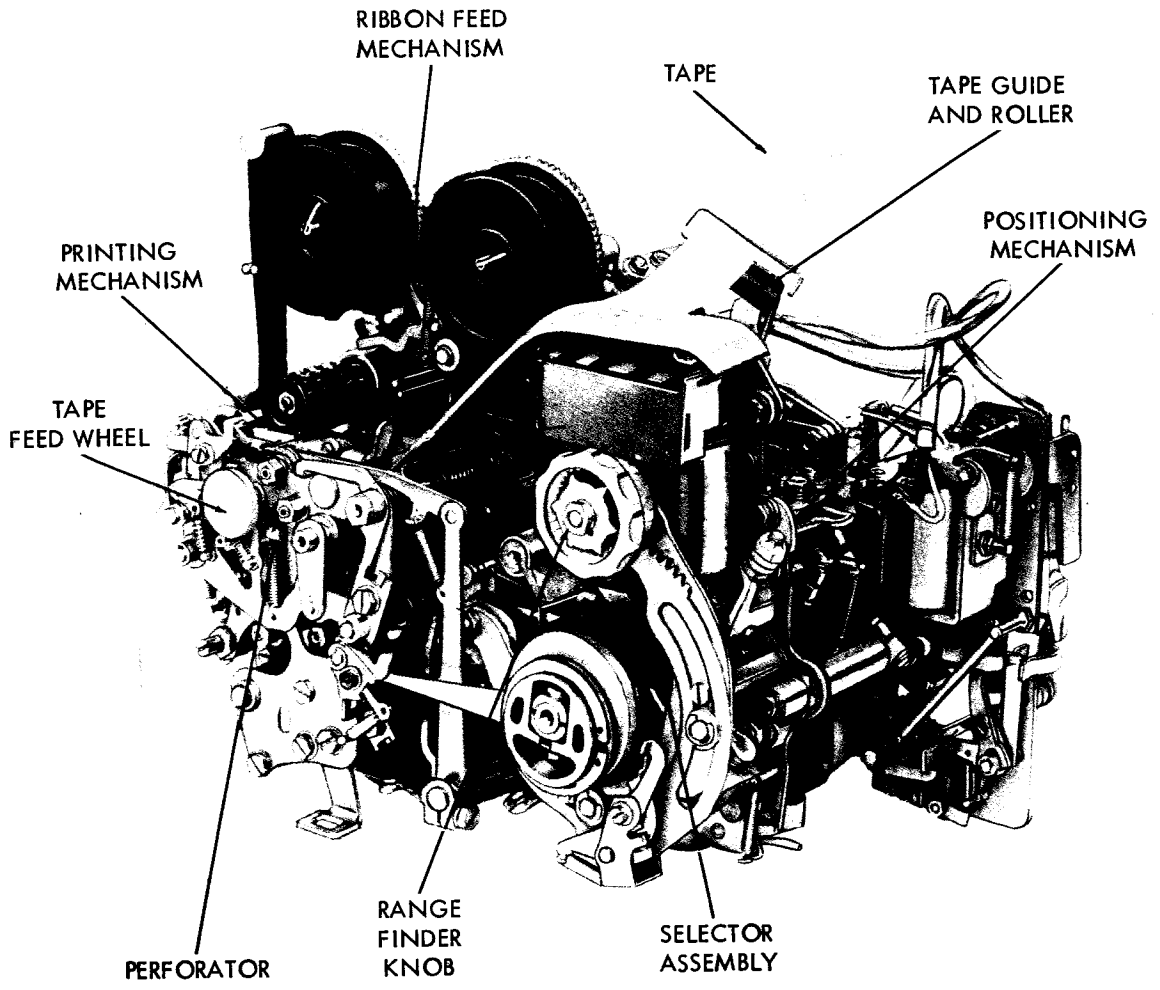


Figure 10-24.—Typing reperforator (front view).

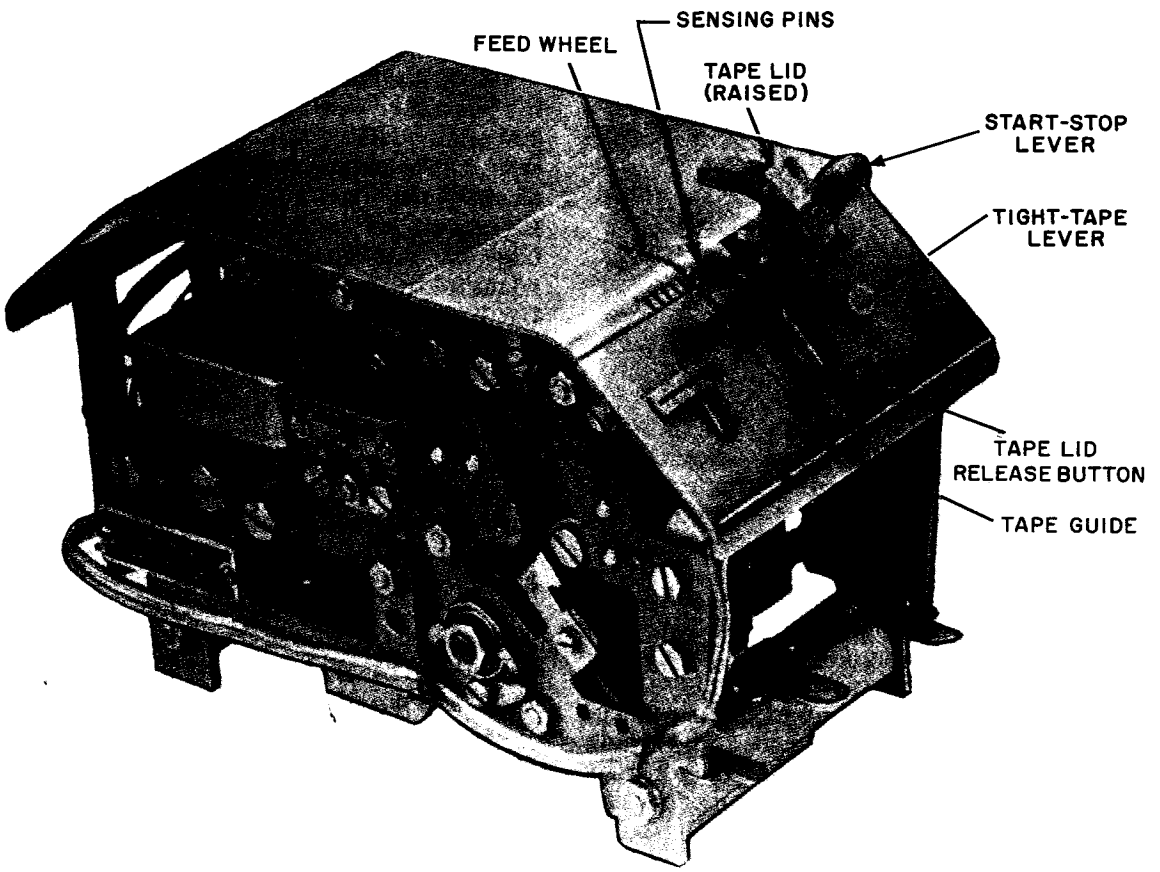
cabinet on the left side. It is a mechanical tape reader used to convert messages on standard chadless or fully perforated tapes to the electrical impulses of the teletypewriter code. The impulses are transmitted directly to the signal line or circuit.

Conversion of the perforations in the tape to electrical impulses is accomplished by passing the tape over five sensing pins. These sensing pins activate a mechanical mechanism that operates a set of contacts to send out either a mark or space impulse, depending upon whether the sensing pins rise into a perforation or are held stationary by the tape.

The unit includes a start-stop switch in which are incorporated tight-tape, shutoff, and freewheeling tape features. The start-stop switch is a three-position switch. When positioned in the center, the switch is OFF and tape will not feed. When positioned to the right, the switch is in the ON (or RUN) position and tape is fed over the sensing pins. When positioned to the left, the switch is in freewheeling, and tape may be manually pulled back and fed forward without any intelligence being sent to the line.

The tight-tape lever rides on the tape as it feeds through the tape guide. If the tape becomes tight or tangled, the lever is lifted and the TD stops feeding tape. Relieving the pressure on the lever automatically starts the tape feeding again.

Another feature of the TD is the end-of-tape switch. The switch is controlled by a pin protruding through the tape guide plate. As long as this pin is depressed by tape feeding through



76.33

Figure 10-25.—Transmitter distributor (TD).

the guide, the TD is operable. When the end of the tape passes over the pin, the pin rises and the TD stops transmission automatically.

OPERATING THE AN/UGC-6

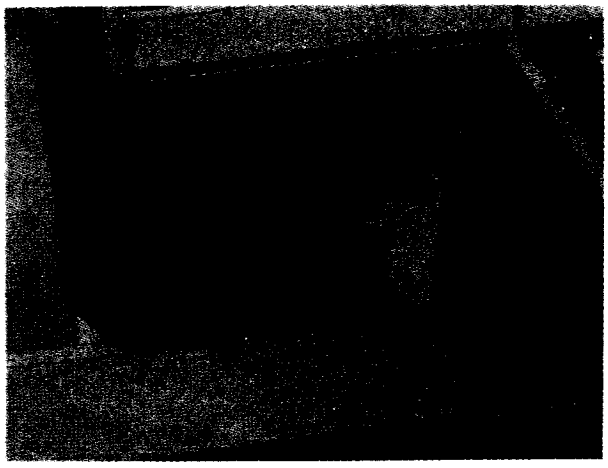
Power is applied to the AN/UGC-6 in the same manner as to the TT-48/UG. The switch is located on the front of the cabinet, slightly below and to the right of the keyboard. Rotating the switch so that the pointer is pointed up energizes the equipment, except for the reperforator, which is controlled by its own power switch.

After applying power, but before operating the set, ascertain that the line-test switch is in the desired position. The switch must be in the lower (LINE) position to connect the teletypewriter to distant stations. In the upper (TEST) position, the equipment is connected to a local test circuit (if wired), and no intelligence is sent to the signal line. This, of course, does not affect the reperforator, which is connected to its own external line.

With power applied, and the line-test switch in the LINE position, select the desired mode of operation with the three-position selector switch (fig. 10-26). From left to right, the three positions of the switch are keyboard (K), keyboard and tape (K-T), and tape (T).

KEYBOARD MODE OF OPERATION

To transmit a message directly to the line as you are typing it, rotate the selector switch to the K position. Depress and hold down the BREAK key for approximately 2 seconds to lock out all keyboards in the circuit, and then depress the SEND (KBD UNLK) key to unlock your keyboard. Transmit five spaces, two carriage



76.34

Figure 10-26.—Selector switch.

returns, and a line feed, in that order, to align the distant machines to the same position as yours, and then type your message. The automatic typer monitors your transmission, providing you with a printed copy of the message.

In the keyboard mode of operation, the typing perforator is mechanically isolated from the keyboard, and the character counter mechanism does not function. The transmitter distributor circuits also are inoperable.

KEYBOARD-TAPE MODE OF OPERATION

Keyboard operation in the keyboard-tape (K-T) mode is the same as when in the keyboard mode, except that typed, perforated tape is prepared simultaneously by the typing perforator. This mode is particularly useful when a message must be transmitted on more than one circuit. You can transmit the message on one circuit while preparing a tape for transmission on the other circuits.

With the line-test switch in the TEST position, you can utilize this mode of operation to prepare tape for later transmission and, at the same time, to obtain a page copy of the transmission as it will appear when sent on the circuit. Care must be exercised in using this method, however, because you can neither send nor receive messages during the period the machine is disconnected from the circuit.

When the selector switch is in the K-T position, the character counter moves one unit to the right with each character and spacing operation recorded on the tape. The transmitter distributor also is operable.

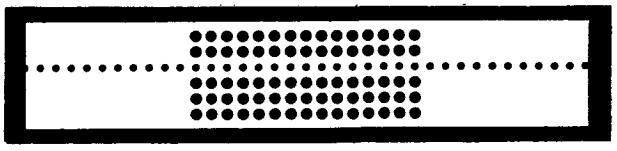
TAPE MODE OF OPERATION

When the selector switch is in the T position, the keyboard and perforator are isolated from the other units. This permits you to prepare tape for transmission while transmitting messages via the transmitter distributor, or receiving messages on the printer. You type no page copy in this position, so watch the character counter to make certain that you do not type too many characters for the length of the line. As pointed out previously, the counter registers each spacing character. Nonprinting functions, such as FIGS, LTRS, LF, and CAR RET, are not registered.

To correct an error when punching tape, depress the TAPE B.SP. key to move the tape back, one space at a time, until the first wrong code is over the perforating pins of the punch block. Press the LTRS key as many times as you have backspaced to change the incorrect codes to LTRS codes. Because it is the only character having all five perforations, the LTRS code will obliterate any other character code on the tape. This is called "lettering out" an error. After lettering out the incorrect portion, retype that part of the message. The error will not appear on the page copy when the tape is sent. The characters still are registered on the counter, however. Therefore, when the counter indicates that you have reached the end of the line, you still may type as many characters as you lettered out. Figure 10-27 shows a letter-out tape.

USING THE TRANSMITTER DISTRIBUTOR

The transmitter distributor (commonly called the TD) is operable only in the K-T and T modes of operation, and then only when the SEND key is depressed. In the following discussion of the TD, assume that the selector switch is in either the K-T or T position and that the SEND key is depressed.



31.24

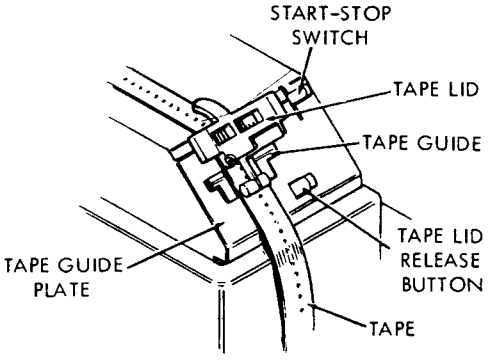
Figure 10-27.—A lettered-out tape.

To place a tape in the TD, move the start-stop lever to the center (OFF) position. Release the tape lid by pressing the tape lid release button. Place the tape in the tape guide in such a manner that its feed holes engage the feed wheel with the portion of the tape having two perforations toward the rear of the TD. Insert printed tape so that the printed, chad side is up. If nontyped chadless tape is used, position the tape so that the open side of the hinged chads is to the top. With fully perforated (chad) nontyped tape, you must be careful to feed the tape from the beginning. Reversing the tape results in a garbled transmission. While holding the tape firmly in place on the feed wheel, press down on the tape retaining lid until its latch is caught. Move the start-stop lever to the left (FREE-WHEELING) position, and manually adjust the tape so that the first character to be transmitted is located over the sensing pins. Figure 10-28 shows the path of the tape through the TD.

To transmit from the tape, operate the start-stop lever on the TD to the extreme right (ON) position. If the tape is inserted in the TD correctly, it feeds over the sensing pins, and the message is transmitted to the signal line.

CHANGING TAPE

A visual indication of low tape supply is incorporated into each roll of tape. When the color of the tape changes from pale yellow to red, the roll is nearly exhausted and requires replacement. Additionally, the warning device in the reperforator's tape container is activated when the tape supply for that unit is low. Heed these warnings! Don't miss a message by trying to use up the last bit of tape on a roll.



1.210

Figure 10-28.—Path of tape in transmitter distributor.

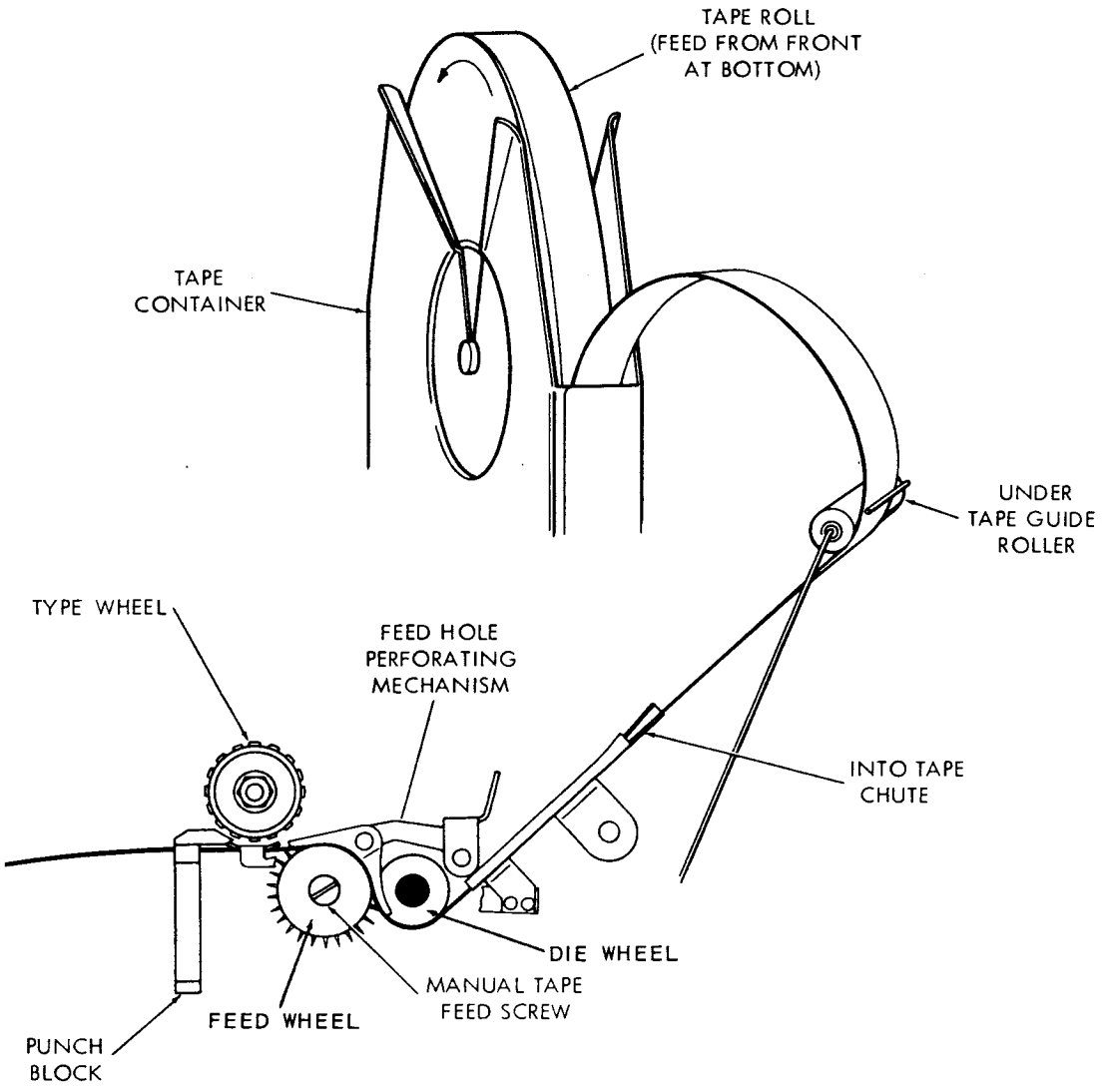
To change tape in the perforator, set the keyboard selector switch to the T mode of operation. Raise the perforator cover, and open the lid in the center of the cabinet dome. Tear the old tape at the point where it enters the tape chute (fig. 10-29). With power applied to the equipment, depress the REPT key and any character on the keyboard until the old tape is fed out of the punch block. Then, lift the tape reel from its container and remove the remainder of the old tape from the real. Insert a fresh roll of tape on the reel. Place the reel back into its container so that the tape feeds from the front of the container and off the bottom of the reel. Thread the tape over the tape guide roller and into the chute of the punch mechanism. Depress the REPT key and any character on the keyboard for automatic feeding, and, at the same time, push the tape downward until it is engaged by the feed and die wheels. Continue feeding tape until the tape appears at the left side of the punch block. Close the lid in the cabinet and lower the cover over the perforator.

The procedure for changing tape in the reperforator is almost identical to that for changing tape in the perforator. The path of the tape through the two units is identical. (Refer to fig. 10-30 as necessary.)

For access to the reperforator and its tape supply, open the left rear lid in the cabinet. Tear the tape at the tape chute and clear it out of the punch block by manually rotating the feed wheel or, if the reperforator is so equipped, by pressing the automatic tape feed button. Lift the tape reel from its container, remove the old tape, and insert a fresh roll of tape on the reel. Position the reel in its container in such a manner that tape feeds from the rear of the container and off the bottom of the reel. Make certain that the lever on the tape out switch assembly is toward the rear of the cabinet and under the roll of tape. Lead the tape over the tape roller at the rear of the tape container, to the right and over the roller mounted on the typing reperforator, and to the tape chute. Slide the tape into the chute and rotate the tape feed wheel until the tape emerges from the punch and chute at the left of the reperforator. Close the lid, making sure that the tape feeds through the hole in the front of the lid.

CHANGING RIBBONS

You already know how to change the ribbon in the automatic typer. Now you will learn how this



1.215

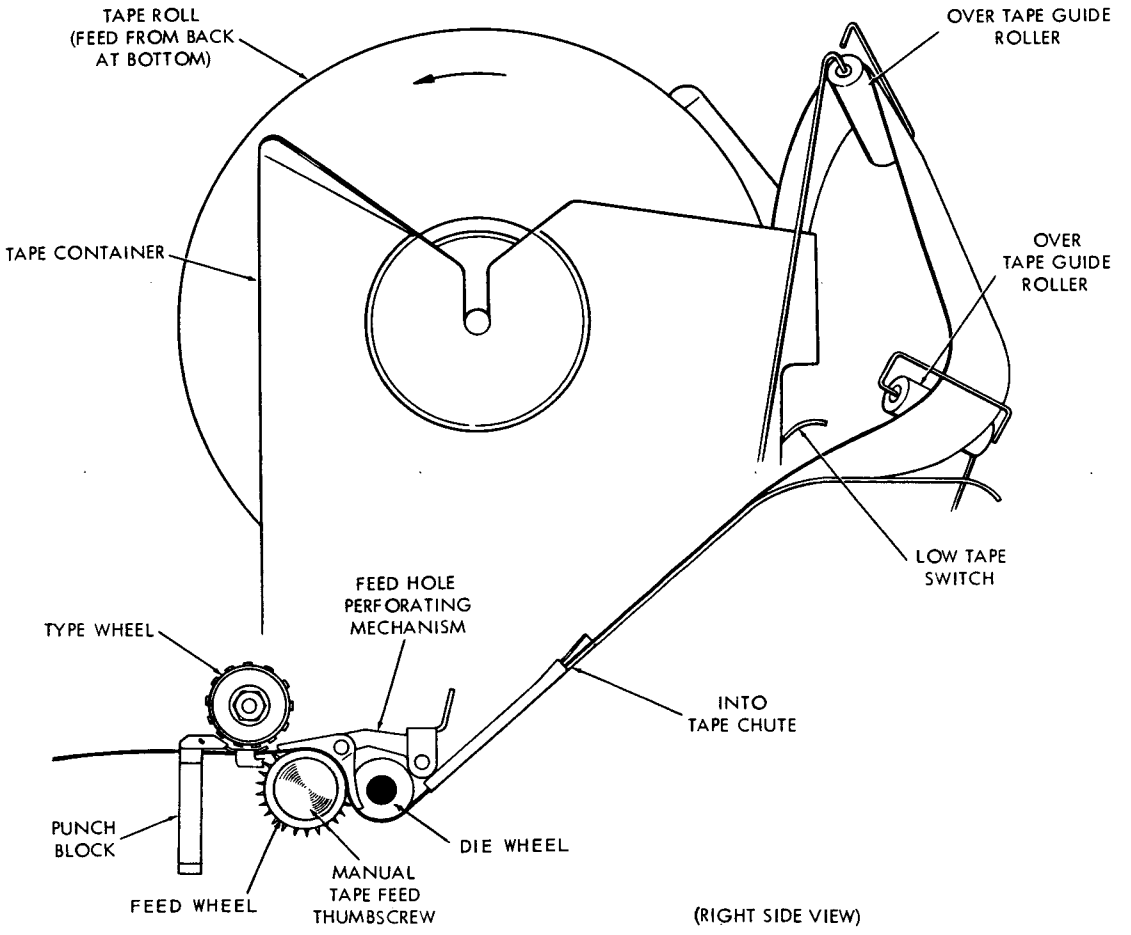
Figure 10-29.—Path of tape intyping perforator.

is done in the perforator and reperforator. The procedure for replacing the ribbon in either the typing perforator or the typing reperforator is the same.

Open the cabinet dome lid required for access to the component. Open the ribbon spool toggles and remove the old spools. Disengage the old ribbon from the reversing pins, the ribbon guide, and the rollers. Remove the old ribbon from one of the spools. Engage the hook of the new ribbon on the hub of the empty spool, and wind the ribbon on the spool past the reversing eyelet. Insert the spools on the shafts and close the toggles.

The path of the ribbon (fig. 10-31) is from the bottom of the left spool, up and over the left roller, down through the left reversing pins, through the ribbon guide under the type wheel, across the front of the unit and through the right reversing pins, under the right roller, and up and around the left side of the right spool.

Make certain that the ribbon remains in the guide slots and that both reversing eyelets are between the ribbon spools and the reverse levers. Roll up any slack in the ribbon on the spool on which the ribbon is being wound.



1.215

Figure 10-30.—Path of tape intyping reperforator.

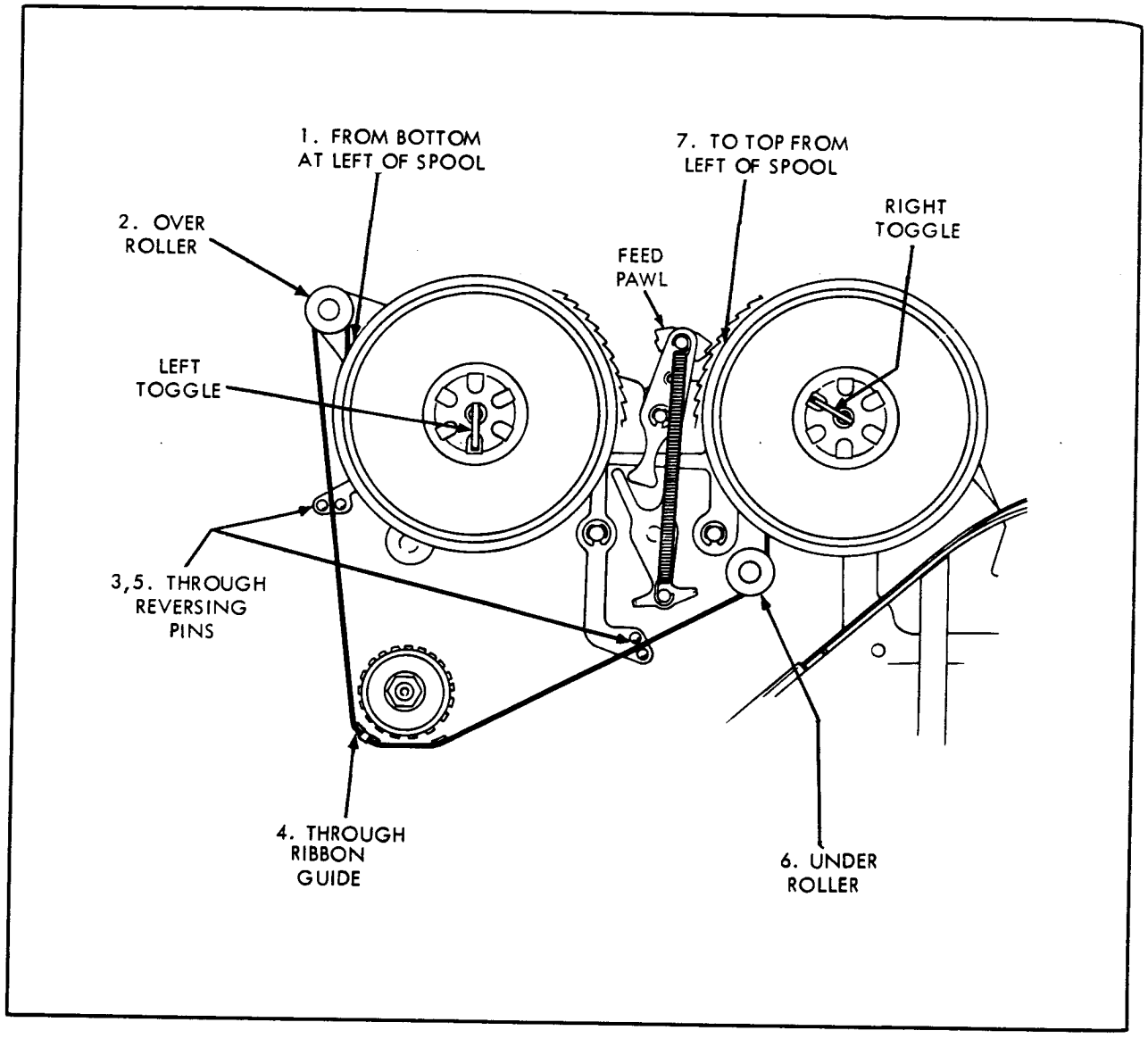
ADDITIONAL MODEL 28 UNITS

The design and function of the individual units in the model 28 line of teletypewriters remain basically the same, but the AN nomenclature assigned the units when they are employed separately (or in combinations such as found in the AN/UGC-6) usually is changed. Often, simply changing the style or type of cabinet in which a unit is enclosed causes a change in nomenclature. For example, when the keyboard and automatic typer comprising the TT-48/UG teletypewriter (fig. 10-10) are placed in the cabinet shown in figure 10-32, they become the TT-69/UG teletypewriter set. The latter set is designed for installation aboard ship.

TYPING REPERFORATOR TT-192/UG

The typing reperforator shown in figure 10-33 is designated TT-192/UG. Basically, it is the same as the one described as a component of the AN/UGC-6. It serves the same purpose and functions in the same manner. Because of space limitations, however, most shipboard installations of the TT-192/UG do not include the table shown in the illustration.

Normally, the reperforator's wiring is terminated in a patch panel (described later in this chapter) so that it can be patched or connected into any teletype circuit wired through the panel. By patching the reperforator into a circuit, a tape copy of each message is obtained, and



1.215

Figure 10-31.—Path of ribbon in typing perforators.

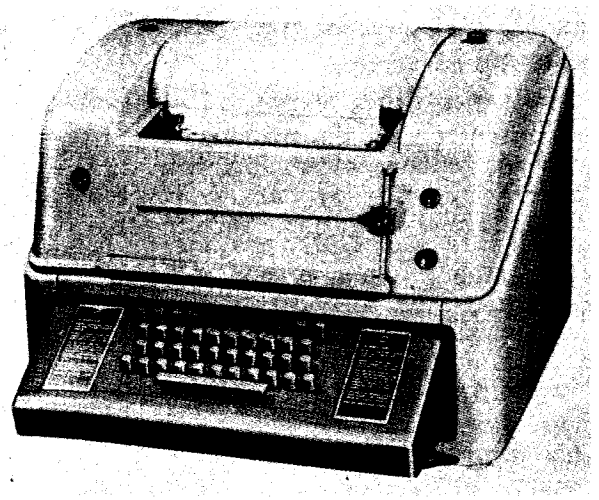
messages requiring further processing in tape form need not be retyped by the operator.

SEND/RECEIVE TYPING REPERFORATOR TT-253/UG

Because of its versatility and compactness, the TT-253/UG send/receive typing reperforator (fig. 10-34) is installed aboard ship in large numbers. In addition to its usefulness as a regular reperforator, the set can be utilized to prepare tape for transmission and to send and receive messages in the same manner as the larger, page-printing teletypewriter sets. Its use for sending and receiving messages is, of course, restricted to situations where a page copy is not required.

TRANSMITTER DISTRIBUTOR TT-187/UG

With the addition of its own motor, the transmitter distributor described as a part of the AN/UGC-6 console becomes the TT-187/UG



76.35

Figure 10-32.—Teletypewriter TT-69/UG.

shown in figure 10-35. The unit is self-contained, and can be mounted in any convenient space that is large enough to accommodate its base.

OLDER TELETYPEWRITER

The forerunners of the model 28 line of teletypewriter equipment are the model 14 typing reperforator (fig. 10-36), the model 15 page printer (fig. 10-37), and the model 19 teletypewriter set (fig. 10-38). A number of these equipments still are found at shore stations (and possibly aboard a few ships), but their use is limited because of their operating speed. The maximum operating speed of the older equipment is 60 wpm, which is incompatible with the higher speeds now employed on most Navy circuits. Consequently, as these older models age beyond economical repair, they are being replaced by components from the model 28 line.

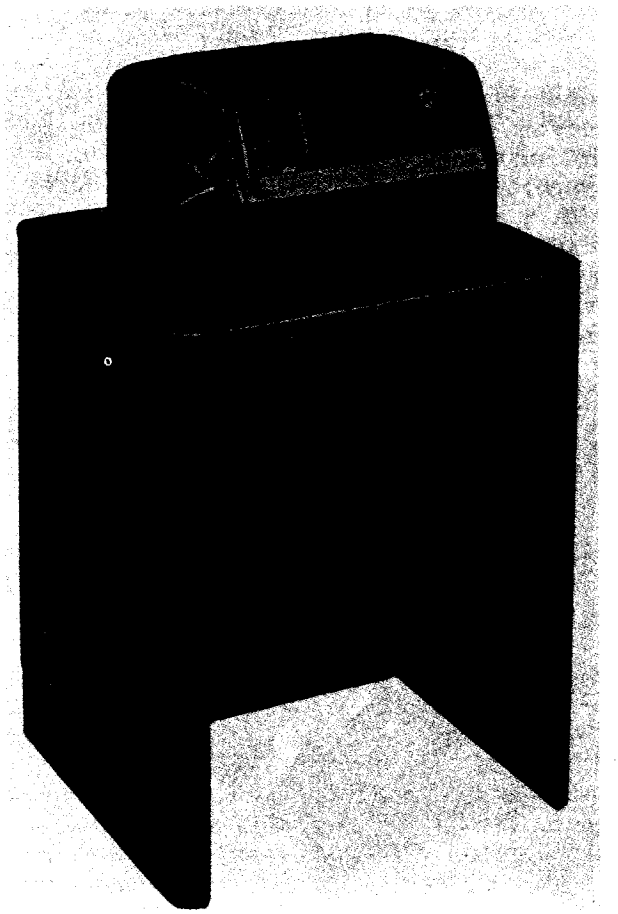
Operating the older machines is similar to operating their model 28 counterparts. By comparing figures 10-36, 10-37, and 10-38 with the previous illustrations of model 28 equipment, it readily is seen that the location and appearance of some of the functional controls are somewhat different. But an operator familiar with the purpose of these controls can adapt easily to operating either the older models or their counterparts in the model 28 line.

TELETYPEWRITER SERVICE TROUBLES

Here are some of the more common service troubles you may encounter, with a brief description of how they may be recognized, their causes, and what action the operator may take to correct them.

The troubles presented here are only a representative sample of those that may be encountered. The equipment technical manuals give a thorough coverage and include helpful charts to aid in tracking down the trouble.

MACHINE WILL NOT START: See that the plug on the power cord from the teletypewriter is pushed all the way into the outlet. Check for a power or fuse failure. If a fuse is open,



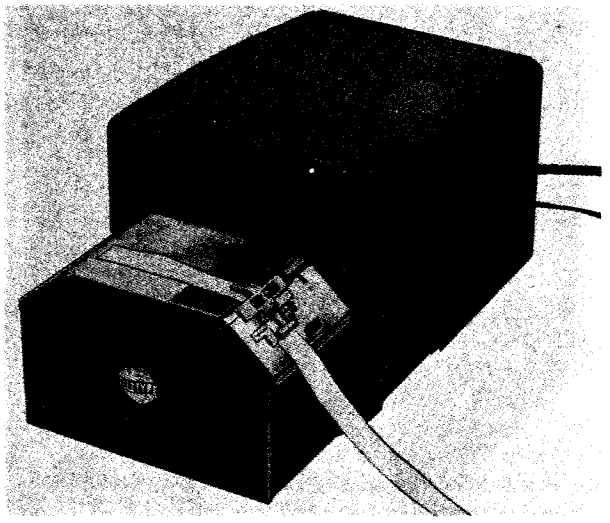
50.114

Figure 10-33.—Model 28 typing reperforator set TT-192/UG.

50.116

Figure 10-34.—Send/receive typing reperforator TT-253/UG.

rotate the motor by hand and check for excessive bind. If the fuse is not blown, check the motor for excessive temperature. The synchronous motor in the Model 28 is equipped with a thermal circuit breaker that protects it against excessively high temperatures caused by a prolonged overload. If the breaker is tripped, reset it by pressing the red button on the motor plate at the rear of the motor.



1.210

Figure 10-35.—Transmitter distributor TT-187/UG.

UNABLE TO COMMUNICATE WITH OTHER OFFICES: Make sure the SEND key is depressed. Be sure the line switching lever is positioned correctly.

PRINTER RUNS "OPEN": This trouble may be recognized by the machine operating continuously without either printing or spacing. The machine also appears to run faster than during normal operation. Shift the line switching lever to the TEST position or patch the equipment into a test circuit as applicable. If this causes the machine to become idle, it is an indication that the trouble probably is in the incoming signal circuit.

PRINTING ERRORS: When printing errors occur that obviously are not typographical, some comparisons may be made to determine whether the trouble is in the machine or in circuit. If the errors occur when you are sending, operate the line switching lever to the TEST position (or plug in the test loop) and try the machine. If the same errors occur, the trouble probably is in the machine.

If you have a spare machine, connect it to the circuit. If errors occur on both machines, the trouble is in the circuit. If the errors happen on only one of the machines, the trouble is probably in that machine.

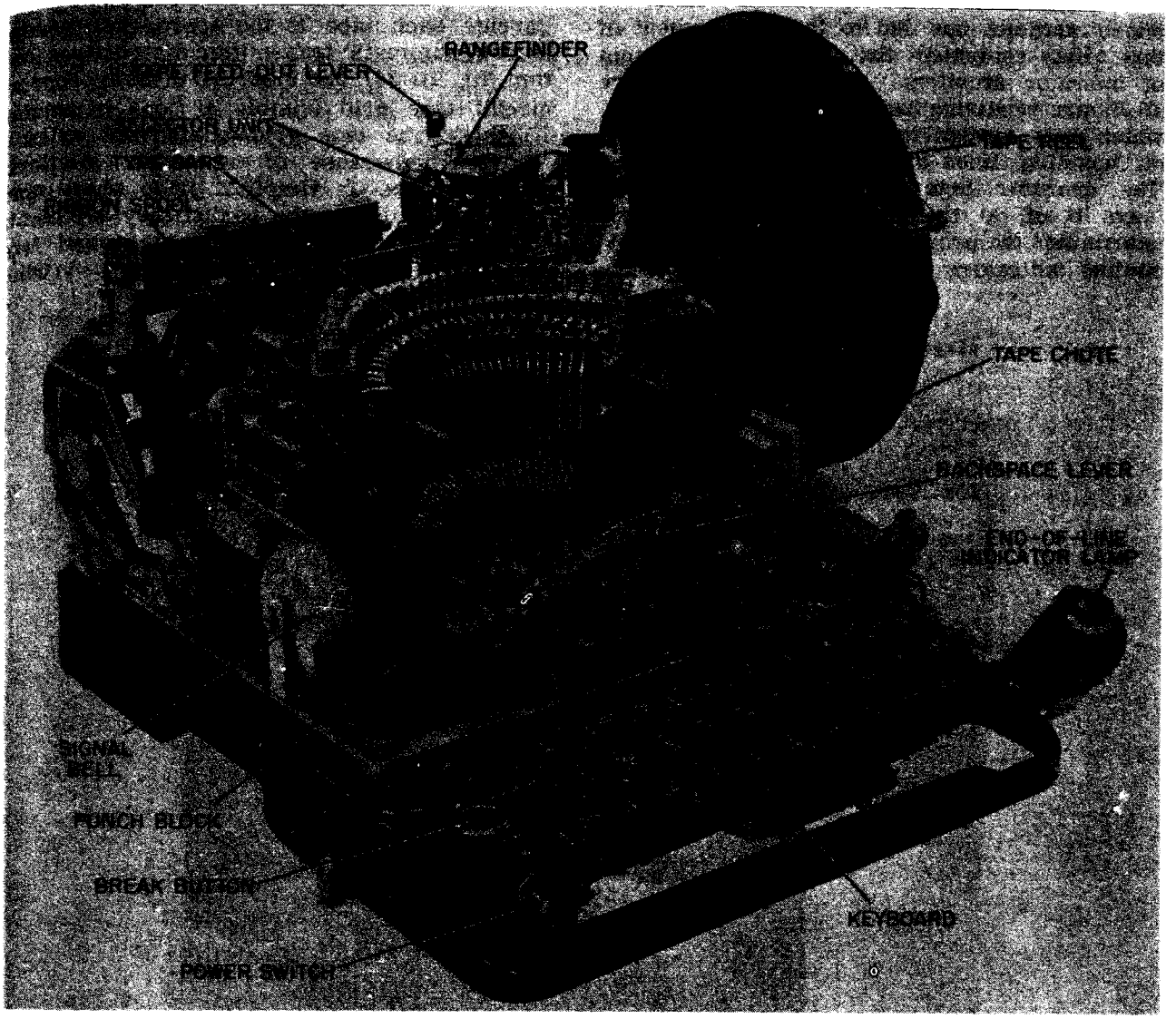
For errors when receiving, connect a spare machine to the circuit. As pointed out already, errors on the spare machine indicate circuit trouble, and correct copy from the spare machine indicates that the first teletypewriter is causing the trouble.

RIBBON TROUBLES: If the ribbon is feeding and the printing is faint, a new ribbon is needed. If the ribbon is not feeding, make sure it was placed in the machine correctly.

PAPER FEED TROUBLES: This is indicated by the paper either feeding to one side, not feeding, tearing, or jamming. Make sure that the paper was placed in the machine as previously outlined. See that too much paper has not accumulated behind the unit. The paper may not have been torn correctly.

UNABLE TO SEND WITH TD: Make sure the tape was properly placed in the transmitter distributor. Check to see that the end-of-tape pin is depressed, and that the tight-tape stop lever is down. See that feed holes in the tape are not mutilated.

TAPE FEED TROUBLES WHILE PERFORATING: Make sure tape is feeding freely



31.25

Figure 10-36.—Model 14 typing reperforator.

off the roll, and that it was placed in the machine correctly.

FAILURE ON LINE FEED: There may be binds in the moving parts of linkage for line feed function. Check these parts for freeness.

FAILURE TO PRINT: This may be due to binds in the printing carriage assembly. Check for freeness in moving parts, and for missing springs. Another source of this trouble may be the improper installation of the ribbon.

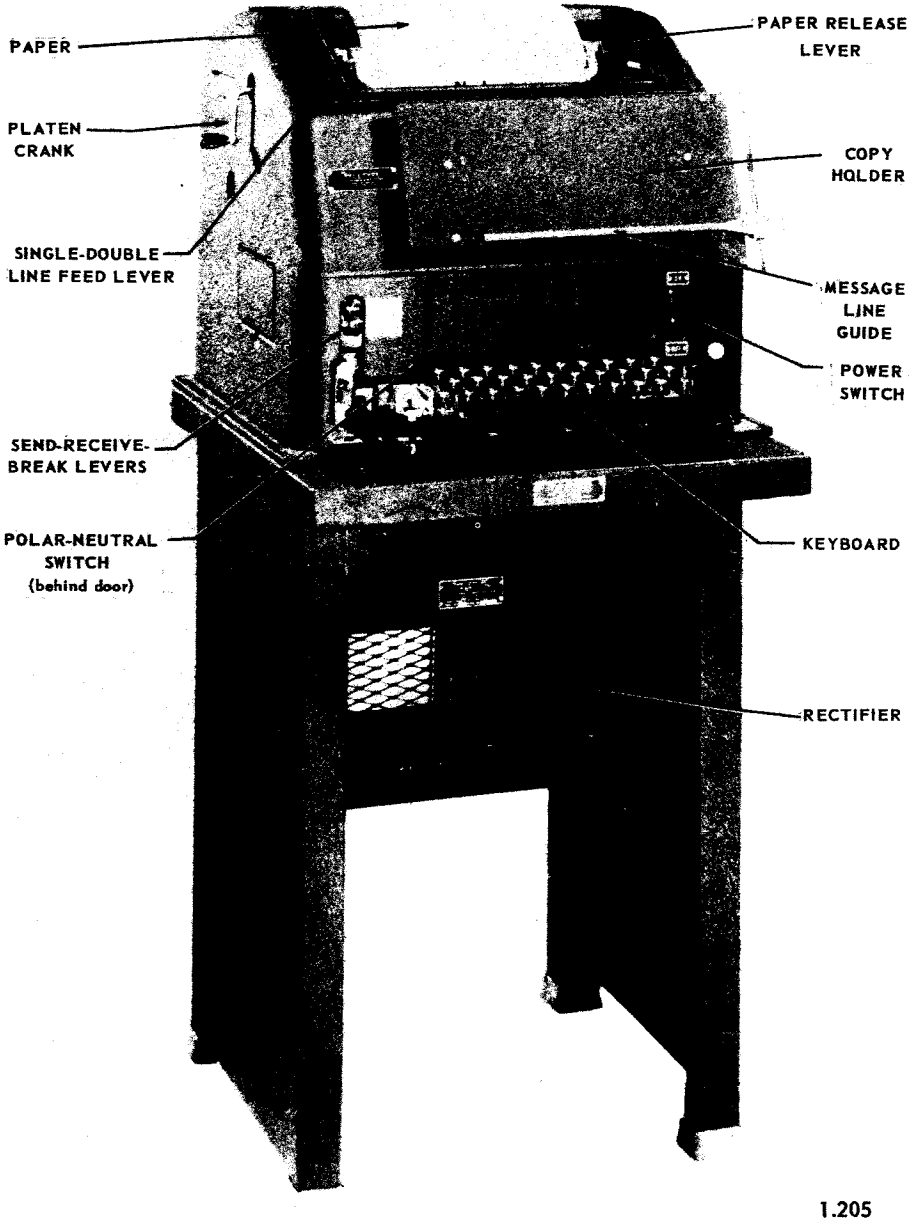
NO SIGNALS FROM KEYBOARD: This trouble may stem from either an open or a closed signal line. The contacts should be checked to determine if they are dirty or shorted.

INTERMITTENT ERRORS: This trouble may have a variety of sources. Among them are inadequate or excessive line current, range finder set beyond range limits, or incorrect adjustments.

PACKAGE EQUIPMENTS

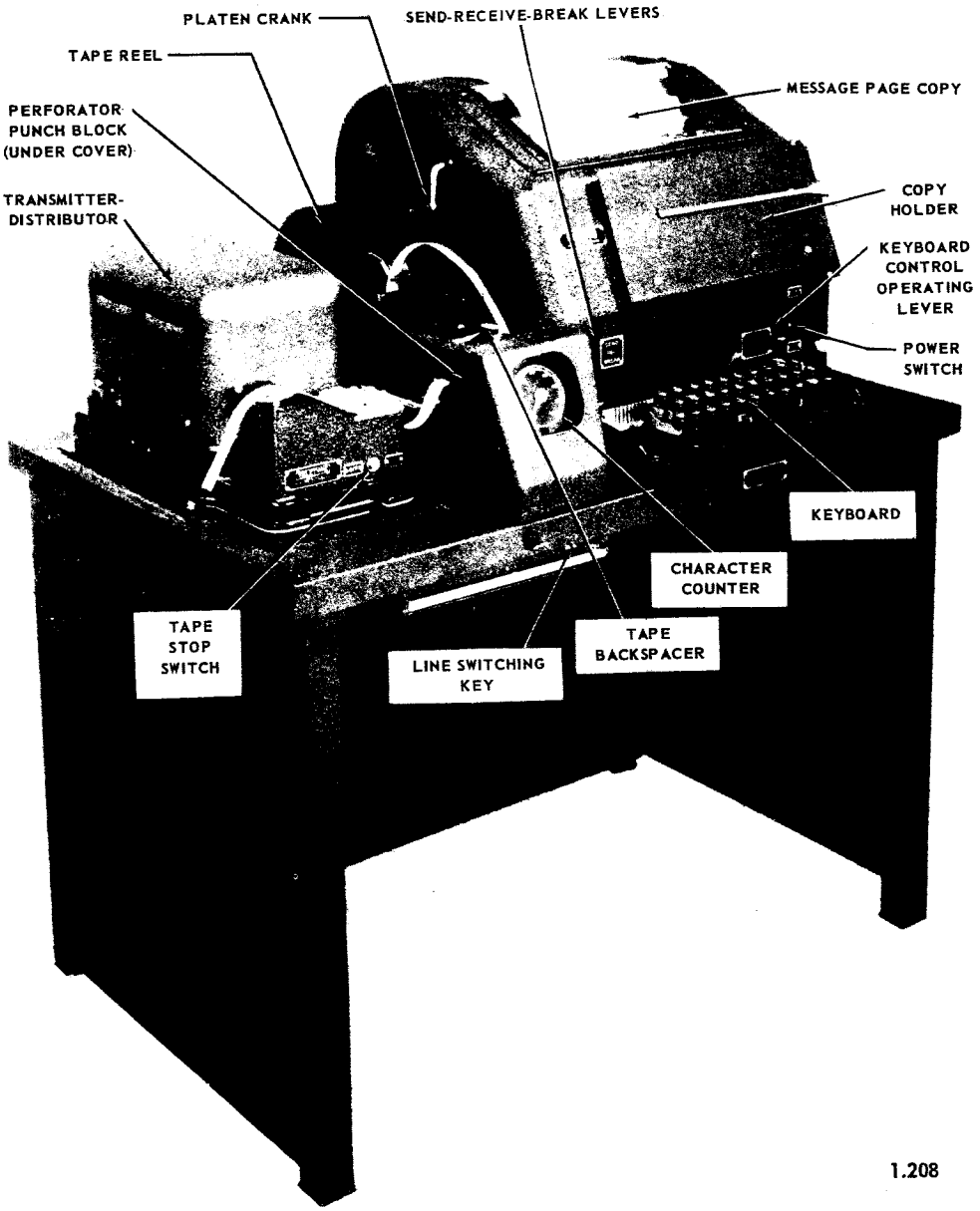
The volume of teletypewriter traffic relayed by NAVCOMMSTAS and many of the smaller

shore stations has led to the development of tape relay equipment that requires a minimum of operator attention. At the top in figure 10-39 are receiving banks or console packages, which house several typing reperforators for use on incoming lines in torn-tape relay centers. The operator logs each incoming message, tears it off at the end of the message, and determines the proper outgoing circuit from the routing indicators on the tape. He then hand-carries each tape to the appropriate sending bank of automatic transmitter distributors (bottom, fig. 10-39), and inserts it in the appropriate circuit tape grid (visible at tops of sending banks). The tape grid—sometimes called a washboard because of a certain similarity of appearance—is simply a place where tapes can remain during the period they are awaiting retransmission. They are stowed from top down in order of precedence. Other



1.205

Figure 10-37.—Model 15 page printer.



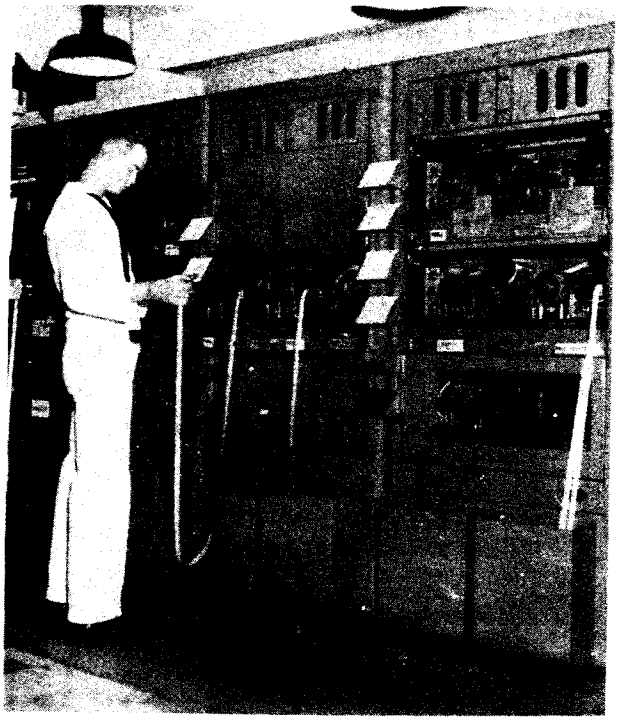
1.208

Figure 10-38.—Model 19 teletypewriter set.

operators in attendance at the sending bank remove waiting tapes from the grid in order of precedence, and insert them in the TDs. A numbering TD applies a sequential channel number to each message, thus keeping a record of traffic relayed over each channel.

1.205

If duplicate copies of relayed traffic are required for the files, monitoring equipment (not shown in fig. 10-39) is used. This is a group of typing reperforators that produces duplicates of tapes undergoing transmission on the sending bank, and winds the monitor tapes on reels suitable for stowage. The monitoring equipment also duplicates the channel number for each message, providing a means of reference if the message should be needed in the future.



31.30

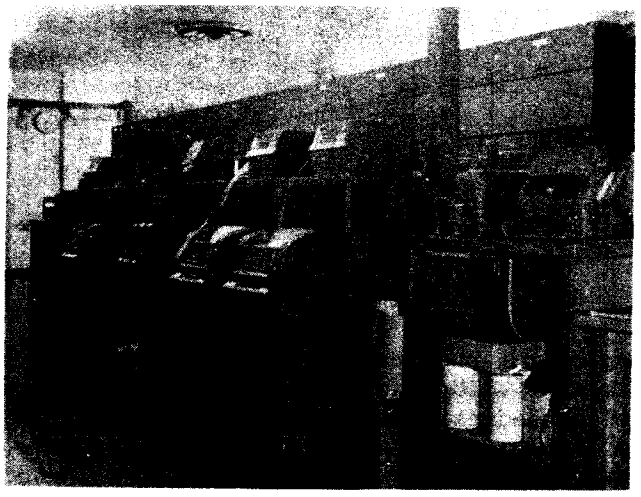
Figure 10-39.—Receiving and transmitting consoles at a torn-tape relay center.

31.31

Figure 10-40.—Automatic relay center.

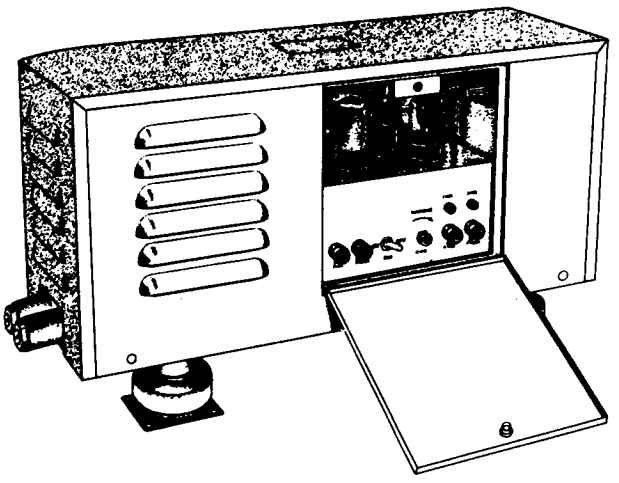
FULLY AUTOMATIC RELAY EQUIPMENT

High-speed automatic relay centers are equipped with the very latest model 28 teletypewriter components. The transmitter distributors and reperforators are enclosed in cabinets that also contain the operating controls. Figure 10-40 shows the equipment layout at an automatic relay center. At left are the incoming line cabinets; outgoing line cabinets are at right. At center are the supervisor's control position and the miscellaneous intercept section. There are two reperforator-transmitters in each incoming cabinet. They slide out of the cabinet for easy replacement in event of failure. The



31.32

Figure 10-41.—Intercept section of automatic relay center.



31.33

Figure 10-42.—Rectifier power supply for teletypewriter operation.

reperforator-transmitters operate at a cross-office speed of 200 wpm. Therefore, messages are relayed from the incoming line cabinets to the outgoing line cabinets in a matter of seconds. When necessary, a third machine can be assigned to an outgoing circuit, to which high-precedence messages can be switched. The equipment is designed to "recognize" high-precedence tapes; a message in this "priority" machine causes its transmitter to take control of the line as soon as any message in progress is transmitted. The transmitter retains control until it has processed all urgent messages awaiting transmission. Only then does control revert to the two regular machines.

Traffic volumes to be delivered to a given destination may often exceed the capacity of one outgoing-line channel. In such an event as many as 10 machines and 10 line channels may be shifted to serve a single destination.

All lines are duplex circuits; that is, any station can transmit a message to the relay center at the same time it is receiving a message. Each tributary station normally has two teletypewriters; one is a sending machine and the other a receiving-only teletypewriter.

Automatic relay centers are manned by very few operators, compared with semi-automatic torn-tape relay stations. Improperly prepared or garbled message tapes are routed automatically to the intercept position (fig. 10-41) for operator action. Correctly prepared messages enter and leave the relay center untouched by human operators.

To reduce the frequency of supplying the reperforators with fresh tape, the machines use a 3000-foot tape supply roll, instead of the usual 1000-foot roll.

ASSOCIATED EQUIPMENT

Teletypewriter communication systems require other associated equipment in addition to the teletypewriters just discussed. Radio transmitters and receivers are required for radio-teletypewriter transmission and reception. Let us now get acquainted with the patch panels, keyers, converters, and other equipment necessary for RATT operation.

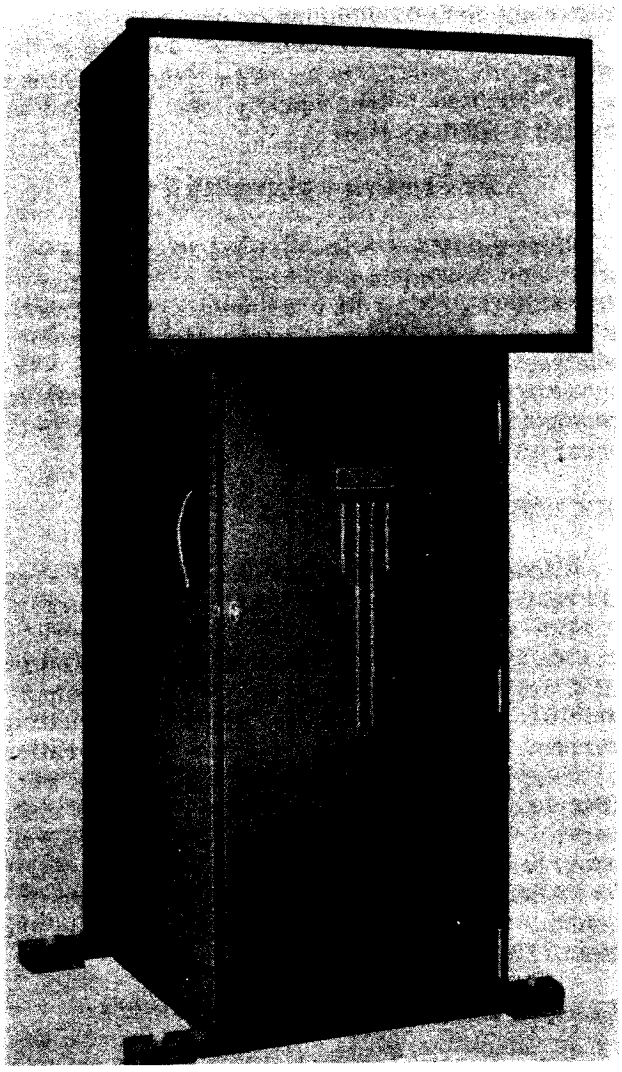
RECTIFIER POWER SUPPLY

Although teletypewriter motors operate on alternating current, a source of direct current is always required for the signal circuit carrying the start-stop code intelligence. Figure 10-42 shows one model rectifier power supply installed aboard ship to rectify alternating current, changing it to d-c for the operation of teletypewriters and converters. This rectifier furnishes a power output of 120 volts d-c at 1.0 ampere, which is enough to supply many teletypewriters operating simultaneously. The on-off switch, fuses, and voltage adjusting control are accessible through a door in the front of the cabinet.

TELETYPEWRITER PROJECTOR UNIT

Teletypewriter projector unit model TT-71, shown in figure 10-43, enables a teletypewriter message to be read simultaneously by groups of persons. It is installed in the pilot ready rooms in aircraft carriers and in teletypewriter conference rooms ashore.

The bottom of the cabinet houses a page printer. The message is printed on a roll of transparent cellophane. An optical lens system with a 1000-watt lamp enlarges the image of the teletypewriter message and projects it onto a tilted mirror at the top rear of the cabinet from where it is reflected onto the translucent screen. The message is visible along the lower edge of the screen as it is being printed. With each successive line feed the message advances upward on the screen



31.34

Figure 10-42.—Teletypewriter projector unit model TT-71.

one line at a time and finally moves out of view at the top. A tape typing unit provides a permanent typewritten record of transmissions in the projector unit, but at most installations this feature is not used because a page copy from an additional printer patched into the same circuit has been found to provide a more readable and more convenient file copy.

The projector unit uses an ordinary teletypewriter ribbon. The cellophane roll is changed exactly as you would install a roll of paper in an ordinary printer, except that the loose end must be started on an automatic takeup spool. The optical unit is focused easily and does not often need refocusing.

The screen size limits the length of the typing line to approximately half the normal line length. You must remember this whenever you are typing material to be received on the projector unit. At most installations, the printer or perforating teletypewriter used for punching tapes for the projector has the end-of-line warning light and bell adjusted to warn you of this shortened line length.

TELETYPE PANELS

Teletype panels SB-1203/UG and SB-1210/UGQ, shown in figure 10-44, are used for interconnection and transfer of teletypewriter equipment aboard ship with various radio adapters, such as frequency shift keyers and converters. The SB-1210/UGQ is intended for use with cryptographic devices, whereas the SB-1203/UG is a general-purpose panel.

Each of the panels contains six channels, with each channel comprising a looping series circuit of looping jacks, set jacks, and a rheostat for adjusting line current. The number of looping and set jacks in each channel varies with the panel model. Each panel includes a meter and rotary selector switch for measuring the line current in any channel. There are six miscellaneous jacks to which may be connected any teletypewriter equipment not regularly assigned to a channel.

To operate either of the teletype panels:

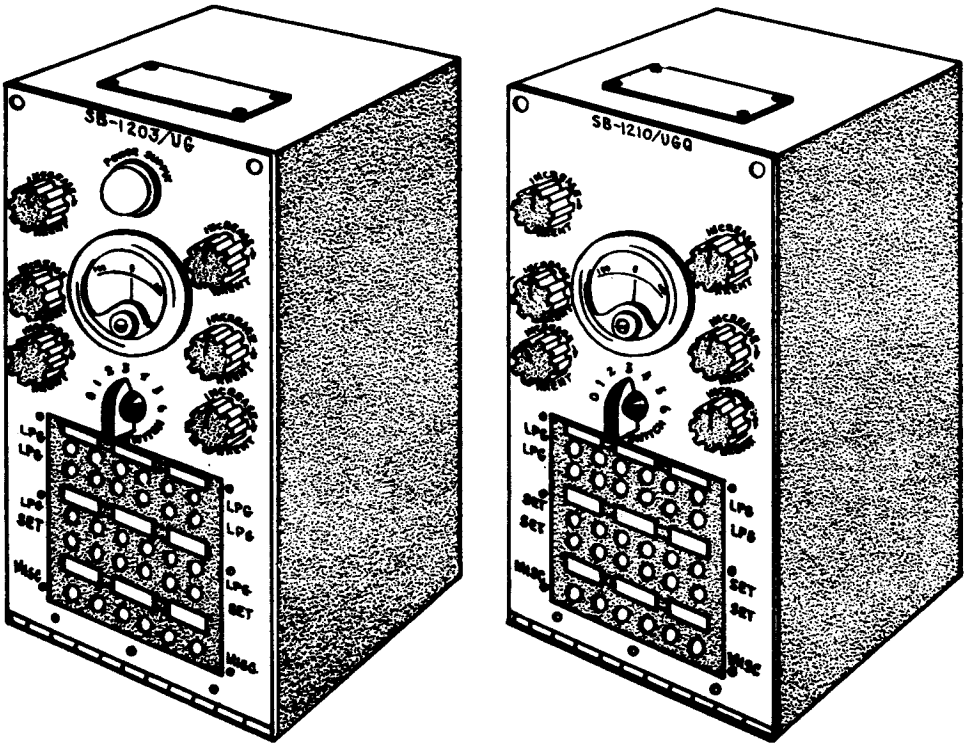
1. Turn all line current rheostats counterclockwise to increase circuit resistance to maximum value.

2. Turn on the local line current supply at the rectifier unit and at the distribution panel (not shown in the illustration). The green indicator light on the model SB-1203/UG panel will come on.

3. If the desired teletype equipment is wired in the same looping channel as the radio adapter (keyer or converter) to be used, no patch cords are required.

4. Turn the meter selector switch to the desired channel and adjust the corresponding rheostat to give a line current indication of 60 milliamperes.

5. If the desired teletypewriter (for example, in channel 1) is not wired in the same



70.79

Figure 10-44.—Teletype patch panels SB-1203/UG and SB-1210/UGQ.

looping channel as the keyer or converter to be used (for example, channel 3), insert one end of a molded patch cord (supplied with panel) in the set jack in channel 1, and the other end in either one of the two looping jacks in channel 3.

In any switching operation between the various plugs and jacks of a teletype panel, remember to never pull the patch plug from the machine (set) jack before first removing the other end of the cord plug from the loop jack. Pulling the plug from the set jack first will open-circuit the channel and cause all teletype messages in the channel to be interrupted. The proper procedure is to take the plug out of the looping jack first, and to insert it last. This action maintains closed-circuit operation of all channels in the panel at all times.

TONE-SHIFT KEYER/CONVERTER

Tone-shift keyer/converter model AN/SGC-1A is used for short-range RATT operation. Normally it is used for communication on UHF and VHF bands, but it can be used with any transmitter designed for voice modulation. The AN/SGC-1A is shown in figure 10-45, with blocks to indicate other equipment necessary for a complete tone-shift system.

In tone modulation transmission, the teletypewriter pulses are converted into corresponding audio tones, which amplitude modulate the transmitter. Conversion to the audio tones is accomplished by an audio oscillator in the tone converter, which operates at 700 cycles when the teletype loop is in a closed-circuit (mark) condition and at 500 cycles when the loop is in an open-circuit (space) condition.

An internal relay closes a control line to the radio transmitter, which places the transmitter on the air when the operator begins typing a message. The control line remains closed until after the message is transmitted.

When receiving messages, the tone converter accepts the mark and space tones coming in from the radio receiver and converts the intelligence of the tones to make and break contacts

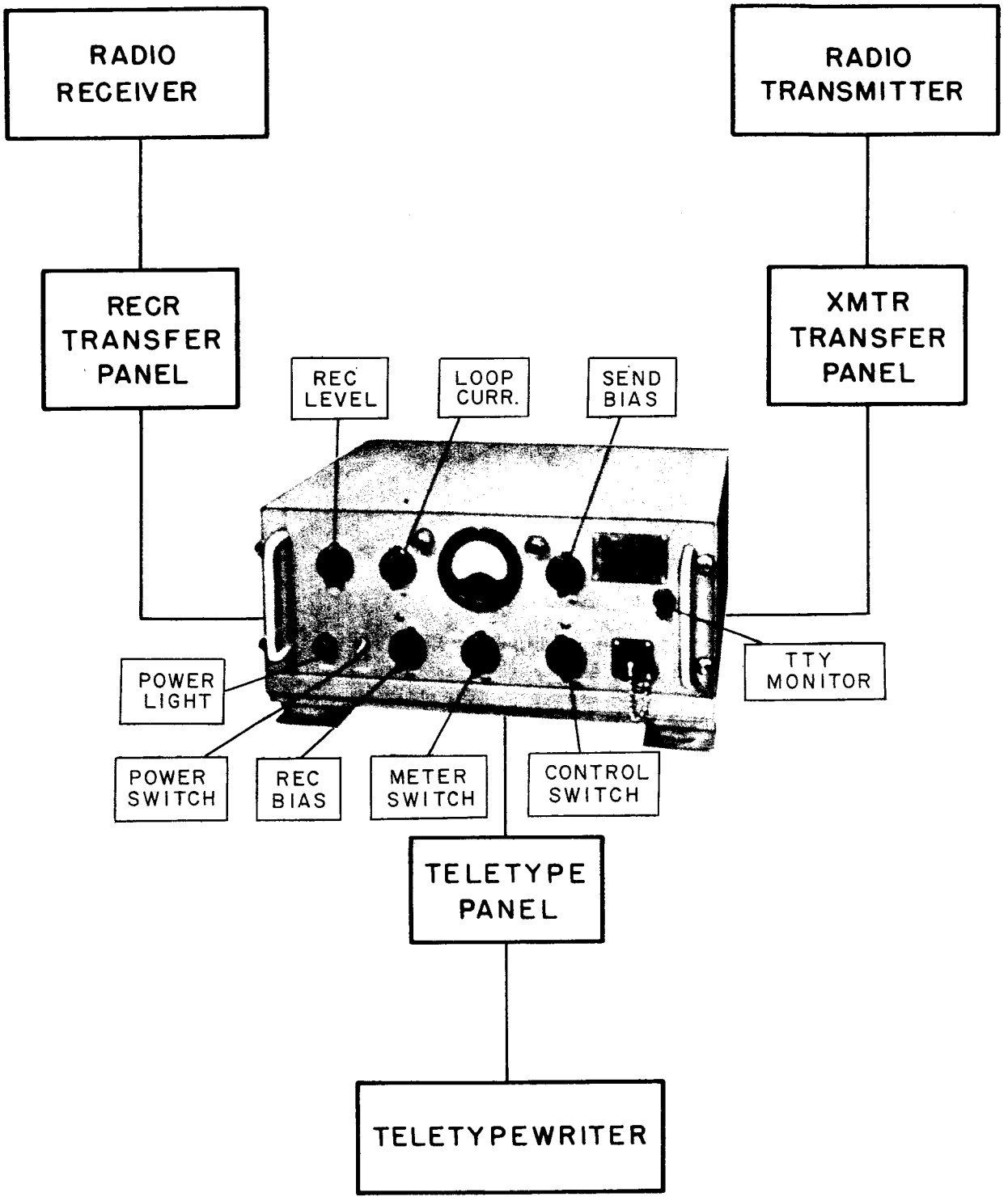


Figure 10-45.—Tone-shift keyer/converter AN/SGC-1A.

of a relay connected in the local teletypewriter loop circuit. This action causes the local teletypewriter to print in unison with the mark and space signals from the distant teletypewriter.

The receive level control, located at the upper left on the front panel, permits adjustment of the level of the incoming tone signals from the receiver. The loop current rheostat is next to the receive level control, and is adjusted to 60 milliamperes when the teletype loop is in the mark, or closed, circuit condition. A meter and its switch permit measurements to be taken in all the important portions of the circuit.

Two indicator lights flank the upper part of the meter. One light (green) indicates the receive condition and the other (red) indicates the transmit condition. Both lights are off when the keyer/converter is in the standby condition.

The send bias rheostat is located at the right of the meter. It permits correction of teletype distortion (for example, unequal length of mark and space signals) in the local teletypewriter loop when sending a message.

At the far right is a jack marked TTY MONITOR. A monitoring teletypewriter may be patched into this jack, thereby placing it in series with all other teletypewriters in the loop.

The power indicator light is located at the lower left side of the front panel. The ON-OFF switch is located next to it.

The receive bias control is located at the right of the power switch. This control enables correction of distortion in the receiving tone circuit.

The control switch, located at the right of the meter switch, permits the keyer/converter to function in several ways. When the switch is on AUTO (automatic), the equipment may be in one of three conditions: receiving, transmitting, or standby. When in the standby condition, the reception of an incoming mark tone causes the control circuit to change to receiving. Following the end of the incoming message, the circuits shift back to standby. When in the standby condition, the operation of the local teletypewriter causes the circuits to change to transmit. After the last letter is keyed, there is a time delay of about 3 seconds and then the circuits shift back to standby. These interlocking functions prevent the equipment from shifting directly from transmit to receive, or vice versa. Thus an incoming signal will not interrupt an outgoing signal nor will keying the local teletypewriter, when receiving, cause the circuit to shift to transmit. The normal method of operation is with the control switch in AUTO position. After a station has completed sending its message, it is ready for reception of any return message after a 3-second time delay.

The control switch position marked TRS is useful when making initial adjustments but is not used in carrying on communications because it locks the equipment in the transmit condition and makes it impossible to receive any message.

The REC/STDBY position of the control switch prevents the equipment from changing to the transmit condition even though the teletypewriter is operated, but it can receive messages or remain in the standby condition.

The fourth position of the control switch is ADJ FREQ. This position is for maintenance use only, and is not used during operating periods.

Because a small time delay is incurred in the operation of the control circuits of the local and distant terminals, the first character transmitted is usually lost. The normal 5 spaces, 2 carriage returns, and line feed functions used at the beginning of each message are more than adequate to compensate for this first-character loss.

FREQUENCY-SHIFT KEYER

For frequency-shift RATT transmission, a keyer is needed to replace the oscillator of a CW transmitter with a source of radiofrequency excitation that can be shifted a small amount upward and downward to produce RATT signals corresponding to the mark-space teletypewriter code. Such a frequency-shift keyer is model KY-75/SRT shown in figure 10-46.

During frequency-shift keying operation, the frequency of the transmitter's carrier appears at a certain frequency during a SPACE signal and shifts a few hundred cycles higher for a MARK signal. The amount of this frequency-shift deviation of the keyer is adjustable over a range from 0 to 1000 cycles per second. Usually, the keyer is adjusted for an 850-cycle shift, which means that the MARK signal is 425 cycles above the carrier frequency, but the SPACE signal is 425 cycles below the carrier.

The procedure for setting up the keyer and transmitter for frequency-shift transmission is that of adjusting the crystal oscillator and tuned circuits of the keyer to the desired

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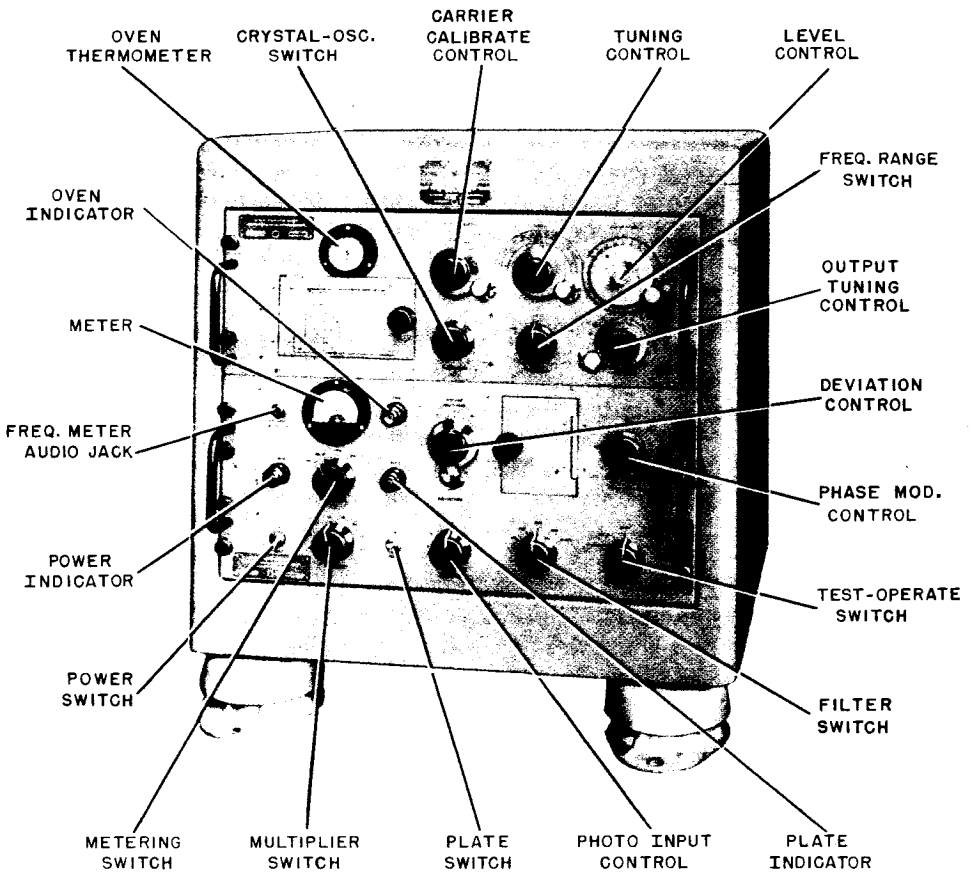


Figure 10-46.—Frequency-shift keyer KY-75/SRT. 31.35

crystal frequency. A signal from the teletypewriter is then applied to the keyer where it is frequency modulated and then coupled to the transmitter where it is multiplied to the channel frequency.

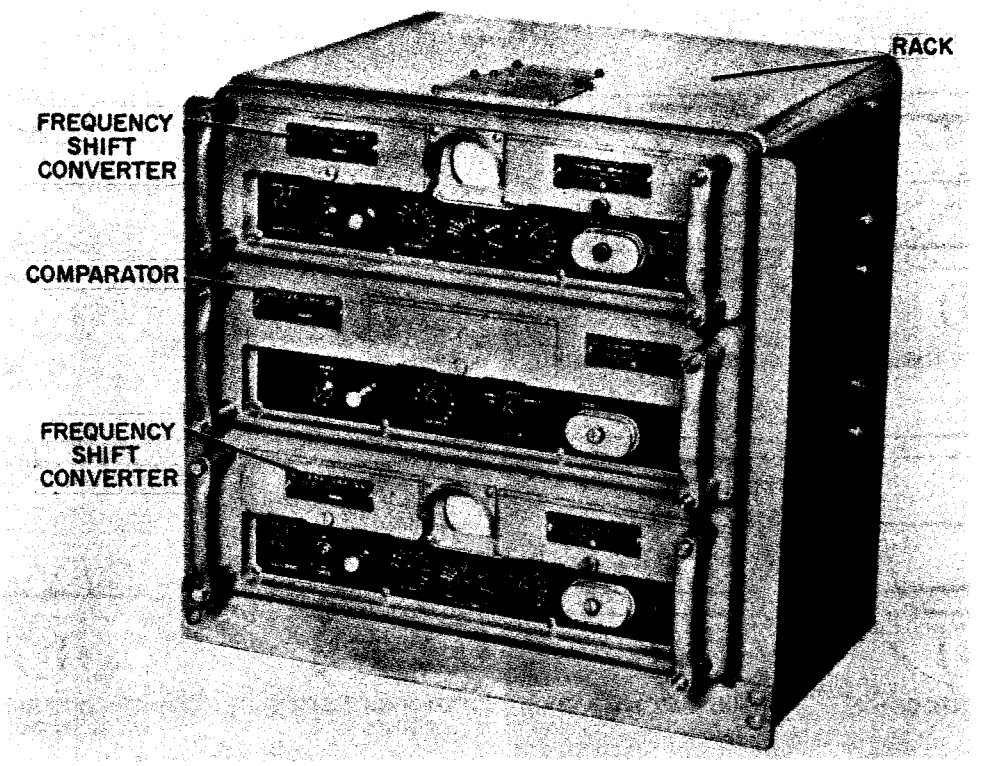
The KY-75/SRT keyer is used also for facsimile transmission. Newer models of Navy transmitters, such as the AN/SRT-15 described in chapter 9, have built-in keying circuits for frequency-shift mode of operation and do not require an external keyer for either RATT or facsimile transmission.

CONVERTER-COMPARATOR GROUPS

The AN/URA-8B frequency-shift converter-comparator group, shown in figure 10-47, is used for diversity reception of RATT and FAX signals. The equipment consists of two frequency-shift converters (top and bottom units) and a comparator (middle unit).

For either space diversity or frequency diversity reception, two standard Navy receivers are employed in conjunction with the converter-comparator group. In space diversity operation, the two receivers are tuned to the same carrier frequency, but their receiving antennas are spaced several wavelengths apart. Because of the required spacing between antennas, space diversity usually is limited to shore station use. In frequency diversity operation, the two receivers are tuned to different carrier frequencies that are carrying identical intelligence. Frequency diversity reception commonly is used aboard ship for copying fleet broadcasts, which are keyed simultaneously on several frequencies.

In diversity reception, the audio output of each receiver is connected to its associated frequency-shift converter, which converts the frequency-shift characters into d-c pulses. The d-c (or mark-space) pulses from each



1.235

Figure 10-47.—Frequency-shift converter-comparator group AN/URA-8B.

converter are fed to the comparator. In the comparator, an automatic circuit compares the pulses and selects the better mark and the better space pulse for each character. The output of the comparator is patched to the teletypewriter. The converter units also can be used individually with separate teletypewriters to copy two different FSK signals.

The newest converter-comparator group is the AN/URA-17 shown in figure 10-48. This is a completely transistorized equipment designed to perform the same functions as the AN/URA-8B. Although present procurement of frequency-shift converters is confined to the AN/URA-17, there are relatively few installations compared with the larger number of AN/URA-8B converters.

The AN/URA-17 consists of two identical converter units. Each converter has its own comparator circuitry. Hence, a separate comparator unit is not required. The physical size of the AN/URA-17 is further reduced by using transistors and printed circuit boards. The complete equipment is less than half the size of the older AN/URA-8B.

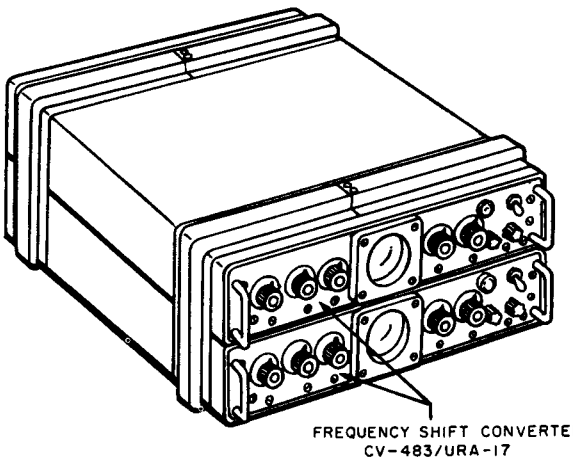


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Figure 10-48.—Converter-comparator group AN/URA-17.

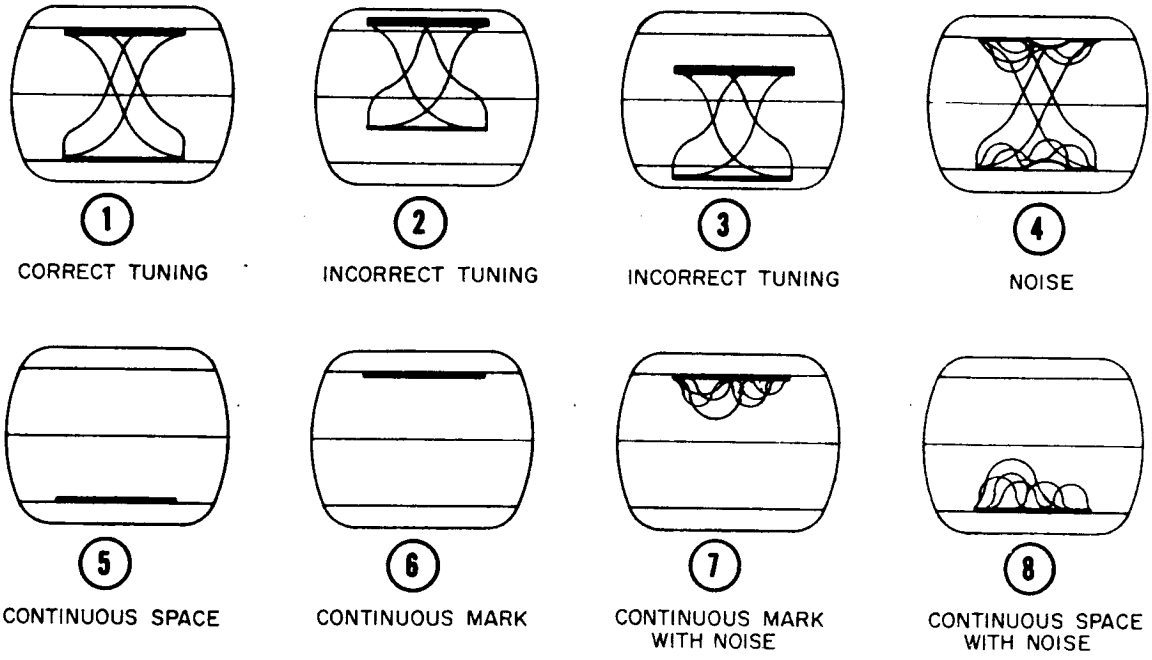

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Figure 10-49.—Monitor oscilloscope patterns for frequency-shift converters.

Proper tuning of the receivers employed with these converter-comparator groups is of the utmost importance. Each converter has a small monitor oscilloscope that gives a visual indication of the receiver tuning. The scope patterns for correct and incorrect tuning are shown in figure 10-49.

Detailed instructions for operating the AN/URA-8B and the AN/URA-17 are contained in their respective technical manuals.

TRANSMITTER TELETYPEWRITER CONTROL UNIT

Another piece of equipment used with teletypewriter installations aboard ship is the control unit shown in figure 10-50. This unit is mounted close to the teletypewriter keyboard and permits remote control of the radio transmitter. It has a transmitter power on-off switch, a power-on indicator lamp, a carrier-on indicator lamp, and a three-position rotary selector switch.

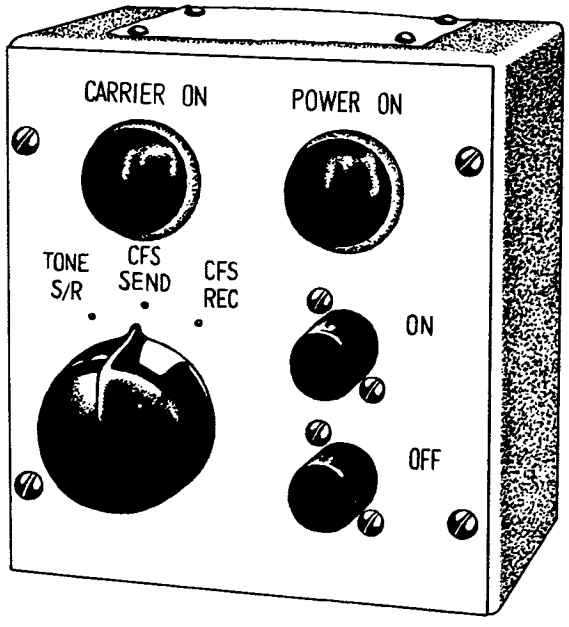

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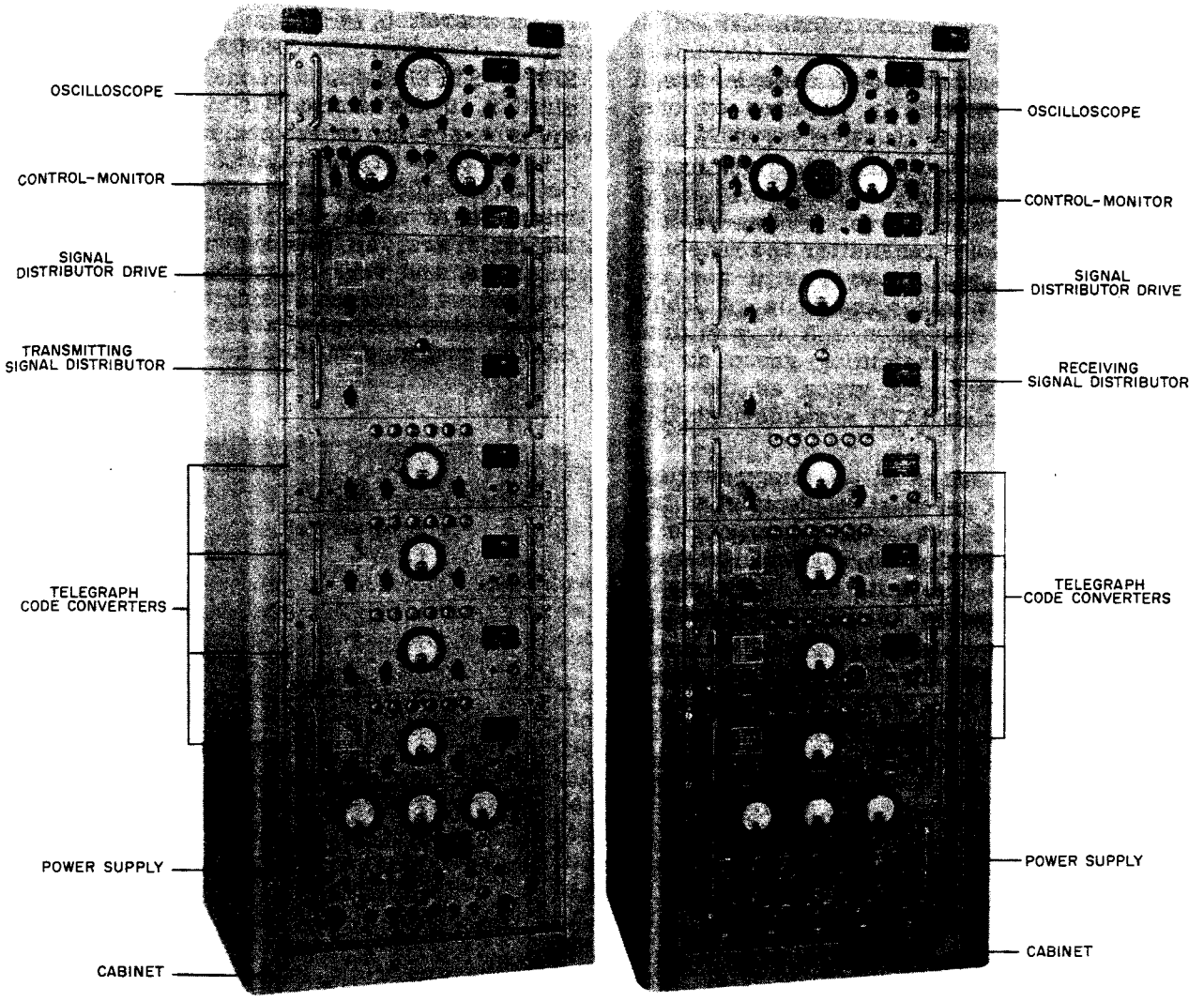
Figure 10-50.—Transmitter teletypewriter control unit.



31.36

Figure 10-51.—Electronic multiplex telegraph terminal set AN/FGC-5.

The TONE S/R switch postion is used for both sending and receiving when using tone-shift keyer/converter AN/SGC-1A. When using carrier-frequency shift mode of operation, the operator must switch to CFS SEND position for transmitting, and to CFS REC position for receiving.

ELECTRONIC MULTIPLEX TERMINAL SET

Model AN/FGC-5 (fig. 10-51) is a send-receive electronic time-division multiplex terminal set used chiefly for teletypewriter communications over long-range, high-frequency radio circuits using frequency shift keying.

Time-division MUX (multiplex) is the transmission of the intelligence of several teletypewriter circuits on a time-sharing basis in a character-by-character sequence. Teletypewriter signals can be fed into the MUX equipment simultaneously from two, three, or four teletypewriters. The same information is then transmitted from one MUX equipment to the receiving group at the distant station in a time sequence with one character from each channel at a time. The receiving MUX then

distributes the information to the proper teletypewriter circuits in their original on-off direct-current form. Up to four characters are therefore transmitted over a single circuit during the time ordinarily required by one.

As shown in figure 10-51, AN/FGC-5 consists of two equipments, the telegraph transmitting group and the telegraph receiving group. These terminal equipments do not, however, take the place of the radio transmitter and receiver. The transmitter and receiver still are required as in any other methods of RATT transmission and reception. You may think of the AN/FGC-5 transmitting group as the keyer, and the receiving group as the converter in the simpler RATT systems described previously.

The operating speed of all teletypewriters used with the MUX set must be identical so that both terminals of the system can cycle in synchronism. Normally, 60-wpm channel speed is used, although the units and the teletypewriters can be changed to operate at 75 wpm.

A newer telegraph terminal set is model AN/UGC-1 (fig. 10-52). It is a completely transistorized version of the AN/FGC-5. The receiver group, transmitter group, and a common power supply are all housed in a single cabinet only 36 inches high. It is only one-fourth the size of the complete AN/FGC-5 equipment, with which it is operationally compatible. The AN/UGC-1 offers a choice of 3 system channel speeds: 60, 75, or 100 wpm per channel, and either 2, 3, or 4 channels of operation, depending on traffic requirements and radio propagation conditions.

A recently developed transistorized telegraph terminal set designed for 100 wpm, single sideband operation is the AN/UCC-1 (not illustrated). Multiplexing is accomplished by frequency division. The equipment has the capability of 16 narrow-band channels or 8 narrow-band channels and 4 narrow-to-wide-band channels, in the frequency range of 300 to 3300 cps. Spacing between channels is 170 cps.

RATT SYSTEMS AFLOAT

Let us now see how the various pieces of equipment—teletypewriters, keyers, converters, receivers, and transmitters—are combined into complete RATT systems. The Navy uses two basic RATT systems aboard ship. One, the TONE-MODULATED SYSTEM for short-range operation, is similar to the familiar a-m radio. The other, the CARRIER-FREQUENCY-SHIFT SYSTEM for long-range operations, is similar to the standard f-m radio. The two systems are shown integrated in figure 10-53.

The page printer—model 15 or 28—sends out a continuity of d-c on-and-off pulses (timed intervals of current and no-current). These intervals are, as you know, mark and space impulses, and various combinations represent the various characters being transmitted.

When two teletypewriters are wire-connected, the exchange of intelligence between them

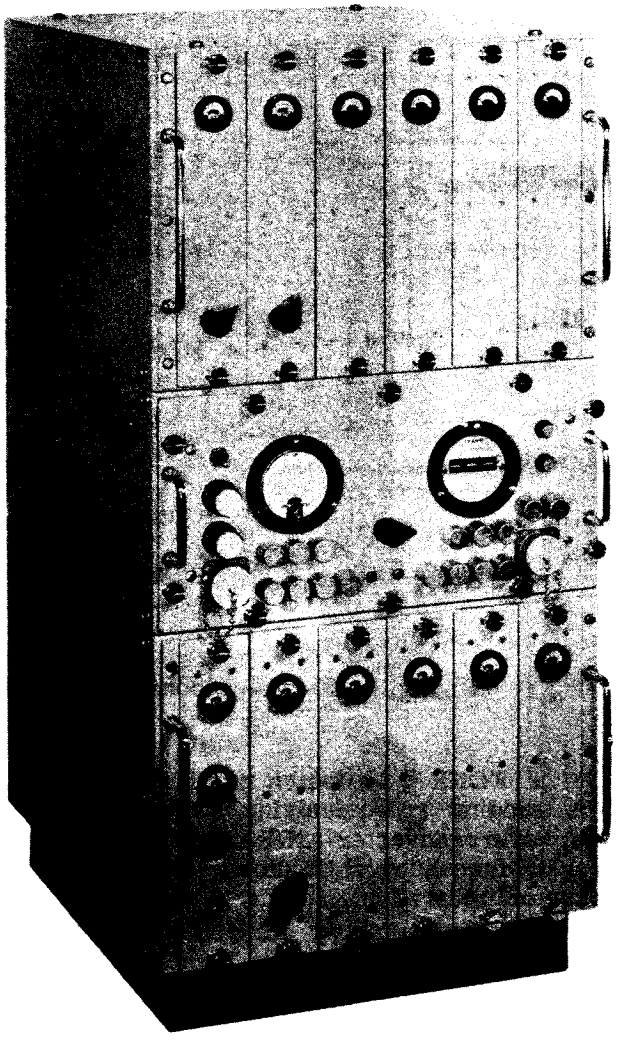


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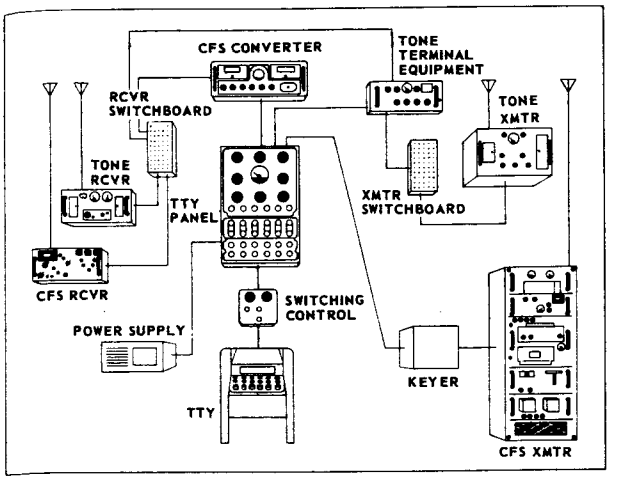
Figure 10-52.—Transistorized electronic multiplex telegraph terminal set AN/UGC-1.



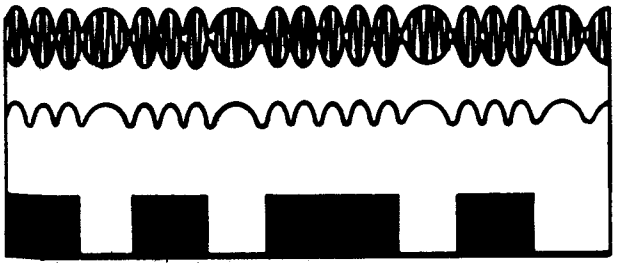
1. 225

Figure 10-53.—Basic RATT transmit-receive systems.

is direct. But when the teletypewriters are not joined by wire, operation is more complex. Direct-current mark and space intervals cannot be sent through the air.

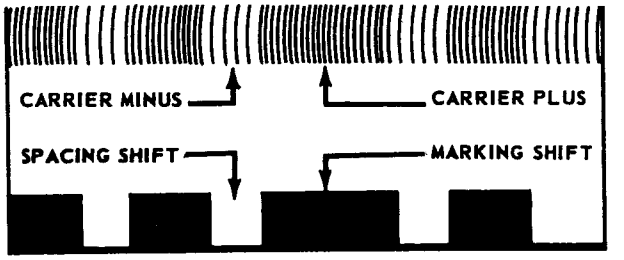
The gap between the machines must be bridged by radio. To bridge the gap, a radio transmitter and receiver are needed. The transmitter produces a radiofrequency carrier wave to carry the mark and space intelligence. Also, a device such as a KEYER is needed to change the d-c pulses from the teletypewriter into corresponding mark and space modulation for the carrier wave in the transmitter. The radio receiver and a CONVERTER are required to change the radiofrequency signal back to d-c pulses.

Figure 10-54 shows a modulated carrier wave with audio tone impulses impressed on



1. 226

Figure 10-54.—Modulated carrier wave with corresponding audio tone for mark and space electrical impulses.



1. 227

Figure 10-55.—Frequency of the carrier wave increases and decreases corresponding to mark and space impulses.

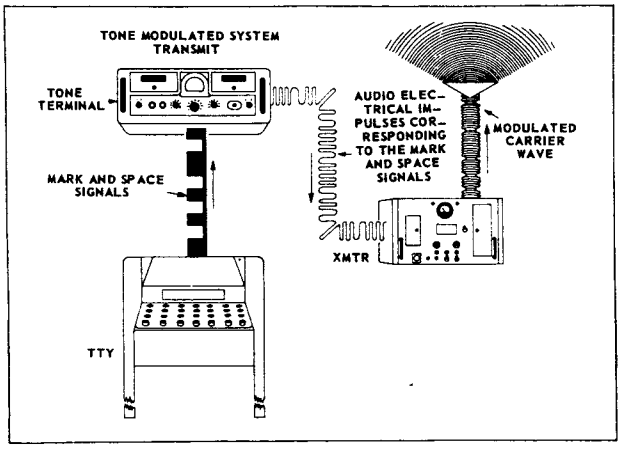
the radiofrequency carrier wave, with corresponding d-c mark and space signals.

Figure 10-55 shows a carrier-frequency-shift wave that increases and decreases to denote mark and space d-c impulses.

In the operations shown in figures 10-54 and 10-55, the d-c teletypewriter signal that can travel only by wire becomes, through the medium of a tone terminal or keyer unit, either a tone-modulated signal or a carrier-frequency-shift signal for radio carrier wave transmission.

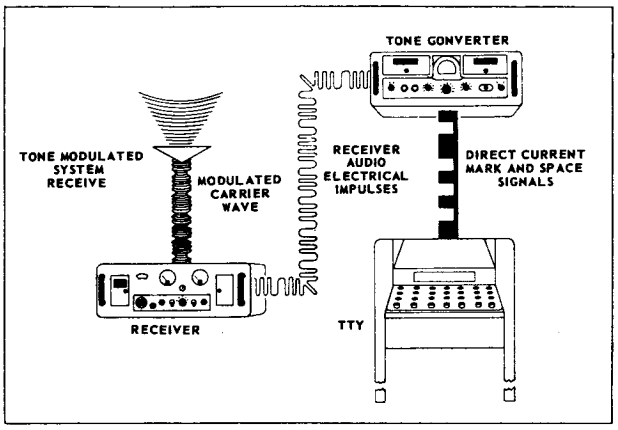
SHORT-RANGE SYSTEM

To transmit messages by the short-range system, a page printer, a tone terminal, and a transmitter are used. The printer sends out a d-c signal. The signal is changed to audio tones in the tone terminal. The transmitter impresses the audio tones on the carrier and sends out a tone-modulated carrier wave (fig. 10-56).



1. 228

Figure 10-56.—D-C mark and space impulses converted to audio tones and impressed on carrier wave.

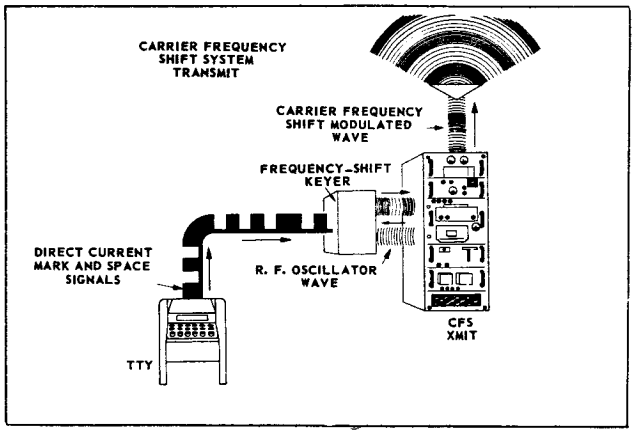


1. 229

Figure 10-57. —Receiving operation of the tone converter.

To receive messages with the short-range system, a radio receiver, a tone converter, and a page printer are required. The tone-modulated carrier wave enters the receiver, which extracts the signal intelligence and sends the audio tones to the tone converter. The converter changes the audio tones into d-c mark and space pulses for the page printer (Fig. 10-57).

In practice, the same tone terminal is used for the receiving and the sending circuits inasmuch as it contains both a transmit "keyer" unit and a receive "converter" unit.



1. 230

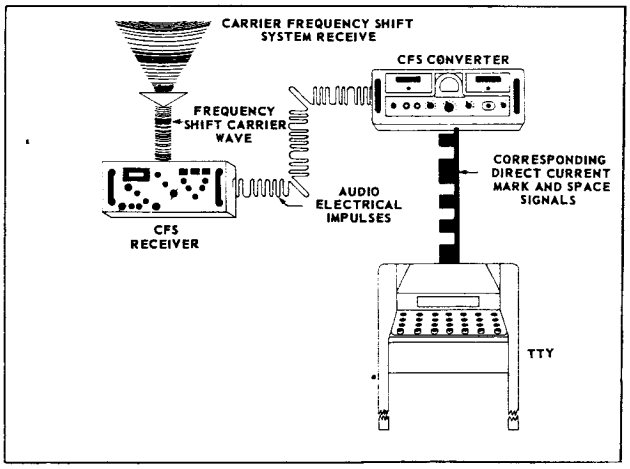
Figure 10-58.—D-C mark and space impulses are changed by the keyer unit into frequency-shift intervals.

LONG-RANGE SYSTEM

At the transmitting end of the long-range system are a page printer, a transmitter, and a frequency-shift keyer unit. The keyer unit is built into the newer transmitters, but in some older systems it is a separate piece of equipment. When the page printer is operated, the d-c mark and space signals are changed by the keyer unit into frequency-shift intervals. The frequency-shift intervals are transmitted as carrier-frequency-shift signals (fig. 10-58).

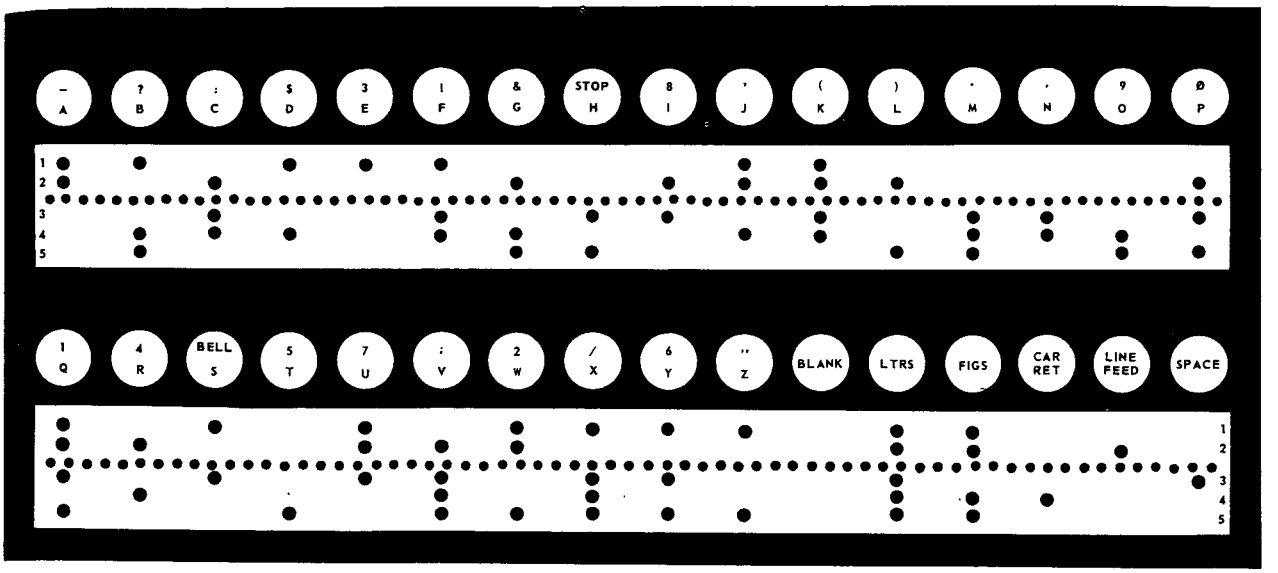
On the receiving side of the long-range system are a receiver, a frequency-shift converter, and a page printer. When the carrier-frequency-shift signal enters the receiver, it is detected and changed into a corresponding frequency-shifted audio signal. The audio output of the receiver is fed to the converter, which changes the frequency-shifted audio signal into d-c mark and space signals (fig. 10-59).

In both the tone-modulated system and the carrier-frequency-shift system, all teletypewriter signals pass through the teletypewriter panel that controls the looping current in all the circuits. The teletypewriter panel integrates the tone-modulated and the carrier-frequency-shift systems. It provides every possible RATT interconnection available on board ship. This operational fexibility gives maximum efficiency with the fewest circuits and the least amount of equipment in the Navy's compact RATT systems afloat.



1. 231

Figure 10-59.—Conversion of frequency-shifted carrier wave into mark and space impulses.



31.38

Figure 10-60. —The 5-unit teletypewriter code.

TAPE READING

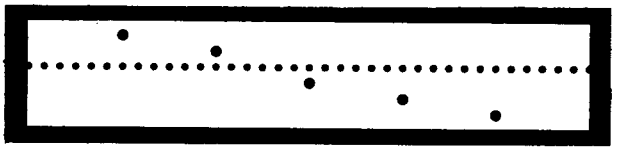
In order to read perforated tape, you must understand arrangement of code positions. The code is a five-unit mark-space signaling code arranged vertically on the tape, from the No. 1 position at the top to the No. 5 position at the bottom. A hole is a mark; no hole is a space. Between the second and third positions is a tape feed perforation (TRACK) that is smaller than the code perforation (see fig. 10-60). This smaller perforation fits over the tape feed wheel that moves the tape through the transmitter-distributor, and is NOT a part of the code. The upper side of chad tape usually has a slight roughness made by the hole-punching pins. Read the tape with this side uppermost. Use the track as a visual guide. Remember, no more than two perforations will appear above the track, nor more than three below. In figure 10-60 the positions are numbered from 1 to 5. This is for study purposes; don't expect these numbers to appear on an actual tape.

The LTRS code contains perforations in all five positions. Codes besides LTRS and BLANK contain perforations in different combinations of positions. For instance, A is 1—2, B is 1—4—5, and C is 2—3—4.

Read the perforations in lowercase until a FIGS code appears. Following a FIGS code read the tape as uppercase until a LTRS code appears, after which read as lowercase again. On circuits on which machines unshift on spacing, read codes in lowercase following the space code.

Memorize several codes at a time, learning the uppercase characters for each. Perforate strips of tape and read the codes you have memorized. Association of memory and eye will help you recognize codes quickly and will build reading speed.

The discussion and illustrations following provide a study plan for learning the code. Begin by learning the 1-HOLE codes: E, LF, SPACE, CAR RET, and T (fig. 10-61). Letter E is perforated in the No. 1 position, and the remainder of the positions are blank. LINE FEED is one perforation in the No. 2 position—and so forth, down to T, which is perforated in the No. 5 place. Keep this



31.39

Figure 10-61.—The 1-hole codes: E, LF, SPACE, CAR RET, and T.

pattern in mind. Perforate these codes several times on a tape to help remember them.

Your next group is of three key letters: A, O, and N.

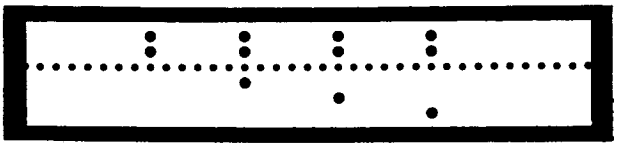
Check figure 10-62. The letter A is represented by two holes above the track. This pattern—two holes above the track—is also characteristic of U, J, and W; read DOWN to find which. In the same way (fig. 10-63) O is common to M, G, and B, but this time read UP to get the associated codes. The final letter of this series is N (fig. 10-64), which you read up for C and F.

With this much information mastered, get plenty of practice before learning more letters. Perforate the codes and, as your reading improves, mix them to make the reading more difficult. Emphasize ACCURACY, not speed. If you haven't the opportunity to work with a perforator, draw the codes on 3 x 5 cards (with answers on back) and scramble them.

You can learn three more sets of letters by using the track line for a guide. Read letter I (one hole above and one below the track line) and retain it as a reference point for reading D or Z (fig. 10-65). Learn R and use it to read L; learn Y and read P (fig. 10-66).

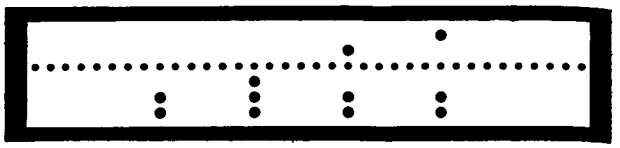
Eight letters that you can master by remembering them as opposites are Q and X, V and K, H and S, E and T (figs. 10-67 and 10-68). Letters E and T, remember, are also among the one-hole codes.

Two keys you will use a great deal are LTRS and FIGS, which shift your machine into lowercase and uppercase. The LTRS code is easy to recognize because it is the only one with five perforations. The FIGS code resembles it in that there are two perforations above the track, and two below, with only the No. 3 position blank.



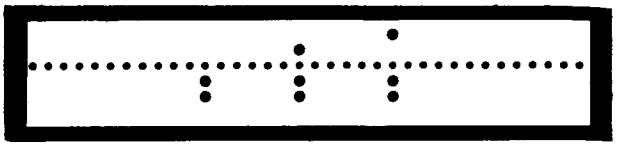
31.40

Figure 10-62. —Letters A, U, J, and W.



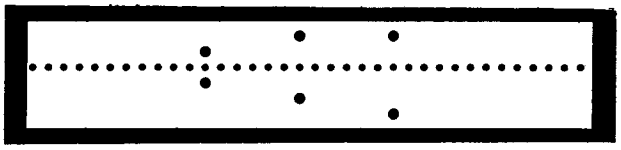
31.41

Figure 10-63. — Letters O, M, G, and B.



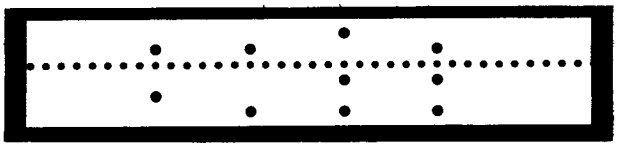
31.42

Figure 10-64.—Letters N, C, and F.



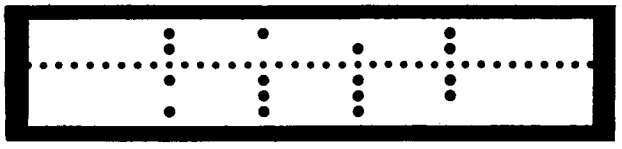
31.43

Figure 10-65.—Letters I, D, and Z.



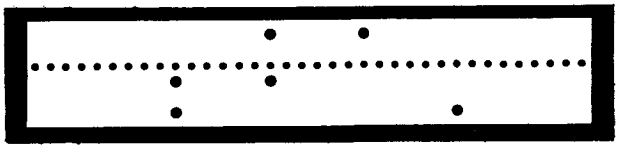
31.44

Figure 10-66.—Letters R and L; Y and P.



31.45

Figure 10-67.—Letters Q and X; V and K.



31.46

Figure 10-68. —Letters H and S; E and T.

CHAPTER 11

TELETYPEWRITER PROCEDURES

Before discussing teletypewriter and tape relay procedures, a brief description of the network in which these procedures are employed is necessary.

As you learned in chapter 2, the Naval Communication System is the Navy-operated portion of the DCS, and includes all shore-based communication activities and the fixed circuits (landline and radio) that bind them into a worldwide network. The majority of these fixed circuits are teletypewriter circuits. They help make up the Defense Communication System Teletypewriter Network (DCSTTYNET).

The communication activities of the DCSTTYNET are major and minor communication stations. These activities and their functions are described in chapter 2.

Each communication station maintains a tape relay station that receives and forwards messages in tape form by means of semiautomatic and automatic relay equipment. The relay station does not originate messages, except those relating to traffic handling (such as service messages and supervisor wirenotes), nor receive them as addressees. The message center belonging to the same communication station as the relay station originates and receives all messages for the communication station.

The DCS network presently has both classified (on-line) and unclassified (off-line) relay stations. As cryptographic equipment becomes available, though, the entire network is being converted to on-line operation.

AUTOMATIC RELAY

Five automatic relay stations make up the Navy's tape relay network. They are located at Trenton, N.J., Cheltenham, Md., Norfolk, Va., San Diego, Calif., and Stockton, Calif.

The automatic switching equipment installed in these relay stations is designed to relay only those message tapes that meet certain requirements. In certain critical portions of an incoming tape, the equipment senses each character (letter and function) to determine the message routes and to guard against nondelivery resulting from garbles or improper character sequence. Any deviation from prescribed procedure, including omission or insertion of machine functions, results in a rejected message.

Messages rejected by the equipment are shunted to a miscellaneous intercept position for service action. When rejections occur, delay is inevitable and, depending upon the traffic load and number of rejects, the delay may amount to hours.

You must bear in mind that automatic relay stations are manned by very few operators. If your message is not punched correctly and the precedence is lower than IMMEDIATE, the relay station does not reprocess and correct it for you. Your station is notified by service message to transmit a correctly prepared tape, and you will have to repunch the message. It is most important, therefore, that you learn and always use correct teletypewriter procedure.

Even if a minor station does not work directly into an automatic relay station, the messages enter the automatic system if there are addressees in the continental United States.

The sequences of letter, numeral, and machine function characters required for automatic system operation are shown in message examples later in this chapter.

TORN TAPE RELAY

Torn tape relay is a term derived from the manner in which message tapes are processed at a semiautomatic relay station. At such stations, incoming message tapes are received on

a reperforator, torn from the reperforator by the operator, and hand-carried to the outgoing circuit. Hence, torn tape relay means that the tape actually is torn at the receiving machine, and is transferred to the outgoing machine by hand.

An operator at a torn tape relay station usually is assigned to operate several circuits in the immediate vicinity of one another. He is responsible for all traffic passed over these circuits; maintains a separate message log for each circuit; screens all messages for obvious errors or garbles; makes certain that messages given him for transmission are transmitted on the circuit indicated; and disposes of incoming messages in accordance with the practices of his particular station.

Except for a slight difference in format line 1, the message format for torn tape relay is identical to the format for automatic relay. We will discuss this difference when we take up the message format.

ROUTING INDICATORS

In order to move tape relay traffic efficiently from one point to another, each station in a teletypewriter network is designated by a routing indicator. An indicator is made up of a group from four to seven letters, following a specific pattern, to indicate the nation to which the station belongs, its geographic area and whether it is a major or minor station.

CONSTRUCTION

Routing indicators are distinguished easily from call signs and address groups because the first letter of a routing indicator is always either the letter R or U. These letters, in that order, show whether the message will be handled by the worldwide communication network or will travel over a net serving some local area. Messages with routing indicators, beginning with the letter U do not enter the worldwide system. Routing indicators are not encrypted for transmission security purposes.

The second letter identifies the communication system of each country. Those of the United States and its Allied Nations are as follows:

A—Australia;
B—British Commonwealth (less Canada);
C—Canada;
U—United States;
X—NATO.

The third letter indicates the geographical location in which a station is located or from which it is served. There are 15 such areas. Following is a list of the letters used to designate each.

A—Eastern Asiatic area, including Japan and Korea;
C—Central United States;
M—Southwest Pacific area, including the Philippines and Marianas;
Y—Australian-New Zealand area;
K—Alaskan-Aleutian area;
H—Central Pacific area, centered on the Hawaiian Islands;
W—Western United States and Canada; Mexico;
E—Eastern United States and Canada; Greenland;
L—South American and Caribbean areas;
D—British Isles and Iceland;
F—European area;
T—Northwest African area;
Q—East African, Arabian, Turkish, and Iranian areas;
V—South African area below equator;
S—Western Asian area, including India.

Zone boundaries are laid out according to latitude and longitude; but, despite area boundaries, a minor station must carry the same area designator as the parent relay station, regardless of location. For example, although in a different zone area, the Naval Air Station in Olathe, Kansas (C zone) is assigned a routing indicator from major relay Trenton, N. J. (E zone).

Fourth and subsequent letters (except for any special suffixes) designate relay stations. Four-letter indicators designate the major relay stations. (Although A is assigned as the fourth letter to the major relay station at Asmara, and some alphabetical connection can be seen in some of the other assignments, they are not assigned alphabetically.)

Following are breakdowns of the routing indicators for (1) station RUMG, and (2) station RUAT.

R—Worldwide network;
U—U.S. facility;
M—Southwest Pacific;
G—Relay station (Guam, Mariana Islands).

R—Worldwide network;
U—U.S. facility;
A—Eastern Asia;
T—Relay station (Yokosuka, Japan).

Routing indicators containing four letters always mean a major relay station. These four-letter indicators form the basis for every routing indicator in the tape relay network. If you learn the geographical location of the relay stations and their routing indicators, you will have no trouble routing or relaying DCSTTYNET messages.

Fifth and subsequent letters of a routing indicator designate a minor relay station. You will have to look it up to know which one it is. A minor relay station always has a five- or six-letter routing indicator, the first four letters of which are identical to the indicator of the major station into which it feeds. The minor relay station RUKAG at Adak, Alaska, for example, feeds into the major relay station RUKA, Kodiak.

Routing indicators simplify message handling in semiautomatic relay systems because operating personnel do not need to look up locations of distant addressees to relay the message properly. Assume that NAS Patuxent River originates a message addressed to NAS Guantanamo Bay—served by the minor station RULAGB.

The first relay point is Washington (relay station is located at Cheltenham, Md.), where the message is received in the automatic relay center but must be transferred to the semiautomatic relay section that handles overseas traffic. An operator in the semiautomatic relay station, seeing that the routing indicator begins with the letters RULA, knows that the message goes to the major relay station at San Juan, P.R., and forwards it to RULA through the facilities of RULB. At San Juan, RULA, the operator knows that the next letter, G, designates the minor relay center at Guantanamo Bay. At Guantanamo, RULAG, the operator knows that the last letter, B, designates the Naval Air Station, and forwards the message to them.

SPECIAL SUFFIXES

The letter C, and all two-letter combinations CA through CZ, are reserved for suffixes to routing indicators. Additionally, the two-letter combinations SO, SU, and SX are used as routing indicator suffixes by the U. S. Air Force only. There is a prescribed meaning for each suffix. Suffixes aid routing of tapes for processing purposes or localized action by the relay station or any of its supplementary sections or facilities. A list of suffixes and their meanings follows. Those authorized for Navy use are so indicated in ACP 117 CAN-U. S. SUPP-1.

C—Local delivery or refile in page form is required.
CF—Section accomplishing delivery by broadcast methods.
CI—Section coordinating routing information.
CM—Section preparing tape copies for retransmission.
CN—Electrical conference facility or section
CR—Cryptocenter.
CS—Section dealing with service messages.
CT—Section effecting delivery by telephone.
CU—Section using tape relay for delivery to commercial carriers.
CW—Section relaying by radiotelegraph.
CX—Section using tape relay for refile to activities served by teletypewriter exchange systems.

Following are two examples of suffixes as used with the routing indicator of COMMSTA Washington, D. C. (RUEC).

RUECC—Message center, COMMSTA Washington,
RUECCR—Cryptocenter, COMMSTA Washington.

PUBLICATIONS

Publications of principal importance to teletypewriter operators are the effective editions of ACP 127 (with United States supplement), ACP 117 (with Canadian and United States supplements), and DNC 5. Tape relay procedure is dealt with in ACP 127 and DNC 5. Routing indicators are listed in ACP 117.

Supplements actually are separate publications, issued by the individual Allied countries, that amplify (or expand) the basic publications. For example, ACP 127 U. S. SUPP-1 prescribes operating procedures that are peculiar to the United States tape relay networks. In ACP 117 CAN-U. S. SUPP-1 (a Joint supplement) are listed the routing indicators of the teletypewriter stations belonging to the United States and to Canada. The ACP 117 U. S. SUPP-1 contains instructions for routing U. S.-originated messages to military and nonmilitary activities that are not assigned a routing indicator in the CAN-U. S. SUPP-1.

At the larger shore COMMSTAs, the routing indicator book would literally be "worn out" in a short time through constant usage. For that reason, most of the busier message centers ashore transfer the routing information from

ACP 117 to cardboard strips, which are held in metal frames supported by revolving stands called spindles. Routing spindles are practically indestructible and provide speedier access to the current routing information. They also provide more space for entering the frequent routing indicator changes than is available on a fixed, printed page.

MACHINE FUNCTIONS

Machine functions are of the utmost importance in teletypewriter operation. Because some functions do not show up on the printed page copy of the message, you may wonder why it is necessary to use them at all. Remember that teletypewriter messages are relayed in tape form; machine functions play an important part in efficient operation of the tape relay system.

An explanation of the machine functions and the rules for their use are given in the ensuing six topics.

SHIFT (FIGS) AND UNSHIFT (LTRS)

Teletypewriter machines, owned or leased for use in naval communications, shift from uppercase characters (figures) to lowercase characters (letters) only when the LTRS key is pressed. Many naval messages, however, are delivered to some addressees by the commercial Teletypewriter Exchange Service (TWX). The TWX machines shift automatically from uppercase to lowercase characters whenever the SPACE BAR is pressed, in addition to shifting when the LTRS key is pressed. To ensure that this unshift-on-space feature does not result in errors, the following rules must be complied with when transmitting by direct keyboard or punching tape on either a TWX or Navy—owned or—leased teletypewriter.

1. Always press the LTRS key to shift from uppercase to lowercase (disregarding the unshift-on-space feature of TWX machines). Example:

35784 (SPACE) (LTRS) TRY MAKE

This procedure has no adverse effect on either a TWX or Navy machine. Failure to follow this procedure would result in the following error:

a. Transmitted on TWX machine:
35784 TRY MAKE
b. As received on Navy machine:
35784 546 .-(3

2. Always press the FIGS key to shift from lowercase to uppercase, and also after the space before each group of figures or uppercase characters in a series. Example:

35784 (SPACE) (FIGS) 27896 . . .

The procedure in step 2 has no adverse effect on either a TWX machine or on a Navy machine. This rule applies whether direct keyboard transmission or tape perforation is used. Failure to follow this practice would result in the following error:

a. Transmitted on Navy machine:
35784 (SPACE) 27896
b. As received on TWX machine:
35784 (SPACE) WUIOY

CARRIAGE RETURN (CR)

The carriage return function resets the machine to the left margin of the paper. As a special precaution to make sure that the carriages return on all machines properly, the operator presses the CR key twice at the end of each line. Regardless of your own typing speed when punching a message tape, the message is transmitted on circuits running at 60, 75, or 100 words per minute. At these high speeds, the carriage does not have enough time to return to the left margin on a single CR function. As a result, the next character prints while the carriage still is moving toward the left. Always remember to press the CR key twice at the end of each line in the message examples in this chapter.

LINE FEED (LF)

The line feed function advances the paper on the page. You will note that the normal end-of-line functions include only one LF. At the end of the message, however, eight LF functions are used to provide more space between messages on the printed page.

BELL SIGNAL

The bell signal attracts the attention of the receiving operator. It precedes the precedence prosign in the routing line (format line 2) in FLASH messages.

On most teletypewriters the bell signal rings when the uppercase S key is pressed. Some equipments, though, particularly those used in the Canadian tape relay network, have the bell on the uppercase J key. Consequently, correct procedure requires the bell signal to be transmitted as follows:

(FIGS) JJJJJSSSSS (LTRS)

SPACE (SP)

The space function advances the carriage without printing any character on the page. It is used throughout the message for spacing between prosigns, routing indicators, words or groups, and the like.

BLANK (BL)

Pressing the blank key has no effect on the page copy of a message, but it advances blank tape through the punch block of the teletypewriter perforator. The blank function is required in the operation of certain cryptosystems, but has no application in DCSTTYNET procedure. Do not substitute BLs for LTRS functions.

MESSAGE ALIGNMENT

Message alignment is essential so that the receiving teletypewriter can print a legible page copy of the message. The alignment procedure given here is for your guidance when preparing message tapes for transmission. Functions that usually are inserted by the automatic channel numbering unit are not included here, but are discussed in the next topic.

- Machine functions that are a part of the message alignment must appear in the specified sequence. Otherwise, the message is rejected at the first automatic relay station along its route.
- All messages must be preceded by five spaces, two carriage returns, and one line feed. The transmission must begin with the five spaces. Any tape feedout functions preceding the five spaces are not transmitted.
- The functions at the end of each line of a message are two carriage returns and one line feed. An exception is when the end of the line is also the end of a page of a long message. Then, the end-of-line functions are two carriage returns and four line feeds.
- End-of-message functions are two carriage returns, eight line feeds, the letter N repeated four times, and 12 letters (functions). (The BL key is not used in lieu of LTRS, and any tape feedout in excess of 12 LTRS is removed before the message is transmitted.)
- Separation between groups within any given line of a message is one space, except in the text of tabulated messages (presented later in the message examples). Spacing between routing indicators in the routing line is particularly important because the routing indicators are sensed by the automatic switching equipment when it is determining message routes.
- The lines of a teletypewriter message are limited to 69 characters, including spaces.

MESSAGE NUMBERING

Aside from the DTG and any message identifying numbers (called cite numbers) in the text, the numbers assigned a message for identification purposes are of two types. They are station serial numbers and channel numbers.

STATION SERIAL NUMBERS

Teletypewriter messages are assigned station serial numbers by the station originating (punching) the messages. Messages are numbered consecutively for a 24-hour period, beginning at ØØØ1Z each day.

The station serial number is a permanent means of message identification, and it remains the same regardless of whether the message is destined for one or many addressees. Communication activities that have occasion to refer to the message (to obtain repetitions, for example) cite the station serial number of the message as part of their identifying data. The station serial number is also referenced for in-station accountability of the message.

When a station has more than one outgoing position or transmitting channel, a separate set of serial numbers is used for each channel. In such instances, a channel letter designator is added to the station serial number to identify the channel over which the message is transmitted. The letter appears following the station serial number. Letter A usually is assigned the first channel. The next channel is designated B, the next C, and so on. For example, the station serial number 1Ø7B indicates a message transmitted over channel B of a teletypewriter station.

CHANNEL NUMBERS

Another name for channel numbers is transmission inditification (TI). You will see and hear both terms used interchangeably.

To provide a means of keeping a constant check on traffic between station, a channel number is required in the heading of every message. The channel number ensures that no message is lost or unaccounted for. Each station relaying a message adds its channel number

to the head of the message. The station receiving the message checks this channel number against its record of transmissions received from that station. The number of transmissions received and the number in the message heading must agree. Such a check on traffic is known as "protecting the continuity of service." Understand: A message carries the same station serial number all the way, but receives a new channel number at each relaying station.

Equipment that automatically sends transmission identification ahead of each message is the most satisfactory means of performing the identification function. When automatic number equipment is unavailable, transmission identification is prepared in tape form in such a way that a tab containing identification for one transmission can be detached from a roll and be transmitted ahead of each message. As a last resort, transmission identification is incorporated directly into each message as it is being prepared for transmission.

Transmission identification for messages transmitted directly into fully automatic relay stations consists of the following: (1) the letter V; (2) the start of message indicator ZCZC; (3) the three-letter station and channel designators; (4) one figures shift; (5) a channel serial number; and (6) one letters shift. Example: VZCZCABC(FIGS)Ø31(LTRS).

The preceding example is explained in this manner: Letter V is required to ensure that the first character of intelligence is not lost or garbled. The start of message indicator (abbreviated SOM) activates the automatic switching equipment at the relay station. (The SOM must appear once (and only once) in each transmission introduced directly into an automatic relay station.) Letters ABC are the station (AB) and the channel (C) designators of the station making the transmission. The figures shift is operated once to shift the equipment from lowercase to receive the channel serial (Ø31). Then the letters shift is operated once to bring the equipment back to the lowercase position.

A slightly different form of transmission identification applies in messages transmitted directly into torn tape relay stations. It consists of (1) letters VV; (2) three space functions; (3) the three-letter station and channel designators' (4) a figures shift; (5) a channel serial number; and (6) a letters shift. Example: VV(3 SPACES)ABC(FIGS)Ø31(LTRS).

The explanation of the foregoing example is the same as that for the automatic system, except that the characters VV(3 SPACES) replace the start of message indicator. This substitution is made because the ZCZC serves no purpose unless automatic switching equipment is used.

MESSAGE FORMAT

Messages transmitted over tape relay circuits must be prepared in the message format shown in table 11-1. The 15 format lines are explained briefly in the table, and are amplified in the following paragraphs.

Line 1: Because format line 1 contains the message transmission identification, its construction varies with the type of relay station into which you are transmitting. If you are transmitting into an automatic station, this line must include the start of message indicator (ZCZC).

The security prosigns referred to in the Contents column of table 11-1 are not used by the United States. Hence, they are not discussed in this text. (Consult ACP 127 U. S. SUPP-1.)

Pilots are explained under a separate topic later in this chapter.

Line 2: Tape preparation usually begins with line 2, the routing line. It consists of the precedence prosign (repeated) and the routing indicators of stations called, that is, stations to which the message is routed for final delivery. To avoid misroutes, the routing line must be prepared with special care.

In multiple-call messages, all routing indicators associated with a single relay station are grouped together in the routing line. They are not intermingled indiscriminately. If a called station serves more than one addressee in the message, the station's routing indicator need appear only once in line 2.

When dual precedence is used, only the higher precedence appears in the routing line. If a dual precedence of FLASH and a lower precedence are assigned to multiple-address message, and the message requires using more than nine routing indicators in line 2, the originating station makes two separate transmissions. One transmission goes to the action addressees, and the other is sent to the information addressees. You must remember: When the FLASH precedence prosign is transmitted in the routing line, it is preceded by the bell signal.

Table 11-1. —DCSTTYNET Message Format

PARTS	Components	Format line	Elements	Contents	Explanation*/
HEADING	PROCEDURE	1	Handling instructions.	Transmission identification. Security warning prosign (when used). Pilot - Pilots contain: Repeated precedence prosign **/. Routing indicator(s). Prosigns, operating signals and address designations***/ as required.	Always contains transmission identification (which includes the "start of message indicator" when necessary); also contain pilot(s) as required to convey specific message-handling instructions.
		2	Called station(s).	Repeated precedence prosign**/ . Routing indicator(s) of station(s) responsible for delivery or refile.	Basic routing line. If message is dual-precedence, only the higher precedence is shown in this line.
		3	Calling station and filing time.	Prosign DE. Routing indicator of station preparing message for transmission. Station serial number. Filing time: Date separated by slant from hour and minutes expressed in digits followed by zone suffix.	Filing time is the date and time the message was filed with the communication center.
		4	Transmission instructions.	Security warning operating signal (when used). Prosign T. Other operating signals. Special operating group(s) (SOGs). Address designator(s) Routing indicator(s).	Indicates specific transmission responsibility not apparent in other components of the message heading. Not to be used unless necessary. Plain language address designators are not permitted in codress messages.

Table 11-1. —DCSTTYNET Message Format—Continued

Parts	Components	Format line	Elements	Contents	Explanation */
	PREAMBLE	5	Precedence; date-time group; message instructions.	Precedence prosign(s). Date-time group and zone suffix (Z indicating Greenwich mean time). Operating signal(s)	In dual precedence, both prosigns are shown separated by a space. Operating signals are used only when required to convey message-handling instructions.
	ADDRESS	6	Originator.	Prosign FM. Originator's designation.	Message originator is indicated by plain language, routing indicator, address group, or call sign.
		7	Action addressee(s).	Prosign TO. Rourting indicator(s). Operating signal. Address designation(s).	Action addressees are indicated by plain language, routing indicator(s), address group(s), or call sign(s). In multiple-address messages, when addressees are listed individually, each address designation must be on a separate line and may be preceded either by the operating signal ZEN (meaning delivered by other means) or by the routing indicator of the station responsible for delivery. Such use is mandatory on all joint and combined messages.
		8	Information addressee(s).	Prosign INFO. Routing indicator(s). Operating signal(s). Address designator(s).	Same as for line 7, except that line 8 pertains to information addressee(s).

Table 11-1.—DCSTTYNET Message Format—Continued

Parts	Components	Format line	Elements	Contents	Explanation*/
		9	Exempted addressee(s).	Prosign XMT. Address designator(s).	Used only when a collective address designation is used in line 7 or 8 and an indication of the addressee(s) exempted from the collective address is required.
	PREFIX	10	Accounting information: group count.	Accounting symbol (when required). Group count prosign GR. Group count.	The group count prosign and group count must be used only when the text consists of countable encrypted groups.
SEPARATION		11	. . . . .	Prosign BT.	
TEXT	. . . . .	12	Classification; internal instructions; thought or idea expressed by originator (in that order).	. . . . .	See ACP 121 series.
SEPARATION		13	. . . . .	Prosign BT.	
ENDING	PROCEDURE	14	Confirmation.	. . . . .	Not used in tape relay operation.
	. . . . .	15	Correction.	Prosign C. Other prosigns, operating signals, and plain language as required.	
			End-of-message functions.	2CR, 8LF, 4Ns, 12LTRS	The 4Ns in this sequence are the end-of-message indicator.

*/ Included only when required for clarity.
**/ If message is dual-precedence, only the higher precedence is shown in this line.
***/ Plain language designators are not permitted in codress messages.

Line 3: Line 3 consists of the prosign DE, the routing indicator of the station preparing the message for transmission, the station serial number, and the date and time the message was filed with the communication center for transmission.

It is essential that the prosign DE follow immediately the two CRs and one LF at the end of the routing line (line 2). The automatic relay equipment is designed to stop seeking outgoing channels upon receipt of the letter D at the beginning of line 3.

Line 4: The operating signal ZNR is transmitted as the first component in format line 4 of all unclassified messages (including off-line encrypted messages and service messages), except unclassified EFTO messages. When used in this manner, ZNR means "This message may be forwarded without change by radio or nonapproved circuit." The absence of ZNR indicates that the message is classified and must be transmitted over secure circuits.

When necessary, transmission instructions denoting transmission responsibility are included in line 4. Such instructions are employed only when essential to ensure delivery of the message. They are not used when stations called are automatic guard for the addressees, nor when delivery responsibility is indicated in the address portion of the message.

Lines 5 and 6: See table 11-1 for explanation of format lines 5 and 6.

Line 7: Line 7 is the action addressee line. It commences with the prosign TO and contains the address designations of commands or activities that are to take action on the message. Addressees normally are designated by plain language. But, as you will see in the message examples that follow this section, there are certain instances when the addressees are designated by both plain language and call signs or address groups.

Delivery responsibility is indicated by preceding each address designation with the routing indicator of the station responsible for delivery to that addressee. An exception to this is when the addressees are designated by a collective address designator or an address indicating group. Then, it is not necessary to precede the designator with routing indicators. When a single station is responsible for delivery to all addressees represented by a collective address designator, however, that station's routing indicator precedes the designator.

When delivery to an addressee is accomplished by other means than a particular transmission, the operating signal ZEN is used in place of a routing indicator. A slant sign separates the routing indicator (or ZEN) from the address designation.

Line 8: The explanation of line 8 is the same as line 7, except that line 8 pertains to information addressees.

Line 9: When necessary to exempt one or more addressees from a collective address designation appearing in lines 7 or 8, line 9 is utilized. Line 9 consists of the prosign XMT and the designator(s) of commands or activities exempted from the collective address designation.

Line 10: In tape relay procedure, line 10 (group count) is included only when the text of the message consists of encrypted groups. An accounting symbol is used to indicate financial responsibility only when the message requires commercial refile. (Complete instructions concerning accounting symbols are contained in ACP 127 U. S. SUPP-1.)

Line 11: The prosign BT appears in line 11. It separates the text from the message heading.

Line 12: Line 12 is the text of the message. The first word of all plain language text messages must be either the abbreviation UNCLAS, the word CLEAR, or the security classification of the message. The abbreviation UNCLAS indicates that the message is unclassified. CLEAR indicates that the message is classified, but that the originator has authorized its transmission over nonapproved circuits. The abbreviation UNCLAS and the world CLEAR are sent as one word, but a space is transmitted between each letter of the security classification of a classified message. For example, SECRET is sent as S E C R E T.

Line 13: The prosign BT appears in line 13. It separates the text from the message ending.

Line 14: Line 14 is not used in tape relay procedure.

Line 15: Occasionally, an error in the text of a message is undetected until the message is nearly completed. Instead of canceling the transmission (or detroying the tape) and starting the message again, the error is corrected in line 15. The correction consists of the prosign C, followed by the correct version of the error.

The end-of-message functions are a part of line 15. They follow any necessary corrections, and consist of two carriage returns, eight line feeds, the letter N repeated four times, and 12 letters functions. The end-of-message functions must be in the exact order indicated.

MESSAGE EXAMPLES

The message examples shown in the remainder of this chapter are for illustrative purposes only; they do not necessarily reflect actual routing indicator, call sign, or address group assignments. The format of the examples, however, gives the proper sequence of the message elements and of line functions used. End-of-line and end-of-message functions are in parentheses. The messages are prepared as they would appear when reproduced on a page printer set for single line feed.

PLAINDRESS MESSAGE

A plaindress message carries the originator and addressee designations in the message heading. The message text may be plain language or encrypted. A group count is not required for plain language, but an encrypted message always carries a numerical group count.

As explained earlier, in line 7 the addressees of DCSTTYNET messages normally are designated in plain language. Intra-Navy messages, however—those originated by and addressed to commands and activities served entirely by Navy-operated stations—destined for mobile units, such as ships and commands afloat, must indicate the mobile units by their call signs or address groups and by their plain language designations. You must remember that the foregoing method of addressing messages applies only to messages handled within the tape relay system. It does not affect the addressing of messages sent via CW (which are addressed by call signs/address groups), nor those sent via manual RATT (discussed later in this chapter). In addition, the only call signs/address groups authorized for use with their plain language equivalents are those assigned to U. S. Navy, Marine Corps, and Coast Guard units.

Single-Address

Following is a plaindress version of a single-address message destined for a mobile unit (ship).

Format Line		
	(5 SPACES 2CR LF)	
2	PP RUHPC	(2CR LF)
3	DE RUHPB 85 Ø1/Ø841Z	(2CR LF)
4	ZNR	(2CR LF)
5	P Ø1Ø837Z	(2CR LF)
6	FM CINCPACFLT	(2CR LF)
7	TO RUHPC/NWBJ/USS	(2CR LF)
	RENSHAW	(2CR LF)
11	BT	(2CR LF)
12	UNCLAS	(2CR LF)
	1. THIS PLAINDRESS	(2CR LF)
	SINGLE-ADDRESS MSG IS	(2CR LF)
	PREPARED IN FORMAT	(2CR LF)
	PRESCRIBED FOR INTRA-	(2CR LF)
	NAVY MSGS ADDRESSED	(2CR LF)
	TO MOBILE UNITS.	(2CR LF)
	2. TRANSMISSION IN-	(2CR LF)
	STRUCTIONS ARE UN-	(2CR LF)
	NECESSARY BECAUSE	(2CR LF)
	DELIVERY RESPONSIBLE	(2CR LF)
	IS INDICATED IN ADDRESS	(2CR LF)
	OF MSG.	(2CR LF)
	3. NOTE UTILIZATION OF	(2CR LF)
	LINE 15 TO CORRECT AN	(2CR LF)
	ASSUMED ERROR	(2CR LF)
13	BT	(2CR LF)
15	C WA PLAINDRESS	(2CR 8LF)
	SINGLE-ADDRESS	(2CR 8LF)
	NNNN	(12LTRS)

Multiple-Address

A multiple-address message intra-Navy form appears in the next example. Plain language address designators are employed because all the addressees are stationary commands, and are a part of the type relay network.

Format Line		
	(5 SPACES 2CR LF)	
2	RR RUHPB RUHPC RUATA	(2CR LF)
	RUWSPG	(2CR LF)
3	DE RUECW 115A 3Ø15Ø5Z	(2CR LF)
4	ZNR	(2CR LF)
5	R 3Ø1455Z	(2CR LF)
6	FM CNO	(2CR LF)
7	TO RUHPB/CINCPACFLT	(2CR LF)
8	INFO RUHPC/	(2CR LF)
	COMWESTSEAFRON	(2CR LF)
	RUATA/	(2CR LF)
	COMFAIRWESTPAC	(2CR LF)
	RUWSPG/	(2CR LF)
	COMWESTSEAFRON	(2CR LF)

Format Line		
11	BT	(2CR LF)
12	UNCLAS	(2CR LF)
	1. INCLUSION OF CALL	(2CR LF)
	SIGNS/ADDRESS GROUPS	(2CR LF)
	IN ADDRESS UNNECES-	(2CR LF)
	SARY. ADDEES NOT	(2CR LF)
	MOBILE UNITS	(2CR LF)
13	BT	(2CR 8LF)
15	NNNN	(12LTRS)

A message received via CW, R/T, or manual RATT must be prepared in tape relay format before it can be introduced into the tape relay network. This preparation is made by the station introducing the message into the network. (It is called the refile station.)

Assume that a refile station receives an unclassified message via radiotelegraph. Prior to tape preparation, the station must (1) insert routing indicators in format lines 7 and 8, (2) convert the heading to authorized plain language address designators, and (3) retain the call signs/address groups for mobile addressees. These follow the routing indicators and precede the plain language designators.

The following exemplifies a message prepared in tape relay format after it is received by radiotelegraph.

Format Line		
	(5 SPACES 2CR LF)	
2	PP RUCKCF RUCKHC	(2CR LF)
	RUEGNE	(2CR LF)
3	DE RUECC Ø55 Ø9/1542Z	(2CR LF)
4	ZNR	(2CR LF)
5	P R Ø91428Z	(2CR LF)
6	FM USS TUCKER	(2CR LF)
7	TO RUCKCF/SQBC/	(2CR LF)
	COMDESRON 12	(2CR LF)
8	INFO ZEN/	(2CR LF)
	COMDESDIV 121	(2CR LF)
	RUCKHC/CINCLANTFLT	(2CR LF)
	RUEGNE/	(2CR LF)
	COMCRUDESLANT	(2CR LF)
	RUCKCF/E5TT/CTF 14Ø	(2CR LF)
11	BT	(2CR LF)
12	UNCLAS	(2CR LF)
	1. PLAIN LANGUAGE	(2CR LF)
	TEXT.	(2CR LF)
	2. NOTE USE OF ZEN TO	(2CR LF)
	INDICATE MSG DLVD BY	(2CR LF)
	OTHER MEANS TO COM-	(2CR LF)
	DESDIV 121.	(2CR LF)
	3. NOTE USE OF DUAL	(2CR LF)
	PRECEDENCE.	(2CR LF)
	A. ONLY HIGHER	(2CR LF)
	PRECEDENCE APPEARS	(2CR LF)
	IN ROUTING LINE. BOTH	(2CR LF)
	APPEAR IN LINE 5	(2CR LF)
13	BT	(2CR 8LF)
15	NNNN	(12LTRS)

As indicated in the preceding example, RUCKCF has delivery responsibility for two addressees via fleet broadcast. If the message is transmitted on the RATT broadcast, routing indicators and call signs normally are not removed. But if the message is sent on the CW broadcast, routing indicators and call signs must be removed by RUCKCF. In other words, only the plain language address designators appear in the heading, and these are separated from each other by the separative sign.

JOINT AND COMBINED FORM

Messages originated by or addressed to activities served by Army or Air Force tape relay networks must be in joint form. If addressees are served by teletypewriter systems belonging to other countries, the message format is called the combined form. The formats of joint and combined forms are exactly alike. These forms differ slightly from the intra-Navy form, however.

In the intra-Navy message form, routing indicators are used in the address of both single- and multiple-address messages to denote delivery responsibility. In the joint and combined forms, routing indicators are used for this purpose only in multiple-address messages. Similarly, call signs and address groups are mixed with plain language to designate addressees of joint and intra-Navy messages, but such mixtures are never permissible in combined form messages. The address must consist of either all plain language designators or all call signs and address groups.

ABBREVIATED PLAINDRESS

Operational requirements for speed of message handling may sometimes require abbreviations of plaindress message headings. In such instances, any or all of the following elements may be omitted from the message heading: precedence, date, date-time group, and group count.

Most plaindress messages originated within the DCSTTYNET system omit the group count (format line 10). In this instance, absence of the group count does not, in itself, place the messages in abbreviated plaindress form. (This is an exception to the definition of the abbreviated plaindress form.) Only in encrypted messages are numerical group counts required for messages originated within the system.

Abbreviated plaindress form is employed widely in radiotelephone, radiotelegraph, and manual teletypewriter procedures. It is used rarely, if ever, in tape relay procedure. An abbreviated plaindress message is included in the explanation of manual teletypewriter procedures later in this chapter.

CODRESS MESSAGES

A codress message is an encrypted message that has the designations of the originator and addressees (and any internal passing instructions) in the encrypted text. Accordingly, the address components (format lines 6, 7, 8, and 9) are omitted. Codress is a valuable security device, because it conceals the identity of units and prevents an enemy from making inferences from originator-addressee patterns.

Transmission instructions are required in the heading of codress messages when the station (or stations) called in line 2 is to deliver or refile the message without decrypting it. If the station is to decrypt the message, as well as refile it, the station's routing indicator must appear following the prosign T in line 4. An example of a codress message follows.

Format Line		
	(5 SPACES 2CR LF)	
2	OO RUCKHCR RUECK	(2CR LF)
3	DE RUTPC 42C 12/1Ø4ØZ	(2CR LF)
4	ZNR	(2CR LF)
	RUECK T RUECK XYPT	(2CR LF)
5	O 121Ø37Z	(2CR LF)
10	GR97	(2CR LF)
11	BT	(2CR LF)
12	(Ninety-seven encrypted	(2CR LF)
	groups typed five char-	(2CR LF)
	acters per group and	(2CR LF)
	ten groups to a line.)	(2CR LF)
13	BT	(2CR 8LF)
15	NNNN	(12LTRS)

ROUTING LINE SEGREGATION

The automatic relay system uses a method of routing multiple-call tapes (messages having two or more routing indicators in the routing line) known as routing line segregation. This means that routing indicators in the routing line are segregated or distributed in accordance with the desired transmission channel in the switching process. Under this method, only the routing indicators applicable to a particular transmission appear in the routing line. Messages received at a station that has further relay responsibility contain only the routing indicators for which that station has relay responsibility.

Routing line segregation does not affect the tape preparation at the originating station; it is accomplished at the relay stations. At the automatic relay stations, the relay equipment segregates the routing indicators automatically according to the required transmission path.

In order to make the semiautomatic relay system compatible with the fully automatic system, relay stations that are not connected directly to the automatic system must also perform routing line segregation on all relayed messages. Semiautomatic relay stations require an operator using special routing segregation equipment to perform the routing line segregation.

Format lines 2 and 3 of a message as prepared by originating station RUQAC and forwarded to RUQA relay Asmara:

PP RUFRC RUCKC RUWSC RUMFC
DE RUQAC 27 21/1234Z
(Etc.)

Station RUQA relay must make two transmissions of this message, one to RUTP, Morocco, and another to RUMF, Philippines.

As relayed to RUTP:
VZCZCQAB137
PP RUFRC RUCKC RUWSC
DE RUQAC 27 21/1234Z
(Etc.)

As relayed to RUMF:
VZCZCQAA1Ø3
PP RUMFC
DE RUQAC 27 21/1234Z
(Etc.)

The next example is how the message is processed by RUTP. Two transmissions are

required, one to RUFR, Naples, and the other to RUEC, Washington, for relay to RUCKC and RUWSC. The routing line is altered for the two transmissions as follows:

Transmission to RUFR:
VZCZTPA296QAB137
PP RUFRC
DE RUQAC 27 21/1234Z
(Etc.)

Transmission to RUEC:
VZCZCTPC678QAB137
PP RUCKC RUWSC
DE RUQAC 27 21/1234Z
(Etc.)

Station RUEC is responsible for two transmissions, one to RUCK, Norfolk, the other to RUWS, San Francisco. Each transmission is reduced to a single call in the basic routing line.

As relayed to RUCK:
VZCZCECB311TPC678
PP RUCKC
DE RUQAC 27 21/1234Z
(Etc.)

As relayed to RUWS:
VZCZCECD935TPC678
PP RUWSC
DE RUQAC 27 21/1234Z
(Etc.)

As can be seen from the preceding examples, routing indicators are dropped from the routing line when they have served their purpose. This procedure results in decreased transmission time for onward relay of the message, and the message arrives at each terminal station with only that station's routing indicator in the routing line.

PUNCTUATION

Message drafters try to word their messages clearly without using punctuation. Occasionally, though, punctuation is essential for clarity. In such instances, punctuation marks (or symbols) are used in preference to spelling out the desired punctuation.

All of the punctuation marks and symbols on U. S. military teletypewriter keyboards are authorized for use in U. S. networks. Only those marks and symbols listed in table 11-2, however, may be used in messages that have other routing indicators besides the United States in format line 2.

Table 11-2.—Punctuation Used in Allied Messages

Punctuation	Abbreviation	Symbol
Period	PD	.
Hyphen	---	-
Parentheses	PAREN	( )
Slant sign	SLANT	/
Colon	CLN	:
Comma	CMM	,
Question mark	QUES	?
Quotation marks	QUOTE UNQUOTE	" "
Apostrophe	---	'

TABULATED MESSAGES

The ability to handle information in tabulated form is one of the many advantages of teletypewriter equipment. If a message is received for transmission in tabulated form, it normally should be transmitted in that form. In some instances the headings of the columns require more space than the data in the column. When this happens, use more than one line for the headings. (Compare the form of the headings in the examples of incorrect and correct methods.) Another point: Keep your columns as close as possible to the left margin, to reduce the total transmission time.

In the first example, each dot represents the transmission of a space, which requires as much circuit time as transmitting a character. In the second example (the correct way), the same information is transmitted at a considerable saving of circuit time.

1. Example of incorrect method:

Stock Report and Requirements

Item	Cat. No.	Quantity On Hand	Article	Required
1	268423	1ØØ	CYL RINGS	3ØØ
2	93846	39	MUFFLERS	5Ø
3	624364	28	MAGNETOS	2Ø
4	34256	3ØØ	WRIST PINS	3ØØ
5	19432	14Ø	VALVES	5ØØ
6	43264	42	CARBURETORS	5Ø

2. Example of correct method:

Stock Report and Requirements

Item	Cat. No.	Quantity On Hand	Article	Required
1	268423	1ØØ	CYL RINGS	3ØØ
2	93846	39	MUFFLERS	5Ø
3	624364	28	MAGNETOS	2Ø
4	34256	3ØØ	WRIST PINS	3ØØ
5	19432	14Ø	VALVES	5ØØ
6	43264	42	CARBURETORS	5Ø

MULTIPLE-PAGE MESSAGES

Most message centers ashore serve several addressees. To provide the addressees with sufficient copies of each message, the messages are run off on a duplicating machine. Usually, the paper used in duplicating the messages is standard letter-size paper on which approximately 20 lines can be typewritten. To facilitate the duplication process, messages containing more than 12 lines of text are divided into pages by the operator preparing them for transmission.

The first page of a multiple-page message contains the heading and the first 10 lines of text. Each succeeding page contains 20 lines of text, with the exception of the last page, which may have fewer. No more than five pages may be sent in any one transmission.

The second and succeeding pages carry a page identification line above the first line of text. This page identification line gives the page number, the originating station's routing indicator, the station serial number of the message, and, if the text is plain language, the security classification or the abbreviation UNCLAS. Page identification is not included in the group count of those messages for which a group count is required.

In the following example of the proper way to page a message, note that necessary corrections are made at the end of each page, and that the pages are separated from each other by 4LF functions.

(5 SPACES 2CR LF)	
RR RUWSPG RUHPB	(2CR LF)
DE RUECW 43B Ø8/1123Z	(2CR LF)
ZNR	(2CR LF)
R ØSØ951Z	(2CR LF)
FM CNO	(2CR LF)
TO RUWSPG/COMWESTSEAFRON	(2CR LF)
RUHPB/CINCPACFLT	(2CR LF)
BT	(2CR LF)
UNCLAS	(2CR LF)
(Ten lines of plain language text	(2CR LF)
on page.)	(2CR LF)
C LINE 6 WA LANDING POINT	(2CR 4LF)
PAGE 2 RUECW 43B UNCLAS	(2CR LF)
(Twenty lines of plain language	(2CR LF)
text.)	(2CR 4LF)
(Note: Pages 3 and 4 appear as shown for page 2.)	
PAGE 5 RUECW 43B UNCLAS	(2CR LF)
(Remaining lines of text.)	(2CR LF)
BT	(2CR LF)
C PAGE 3 LINE 2 WA BEACH	(2CR 8LF)
NNNN	(12LTRS)

Paging rules do not apply to statistical and meteorological (weather) messages that are intended for processing by computers. Messages of this type that exceed 100 lines, however, are divided into transmission section, which are discussed in the next topic.

LONG MESSAGES

Messages that exceed five teletypewriter pages are transmitted in sections. This procedure prevents prolonged circuit tieups that could result in delaying more important traffic. By breaking the longer messages into sections, higher precedence messages can be sent between sections without appreciable delay.

At a convenient point within the limits of five pages, the text of a long message is separated into sections. Normally, the separation is at the end of a sentence or a cryptopart. (Long encrypted messages have cryptoparts.) Each section then is numbered, and the section number is inserted on a separate line at the beginning of the text. If the text is plain language, the section number follows the security classification or the abbreviation UNCLAS. For example, when a message is divided into two sections, the first section is identified as SECTION 1 of 2, and the second as FINAL SECTION OF 2.

In long encrypted messages, when a transmission section commences with a new cryptopart, the designation of the cryptopart follows the designation of the transmission section.

Transmission sections of a long message have exactly the same heading, except that station serial numbers change with section. Each

section bears the same date-time group and filing time. A group count, if used, applies only to the section it accompanies. Transmission section and page identifications are not included in the group count. The cryptopart identification is included.

Here is a message handled in two transmission sections:

(5 SPACES 2CR LF)	
RR RUHPB RUWSPG RUMGB	(2CR LF)
DE RUECW 1Ø5A 18/2Ø15Z	(2CR LF)
ZNR	(2CR LF)
R 181912Z	(2CR LF)
FM CNO	(2CR LF)
TO RUHPB/CINCPACFLT	(2CR LF)
INFO RUWSPG/	(2CR LF)
COMWESTSEAFRON	(2CR LF)
RUMGB/COMARIANAS	(2CR LF)
BT	(2CR LF)
UNCLAS	(2CR LF)
SECTION 1 OF 2	(2CR LF)
(Plain language text includes 90	(2CR LF)
teletypewriter lines in this sec-	(2CR LF)
tion, paged as required.)	(2CR LF)
BT	(2CR 8LF)
NNNN	(12LTRS)
(5 SPACES 2CR LF)	
RR RUHPB RUWSPG RUMGB	(2CR LF)
DE RUECH 1Ø6A 18/2Ø15Z	(2CR LF)
ZNR	(2CR LF)
R 181912Z	(2CR LF)
FM CNO	(2CR LF)
TO RUHPB/CINCPAFLT	(2CR LF)
INFO RUWSPG/	(2CR LF)
COMWESTSEAFRON	(2CR LF)
RUMGB/COMARIANAS	(2CR LF)
BT	(2CR LF)
UNCLAS	(2CR LF)
FINAL SECTION OF 2	(2CR LF)
(This transmission section con-	(2CR LF)
tains the remainder of the text,	(2CR LF)
paged as required.)	(2CR LF)
BT	(2CR 8LF)
NNNN	(12LTRS)

CORRECTING ERRORS

Even the best operators sometimes make mistakes. There are definite procedures for correcting mistakes, depending on whether they occur in tape preparation or while you are sending direct from a keyboard.

You learned in chapter 10 how to erase or letter out errors in tape by backspacing and striking the LTRS key as many times as necessary to obliterate the error. This is the method used to correct errors in tape preparation, except when they occur in format lines 1, 2, 3, and 4. Errors in the first four format lines cannot be corrected; you must discard the tape with the error in it and prepare a new one. The main reason for this rule is that even one extra LTRS function in any of the first four format lines results in rejection of the tape at the first automatic relay station.

Another special rule applies to correcting errors in the security classification of a plain language message. When such errors occur, you must backspace and obliterate the entire classification. Then, start anew with the first letter of the classification.

When transmitting from the keyboard, you cannot correct mistakes that occur in the message heading, nor in the security classification when it is the first word of the text. You must cancel the transmission and again send the message from its beginning. To cancel the transmission, send 2CR, 1LF, 1LTRS, and prosigns E E E E E E E E AR, followed by your station's routing indicator and the usual end-of-message functions. In NTX procedure the error prosign is exactly 8 Es—no more, no less—with a space between each E.

To correct a mistake in the text of the message (other than one in the security classification), send 1 LTRS, 8 Es, repeat the last word sent correctly, and continue with the correct version of the text. For example, assume you are transmitting the words IN ACCORDANCE WITH PREVIOUS INSTRUCTIONS and make a mistake in the word "previous." Correct it as follows: IN ACCORDANCE WITH PREVX E E E E E E E E WITH PREVIOUS INSTRUCTIONS. The error prosign is transmitted immediately after the error occurs. Transmission resumes with the last word or group sent correctly.

If the text is transmitted before you discover an error in it, make the correction on the line following the prosign BT. Use of the prosign C for this purpose was shown in earlier message examples. Errors in a multiple-page message, which were not corrected by 8 Es or the lettering-out method, are corrected at the botton of each page by means of the prosign C. If the error is not noticed before starting another page, the error is corrected at the end of the last page.

HIGH-PRECEDENCE TAPES

Messages of FLASH precedence are given special handling over DCSTTYNET circuits.

When the tape is prepared at the originating station, the repeated precedence prosign in line 2 is preceded by the bell signal so that succeeding stations have audible warning that a high-precedence message is coming in. Example:

(FIGS)JJJJJSSSSS(LTRS)ZZ RUHPB RUWSC
DE RUATC 58A Ø1/231ØZ
Z Ø12312Z
(Etc.)

Notice that the precedence prosign appears in lines 2 and 4, just as in any other message, but the bell signal is used only in line 2.

In semiautomatic relay stations, high-precedence tapes receive hand-to-hand processing. The receiving operator immediately notifies the supervisor when a high-precedence tape is being received. The supervisor sees that the tape is taken immediately to the proper outgoing circuits and sent out. A receipt must be transmitted to the station from which the message was received, and a receipt obtained from every station to which the message is relayed.

The equipment in automatic relay stations is designed to "recognize" IMMEDIATE as well as FLASH messages. Upon receipt of the repeated prosigns ZZ or OO at the beginning of the routing line, the director component of the switching equipment seeks an immediate connection with the proper outgoing circuits instead of waiting for the for Ns at the end of the message. As a further aid to high-speed relay of high-precedence messages, the busiest circuits usually are provided with an additional receiving unit for use exclusively with high-precedence messages.

The system of station-to-station receipts used by semiautomatic relay stations for FLASH messages is not practical in the fully automatic system because messages enter and leave the relay station unseen and untouched by human operators. For this reason, receipts for FLASH messages are handled as follows:

1. Messages originated and addressed entirely within the automatic relay network require a receipt from the addressee to the originator.

2. Messages originated by a station within the automatic network and addressed to stations outside the automatic network require a receipt from the station transferring the message from the automatic network (called gateway refile station) to the originator. All messages transmitted outside the automatic network must be receipted for, station-to-station.

3. Messages originated outside the automatic network and destined for addresses within the automatic network are receipted for station-to-station from originator to the gateway refile station. No receipt is required of such messages after entry into the automatic relay network, unless an acknowledgement was requested.

MISSENT AND MISROUTED

Occasionally you will receive a message that was delivered to your office through error. Whenever this happens, remember that every office is responsible for delivering EVERY message received, even though it was transmitted through error.

Messages transmitted through error are classed in two groups: MISSENT and MISROUTED. A missent message has the correct routing indicator, but the relay station transmitted it over the wrong circuit. The message may have carried Asmara's indicator RUQA, for example, but was transmitted over the RUFR circuit to Naples.

Misrouted messages bear the wrong indicators, either through error when assigned by the punching station, from mechanical trouble in the system, or from the tape-cutter's typing mistake.

If you should receive two copies of a multiple-address message, and the second is not marked SUSPECTED DUPLICATE, you must assume that one of the other addresses did not receive his copy. You must notify the relay station from which you received the duplicate message, explaining the situation. The relay station then checks its monitor rolls to make sure that all addressees received a copy of the message in question.

The procedure for forwarding a misrouted message is treated in detail in the discussion of reroute pilot tapes.

PILOT TAPES

A pilot indicates that, for some reason, a particular message required special handling over relay circuits. The pilot is considered to be format line 1 of the message. Here are four important types of pilots.

Pilot	Abbreviation	Associated operating signal
1. Subject to correction.	SUBCOR	ZDG
2. Corrected copy.	CORCY	ZEL
3. Suspected duplicate transmission.	SUSDUPE	ZFD
4. Rerouted message.	- - - -	ZOV

SUBCOR PILOT

When a relay operator finds a garbled or mutilated tape of PRIORITY or lower precedence, the tape usually is not relayed until a good copy is available. If waiting for a good copy would delay the message unreasonably, or if the message is of higher precedence than PRIORITY, it is forwarded immediately, subject to correction. The station releasing a message subject to correction is responsible for seeing that a good tape is transmitted as soon as possible as a corrected copy.

In the following example, a message from the Far East, addressed to Washington, is received garbled at the relay station in Honolulu, and is forwarded SUBCOR.

(TI) (5 SPACES 2CR LF)	
OO RUECN	(2CR LF)
ZNR ZDG RUHP	(2CR LF)
VV (3 SPACES)MGA19ØVV	(2CR LF)
(3 SPACES)ATA1Ø5	(2CR LF)
OO RUECN	(2CR LF)
DE RUATH 93 18/19Ø1Z	(2CR LF)
ZNR	(2CR LF)
O 18191ØZ	(2CR LF)
FM COMNAVFORJAPAN	(2CR LF)
TO RUECN/DIRNAVSECGRU	(2CR LF)
BT	(2CR LF)
(Text garbled but still useful.)	
(Etc.)	(Etc.)

CORCY PILOT

When a relay station forwards a SUBCOR message, as in the foregoing example, it is that station's responsibility to obtain a good tape and forward it to the station to which the SUBCOR was sent. The next example shows the pilot used by RUHP in forwarding the corrected copy of the preceding message.

(TI) (5 SPACES 2CR LF)	
OO RUECN	(2CR LF)
ZNR ZEL RUHP	(2CR LF)
VV (3 SPACES)MGA19ØVV	(2CR LF)
(3 SPACES)ATA1Ø5	(2CR LF)
OO RUECN	(2CR LF)
DE RUATH 93 18/19Ø1Z	(2CR LF)
....Etc....	(Etc.)

SUSDUPE PILOT

When a station has no conclusive evidence that a tape was transmitted, but suspects that it was, the message is forwarded as a suspected duplicate. In such instances, the station called is responsible for preventing duplicate deliveries to the addressee. Example:

(TI) (5 SPACES 2CR LF)	
PP RULAGB	(2CR LF)
ZFD RULA	(2CR LF)
PP RULAT RULAC RULAGB	(2CR LF)
DE RUECH 48A 11/1158Z	(2CR LF)
P 111213Z	(2CR LF)
(Etc.)	(Etc.)

REROUTE PILOT

As you learned in the previous section, a misrouted message bears an incorrect routing indicator. Because a misroute is handled differently, do not confuse this type of message with the missent message, which bears the correct routing indicator but inadvertently is sent to the wrong station. The misrouted message must be forwarded with a pilot, whereas the missent message is forwarded without alteration.

The station detecting a misroute is responsible for taking corrective routing action. (In some instances the station detecting a misroute is a relay station; in others, the minor station to which the message was misrouted.) Corrective routing action consists of preparing a pilot containing the message precedence (repeated), the correct routing indicator of the station to effect delivery, the operating signals ZNR (when appearing in the original heading) and ZOV (the routing indicator of the station preparing the pilot), and, if required, transmission instructions. Transmission instructions are used only in multiple-addressed messages, and then only when absolutely necessary to effect delivery of the message.

In the following example, assume that relay station RUHP receives a message for further relay, and discovers a misroute in it. An operator at RUHP prepares a reroute pilot tape,

prefixes it to the original tape (as received), and relays the message to the correction station.

(TI) (5 SPACES 2CR LF)	
RR RUHPF	(2CR LF)
ZNR ZOV RUHP	(2CR LF)
VV (3 SPACES UATØ98	(2CR LF)
RR RUHPB RUHPE	(2CR LF)
DE RUATA 43 Ø8/Ø759Z	(2CR LF)
ZNR	(2CR LF)
R ØSØ923Z	(2CR LF)
FM NAS ATSUGI	(2CR LF)
TO RUHPB/CINCPACELT	(2CR LF)
INFO RUHPE/COMBARPAC	(2CR LF)
BT	(2CR LF)
(Etc.)	(Etc.)

After rerouting the message, RUHP transmits a service message to RUATA (station originating the misrouted message), pointing out the incorrect routing and indicating the corrective action taken. This procedure is an important part of the reroute process. It brings the routing error to the attention of the station at fault, and helps prevent future misroutes.

TWX SYSTEM

The TWX is a commercial teletypewriter system owned and operated by the various telephone companies. Its services are available to anyone on much the same basis as the telephone. Any businessman may have TWX installed in his office. Charges are made as for phone service—so much for the use of the equipment and so much for each call, based on time and distance.

The Navy uses TWX as an extension of the DCSTTYNET system. The TWX serves outlying stations that do not send or receive enough traffic to warrant the cost of circuits and equipment that would make them a part of DCSTTYNET.

A message to an activity served by TWX is forwarded over DCSTTYNET to the station nearest its destination and there is refiled into the TWX network. This method results in considerable savings because the long-haul portion of such traffic is then handled over Navy-leased lines and the only extra cost is for the short-distance transmission from the DCSTTYNET station. The routing indicator given in ACP 117 for an activity served by TWX is the basic indicator of the relay station or tributary station that will effect transfer of traffic, with the suffix CX added. For instance, the routing indicator for the Naval Propellant Plant at Indian Head, Md. is listed as RUECCX, which indicates that the message would be sent to the TWX section of RUECC COMMSTA in Washington, and there refiled by TWX for delivery to Indian Head. Keep in mind that any time you have a message to an activity whose rating indicator ends in CX, there are commercial charges for final delivery.

When a message is received for TWX refile, the operator finds the TWX number in the directory. When he has the number, he calls the local TWX operator, states the number he wants, and then stands by until he receives a GA (go ahead) from the distant station.

Assume that RUECCX receives a message for refile to the Naval Propellant Plant at Indian Head. This is the way it came in:

VZCZCCCB395CDAØ78 (5 SPACES 2CR LF)	
RR RUECCX	(2CR LF)
DE RUECD 21B 11/1412Z	(2CR LF)
ZNR	(2CR LF)
R 111533Z	(2CR LF)
FM BUWEPS	(2CR LF)
TO RUECCX/NPP INDIAN HEAD	(2CR LF)
NAVY	(2CR LF)
BT	(2CR LF)
(Etc.)	(Etc.)

In the following procedure for delivery by TWX, the TWX operator answers as soon as the RUECC operator turns on his machine. Example:

Transmission	Explanation
GA PLS	TWX operator answers "Go ahead, please."
INDIAN HEAD MD 241	RUECC operator gives number he wants.
MIN PLS	TWX operator says "Stand by a minute please," then makes the circuit connection.
INDIAN HEAD	TWX operator calls Naval Propellant Plant, Indian Head, Md.
GA PLS	Naval Propellant Plant, Indian Head, answers. (At this point, the TWX switchboard operator drops off line.)
RUECC 3, etc.	RUECC transmits message.
END (bell signal)	Sent by RUECC operator at end of message or end of last message, if more than one is transmitted.
R NR3	Operator at Indian Head receipts for message. Both

Transmission	Explanation
R NR3 (Cont'd)	the RUECC and Indian Head operators turn off machines, and the TWX operator disconnects circuit.

COMMERCIAL MESSAGES VIA DCSTTYNET

Official messages to commercial activities are sent over DCSTTYNET circuits to the message center nearest the addressee. If the message center is near enough, delivery may be made by telephone or by other appropriate means. Otherwise, it must be given to commercial communication company for final delivery.

Here are two messages addressed to commercial activities. The first message has two commercial addressees; the second has one naval addressee and one commercial addressee. Note that the form is the same for both messages. An accounting symbol is always required in format line 10.

Example 1:

VZCACCDA198	(5 SPACES 2CR LF)
RR RUEGCU	(2CR LF)
DE RUECD 43A 26/1Ø15Z	(2CR LF)
ZNR	(2CR LF)
R 261235Z	(2CR LF)
FM BUSHIPS	(2CR LF)
TO RUEGCU/TELETYPE CORP	(2CR LF)
41ØØ FULLERTON	(2CR LF)
AVE CHGO	(2CR LF)
RUEGCU/COLLINS RADIO CO	(2CR LF)
CEDAR RAPIDS IOWA	(2CR LF)
NAVY	(2CR LF)
BT	(2CR LF)
UNCLAS	(2CR LF)
THIS IS AN EXAMPLE OF A	(2CR LF)
MULTIPLE ADDRESS MSG	(2CR LF)
FOR COMMERCIAL ADDEES	(2CR LF)
ONLY CMM ROUTED TO	(2CR LF)
AUTHORIZED REFILE POINT	(2CR LF)
NEAREST ADDEES	(2CR LF)
BT	(2CR 8LF)
NNNN	(12 LTRS)

Example 2:

VZCZCCDB312 (5 SPACES 2CR LF)	
RR RUCKDY RUWPLC	(2CR LF)
DE RUECD 296B 27/1759Z	(2CR LF)
ZNR	(2CR LF)
R 272331Z	(2CR LF)
FM BUWEPS	(2CR LF)
TO RUCKDY/NAVSHIPYD NORVA	(2CR LF)
RUWPLC/CONSOLIDATED	(2CR LF)
VULTEE ACFT	(2CR LF)
CORP POMONA	(2CR LF)
NAVY	(2CR LF)
BT	(2CR LF)
UNCLAS	(2CR LF)
THIS IS AN EXAMPLE OF A	(2CR LF)
MULTIPLE ADDRESS MSG	(2CR LF)
FOR A NAVAL AND A COM-	(2CR LF)
MERCIAL ADDEE, ROUTED BY	(2CR LF)
DCSTTYNET FOR DELIVERY TO	(2CR LF)
NAVAL ADDEE AND TO NEAR-	(2CR LF)
EST POINT OF COMMERCIAL	(2CR LF)
REFILE FOR DELIVERY TO	(2CR LF)
COMMERCIAL ADDEE	(2CR LF)
BT	(2CR 8LF)
NNNN	(12 LTRS)

CLASS E DCSTTYNET MESSAGES

Class E messages originated by ships were discussed in chapter 8. The class E privilege is extended to personnel at all overseas naval stations served by naval communications. Such messages are handled as plaindress, single-address messages to points of refile in the continental United States. Although many shore stations on both coasts are authorized to refile class E messages from ships at sea, those originating at overseas shore stations are refiled at the circuit entry points at Washington and San Francisco. Following is an example of a class E message in DCSTTYNET form.

(TI) (5 SPACES 2CR LF)	
RR RUECC	(2CR LF)
DE RULAC 125A 14/Ø913Z	(2CR LF)
ZNR	(2CR LF)
R 141227Z	(2CR LF)
FM NAVCOMMSTA SAN JUAN	(2CR LF)
TO RUECC/NAVCOMMSTA WASHDC	(2CR LF)
BT	(2CR LF)
MSG CK18 COMLE JOHN D	(2CR LF)
NICHOLAS 33Ø8	(2CR LF)
SENATOR AVE SE DISTRICT	(2CR LF)
HEIGHTS MD	(2CR LF)
JOYCE AND KIDS ARRIVING	(2CR LF)
IDLEWILD 123Ø AM	(2CR LF)
OCT 15 PAA FLT 2Ø6 MEET IF	(2CR LF)
POSSIBLE	(2CR LF)
MARK VECELLIO NAVCOMMSTA	(2CR LF)

SAN JUAN	(2CR LF)
BT	(2CR 8LF)
NNNN	(12 LTRS)

READDRESSING

All procedure lines preceding line 5 (preamble) of the original heading are deleted, and a supplementary heading is inserted in front of the original preamble. The supplementary heading is separated from the remaining portion of the original heading by a line feed function.

Assume that on receipt of this message, COMFIVE wishes to readdress it for INFO to NTC Bainbridge, Md.

(TI) (5 SPACES 2CR LF)	
PP RUECW RUCKC RUWSPG	(2CR LF)
DE RUHPB 123C 15/Ø821Z	(2CR LF)
ZNR	(2CR LF)
P 15Ø911Z	(2CR LF)
FM CINCPACFLT	(2CR LF)
TO RUECW/CNO	(2CR LF)
RUCKC/COMFIVE	(2CR LF)
RUWSPG/COMWESTSEAFRON	(2CR LF)
BT	(2CR LF)
UNCLAS	(2CR LF)
(Plain language text.)	(2CR LF)
BT	(2CR 8LF)
NNNN	(12 LTRS)

The next example is the message as readdressed. Notice that COMFIVE has changed the precedence in the supplementary heading. Selection of the precedence and the decision whether the message is to be readdressed for action or information are responsibilities of the readdressing activity. The original message is unchanged past line 4.

(TI) (5 SPACES 2CR LF)	
RR RUECTAJ	(2CR LF)
DE RUCKC 34 15/1334Z	(2CR LF)
ZNR	(2CR LF)
R 151452Z	(2CR LF)
FM COMFIVE	(2CR LF)
INFO RUECTAJ/NTC BAIN	(2CR LF)
P 15Ø911Z	(2CR LF)
FM CINCPACFLT	(2CR LF)
TO RUECW/CNO	(2CR LF)
RUCKC/COMFIVE	(2CR LF)
RUWSPG/COMWESTSEAFRON	(2CR LF)
BT	(2CR LF)
UNCLAS	(2CR LF)
(Plain language text.)	(2CR LF)
BT	(2CR 8LF)
NNNN	(12 LTRS)

SERVICE MESSAGES

Service messages are short, concise messages between communication personnel used to expedite the handling of messages. Usually, service messages concern transmissions originated at, addressed to, or refiled by a station, although they may pertain to any phase of traffic handing, communication facilities, or circuit condition.

Plain language service messages are prepared in abbreviated plaindress format. The degree of abbreviation depends upon whether the service messages must be relayed. If two stations are directly connected, service messages consist of only format lines 1, 2, 3 (less station serial number), 4 (when required), and 12. Service messages requiring relay contain all format lines except lines 5, 6, and 10. Lines 7 and 8 are used only when it is necessary to show action and information addressees, at which time addressees are designated by routing indicators. Service messages requiring commercial refile must show the complete address, including accounting data in format line 10.

The text of all service messages begins with the security classification or the abbreviation UNCLAS. Then follows the abbreviation SVC, which, in turn, may be followed by a reference number. When reference numbers are used, they are assigned consecutively on a monthly basis, commencing with the first and ending on the last calendar day of each month. This numbering method provides an additional means of referring to a particular service message.

Following is an example of an abbreviated service message between directly connected relay stations, requesting retransmission of a garbled tape.

(TI) (5 SPACES 2CR LF)	
RR RUEP	(2CR LF)
DE RUCA Ø2/1421Z	(2CR LF)
ZNR	(2CR LF)
UNCLAS SVC EUC128 RPT	(2CR 8LF)
EUC 128 ZES2	(2CR 8LF)
NNNN	(12 LTRS)

A normal, single-address service message between minor stations in the continental United States (CONUS) is shown in the next example.

(In the CONUS, a minor station receiving a garbled message requests retransmission (rerun) from the station originating the message. Outside the CONUS, a minor station receiving a garbled message from a relay station requests retransmission from the relay station.)

(TI) (5 SPACES 2CR LF)
RR RUEPDA (2CR LF)
DE RUEPPD 29 Ø7/Ø643Z (2CR LF)
ZNR (2CR LF)
BT (2CR LF)
UNCLAS SVC RUEPDA 15A (2CR LF)
Ø7/Ø5Ø5Z Ø7Ø445Z (2CR LF)
ZES2 (2CR LF)
BT (2CR 8LF)
NNNN (12 LTRS)

TEST TAPES

Standard test tapes are utilized for testing circuit operation. The test tapes themselves must be letter perfect to prevent misleading the receiving operator at the distant station. You should prepare test tapes ahead of time and keep them available near the operating position for use when needed. Accurate reception of the tests indicates that the circuit and the equipment at both terminals are operating satisfactorily.

Test tapes are transmitted on a circuit or channel that has just been opened, but before transmission of traffic. In the following examples, a channel is opened between RUEPW and RUEPWN.

(TI) (5 SPACES 2CR LF)
RR RUEPW (2CR LF)
DE RUEPWN (2CR LF)
ZNR (2CR LF)
TEST THE QUICK BROWN FOX (2CR LF)
JUMPS OVER THE LAZY DOG (2CR LF)
1234567890 (2CR LF)
RYRYRYRYRYRYRY (2CR LF)
RYRYRYRYRYRYRYRYRYR (2CR LF)
INT ZBZ K (2CR 8LF)
NNNN (12 LTRS)

When the operator at RUEPW determines that the test message is satisfactory, he transmits:

(TI) (5 SPACES 2CR LF)
RR RUEPWN (2CR LF)
DE RUEPW Ø8/1245Z (2CR LF)
ZNR (2CR LF)
ZBZ5 K (2CR 8LF)
NNNN (12 LTRS)

After a circuit or channel is opened for traffic, it becomes necessary, sometimes, to interrupt traffic and send a test because of poor readability. In such instances, the test tape is constructed as follows:

(Sufficient LTRS to permit splicing tape into a continuous loop.)
(5 SPACES 2CR LF)
THE QUICK BROWN FOX JUMPS OVER
THE LAZY DOG
1234567890 TEST DE RUHPC (2CR)
THE QUICK BROWN FOX JUMPS OVER
THE LAZY DOG
1234567890 TEST DE RUHPC (2CR LF)
RYRYRYRYRYRYRYRYRYRYRY
RYRYRYRYRYRYRYRYR
RYRYRYRYRYRYRYRYRYRYRY(2CR LF)
(Sufficient LTRS to permit splicing tape into a continuous loop.)

ENSURING CONTINUITY OF TRAFFIC

Except for FLASH messages, station-to-station receipts are not employed in the tape relay system. The responsibility for continuity of received messages rests with the station receiving the traffic. The receiving station ensures that a tape is received under each channel number and that numbers are not duplicated or omitted.

When no transmission is received over a circuit or channel for a period of 30 minutes (this interval may be increased to 60 minutes at the discretion of the relay station on channels to its tributaries), the receiving station originates a service message (called a channel check) to the transmitting station. The channel check is assigned a precedence of IMMEDIATE, and is in the following form:

(TI) (5 SPACES 2CR LF)
OO RUHPB (2CR LF)
DE EUHPC Ø3/16Ø5Z (2CR LF)
ZNR (2CR LF)
UNCLAS SVC ZID PBA113 (2CR 8LF)
NNNN (12 LTRS)

(The channel number following the operating signal ZID indicates the channel number of the last message received from RUHPB on that channel.)

Station RUHPB checks the channel number of the last message transmitted to RUHPC on the channel indicated, and, if it agrees with the

number in the channel check, RUHPB transmits:

(TI) (5 SPACES 2CR LF)	
OO RUHPC	(2CR LF)
DE RUHPB Ø3/16Ø7Z	(2CR LF)
ZNR	(2CR LF)
UNCLAS SVC SIC PBA113	(2CR 8LF)
NNNN	(12 LTRS)

If the message reported as last received does not correspond to that sent last, RUHPB takes whatever action is necessary to establish contact with RUHPC, and retransmits the missing message(s).

At minor station, if no traffic is received for a period of 30 minutes (or 60 minutes if so directed), the minor station originates and transmits a channel check addresses to its own station. The following example is such a channel check.

(TI) (5 SPACES 2CR LF)	
OO RUHPB	(2CR LF)
DE RUHPB	(2CR LF)
ZNR	(2CR LF)
UNCLAS SVC CHANNEL CHECK	(2CR LF)
RYRYRYRY	(2CR LF)
ABCDEFGHIJKLMNOPQRSTUV	(2CR 8LF)
WXYZ 1234567890	(2CR 8LF)
NNNN	(12 LTRS)

The preceding message, routed in its own station, indicates to the minor station a satisfactory circuit condition if it is received promptly from the relay station and the channel number agrees with the received message log. If it is not returned over the receive channel within a reasonable length of time, then circuit trouble should be suspected, and the condition of the circuit should be investigated by maintenance personnel.

CHANGING CHANNEL NUMBER SEQUENCE

Channel number sequences are changes as near to 0001Z daily as practicable. Because of having many circuits on which the numbers must be changed, relay stations usually commence resetting their outgoing channel numbers to 001 at approximately 2330Z daily.

Upon receipt of channel number 001 from the relay station, minor stations reset their numbers to 001. Then they originate a service message to the relay station, stating the last number received for that day and listing any messages awaiting rerun. This service message is sent under channel number 001 for the new day.

In the following example, station RUECD sends the final number comparison for the old day and informs RUEC that retransmission of a message still is pending.

(TI) (5 SPACES 2CR LF)	
RR RUEC	(2CR LF)
DE RUECD 12/ØØØ2Z	(2CR LF)
ZNR	(2CR LF)
UNCLAS SVC ZID ECA164	(2CR LF)
AWAITING ZDK ECA137	(2CR 8LF)
NNNN	(12 LTRS)

The same procedure is observed on circuits between relay stations, except that on multichannel circuits one service message usually suffices for reporting all circuits. Example:

(TI) (5 SPACES 2CR LF)	
RR RUEC	(2CR LF)
DE RUWS 12/ØØØ2Z	(2CR LF)
ZNR	(2CR LF)
UNCLAS SVC ZID ECA558	(2CR LF)
ECB62Ø ECC459 ECD7ØØ	(2CR 8LF)
NNNN	(12 LTRS)

TRACER PROCEEDINGS

Naval communications prides itself on reliability, but no communication system is absolutely perfect. For this reason there must be some provision for tracing messages that are lost or meet unreasonable delay. Tracers answer three questions: Was the message actually lost? Who lost it? Why was it lost?

Tracers are sent to protect the dependability of communications—not to serve as a basis for disciplinary action. They warn the station at fault that its internal message-handling procedures may need reexamination.

Tracing a message is nothing more than checking from station to station to find where the failure occurred. The proceedings leading to transmission of a service message tracer differ, however, depending upon whether the message in question is a nondelivery, a suspected nondelivery, or an excessively delayed delivery. Detailed procedures for each of these circumstances are prescribed in the effective edition of ACP 127.

For purposes of our discussion of tracer proceedings, assume that a known (not suspected) nondelivery occurs. In such instances, tracer proceedings start with the originator of the message, either on his own initiative or at the request of the addressee who did not receive the message.

The first step the originator takes is either to cancel or retransmit the original message to the addressee not receiving it. If the message is transmitted, the operating signal ZFG is transmitted immediately following the DTG in the original message heading. (Operating signal ZFG means "This message is an exact duplicate of a message previously transmitted.")

After retransmitting the message, a service message tracer is drafted and sent to the first relay station concerned with the original message. The relay station, after assuring that the message was not mishandled at that station, forwards the tracer to the next relay station for action, and to the originating station for information. This procedure continues on a station-to-station basis until the cause for the lost message is determined and reported to the originating station.

To illustrate a message being traced from originator to addressee, assume a message originated by RUEAHQ was lost en route to the addressee at RUFPBW. After retransmitting the original message to RUFPBW as an exact duplicate, RUEAHQ originates and transmits the following tracer to the service desk of the first relay station handling the original message.

(TI) (5 SPACES 2CR LF)	
RR RUEASU	(2CR LF)
DE RUEAHZ 25A 25/15ØØZ	(2CR LF)
ZNR	(2CR LF)
UNCLAS SVC RUEAHQ 1Ø4C	(2CR LF)
24/ØØ8ØØZ 24Ø75ØZ	(2CR LF)
ZDE2 RUFPBW/HQ USAFE	(2CR LF)
ZDQ RUEA HQB115	(2CR LF)
24Ø9ØØZ	(2CR 8LF)
NNNN	(12 LTRS)

(The meaning of the operating signals used in the text of the tracer are: ZDE2—Message ___ undelivered. Advise disposition. ZDQ—Message___was relayed to___by___at____.)

On receipt of the tracer, RUEASU checks its handling of the original message and finds that the message was forwarded to RUFP. Tracer action continues with RUEASU sending the following to RUFPSU (service desk of relay station RUFP) and RUEAHQ.

(TI) (5 SPACES 2CR LF)	
RR RUFPSU RUEAHQ	(2CR LF)
DE RUEASU 75A 25/1625Z	(2CR LF)
ZNR	(2CR LF)
TO RUFPSU	(2CR LF)
INFO RUEAHQ	(2CR LF)
BT	(2CR LF)
UNCLAS SVC RUEAHQ 104C	(2CR LF)
24/ØØ8ØØZ 24Ø75ØZ	(2CR LF)
ZDE2 RUFPBW/HQ USAFE ZDQ	(2CR LF)
RUFP JNB185	(2CR LF)
24Ø955Z	(2CR LF)
BT	(2CR 8LF)
NNNN	(12 LTRS)

On receipt of the foregoing tracer, RUFPSU checks its station monitors and finds that the questioned message was sent to RUFPBW for delivery to the addressee. Accordingly, RUFPSU sends this tracer:

(TI) (5 SPACES 2CR LF)	
RR RUFPBW RUEAHQ	(2CR LF)
DE RUFPSU 1Ø9 25/17Ø5Z	(2CR LF)
ZNR	(2CR LF)
TO RUFPBW	(2CR LF)
INFO RUEAHQ	(2CR LF)
BT	(2CR LF)
UNCLAS SVC RUEAHQ 1Ø4C	(2CR LF)
24/ØØ8ØØZ 24Ø75ØZ	(2CR LF)
ZDE2 RUFPBW/HQ USAFE ZDQ	(2CR LF)
RUFPBW BWA234	(2CR LF)
241ØØØZ	(2CR LF)
BT	(2CR 8LF)
NNNN	(12 LTRS)

As seen in the preceding examples, the original message was traced from the originating station to the station serving the addressee. After a thorough search of its files and records, RUFPBW discovers that the original transmission of the questioned message was received garbled and was filed without a good copy being obtained. That station must accept responsibility for the nondelivery. It does so in the following report to the originator of the message.

(TI) (5 SPACES 2CR LF)	
RR RUEAHQ RUFPSU	(2CR LF)
DE RUFPBW 223B 25/1915Z	(2CR LF)
ZNR	(2CR LF)
TO RUEAHQ	(2CR LF)
INFO RUFPSU	(2CR LF)

BT	(2CR LF)
UNCLAS SVC ZUI RUEAHQ	(2CR LF)
1Ø4C 24/Ø8ØØZ	(2CR LF)
24Ø75ØZ ZDE2 RUFPBW/HQ	(2CR LF)
USAFE RECEIVED	(2CR LF)
ABK2. THISTA FAILED TO	(2CR LF)
INITIATE ZDK	(2CR LF)
REQUEST. CORRECTIVE ACTION	(2CR LF)
TAKEN	(2CR LF)
BT	(2CR 8LF)
NNNN	(12 LTRS)

MANUAL TELETYPEWRITER PROCEDURE

Manual teletypewriter procedure is used on teletypewriter circuits that are not part of the tape relay network--on ship-ship and ship-shore RATT circuits, for example. The procedure is contained in the effective edition of ACP 126. Message formats for radioteletype, radiotelegraph, and radiotelephone are essentially the same. Because of this similarity, the message format for manual teletypewriter messages is not given here. When studying the examples contained in this topic, refer to table 8-4, chapter 8.

MANUAL TELETYPEWRITER MESSAGES

In the ensuing message examples, you will see the similarities of the manual teletypewriter procedure with tape relay procedures. As in all message examples throughout this text, format lines not needed for the message are omitted. End-of-line and end-of-message machine functions are indicated in parentheses.

Here is a plaindress, single-address message originated by USS Epperson and addressed to USS Renshaw. The originator and the addressee are in direct communication, and the call serves as the address. A preliminary call is made before transmitting the message.

(5 SPACES 2CR LF)	
NWBJ DE NTGT K	(2CR LF)
(5 SPACES 2CR LF)	
NTGT DE NWBJ K	(2CR 8LF)
(5 SPACES 2CR LF)	
NWBJ DE NTGT	(2CR LF)
R 272113Z	(2CR LF)
GR3Ø	(2CR LF)
BT	(2CR LF)
UNCLAS	(2CR LF)
1. EXCEPT FOR ABSENCE	(2CR LF)
OF SEPARATIVE SIGNS	(2CR LF)
IN HEADING, FORMAT OF	(2CR LF)
MSG IS IDENTICAL TO	(2CR LF)
RADIOTELEGRAPH	(2CR LF)
2. NOTICE THAT END-OF-	(2CR LF)
MESSAGE FUNCTIONS ARE	(2CR LF)
THE SAME AS IN TAPE	(2CR LF)
RELAY PROCEDURE	(2CR LF)
BT	(2CR LF)
K	(2CR 8LF)
NNNN	(12 LTRS)

Our next example is of a plaindress, multiple-address message. The originator is not in direct communication with the addressees, and sends the message to NAVCOMMSTA Guam for relay. Assume that communications are established by an exchange of calls (as in the preceding example).

(5 SPACES 2CR LF)	
NPN DE NWBJ	(2CR LF)
T	(2CR LF)
P Ø51921Z	(2CR LF)
FM USS RENSHAW	(2CR LF)
TO COMDESDIV 252	(2CR LF)
INFO COMDESRON 25	(2CR LF)
DOMDESFLOT 5	(2CR LF)
GR29	(2CR LF)
BT	(2CR LF)
UNCLAS	(2CR LF)
1. IF NOT MEMBERS OF TAPE	(2CR LF)
RELAY SYSTEM, MOBILE UNITS	(2CR LF)
TRANSMITTING UNCLAS MSGS	(2CR LF)
TO SHORE STATIONS VIA RATT	(2CR LF)
MUST USE PLAIN LANGUAGE	(2CR LF)
DESIGNATORS IN ADDRESS OF	(2CR LF)
SUCH MSGS	(2CR LF)
BT	(2CR LF)
K	(2CR 8LF)
NNNN	(12 LTRS)

The following exemplifies an abbreviated plaindress message, with the call serving as the address.

(5 SPACES 2CR LF)	
NLNB DE NREB	(2CR LF)
P	(2CR LF)
BT	(2CR LF)
UNCLAS	(2CR LF)
1. THE DATE AND GROUP	(2CR LF)
COUNT ARE OMITTED FROM	(2CR LF)
THIS MSG. OTHER ELEMENTS	(2CR LF)
THAT COULD BE OMITTED AT	(2CR LF)
THE DISCRETION OF THE ORIG	(2CR LF)
ARE PRECEDENCE	(2CR LF)

AND TIME GROUP IN MSG	(2CR LF)
ENDING	(2CR LF)
BT	(2CR LF)
1421Z	(2CR LF)
K	(2CR 8LF)
NNNN	(12 LTRS)

A radioteletypewriter message prepared in codress form is shown in the next example. The called station, NAVCOMMSTA Honolulu, must decrypt and deliver the message to certain local activities named in the encrypted text. The originator uses an indefinite call.

(5 SPACES 2CR LF)	
NPM DE NA	(2CR LF)
R 2718Ø5Z	(2CR LF)
GR46	(2CR LF)
BT	(2CR LF)
ENCRYPTED GROUPS	(2CR LF)
BT	(2CR LF)
C 12 XYTOP	(2CR LF)
K	(2CR 8LF)
NNNN	(12 LTRS)

TOUCH TELETYPEWRITING TEST

Before you can be recommended to take the fleet servicewide examination for advancement to CYN3, you must demonstrate your ability as a teletypist by satisfactorily passing a performance test in touch teletypewriting. This performance test is not a part of the competitive examination. It is administered by your local examining board at least once each quarter, or four times a year. You cannot compete in the servicewide examinations without first passing the performance test and meeting all the other requirements listed in the front of this Navy Training Course.

The teletypewriting test for advancement to CYN3 consists of three messages, totaling approximately 600 characters, which must be transmitted in 9 minutes. Some of the message texts are plain language, others are composed of five-character groups of random mixed letters, or random mixed numerals. The headings contain about 30 percent and the texts about 70 percent of the total number of characters. Only in the event a teletypewriter is unavailable will the examining board let you use a telegraphic typewriter for the typing test.

The time limits for the test include servicing each message by endorsing the time of transmission, the circuit used, and your personal sign. Servicing should not require much time, but be sure to include time for servicing in your practice runs.

Transmission of the touch teletypewriting test must be by direct keyboard method; you are not permitted to cut a tape. A total of five errors (uncorrected or omitted characters) is permitted in the official test. If an error is corrected properly and according to the correct procedure, it does not count as an error. Thus, there is no limit to the number of corrected errors you may have. But correcting errors takes time and, on an examination, if you must stop to correct too many errors, you may disqualify yourself by failing to finish within the time limits.

Just before the official test you will be given a practice test consisting of messages that are different from the official test, though similar in number, length, and general content. The results of the practice test do not affect the score of the official test, but if you try your best on the practice test, it will help you overcome nervousness, and you will be better able to adjust your typing speed within the time limits on the official test.

Be sure to practice your teletypewriting in preparation for the performance test. Strive to improve both your accuracy and your speed. Remember that you may not be able to do your normal best typing on the day of the test. The examining board may hold the test in surroundings unfamiliar to you; besides, most persons are victims of nervousness on examination day. It is well, therefore, to have sufficient speed and accuracy to provide a little "margin" for overcoming your nervousness in unfamiliar surroundings.

CHAPTER 12

SAFETY

The Department of the Navy maintains a consistent policy of furthering the health and welfare of both military and civilian personnel. Each year the battle readiness of the fleet is undermined to some degree because of the number of manhours lost due to personal injuries. Most accidents occur in noncombat operations which can be prevented if full cooperation of personnel is gained and vigilance is exercised to eliminate unsafe conditions and unsafe acts.

When working with radio, or with any electronic equipment, one rule that cannot be stressed too strongly is: SAFETY FIRST. Dangerous voltages exist in much of the equipment with which you work. Power supply voltages range up to 40,000 volts, and radio frequency voltages are even higher. Special precautions are also necessary because electrical fields in the vicinity of antennas and antenna leads may introduce fire explosion hazards. Especially is this true when flammable vapors are present.

Safety precaution outlines in this chapter are not intended to supersede information given in instruction books or in other applicable instructions for installation of electronic equipment. Check them before ever touching the gear. Additional safety information is contained in—

1. Electronic Installation Practices Manual, NavShips 900,171.
2. Electric Shock, Its Causes and Prevention, NavShips 250-660-42.
3. Electric Shock and Its Prevention, NavShips 250-660-45.
4. U.S. Navy Safety Precautions, OpNav 34P1.

If at any time there is doubt about the steps and procedures you should observe while working on electronic equipment, consult the technician or Radioman in charge.

READ THE SIGNS

Danger signs and suitable guards are provided to prevent personnel from coming in accidental contact with high voltages. The warning signs shown in figure 12-1 are posted on or near every radio transmitter, transmitting antenna lead-in trunk, and in radar rooms and other electronic spaces throughout the ship. The signs are painted red to make them more conspicuous.

Additional signs warn against such hazards as explosive vapors and effects of stack gases aloft.

Look for warning signs and obey them. Notify your supervisor if a dangerous condition exists for which no warning sign is posted.

FUNDAMENTALS OF ELECTRIC SHOCK

One of the greatest safety hazards for the naval communicator is electric shock. In order to avoid this hazard, an understanding of its causes and effects is necessary.

HOW MUCH DOES IT TAKE?

If a 60-cycle alternating current is passed through a man from hand to hand or from hand to foot, the effects when current is increased gradually from zero as follows:

1. At about 1 milliampere (0.001 ampere) the shock can be felt.
2. At about 10 milliamperes (0.010 ampere) the shock is severe enough to paralyze muscles so that the man is unable to release the conductor.
3. At about 100 milliamperes (0.100 ampere) the shock is fatal if it lasts for 1 second or longer.

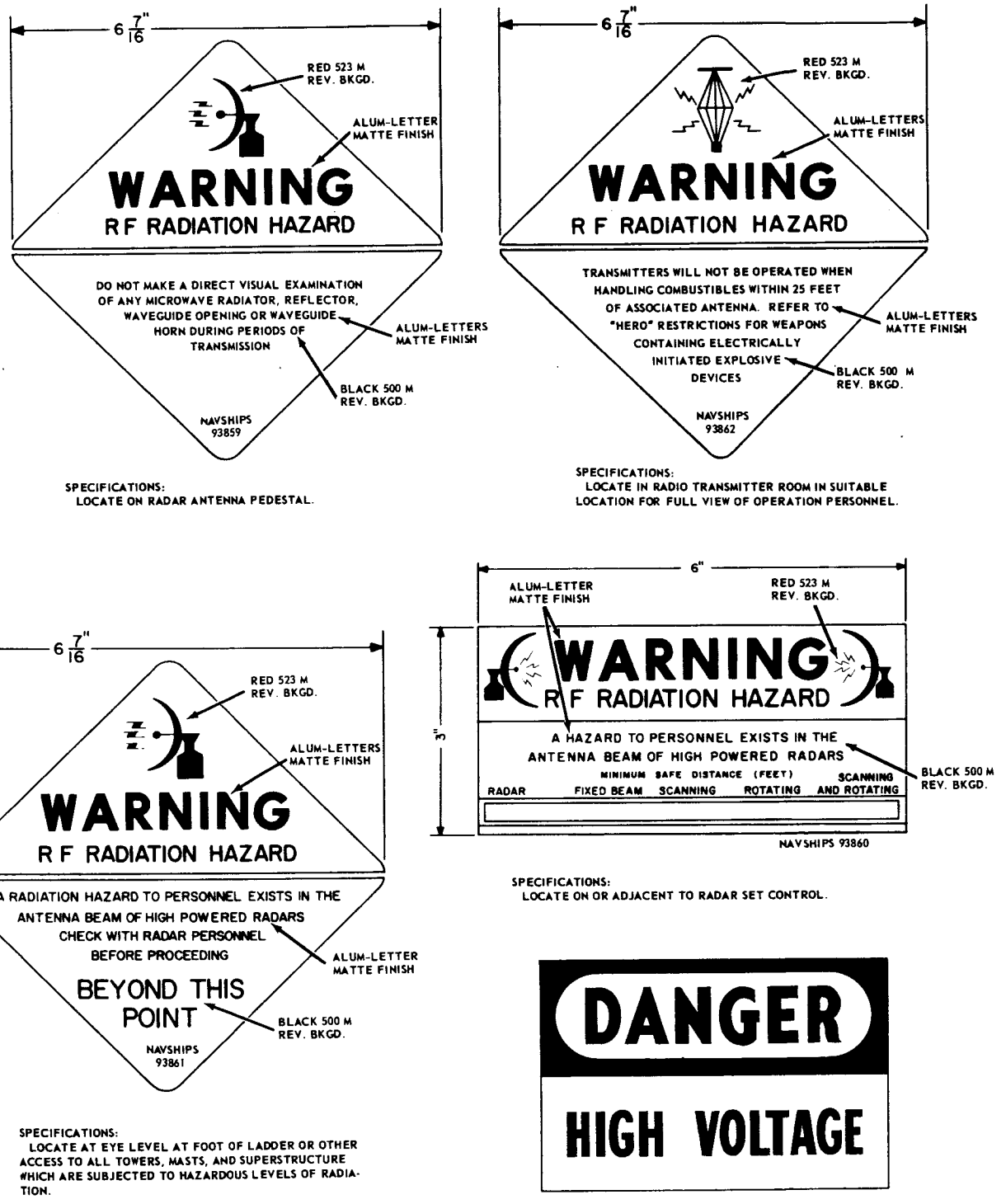


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Figure 12-1.—Hazard warning signs.

The resistance of the human body is insufficient to prevent fatal shock from 115-volt or lower voltages circuits. About 50 percent of shipboard electrocutions are caused by circuits of these types. It is important to remember that current is the shock factor, rather than the quantitative value of the voltage.

CONDITIONS FOR SHOCK

Two conditions must be met for current to flow through a man. First, he must form part of a closed circuit; and second, there must be a voltage to cause current to flow through the circuit. If these two conditions exist and in addition the potential difference between the points of contact is high enough (115 volts is more than high enough), the body resistance is low enough, and the current path goes through some of the man's vital organs, he will be shocked fatally. For this reason a man should see to it that his body does not form part of a closed circuit through which current can flow.

Don't go aboard ship with a casual attitude toward the deadly potentialities of electric current. Few people would handle electric appliances while in the bathtub, or stand ankle-deep in a flooded basement and fumble for the light switch. What is not so well recognized by many Navymen is that the hull of a ship—which, of course, floats in salt water—is an excellent conductor, and that for all practical purposes the man afloat is "standing in a bathtub" all the time.

SOME NOTES ON HUMAN ERROR

Most accidents are avoidable. So that you can see for yourself how avoidable they are, here are the causes of 22 shipboard electrocutions, all of which were traceable to human failure or error.

Causes	Deaths
1. Accidentally touched equipment or conductor, which man knew to be energized.	13
2. Unauthorized modifications to equipment or use of unauthorized equipment.	3
3. Failure to test equipment before working on it to see whether it was energized.	2
4. Failure to repair equipment that had given warning of an unsafe condition by one or more non-fatal shocks prior to the fatal shock.	2
5. Failure to test equipment for insulation resistance and correctness of ground connection AFTER making repairs, and BEFORE trying gear for operability or putting it to use.	2

Men are also electrocuted ashore. In one instance a man erecting an antenna tied a rock to the end of a bare copper wire and threw it over a 3300-volt powerline. Another died when he climbed a pole on a transmission line to capture a monkey sitting on one of the wires. A third walked out of a warehouse with a companion, saw a wire hanging from a pole, said "There's the wire that was popping yesterday," and, before his companion could stop him, walked up and grabbed the wire to throw it out of the way. These are not fairy-tales. Actually, they are true summaries of reports on the deaths of three men who were either ignorant or contemptuous of the lethal capabilities of electric current.

Intentionally taking a shock from any voltage is always dangerous and is strictly forbidden. When necessary to check a circuit to find whether it is alive, use a test lamp, voltmeter, or other suitable indicating device.

HIGH-FREQUENCY OPERATING HAZARDS

Aside from the danger of shock, the hazards involved in the operation of electronic equipment in the high-frequency range may be divided into three categories:

1. RADHAZ, an acronym formed from the underlined letters of its technical significance: radiation hazards to personnel.
2. HERO, a term formed from the underlined letters of the more explicit phase: hazards of electromagnetic radiation to ordnance.
3. SPARKS, the program concerned with the radiofrequency hazards associated with volatile liquids, such as fuel.

RADHAZ

Generally, the possibility of biological injury from radiation at the operating frequencies and powers of most radio communication equipment is slight. But, if your duties bring you into close proximity of radar antennas, the radiation hazard is very real.

Over exposure to r-f radiaton is thermal in nature, and is observed as an increase in overall body temperature or as a temperature rise in certain organs of the body. In short, your body is comprised of skin tissue that lies immediately underneath the skin, and a central mass of deeper tissues consisting of muscles, high water content tissues, and bone formations. If you are working in the vicinity of radar transmitting equipment, you may enter a field of electromagnetic radiation. The electromagnetic energy is absorbed in the tissues of your body, thus heat is produced in them. If the organism cannot dissipate this heat energy as fast as it is produced, the internal temperature of the body will rise. This temperature rise results in damage to the body tissue and, if the rise is sufficiently high, in death.

Proper warning signs are located at various points to warn you when you are entering an area that may be a radiation hazard.

You must remember that electromagnetic radiation is NOT visible. Its presence must, therefore, be measured by instruments.

HERO

Another danger of r-f radiation is the danger of premature firing of rockets or missiles, or the explosion of their warheads. The hazard to electronic explosive devices (EEDs), such as missiles, rockets, VT fuses, and the like, occurs because of the heat associated with a current passed through the sensitive wires surrounded by a temperature-sensitive explosive. If energy is dissipated in wire, the explosive becomes hot and an explosion can result.

Normally, the circuitry of EEDs is shielded in containers. If properly shielded, there is little danger of an accident. But, to be safe, there should be no ordnance in any personnel hazard zone or within 25 feet of any radiating antenna.

SPARKS

Aboard ship, shock hazards and sparks exist on rigging, cables, transmitting and receiving antennas, and other structures that are resonant to a radiated frequency. The position of the radiating antenna relative to these objects governs the amount of induced voltage present. If the induced voltage in an object is large enough, arcs and sparks may be drawn when contact is made or broken by personnel, tools, or other conductive materials. Consequently, during refueling, when arming aircraft, and handling ammunition or volatile liquids and gases, extreme care must be exercised by working personnel. Additionally, all transmitting equipment should be deenergized. If deenergizing is impossible, a separation of at least 25 feet must be maintained between the work area and an energized antenna as a safety precaution.

PAINTING

When you paint radio rooms, or use insulation varnish, lacquer, paint thinner, or other volatile liquid in radio spaces, make sure there is adequate ventilation. Use both exhaust ventilators and power blowers. Blowers should be arranged to ensure rapid removal of explosive, combustible, or toxic vapors. Such vapors should be exhausted in such a way that they will not drift into other areas or be sucked into the ship's supply vents.

If paint vapors or fumes are suspected of being explosive, do not allow anyone in the vicinity to use portable electrical equipment of a type that might set off an explosion. Do not permit smoking in or near the danger area, nor allow any type of work that may produce flames or sparks. See that firefighting equipment is handy.

Practice good housekeeping. See that unnecessary projects are picked up and kept out of the way. Place in a covered metal container or in a bucket of water any rags, sweepings, and waste that may be contaminated with paint.

Never eat, drink, or store food in a compartment where painting is being done. Remove the coffee mess. Keep your hands out of your mouth. Paint is a poison, and ingesting the smallest amount can be serious.

FIRST AID

It is necessary that you understand first aid to be given for electric shock and burns, and how to revive a person by artificial respiration.

RESCUE FROM ELECTRICAL CONTACT

Many times, it is necessary to rescue the victim before you can begin first aid treatment. Rescuing a person who has received an electrical shock is likely to be difficult and dangerous. Extreme caution must be exercised to

avoid being electrocuted yourself. Speed is important, of course, but taking a few moments to evaluate the situation may make the difference between life and death—for you as well as for the person you are trying to rescue.

If the victim still is in contact with the conductor, your first act is to stop current flow through his body. You can shut off power by opening switches or circuit breakers, or by cutting the conductor with a wooden-handled ax or hatchet or with insulated pliers. If circumstances are such that power cannot be shut off quickly, use some dry material such as line, cloth, canvas, rubber, or wood to lift or pull the man away from the conductor. DON'T USE METAL OR MOIST MATERIALS. When you are trying to break an electrical contact, stand on any dry nonconducting material to prevent the current from reaching ground through your body should you touch the conductor.

ARTIFICIAL RESPIRATION

A victim of electrical shock who has stopped breathing is not necessarily dead, but he is in immediate and critical danger. The same methods of artificial respiration used for drowning or gas asphyxiation cases can be used for victims of electrical shock.

The purpose of artificial respiration is to force air in and out of the lungs in rhythmic alternation, until natural breathing is restored. Artificial respiration should be given only when natural breathing ceases. It must not be given to any person who is breathing naturally on his own. Do not assume that a person's breathing has stopped merely because he is unconscious, or because he has been rescued from contact with an electrical circuit. Remember: Do NOT give artificial respiraton to a person who is breathing naturally.

If possible, send for a medical officer or a Hospitalman; but don't go yourself, if you are alone with the victim. Speed in beginning artificial respiration is essential in any instance in which breathing has stopped. Every moment's delay cuts down the victim's chance of survival. Do not take time to move the victim to a more comfortable location, unless he is in such a dangerous position that he must be moved in order to save his life.

If another person is present while artificial respiration is being administered, he can be very helpful. Have him remove false teeth, chewing gum, or other matter from the victim's mouth; at the same time he can bring the victim's tongue forward. He also can loosen the clothing around the victim's neck, waist, and chest. If you are alone, you will have to attend to these details yourself before beginning artificial respiration.

Artificial respiration must be continued for at least 4 hours unless natural breathing is restored before that time or a medical officer declares the person dead. Some people have been revived after as much as 8 hours of artificial respiration.

Three methods of artificial respiration are described in this manual. They are the mouth-to-mouth method, the back-pressure arm-lift method, and the back-pressure hip-lift method.

In addition to the foregoing procedures, there are several other methods of artificial respiration. If you have had training in first aid, it is possible that you learned one of the older methods, but they no longer are considered the most effective. It is now your responsibility to learn the new techniques.

Mouth-to-Mouth Resuscitation

Mouth-to-mouth resuscitation, shown in figure 12-2, is recommended by the National Academy of Sciences, National Research Council, the American Red Cross, and the Armed Forces as the preferred and most effective way of providing artificial respiration. All other procedures are considered alternate methods for use only when mouth-to-mouth resuscitation is impractible.

Mouth-to-mouth resuscitation is particularly recommended for use aboard ship in cases of electric shock. Investigations of shipboard electric shock fatalities indicate that, despite the good intentions of rescuers, valuable seconds are sometimes lost in first moving the victim from an awkward, cramped, wet, or isolated location to a roomier, drier place before applying resuscitation measures. Familiarity with this method enables the man nearest the victim to start revival action readily while sending or yelling for medical help. Commencing artificial respiration can thus be reduced to a matter of a few seconds after freeing the victim from his contact with the electricity.

The following six steps are easy to learn:

1. Place the victim on his back. Loosen collar and belt.

2. Clear the mouth of any foreign matter

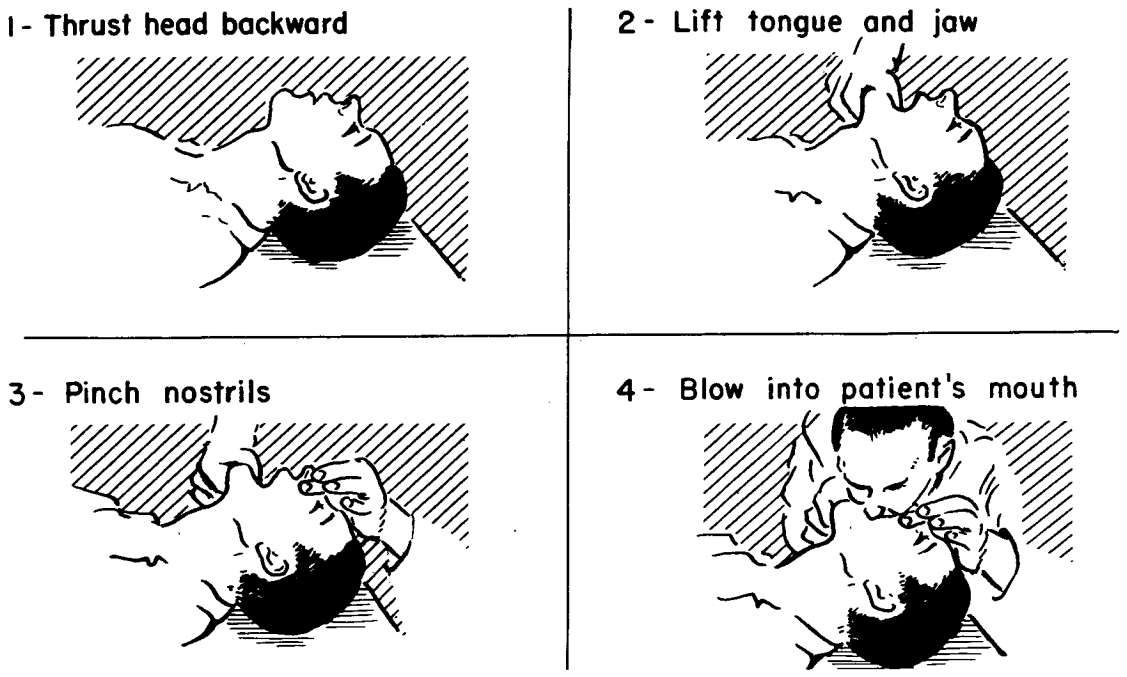

Figure 12-2.—Mouth-to-mouth method of resuscitation.

with your fingers or a cloth wrapped around your fingers.

3. Tilt the head back so the chin is pointing upward. With one hand push the jaw forward into a jutting-out position. Tilting the head and pushing the jaw forward should relieve obstruction of the airway. With the fingers of one hand, pinch the victim's nostrils shut to avoid any air leakage.

4. Take a deep breath. Place your mouth over the victim's mouth and breathe into him. The first blowing effort should determine whether any obstruction exists. Watch his chest rise to make sure his air passage is clear.

5. Remove your mouth, turn your head to one side, and listen for the return rush of air that indicates air exchange. Repeat the blowing effort about 12 times per minute.

6. If you are not getting air exchange, recheck the head and jaw position. If you still do not get air exchange, turn the victim quickly on his side and administer several blows between his shoulder blades in an effort to dislodge foreign matter. Again clean his mouth with your fingers.

Don't worry about germs when a life is at stake. Those who do not wish to come into direct contact with the victim may hold a cloth or handerchief over the victim's mouth or nose and breathe through it. The cloth does not greatly affect the exchange of air.

The Navy has available the plastic resuscitation tube, which is a part of every first aid kit. Use of the plastic tube makes it easier to keep the victim's tongue from blocking the air passage, and avoids the necessity for direct oral contact between rescuer and victim.

Medical research has established conclusively that the mouth-to-mouth respiration technique is superior to all others in reviving a person whose breathing has stopped for any reason. The method is adaptable to a victim of any age. Everyone should be familiar with it.

Back-Pressure Arm Lift Method

The back-pressure arm lift method of artificial respiration is illustrated in figure 12-3. This procedure requires the following steps:

1. Place the victim so that he is lying face down. If he is on a sloping surface, position him so that his head is slightly lower than his feet. Bend both his elbows and place one hand on the other, as shown in figure 12-3. Rest the victim's head on his hands, with his face turned to one side.

Kneel on one knee, facing the victim. (You can use either knee.) Place your knee close

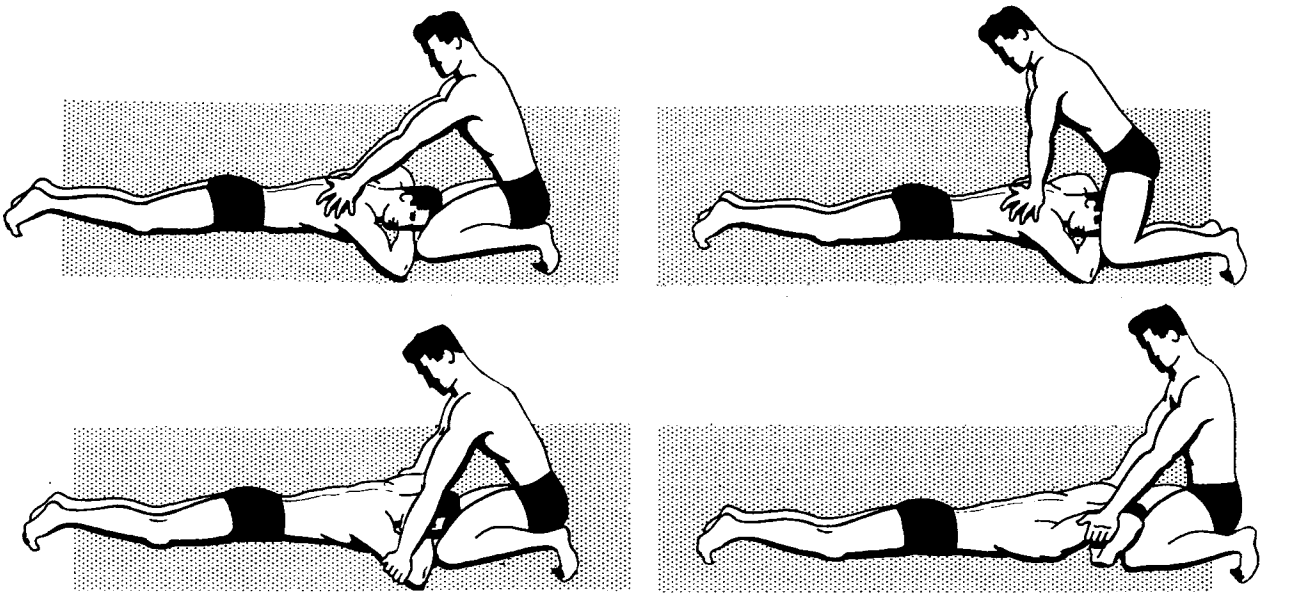

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Figure 12-3.—Back-pressure arm-lift method of resuscitation.

to his head. Put your other foot near his elbow. You may find it more comfortable to kneel on both knees; if you do, have one knee on each side of the victim's head. Next, place your hands on the middle of his back, just below the shoulder blades, in such a position that your fingers are spread downward, and outward, with thumb tips just about touching.

3. With your arms held straight, rock forward slowly so that the weight of your body is gradually brought to bear on the victim. This action compresses his chest and forces air out of the lungs. Do not exert sudden pressure, and do not put your hands too high on his back or on his shoulder blades.

4. Release the pressure quickly by peeling your hands from the victim's back.

5. Now rock backward, and allow your hands to come to rest on the victim's arms just above his elbows. As you swing backward, lift the victim's arms upward. The arm-lift movement pulls on the victim's chest muscles, arches his back, releases the weight on his chest, and causes his chest to expand and fill with air. Finally, lower the victim's arms, and you have finished one full cycle.

Repeat the cycle approximately 12 times per minute (5 seconds per cycle). Follow this rhythm: Rock forward and press, rock backward and lift. The pressing and lifting should take approximately equal periods of time; the release periods should be as short as possible.

Try to maintain a slow, easy rhythm—rocking forward on the back-pressure phase, rocking backward on the arm-lift movement. The rocking motion helps to maintain rhythm. Remember that a smooth rhythm is important in performing artificial respiration, but split-second timing is not essential.

Back-Pressure Hip-Lift Method

The back-pressure hip-lift method of resuscitation is shown in figure 12-4. It is used when necessary to give artificial respiration to a person injured in the upper part of the body—chest, neck, shoulders, or arms. The hip-lift procedure is also useful in situations where lack of space makes it difficult or impossible to use the arm-lift method. The hip-lift technique has the disadvantage of being somewhat harder on the operator.

The back-pressure hip-lift principle requires the following steps:

1. Place the victim face down, with one arm bent at the elbow and the other arm extended as in figure 12-4. Rest his head on his hand or forearm, with his face turned so that his nose and mouth are free for breathing. Clear his mouth of any objects or materials that

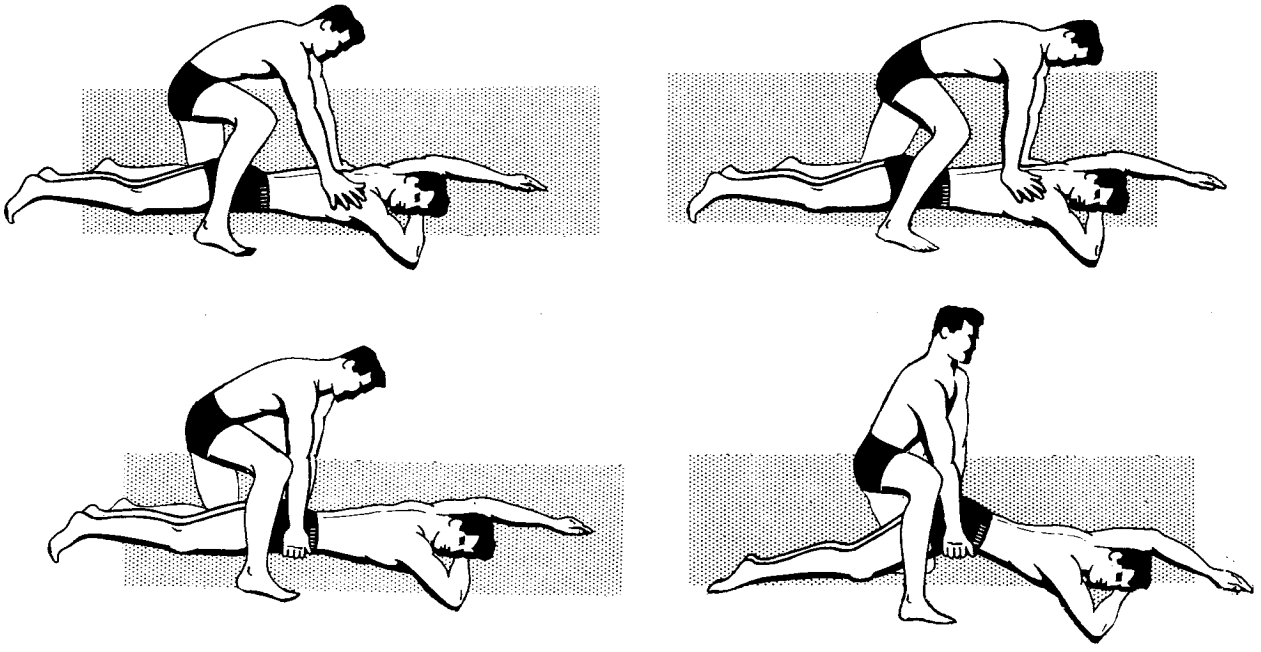

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Figure 12-4.—Back-pressure hip-lift method of resuscitation.

might obstruct his breathing. At the same time, bring his tongue forward so that it will not clog the air passage.

2. Kneel on either knee, and straddle the victim at the level of his hips. Place your hands on the middle of his back, just below the shoulder blades. Your fingers should be spread downward and outward, with your thumb tips just about touching. Be careful that your hands are not too high on his back; they should be below the shoulder blades.

3. With your arms held straight, rock forward slowly so that the weight of your body is gradually brought to bear upon the victim. Keep your elbows straight and your arms almost vertical, so that the pressure is exerted almost directly downward. Do not exert sudden pressure, or any more pressure than is required to feel a firm resistance.

4. Release the pressure quickly by peeling your hands from the patient's back.

5. Now rock backward and let your hands come to rest on the victim's hips, well below his waist. Slip your fingers underneath his hip bones.

6. Lift the victim's hips 4 to 6 inches. The lifting allows the abdomen to sag downward and the diaphragm to descend, causing his chest to expand and fill with air. Lower the victim's hips, and you have finished one full cycle.

As in the arm-lift method, the cycle should be performed approximately 12 times per minute. If a relief operator is available, he can come in on one side and take over after one of the lift movements.

Treatment During Recovery

When a person is regaining his breath, the bluish or pale appearance of his skin may be succeeded by a distinct flush of color. Then his muscles may begin to twitch and his fingers to scratch and clutch. Swallowing movements are sometimes the first sign of natural respiration. The first attempt to breathe may be a faint catch of breath, or a sigh. You must be very careful not to exert pressure when the victim is trying to get his first breath. If he begins to breathe on his own, adjust your timing to assist him. Do not hinder his efforts to breathe; instead, synchronize your efforts with his.

Keep the patient warm. Do not give any liquids until he is fully conscious. To avoid strain on his heart, the patient should be kept lying down and not allowed to stand or sit immediately after he revives. Do not allow

the patient to walk or otherwise exert himself. The slightest exertion at this point might easily cause death from heart failure. After a temporary recovery of respiration, the patient sometimes stops breathing again. If natural breathing stops, resume artificial respiration at once.

SHOCK

Some degree of shock follows all injuries. It may be slight and almost unnoticed, lasting only a few moments; or it may be severe enough to cause death. An interruption of breathing, from whatever cause, almost always is followed by severe shock.

Symptoms

A person suffering from shock feels weak, faint, and cold. His face is usually pale and his skin is cold and clammy. Sweating is likely to be very noticeable. Remember, however, that signs of shock do not always appear at the time of the injury. Indeed, in many serious cases, they may not appear until hours later.

The symptoms of a person suffering from shock are, directly or indirectly, the result of the circulation of the blood becoming disturbed. The pulse is weak and rapid. Breathing is likely to be shallow, rapid, and irregular, because the poor circulation of the blood affects the breathing center in the brain.

It is unlikely that you will see all these symptoms of shock in any specific instance. Some of them appear only in late stages of shock when the victim's life is in serious danger. It is imperative that you know the symptoms that indicate the presence of shock, but don't ever wait for symptoms to develop before beginning the treatment for shock.

Prevention and Treatment

The most helpful deed you can perform for a person revived by artificial respiration is to begin treatment for shock. If shock has not yet developed, the treatment may actually prevent its occurrence. If it has developed, you may be able to keep it from reaching a critical stage. It is extremely important, therefore, that you begin the treatment at the earliest practicable moment.

Get medical assistance as quickly as possible. Meanwhile, place the patient in a horizontal position, with his head slightly lower than the rest of his body. If it is impossible to do this, it might still be feasible for you to raise his feet and legs enough to help the blood flow to the brain. Do the best you can, under the circumstances, to get the patient into this position. Never let the patient sit or stand or walk around.

Heat is important in the treatment of shock, to the extent that the patient's body heat must be conserved. Keep the patient warm, but not hot. Apply only enough clothing and blankets to bring the body to normal temperature.

As a general rule, liquids should NOT be given as a part of first aid treatment for shock. Until recently, first aid books emphasized giving warm fluids (in particular water, tea, and coffee) as a part of the treatment. Now it is believed that administering fluids is not a necessary or even desirable part of first aid treatment. It is true that a person in shock is in need of liquids. But liquids given by mouth are not absorbed—and therefore are ineffective—except in very mild cases of shock. In moderate or deep shock, intravenous administration of fluids is necessary; but this is a medical procedure and cannot, under any circumstances, be performed by a person giving first aid.

One final precaution must be given concerning the use of liquids: Never give alcohol to a person who is in shock or who may go into shock. Alcohol increases the blood supply to the surface blood vessels, and diminishes the blood supply to the brain and other vital organs.

BURNS

Burns and scalds are caused by exposure to intense heat, such as heat generated by fire, bomb flash, hot solids, liquids, and gases, and contact with electric current.

Burns usually are classified according to the depth of injury to the tissues. A burn that reddens the skin is called a first-degree burn. One that reddens and blisters the skin is called a second-degree burn. When the skin is destroyed and the tissues actually are charred or cooked, the injury is described as a third-degree burn.

It is easy to see that a deep burn (third-degree) is more serious than one not so deep. Rememxer, however, that the size of the burned area may be far more important than the depth of the burn. A first-degree or second-degree burn that covers a very large area of the body is nearly always more serious than a small third-degree burn. A first-degree

sunburn, for example, can cause death if an entensive area of the body is involved.

It should be noted that burns and scalds are essentially the same type of heat injury. When the injury is caused by dry heat, it is called a burn; when caused by moist heat, it is referred to as a scald. Treatment is the same for both.

The chief dangers from burns are shock and infection. All first aid treatment for burns must be directed toward relieving the victim's pain, combating shock, and preventing infection.

Minor burns should be dressed immediately. Apply a thin coat of sterile petrolatum (vaseline) to the burned area and cover with a sterile bandage. The pain will be lessened if the bandage is airtight and fairly firm.

Serious burns should be treated as follows:

1. Relieve the pain. Burns are painful, and the pain contributes to the severity of shock. For a person who has suffered extensive burns, 1/4 grain of morphine is given to relieve the pain. (The morphine can be obtained from a first aid kit.)

CAUTION: Remember that the victim may have other injuries besides the burns. Do NOT give morphine to any person who has a head injury, even if he is suffering from extensive burns.

2. Treat for shock. Any badly burned person must be treated for shock immediately. Serious shock always accompanies an extensive burn, and is, in fact, the most dangerous consequence of the injury. Start the treatment for shock before making any attempt to treat the burn itself.

Relieving the victim's pain is, of course, an important part of the treatment for shock. When you have done this, try to place him in position so that his head is slightly lower than the rest of his body. Make sure that he is warm enough. Do not remove his clothing immediately. Cover him with a blanket if he appears to be cold. Do not overheat him, but remember that exposure to cold will cause shock to become even worse.

The general rule that liquids should not be given in first aid treatment for shock was emphasized earlier. In serious burns, however, an exception must be made to this rule. A seriously burned person has an overwhelming need for fluids; and administering liquids is an important part of the treatment for shock. Give small amounts of warm water, warm tea, or warm coffee if the victim is conscious and able to swallow and if he has no internal injuries.

3. Treat the burn. In cases of extensive burns, the first aid treatment depends upon the probable length of time that must elapse before the victim receives medical aid. If you believe that a medical officer will be available within a period of about 3 hours, simply wrap the victimin a clean sheet (or whatever clean material is available), continue to treat him for shock, but do not attempt any treatment of the burn itself.

If more than 3 hours may elapse before the services of a medical officer can be obtained, you will have to dress the burn. First remove the victim's clothing around and over the burn, being careful not to cause further injury. If clothing sticks to the burn, do not attempt to pull it loose. Merely cut around the part that sticks, and leave it in place. If any material such as wax, metal, tar, dirt, grease, etc., adheres firmly to the burn, do not try to remove it. Do not allow absorbent cotton, powder, adhesive tape, or any other substance that might stick to the burn to come in contact with it. Never put iodine or any other antiseptic on a burn.

When you clear away as much clothing as you can, dress the burn. Cover strips of sterile gauze with a thin coating of petrolatum (Vaseline). The petrolatum should not be applied too thickly. Wrap the gauze strips smoothly and gently around the burned areas, and cover with a roller bandage. The bandage must be firm, but not tight enough to restrict circulation of the blood or the interfere with breathing. A smooth, firm bandage greatly reduces the victim's pain.

Once the bandage is applied, it should not be disturbed. Leave it in place until the victim receives medical treatment.

As we have seen, shock is the most immediate danger in burn injuries. Infection is the second danger that must be prevented. Second-degree and third-degree burns are, in effect, open wounds. At first the burned areas are probably sterile, because of the intense heat that caused the burn. In handling and treating a person who has been burned, therefore, you must do everything possible to prevent contamination of the burn. Do not allow unsterile objects or materials to come in contact with the burn. Do not open any blisters. Contamination of the burn can cause serious (sometimes fatal) infections.

ELECTRICAL FIRES

Any fire is a potential source of disater. In electrical fires, observe the following procedures.

1. Deenergize the circuit for the equipment affected. Every radio transmitter has an EMERGENCY OFF switch that removes all power from the equipment. In additon to local power switches on the equipments, the power supply to all transmitters and receivers, converters, and teletypewriters can also be secured at the power distribution panels.

2. Spread the alarm. Ashore, call the fire department. Aboard ship, use the phone or intercom—if available, send another person—to sound the alarm in accordance with the ship's fire bill.

3. Secure ventilation. Turn off the blowers; close the doors.

4. Report the fire to the OOD by telephone or messenger.

5. Attack the fire with equipment available in the immediate vicnity, such as portable 15-pound CO2 (carbon dioxide) extinguishers.

When extinguishing an electrical fire, remember that quick action is required only to deenergize the circuit. When this has been done, STOP! LOOK! THINK! This use of CO_2 fire extinguishers directed at the base of the flame is always best for all electrical fires. Because carbon dioxide is a dry, noncorrosive, inert gas, it will not damage electrical equipment. And, because it is a nonconductor of electricity, it can be used safely in fighting fires that otherwise would present the additional hazard of electric shock.

PORTABLE FIRE EXTINGUISHERS

Some portable 15-pound carbon dioxide fire extinguishers have a squeeze-grip style release valve that is operated by a simple hand squeeze-grip. Others have a release valve operated by a handwheel at the top. Both valves have a locking pin to prevent unintentional discharge of the carbon dioxide. To operate:

1. Carry the extinguisher in an upright position, and approach the fire as closely as the heat permits. (Keep the extinguisher erect while using it. Because of its construction, it should not be laid on its side.)

2. Remove the locking pin from the valve.

3. Grasp the nozzle horn by its handle. (It is insulated to protect your hand from the extreme cold of the discharging carbon dioxide.)

4. Open the valve by turning the valve wheel to the left (or squeeze the release lever), thus opening the valve and releasing the carbon dioxide, and at the same time direct the flow toward the base of the fire. Move the horn slowly from side to side, and follow the flames upward as they recede.

5. Close the valve as soon as conditions permit, and continue to open and close it as necessary. The firefighter may shut off the handwheel type of valve for brief intervals without an appreciable loss of carbon dioxide, but once the valve seal is broken, the carbon dioxide will leak away in 10 minutes or so. The squeeze-grip type likewise may be turned off while in use, but it will hold the contents indefinite without leakage. In continuous operation, the 15-pound cylinder of either type will expend its contents in about 40 seconds.

6. The discharge should not be stopped too soon. When the flame is extinguished, coat the entire surface involved in the fire with carbon dioxide snow in order to prevent reflash.

The firefighter must be warned that the very qualities that make carbon dioxide a desirable extinguishing agent also make it dangerous to life if the compartment should become filled with it. Certainly, when it replaces oxygen in the air to the extent that combustion cannot be sustained, breathing cannot be sustained either. Radio rooms do not have CO2 systems for total flooding such as those installed in uninhabited spaces used for gasoline and paint stowage. Consequently, when using the 15-pound portable fire extinguishers, the firefighter usually does not have to consider the possibility of harm to personnel. Because carbon dioxide is heavier than air, it does not rise, but remains in a pool close to the deck. The quantity of gas released from one—or several—of these extinguishers is insufficient to reduce below a dangerous minimum the total oxygen content of the air in a compartment.

Anyone using a carbon dioxide extinguisher should be warned that the snow blisters the skin and causes painful burns if allowed to remain on the skin.

In the event that all efforts with carbon dioxide fail to put out the fire, fresh water applied with a fog applicator may be used. Because of the fine diffusion of its particles, fog reduces but does not entirely remove the danger of electric shock.

In cable fires in which the inner layers of insulation (or insulation covered by armor) support combustion, the only positive method of preventing the fire from running the length of the cable is to cut the cable after it is deenergized, and separate the two ends.

CHAPTER 13

MAINTENANCE PROCEDURES

A Communications Yeoman is not expected to perform all the maintenance required of a Radioman. You must be able, however, to assist in recording inventory data, complete work logs and reports, and assist in obtaining part and stock numbers from applicable technical publications. Moreover, you will be required to perform routine maintenance on teletypewriters and typewriters.

MAINTENANCE CATEGORIES

Reliable communications depend to a great extent on the equipment operating at optimum efficiency. Maintenance of material is a major factor contributing to battle readiness. Because it is essential that none of the features of shipboard maintenance be overlooked or neglected, a continuing maintenance program is needed to avoid equipment failures at crucial moments. The program itself must provide command and all subordinate supervisory levels with the tools for effectively planning, directing, and controlling all preventive maintenance requirements within the ship.

Maintenance may be broken down into three broad categories: corrective and preventive maintenance and checks.

1. Corrective maintenance is the sum of those actions required to restore equipment to an operational condition within predetermined tolerances or limitations.
2. Preventive maintenance is the sum of those actions performed on operational equipment that contribute to uninterrupted use of the equipment within design characteristics.
3. Checks are standard procedures for determining if the current operational status of an equipment is within the tolerances and limitations of the designed performance standards. When carried out at prescribed intervals, checks are a part of preventive maintenance.

MAINTENANCE OF EQUIPMENT

To be effective, a preventive maintenance program must be laid out in an orderly fashion to accomplish prescribed items of work at regular intervals. A tube that tests satisfactorily today, for example, may go out tomorrow. The only work that is preventive is of a mechanical nature—lubrication, checking tube clamps and electrical connections for tightness, repairing frayed leads, and the like. But this statement does not mean that the preventive maintenance program should stop there. About half the secret of a successful program lies in detecting small troubles as they occur, and having them corrected before they are beyond control.

The big problem in any preventive maintenance program is training people to look for signs of trouble, and to report such signs as soon as they appear. Attaining such a goal and overcoming the obstacles placed in its way require constant attention by all hands, as well as some kind of continuing training program.

The Communications Yeoman should make regular inspections of his equipments to ensure that they are functioning properly. Periodic maintenance checks by specifically named persons are equally important. But you also should strive to catch the small problems as they occur, thus keeping the equipment operating with maximum effectiveness.

ELECTRON TUBES

The most common cause of communication equipment casualties is electron tube failure. A tube also may be operating considerably below standard. In some instances this substandard performance may not be apparent even in a tube test. The average tube tester applies

a 60-cycle sine wave to a tube, whereas in actual performance the tube is expected to handle extremely wide frequency ranges.

A few critical circuits are tuned to the characteristics of the particular tube installed. Replacement with another tube of the same design may, in fact, detune the circuit, resulting in poor equipment performance.

Some tubes perform satisfactorily in equipment, but do not check "good" in the tester. Conversely, some tubes that test "satisfactory" may not perform well in actual use. This explanation is not intended to imply that the shipboard tube tester should not be used, but one should treat its indications with reservations.

Many tubes in common use aboard ship cannot be tested in an ordinary tube tester. These are generally large, high-powered, or special purpose types. The following tube-testing policy is suggested.

1. Tubes should not be tested merely as a matter of routine. The results obtained do not justify the work and time involved. Test tubes only when the equipment shows signs of improper operation. Unless the tube is shown to be completely bad, do not rely too heavily on the results.

2. When testing tubes, each tube must be replaced in its original socket to avoid detuning critical circuits. It is comparatively easy to put a tube of one type into a socket designated for another type, because so many different tubes use the standard octal socket.

AIR FILTERS

Air filter cleaning is most important for the proper operation of electronic equipment. The lack of proper servicing (cleaning or replacing) of air filters causes a great amount of trouble. For some reason (perhaps their importance is not recognized fully), air filters often are neglected or disregarded until excessive heating causes a breakdown of the equipment.

Forced air cooling is used in most modern shipboard transmitters, such as models TED, AN/SRT-14, -15, and -16, AN/WRT-2, AN/WRC-1, AN/SRC-20 and -21. Models AN/URR-13, -27, and -35 receivers, and AN/URA-8 converters also use forced air cooling. Such usage means moving a large volume of air over the hot portions of the equipment. The air is filtered to keep dust and other foreign particles out of the equipment. If the filters are efficient, they remove most of this foreign material from the air that passes through them. This dust and dirt tends to clog the filter and prevent the air from moving through. The result is that the equipment becomes too hot and may be damaged.

An analysis of the failures of parts in electronic equipment indicates that many failures can be traced to excessive heat caused by dirty air filters. This condition cannot be overemphasized. On the basis of this situation alone, it would appear that the man performing maintenance can reduce his workload substantially by ensuring that air filters are serviced properly.

HEADSETS AND MICROPHONES

The best way to maintain headsets and microphones is to ensure that they are handled properly. Proper handling includes, for example, hanging up earphones by the straps, not by the cord; removing plug from receptacles by grasping the plug, not the cord; avoiding kinks or other strains in the cord; avoiding rough handling of microphones and earphones; and avoiding unnecessary exposure to moisture.

Repair consists largely of replacing or repairing plugs, jacks, and cords. In any event, do not place defective equipment with the ready spares. It should be repaired first.

MOTORS AND GENERATORS

Motors and generators are capable of extended operation without mishap and with very little care. They often are neglected, however, resulting in casualties which easily could have been prevented.

The units should be protected from moisture, dirt, and friction. Carbon dust, which collects near the commutator as the result of the wearing of the carbon brushes, should be removed periodically with a vacuum cleaner. Use of a blower should be prohibited, because it may force foreign matter into the windings and bearings. To ensure proper ventilation, loose gear must not be stowed near any motor or generator. Overheating is a major casue of casualties.

Bearings

Bearing casualties result in the greatest single source of motor and generator failures. Excessive lubrication and lack of proper lubrication contribute to these breakdowns. The

manufacturer's instruction books specify the proper grade of lubricant and method of application.

Two types of ball bearings are in general use. They are the grease-lubricated bearing and the permanently lubricated sealed bearing. Grease-lubricated bearings require periodic lubrication. Sealed bearings are permanently lubricated by the manufacturer and need no additional lubrication throughout their service life.

Sealed bearings installed in equipment should be replaced (when necessary) only with bearings of the same type. If not already provided, nameplates reading "do not lubricate" should be attached to the bearing housing.

Some Navy equipment is oil-lubricated. Approved lubrication charts are furnished. Instructions on the charts should be followed exactly; great harm can be caused by excessive lubrication.

Brushes and Holders

Brushes, which are sticks of carbon, should move freely in their holders. Sufficient spring tension should exist to ensure firm contact with the commutator. The area of the commutator where the brushes bear should be a chocolate-brown color. Carbon dust tends to prevent free movement of the brushes in their holders, and the dust must be removed at frequent intervals. If the commutator is scored, it may be required by a tender or, for small generators, by ship's force personnel using a commutator stone. Small copper particles adhering to the brushes are the usual cause of scoring of the commutator.

When insulation resistance readings are being made of the windings, the results should be recorded on the appropriate history card for the machine.

ANTENNAS

Maximum communication efficiency depends on properly maintained antenna systems. Because of their location high in the ship, they are subject to the corrosive action of salt spray and stack gases and to damage caused by ship vibrations and heavy winds. Improper painting also contributes to antenna troubles. Paint, salt, and soot can reduce antenna efficiency considerably by shorting the signals around the insulators. Shorting is a major consideration in poor UHF communications.

When one considers the many enemies of antenna systems, their reliability and effectiveness are remarkable. A reasonable amount of preventive maintenance is sufficient to ensure satisfactory and consistent performance.

Antennas should be lowered and inspected whenever the opportunity presents itself. Deterioration at clamps and lead-ins is a common fault. Nicks and kinks should be avoided because they tend to weaken the wire. Soot and salt spray should be removed; insulators should be wiped clean; and all paint should be removed. Do not use a wire brush on insulators; cleaning without resorting to wire brushes is always preferable.

Whip antennas, which may collect moisture in their hollow centers, should be inspected and cleaned when opportunity permits.

TELETYPEWRITERS

The most important consideration in maintaining teletypewriter equipment is proper lubrication and cleaning of the machines. Too much lubrication will, in a short time, collect dust and grit, and oil-soak the wiring. A machine in this condition is subjected to excessive wear and deterioration of insulation. Such machines are a fire hazard as well as a source of constant trouble.

It is important that you understand your cleaning and lubricating responsibilities. On most shore stations the operators are not required to clean or lubricate equipment. These duties are assigned to the station's maintenance force. It may be necessary on small stations or on some ships, however, for the operator to clean and lubricate.

Before beginning to clean or lubricate a machine, always disconnect the power.

At this point, the equipment technical manual must be consulted for instructions in disassembling the equiment into its major units (such as removing the printing unit from its base).

After the equipment is broken down, wipe all old grease, oil, and dirt from the machine with a dry piece of cheesecloth or other lintfree cloth. Use a screwdriver or stick that has a cloth wrapped around it to reach points not readily accessible by hand. Avoid disturbing springs or adjustments. Troubles frequently develop as a result of careless cleaning.

If a cleaner (solvent) is used to remove hardened grease, be sure that any unit on which

you apply it is not allowed to stand more than 1 hour before grease or oil is applied to the cleaned surfaces. A good cleaning mixture is kerosene with SAE-10 oil. This mixture leaves a rust-preventing residue of light oil on the metal. Never use a paraffin base oil, because it leaves the parts gummy and results in sluggish action of moving parts.

To clean the type on model 28 machines, insert a doubled piece of cheesecloth between the type bars and backstops to catch dirt and excess cleaning fluid. Clean the type thoroughly with cheesecloth moistened with Varsol or patented type cleaner. Use the cleaning fluid sparingly to avoid getting it on other parts of the machine. Then brush the type with a dry typewriter brush.

Do not use cleaning fluid on the model 28 type box. Remove the type box from the machine and clean the type with a dry typewriter brush or soft cloth. Should it be necessary to disassemble the type box, be careful not to lose the small springs that are inside the box.

Clean key caps with a cloth slightly moistened with water. Do not use solvent on key caps.

After a thorough cleaning, the equipment is ready for lubrication. Here, again, consult your equipment technical manual for explicit instructions on points to lubricate and the type and quantity of lubricant to use.

In general, Teletype KS-7470 oil and type MIL-C-3278 grease are used to lubricate teletypewriter equipment. The grease is applied to wearing surfaces, gears, and heavy moving parts. Oil is applied to bearings and small moving parts. All springs, wicks, and felt washers must be a saturated thoroughly in oil.

When lubricating, exercise special caution to prevent any oil or grease from falling between the armatures and the pole pieces of the magnets. Electrical contacts must be kept free of oil.

As the operating speed increases, a teletypewriter must be lubricated more frequently. Thus, a machine geared for an operating speed of 100 wpm requires lubrication oftener than one operating at 60 wpm. The recommended lubrication schedule is given in the accompanying chart.

Operating speed (words per minute)	Lubricating interval (whichever occurs first)
60	3000 hours or 1 year
75	2400 hours or 9 months
100	1500 hours or 6 months

Regarding the lubricating interval, an important point to remember is the expression "whichever occurs first." To illustrate, a machine in continuous use at 100 wpm accumulates 1500 operating hours in only 2 months. For machines used occasionally or intermittently, you need a log to keep track of the total operating hours. The Electronic Equipment Operational Time Log (NavShips 4855) described and illustrated later in this chapter, is for this purpose.

TYPEWRITERS

A typewriter that is used with care will give many years of service. Typewriter manufacturers claim that the modern typewriter never really wears out if it is not dropped or otherwise abused. On an average, with ordinary careful use and with regular cleaning and adjustment, typewriters can be counted on for about 10 years of satisfactory service.

A typewriter should be brushed out by the operator at the end of each day. Type should be cleaned often with one of the various cleaners available for the purpose. Delivery of messages with the letters o and e filled up because of dirt in the keys indicates little attention has been given to this detail. Any commercial type cleaner procured by the Navy is satisfactory (Put out your cigarette before you start using the type cleaner.)

To maintain your typewriter in good condition, eraser waste must be cleaned away often. It can be removed with a long-handled brush. The best way to prevent accumulation of rubber crumbs is to move the carriage far enough to the left or right that the point of erasure is not over the keys or other mechanical parts of the typewriter. The waste then will drop on your desk from where it can be brushed away.

The cylinder and rollers should be cleaned occasionally with alcohol. This treatment prevents their leaving streaks of dirt on paper inserted in the typewriter. In this connection, it is best to use only one typewriter in the office for cutting and correcting stencils. Otherwise, the rollers of all your typewriters will become coated with wax from the stencils.

The typewriter should be oiled occasionally, but do it carefully. Apply oil only at friction points, and don't use too much. When finished, wipe away excess oil; otherwise, it will drip on other parts, and in time will form a gummy mass with dust and eraser crumbs. Keep oil from dripping on rubber parts, the ribbon, and any place in the machine where it might stain the paper.

Keep your typewriter covered when not in use. No matter how clean the office, a certain amount of dust is always in the air. When the machine is uncovered for long periods, dirt finds its way into the moving parts of your machine and causes wear.

MAINTENANCE RECORDS AND PUBLICATIONS

Important elements of the preventive maintenance program are the ship's material histories and the Current Ship's Maintenance Project (CSMP). In maintaining equipment material histories and the CSMP, the following forms are utilized. You will be required to help maintain these forms.

Repair Recrod, NavShips 529;
Alteration Record, NavShips 530;
Resistance Test Record, NavShips 531;
Electronic Equipment History Card, NavShips 536;
Record of Field Changes, NavShips 537.

MATERIAL HISTORY

The material history is a record of all repairs, alterations, inspections, derangements, measurements taken, parts renewed, nameplate data, length of time units were used, and other pertinent information on each item of equipment. An item's material history consists of the electronic equipment history card and the resistance test record.

Because the equipment history card furnishes a complete picture of the past history of an equipment, it is an aid in troubleshooting, correcting repetitive failures, and indicating the general reliability of the unit. A history card is prepared for each equipment. It is filled out initially by the electronics material officer, kept up to date, and remains with the equipment throughout its normal service life. Additional cards are provided for each major unit of the equipment to which the basic card pertains. These supplemental cards are filed alphabetically behind the basic card in a loose-leaf material history binder.

A resistance test record, NavShips 531 (commonly called a megger card) is for the purpose of recording the insulation resistance of units and circuits such as radio antennas and power distribution circuits. Any significant drop in resistance indicates that repairs are needed. Normally, the megger card is inserted in the material history binder adjacent to the applicable equipment history card.

THE CSMP

The three remaining forms, NavShips 529 (blue), 530 (pink), and 537 (white), constitute the Current Ship's Maintenance Project. The CSMP is, in effect, a record of repairs, alterations, and field changes remaining to be accomplished. As a repair is required, an alteration approved, or a field change authorized, the applicable card is filled out and filed in the material history binder behind the appropriate history card. Being of distinctive colors, the cards readily indicate the type of work outstanding.

When preparing the cards, an important consideration is the adequate description of work to be accomplished. The repair records for work that is beyond the capacity of the ship's force, for example, should contain the information needed later for the repair requests for shipyard or tender work. Entering complete data at the time the need for repair becomes evident will do much to guarantee successful shipyard and tender availabilities.

The record of field changes, which remains with the equipment throughout its service life, is extremely significant. Without needed modifications, equipment may become operationally obsolescent or subject to numerous failures. Lacking a record of field changes, it is difficult to determine what modifications, if any, were made. The information recorded on the record of field changes is essential for rountine maintenance, troubleshooting, and ordering parts for the improved equipment.

MAINTENANCE PUBLICATIONS

A nqmber of publications are also essential to the maintenance program. These maintenance books include the equipment technical manuals furnished by manufacturers, the BuShips Technical Manual, BuShips Journal,

Electronics Installation and Maintenance Book (EIMB), and the Electronics Information Bulletin (EIB).

BuShips Technical Manual

The BuShips Technical Manual contains 90-odd chapters of instructions and data for the maintenance and repair of equipment and machinery that come under the cognizance of the Bureau of Ships. These instructions indicate what the Bureau considers the best engineering practice for the operation, maintenance, testing, and safety of the equipment and for the safety of personnel concerned with the equipment.

BuShips Journal

The Bureau of Ships Journal, published monthly, contains articles on new developments in ship operation, construction, and engineering. It has sections on ship maintenance, and electronics, and shop notes.

The EIMB

The EIMB consists of a series of authoritative publications that provide data to field activities on the installation and maintenance of electronic equipment. Information in the EIMB is supplementary to equipment technical manuals and related publications, and is intended to reduce time-consuming research.

The informational content in the EIMB is divided into three categories: (1) general procedures that apply to all classes of equipment; (2) articles on particular classes of equipment, i.e., communication, radar, sonar, and related fields; and (3) information that relates to specific equipment.

The EIB

The EIB is a biweekly publication containing advance announcements on changes to be made in the field, installation techniques, maintenance notes, beneficial suggestions, and technical manual distribution. Articles of lasting interest are transcribed later into the EIMB. Exceptions are field changes and corrections to other publications, which subsequently are reproduced and stocked at the Naval Supply Depot, Philadelphia.

Issues of the EIB are made available to all civilian and military personnel concerned with installation, operation, maintenance, and repair of electronic equipment. It is especially urgent that they be read by all operators.

PERIODIC REPORTS

An efficient reporting system, sensitive to failure or replacement trends of parts and equipment, is required to provide feedback information needed to measure and improve equipment reliability and maintainableness.

By means of BuShips instructions and the biweekly EIBs, the Bureau of Ships specifies certain electronic equipment for which periodic reports must be submitted.

Electronic Performance and Operational Report

To evaluate the characteristics and usefulness of selected newly installed or modified equipment, BuShips requires the monthly submission of an electronic performance and operational report. (See fig. 13-1.)

For most of the chosen equipment, reporting begins with the first operating month after installation or modification, continuing monthly for 1 year. A special report is submitted when an equipment failure is noted in a casualty report, when a hazard is believed to exist, or when it is considered that additional facts would be of interest to BuShips.

These reports contain firsthand data obtained under actual operating conditions. They are of considerable value to BuShips in determining whether the equipment meets design capabilities and operational requirements, evaluating installation adequacy, checking maintenance procedures and safety devices, verifying preliminary manufacturer's standards, and enforcing contractual warranties.

In the general remarks section of the reverse side of the report are indicated any pertinent facts not given elsewhere on the form. Included are detailed information on any unusual difficulty encountered in operation; exceptional maintenance required; and suggestions for improvements in design, tests, and new applications. Shown on the form, for convenience, is a list of possible problem areas, but comments need not be limited to these areas.

Electronic Failure Reporting System

The electronic failure reporting system is established to collect failure data for the purpose of improving the performance, reliability,

and ease of maintenance of electronic parts, assemblies, and equipments. It also facilitates improved support capabilities for items indicating abnormal failure rates.

Two reporting forms are utilized by the failure reporting system. They are (1) an electronic equipment failure/replacement report, and (2) an electronic equipment operational time log. These reports serve several excellent purposes, listed as follows:

1. They provide BuShips with a comprehensive presentation of the overall performance of selected material.
2. They point out the weakest circuit components of a particular equipment.
3. They are useful for calculating load lists and repair parts requirements.
4. Because new models (or modifications of existing models) usually are in some stage of development, prompt receipt of failure reports enable BuShips to initiate corrective action to eliminate similar or related deficiencies in subsequent production.

The success of the reporting program, of course, depends on the basic data being presented accurately and rapidly by the personnel operating and maintaining the equipment.

FAILURE/REPLACEMENT REPORT.—The failure/replacement report (fig. 13-2) is designed so that, in most instances, all information relating to one equipment mishap can be entered on the same form.

Reported failures are tabulated in BuShips, and regular summaries are made to show the number and types of failures of any part of any equipment. The summaries are forwarded for evaluation and corrective measures to the cognizant design and maintenance engineers in the Bureau of Ships and to the equipment contractor. From the reported data a determination may be made of the field changes required to make the equipment perform reliably. The information also shows the point of diminishing return at which it is more economical to replace an equipment than to keep the old one in operation.

You must realize the importance of reporting electronic failures and their causes, particularly the circumstances existing when failures occur under actual operating conditions. The reports must be filled in completely and in conformity with the instructions accompanying the forms. Reports received by the Bureau of Ships are valueless if they fail to provide the essential information required by the form or if the information given is incomplete.

OPERATIONAL TIME LOG.—The electronic equipment operational time log serves two purposes. First, it accumulates information for BuShips concerning the reliability of a selected part or system, its maintenance problems, and failure/replacement rate calculations. Second, it keeps the Bureau informed concerning the number of selected equipments that are operationally in use. At the operating level, it can be helpful in the preparation of both the failure/replacement report and the performance and operational report. Each sheet of the log covers one calendar month, as indicated in figure 13-3. Instructions for completing the log accompany the forms.

PLANNED MAINTENANCE PROGRAMS

The U.S. Navy makes every effort to provide properly designed electronic material and to support this material with adequately trained personnel. Because of broad limitations, however, it is not always possible to effect these provisions. It is mandatory, therefore, that each organizational element plan on using efficiently its existing material with a minimum of outside assistance. Ships must be as self-sufficient as possible. Reliance on expected new equipment or receipt of special experts to improve a unit's readiness is unsound. Lack of specific electronic equipment or of a specially trained officer or enlisted man is no valid reason for not using available equipment efficiently.

The Bureau of Ships has cognizance over the electronic equipment used in the field of detection and tracking, recognition and identification, communications, and electronic warfare, including all testing and measuring devices. Because it is essential that none of the features of shipboard maintenance be overlooked or neglected, a continuing maintenance program is needed. Currently BuShips has two official maintenance programs in effect. They are the POMSEE and the PMS programs.

Performance, Operation, and Maintenance Standards for Electronic Equipment (POMSEE) is the basis for a RECOMMENDED preventive maintenance program for ELECTRONIC equipment under the technical control of the Bureau.

The shipboard Planned Maintenance System (PMS) is a MANDATORY management tool designed to plan, schedule, and control the

ELECTRONIC PERFORMANCE & OPERATIONAL REPORT
NAVSHIPS 3878 (Rev. 4-60) *Submit original only to Bureau - No forwarding letter required*

REPORT-NAVSHIPS-3878-1

FROM: USS RANGER (CVA-61) (Ship name, type and hull no.) ☐ LANT ☐ FLEET ☒ PAC
TO: CHIEF, BUREAU OF SHIPS (CODE)

REPORT CLASSIFICATION: UNCLASSIFIED
DATE: 1 Sep
REPORTING PERIOD: FROM 1 Aug TO 31 Aug

TYPE AND MODEL OF EQUIPMENT: AM-1365/URT Amplifier
SERIAL NUMBER: 383

FIELD CHANGES TO DATE	ACCOMPLISHED	NOT ACCOMPLISHED
	None	None

HOURS DURING PERIOD OF THIS REPORT: OPERATED 180 — NOT IN OPERATING CONDITION 564

PERFORMANCE FIGURE (PF) & TECHNICAL EVALUATION: ☐ OUTSTANDING ☐ GOOD ☐ SATISFACTORY ☒ UNSATISFACTORY

OPERATIONAL EVALUATION: ☐ OUTSTANDING ☐ GOOD ☐ SATISFACTORY ☒ UNSATISFACTORY

RADAR

PEAK POWER OUTPUT (PT) dbm		AVER. VSWR IN TRANSMISSION LINE		AVER. ECHO BOX RING TIME YDS		MIN. DISCERNIBLE SIGNAL (PMDS) dbm	
MAX. RANGE TARGETS DETECTED	MI	MI	MI	MAX. ALTITUDE AT RANGE DETECTED	MI	MI	MI
MAX. ALTITUDE TARGETS DETECTED	FT	FT	FT	RANGE AT MAX. ALTITUDE DETECTED	FT	FT	FT
TARGET CLASS. TYPE - DETAIL (SEE REVERSE)				TARGET CLASS. TYPE - DETAIL (SEE REVERSE)			
MAXIMUM RELIABLE RADAR RANGE MI				MINIMUM RELIABLE RADAR RANGE YDS			

SONAR

SOURCE LEVEL (LS) db//uBAR	RECEIVING SENSITIVITY db//VOLT/uBAR		SEA STATE	PROCEDURE USED		
NOISE LEVEL db//VOLT	5 KNOTS	10 KNOTS	15 KNOTS	20 KNOTS	25 KNOTS	30 KNOTS
MAXIMUM RANGE SONAR TARGETS DETECTED AND TRACKED	RANGING YDS		LISTENING YDS		SOUNDING FATHOMS	
TARGET CLASSIFICATION TYPE AND DETAIL						
BT PATTERN						
OWN SHIP'S SPEED.	KTS		KTS		KTS	

COMMUNICATIONS

PERCENT OF TIME OUT OF CONTACT WHILE WITHIN RANGE (IF ANY)	ANTENNA SYSTEMS	INTERFERENCE (Frequencies, intensity, and sources)
0 %	No problems	No problems

POWER OUTPUT	AVERAGE VSWR	REL RANGE	RECEIVER SENSITIVITY
Voice 100 WATTS	1.5:1	40 miles	NA UVOLTS

ELECTRONIC WARFARE

MAXIMUM RANGE AND ALTITUDE TARGETS WERE DETECTED	MI	FT	MI	FT	MI	FT
TARGET CLASSIFICATION TYPE AND DETAIL (SEE REVERSE SIDE)						
MAXIMUM RELIABLE RANGE AND ALTITUDE	MI	FT	MI	FT	MI	FT
TARGET CLASSIFICATION TYPE AND DETAIL (SEE REVERSE SIDE)						
MAX. RANGE SONAR TARGETS DETECTED YDS	BT PATTERN		MAX. RELIABLE SONAR RANGE YDS		BT PATTERN	

35.83.1

Figure 13-1.—Electronic performance and operational report.

TARGET CLASSIFICATION

TYPE	DETAIL
1. Large Plane (Bomber)	a. Own Ship's controlled aircraft
2. Small Plane (Jet Fighter)	b. An alerted aircraft approach or contact (An aircraft whose existence and location is known prior to being picked up on own radar)
3. Group of Planes	c. An unalerted aircraft approach or contact (An aircraft whose existence was not previously known)
4. Merchant Ship	d. An opening aircraft contact
5. Warship	e. An anticipated surface contact
6. Formation of Ships	f. An unanticipated surface contact
7. Submarine	g. Snorkling
8. Buoy	h. Submerged
9. Weather Front	i. Other (Explain)
10. Land	j. Unknown
11. Other (Explain)	
12. Unknown	

OUTAGE REMARKS: (Account for time equipment was NOT in operating condition. Show casualty, corrective action, outage time and comments. Include time inoperative for preventive maintenance and POMSEE. Reference Casualty Report, if one submitted on this equipment during this reporting period).

Equipment was in use for about 180 hours when C8, P.A. plate feed through capacitor, shorted, causing overload relay to kick out. Repair part not available on board, was ordered and not yet received. Three failures of this type have occurred among the eight units installed.

GENERAL REMARKS: (Comment on any problems or inadequacies encountered in the equipment. Comment is also desired on any item above or any item not covered by this report. When detailed tracking data is available and the equipment can be evaluated operationally, comment on such items as reliability, target discrimination and clarity. If overheating occurs report ambient and equipment temperature in degrees. If equipment is considered to be operating satisfactorily, so state.) (Problem areas listed below are for convenience.)

Antenna
Cabling (including wave guides)
Design
Electrical
Interference
Lubrication
Maintenance
Mechanical
Overheating
Power input
Physical operation
Safety devices
Spare parts
Test equipment
Test points
Transducer
Tube failures
Vibration
Logistic support (Manuals, repair activities, overhaul, etc)

While equipment was operating properly, 40 mile range was consistent.

The failure of C8 is considered a design problem.

Experience to date has indicated that the AM-1365/URT is saving the 4X150A output tubes in the TED-8 transmitter. Longer tube life is gained through reduced drive required from the TED-8. Ten watts output is sufficient, compared with the attempt to drive the transmitter at 30 watts before the AM-1365/URT amplifier was installed.

SIGNATURE C. O. Holt
C. O. HOLT, CDR USN By direction

CLASSIFICATION (Of this report)
UNCLASSIFIED

0-43897

83.1

35.83.2

Figure 13-1.—Electronic performance and operational report—cont.

ELECTRONIC EQUIPMENT FAILURE/REPLACEMENT REPORT DD-787 — REPORT BUSHIPS 10550-1

1. DESIGNATION OF SHIP OR STATION	3. TYPE OF REPORT (CHECK ONE)	4. TIME FAIL. OCCURRED OR MAINT. BEGAN: MONTH	DAY	YEAR	TIME
CVA(N)-65	1. [X] OPERATIONAL FAILURE; 2. [ ] PREVENTIVE MAINTENANCE (POMSEE); 3. [ ] PREVENTIVE MAINTENANCE (NOT POMSEE); 4. [ ] STOCK DEFECTIVE; 5. [ ] REPAIR OF REPLACEABLE UNIT OR PLUG-IN ASSEMBLY; 6. [ ] OTHER	3	3	6_	1200
		5. TIME FAIL. CLEARED OR MAINT. COMPL. MONTH	DAY	YEAR	TIME
		3	3	6_	1225

2. REPAIRED OR REPORTED BY NAME	RATE	AFFILIATION
R.E. LEE	RMC	1. [X] U.S. NAVY 2. [ ] CONTRACTOR 3. [ ] CIVIL SERVICE

EQUIPMENT

6. MODEL TYPE DESIGNATION	9. FIRST INDICATION OF TROUBLE (CHECK ONE)	10. OPERATIONAL CONDITION (CHECK ONE)	11. TIME METER READING
AN/URC-32	1. [X] INOPERATIVE; 2. [ ] OUT OF TOLERANCE, LOW; 3. [ ] OUT OF TOLERANCE, HIGH; 4. [ ] INTERMITTENT OPERATION; 5. [ ] UNSTABLE OPERATION; 6. [ ] NOISE OR VIBRATION; 7. [ ] OVERHEATING; 8. [ ] VISUAL DEFECT; 9. [ ] OTHER, EXPLAIN	1. [X] OUT OF SERVICE; 2. [ ] OPERATING AT REDUCED CAPABILITY; 3. [ ] UNAFFECTED	A. HIGH VOLTAGE: NONE; B. FILAMENT /ELAPSED: NONE; 12. REPAIR TIME: MAN-HOURS: ; TENTHS: 4

7. EQUIP. SERIAL NO.	8. CONTRACTOR (NAVY CODE OR COMPLETE NAME)
23	COL

REPLACEMENT DATA

13. LOWEST DESIGNATED UNIT (U) or SUB-ASSEMBLY (SA)	14. LOWEST DES. U/SA SERIAL NO.	15. REFERENCE DESIGNATION (V-101, C-14, R11, ETC.)	16. FEDERAL STOCK NUMBER	17. MFR. OF REMOVED ITEM	18. TYPE OF FAILURE	19. PRIMARY OR SECONDARY FAIL?	20. CAUSE OF FAILURE	21. DISPOSITION OF REMOVED ITEM	22. REPL. AVAILABLE LOCALLY?
SA1	17	N/A	F5820-672-6313	COL	255	P[X] S[ ]	8	T	Y[X] N[ ]
						P[ ] S[ ]			Y[ ] N[ ]
						P[ ] S[ ]			Y[ ] N[ ]
						P[ ] S[ ]			Y[ ] N[ ]
						P[ ] S[ ]			Y[ ] N[ ]

23. REPAIR TIME FACTORS

CODE	DAYS	HOURS	TENTHS	CODE	DAYS	HOURS	TENTHS

24. REMARKS (CONTINUE ON REVERSE SIDE IF NECESSARY)

15.2

Figure 13-2.—Electronic Equipment Failure/Replacement Report (DD-787).

performance of routine preventive maintenance on ALL equipment.

POMSEE PROGRAM

Under the POMSEE program, performance standards sheets provide the operational performance data and basic technical measurements indicative of the minimum acceptable level of performance for electronic equipment.

The performance standards sheets provide a single standard for each equipment type, furnishing both a technical and nontechnical description of the expected equipment performance. This standard must be met by all ship installations of a particular model.

Procedures for obtaining the maintenance standards test indications are given in a series of charts. Each chart or group of charts covers a functional section of the entire system. An accompanying illustration page shows the equipment setup pertaining to each of the procedural steps on the chart. The illustration page bears encircled numbers corresponding to the steps of procedure of the chart to which it applies.

Using an illustration page along with its associated chart makes a relatively simple task of determining the reading or performing the required check. The comparison of a current reading with readings previously recorded reveals any significant change. Slight changes, which occur frequently, are no cause for alarm. When a particular step of a procedure results in a reading that varies progressively in the same direction, however, it is an indication of improper operation or of reduced performance.

Although the POMSEE program may be phased out when a ship changes over to the PMS program, the charts, illustrations, and performance standards sheets may be of value for reference purposes so long as the applicable equipment does not become obsolete.

PLANNED MAINTENANCE SYSTEM

A Navy planned maintenance system (PMS) is being installed throughout the operating fleet as the result of an OpNav instruction (4700.16) issued in 1963. Within the next few years, the

ELECTRONIC EQUIPMENT OPERATIONAL TIME LOG
NAVSHIPS 4855(5-61)

SUBMIT MONTHLY FOR EACH APPLICABLE EQUIPMENT WHETHER IN USE OR NOT IN USE

1. MONTH	YEAR	2. DESIGNATION OF SHIP OR STATION
6	63	DD 499

3. EQUIPMENT MODEL TYPE DESIGNATION	4. EQUIP. SERIAL NO.
AN/URR-35	64

COMPLETE THIS SECTION IF EQUIPMENT HAS TIME METER(S)

READ DATA ON COVER	5. FILAMENT OR ELAPSED TIME METER READINGS		6. LEAVE BLANK	7. HIGH VOLTAGE (PLATE) TIME METER READINGS		8. LEAVE BLANK	9. NO. OF OPERATIONAL FAILURES THIS MO.
	1st DAY OF MO.	LAST DAY OF MO.		1st DAY OF MO.	LAST DAY OF MO.		

COMPLETE THIS SECTION IF EQUIPMENT DOES NOT HAVE TIME METER(S)

10. DAY OF MONTH	11. STANDBY		12. LEAVE BLANK	13. FULLY ENERGIZED		14. LEAVE BLANK	15. CHECK (✓) IF OPR. FAIL. OCCURRED
	TIME ON	TIME OFF		TIME ON	TIME OFF		
1	N/A			1500			
5					1800		✓
5				1900			
18					1427		

DO NOT WRITE BELOW THIS LINE — CONTINUE ON REVERSE SIDE IF NECESSARY

SRA-2

Figure 13-3.—Electronic Equipment Operational Time Log, NavShips 4855.

PMS will be standard in all departments on all active ships.

For several reasons, previous maintenance programs and efforts fell short of desired goals. To eliminate the problem areas, the PMS defines and schedules the preventive maintenance required for all shipboard equipment, even down to the methods and tools to be used and the time and rate required to accomplish each task.

The objective of the PMS is to prescribe a standard, uncomplicated system of planning and control to provide for the uniform accomplishment of preventive maintenance aboard ships. This goal, in turn, will enable achievement of the highest possible state of material readiness with available resources.

Organization

Under the planned maintenance system, personnel are organized into maintenance groups, which are assigned responsibility for maintaining specific equipment. The groups are patterned after the standard shipboard organization. Each maintenance group is under a supervisor, who is the petty officer in charge of that group.

It is desirable, wherever possible, that personnel who operate equipment perform the required preventive maintenance. Where personnel from one department operate equipment under the cognizance of another, coordination between the two departments is necessary to ensure that all tasks are accomplished.

Tools of the System

In the PMS emphasis is placed on advance planning instead of on recording mere historical maintenance facts. Planning is initiated by the type commander when he issues an overhaul cycle maintenance schedule. Based on this schedule, department heads prepare quarterly schedules. To carry the plan further, responsible petty officers/division officers break down the quarterly schedules into weekly maintenance actions.

Proper use of the scheduling devices ensures accomplishment of all preventive maintenance tasks, takes into consideration the ship's employment schedule and daily routine, provides interdepartmental coordination, and affords flexibility to allow schedule adjustments when the situation dictates. It is important that the schedule of maintenance tasks be planned at least one quarter in advance. This plan then may be adjusted on a monthly basis as contingencies demand.

The basic tools of the planned maintenance system consist of the—

1. Overhaul cycle schedule (referred to simply as the cycle schedule).
2. Quarterly schedule.
3. Weekly schedule.
4. Departmental PMS manual.
5. Maintenance requirements cards (MRCs).

CYCLE SCHEDULE.—A cycle schedule is prepared for each maintenance group on the ship. This practice permits equalization of the group's workload throughout the overhaul cycle. The time frame of the schedule is the entire period between and through overhauls for the class of ship concerned. It commences during the calendar quarter in which the ship completes overhaul (or in which the PMS is installed).

The schedule lists the components (e.g., receivers, transmitters) for which each maintenance group is responsible, and it shows, on a quarterly basis, all the preventive maintenance actions (except weekly and daily) required during the period between overhauls. All the maintenance items in the schedule are within the capability of the ship's force and equipment.

The department head uses the cycle schedule to prepare the current and subsequent quarterly schedule. It is then posted on the department's maintenance control board, with the quarterly schedules, as part of the long-range maintenance schedule. Because the schedules are displayed visually, they are readily accessible to departmental division officers and maintenance group supervisors.

QUARTERLY SCHEDULES.—Taking into consideration the ship's quarterly operating schedule, the department head prepares the current and subsequent quarterly maintenance schedules, based on the requirements contained in the cycle schedule. He makes up the schedule in conjunction with his division officers and maintenance group supervisors.

The information is transcribed from the cycle schedule to a specific week (in the quarterly schedule) during which the work is expected to be done. To permit flexibility in rescheduling to accommodate changes that may occur in the ship's operating schedule, the quarterly schedule is arranged in weekly columns.

A quarterly schedule displays the entire maintenance workload for the quarter, and is a directive for maintenance group supervisors in scheduling their weekly maintenance. At the end of each week, the group supervisors cross out (with an X) all accomplished maintenance requirements, and encircle those not accomplished; the latter must be rescheduled. At the end of each quarter, the current quarter schedule is removed from the display board to become the ship's record of preventive maintenance actions performed or not performed. The subsequent quarter schedule then becomes the current schedule, and a new subsequent quarter schedule is posted.

WEEKLY SCHEDULE.—Each maintenance group supervisor prepares weekly schedules from the information appearing on the quarterly schedule. Preprinted on the weekly schedules are recurring daily and weekly maintenance actions that do not appear elsewhere.

The weekly schedule lists the components in the maintenance group area. It is used by the working area supervisor to assign work and record its completion.

The group supervisor assigns personnel, by name, to perform each required action on a specified day during the week. The schedule is posted in each maintenance group's working area.

The man assigned to work on a component is responsible for completing the required action on the day scheduled. After maintenance is completed, he marks the scheduled item with an X. If, for any reason, work cannot be accomplished during the week concerned, he circles the appropriate entry. At the end of the week, the group supervisor utilizes the X and O entries on the weekly schedule to bring the quarterly schedule up to date. He then cleans off the old weekly schedule (the form is made of plastic) and prepares a new one for the next week.

PMS MANUAL.—Each department of the ship (engineering, operations, weapons, and so on) utilizes its own planned maintenance system manual. It contains the minimum preventive maintenance requirements for every component or system installed for the department. Normally, the PMS manual is retained in the department office. It is used mainly by the department head to plan and schedule maintenance.

Each page in the manual (fig. 13-4) covers a single component or equipment. (The pages are referred to as manual index pages.) On the page are given a short description of all maintenance requirements pertinent to the component, the frequency with which the maintenance actions occur (e.g., M—monthly, A—annually), the enlisted rates required to do the work (in other words, the minimum skills required), and the length of time normally needed to perform the operation. Letters and numerals in the left-hand columns are for BuShips control and identification purposes. The column headed "M.R. No." identifies the number of the maintenance to be accomplished.

MAINTENANCE REQUIREMENTS CARDS.—The maintenance requirements cards are the key to the success of the entire planned maintenance system aboard ship. The development process for the MRCs, which was a vital and critical phase in setting up the PMS, demanded the best professional efforts of all the agencies concerned with the program.

For example, all sources of requirements for maintenance, such as bureau manuals, manufacturer's instruction books, fleet and type commander's instructions, POMSEE manuals, and the like, had to be reviewed to sort out, tabulate, and evaluate the requirements. It was then necessary to examine these requirements critically to eliminate extraneous material but to ensure that no required action was overlooked.

To be of value, the MRCs on any ship must agree completely with the contents of the PMS manual as well as the equipments and systems actually on board. At the very least, this requirement necessitates a complete inventory of all equipment before the cards can be prepared. Once these cards are received on board, they supersede the requirements set forth in any technical publications (including the BuShips Technical Manual), so far as preventive maintenance is concerned.

As shown in figure 13-4, there is a separate MRC for each preventive maintenance action that must be taken on every system, subsystem, or component. The index page number, the card number, and a description of the required maintenance are entered on both the index page and the associated card. In figure 13-5, for example, the complete maintenance requirement numbers are C-1 A-1 and C-2 M-2. The

System, Subsystem, or Component: TED (series) Radio Transmitter

Reference Publications and/or Maintenance Significant Number:

Bureau Card Control No.	Maintenance Requirement	M.R. No.	Rate Req'd.	Man Hours	Related Maintenance
CK 041CTP2A3 AA71 M	1. Check power output and modulation of TED transmitter not used with AM/1365-URT.	M-1	RM3	0.4	
CK 041CTP2A3 AA72 M	1. Clean air filters.	M-2	RMSN	0.2	
CK 041CTP2A3 AA73 A	1. Clean interior of equipment.	A-1	RMSN	0.3	

Bureau Page Control No. C-2

System, Subsystem, or Component: AN/URR-35A, 35B, 35C UHF Radio Receiver

Reference Publications and/or Maintenance Significant Number:

Bureau Card Control No.	Maintenance Requirement	M.R. No.	Rate Req'd.	Man Hours	Related Maintenance
CK 030ARG2 A3 AA42 M	1. Measure sensitivity. 2. Check silencer circuit operation. 3. Measure noise limiter loss. 4. Check blower operation.	M-1	RM3	0.8	
CK 030ARG2 A3 AA69 M	1. Clean air filters.	M-2	RMSN	0.1	
CK 030ARG2 A3 AA70 A	1. Clean interior of equipment.	A-1	RMSN	0.2	

Bureau Page Control No. C-1

98.171

Figure 13-4.—PMS manual index pages.

designations C-1 and C-2 refer to the index page numbers of the PMS manual; A-1 and M-2 are the card numbers. Further, the letter C identifies each equipment as a "communications and control" component; letters A and M indicate the periodicity of the maintenance action required.

The MRC provides detailed guidance for the person performing a preventive maintenance task on a specific equipment. The complete operation is defined in ample detail to enable assigned personnel to perform the job without difficulty. In addition to the instructions regarding the maintenance task, the card lists

SYSTEM	COMPONENT	M. R. NUMBER
Communications and Control	AN/URR 35A,35B, & 35C UHF Radio Receiver	C-1 A-1
		CARD OF
SUB-SYSTEM	RELATED M.R.	RATES M/H
Radio Communication Systems		RMSN 0.2
MAINTENANCE REQUIREMENT DESCRIPTION		TOTAL M/H 0.2 ELAPSED TIME 0.2
1. Clean interior of equipment.		

TOOLS, PARTS, MATERIALS, TEST EQUIPMENT

1. Vacuum cleaner
2. Soft bristle brush
3. Clean rags
4. Shorting bar

PROCEDURE

1. Clean interior of equipment:
   a. Secure all power to the equipment.
   b. Loosen fastening devices on the front panel and pull the receiver out on its slides to the stops.
   c. Discharge all capacitors with a shorting bar.
   d. Remove dirt from the "hard to get to" areas with a soft bristle brush.
   e. Wipe out the inside of the cabinet with a clean rag.
   f. Remove remaining dirt from the chassis with a vacuum cleaner.
   g. Replace and secure the chassis in the cabinet.
   h. Return equipment to normal operation.

C-30470 MAINTENANCE REQUIREMENTS CARD OPNAV FORM 4700-1 (REV. 1-64)

SYSTEM	COMPONENT	M. R. NUMBER
Communications and Control	TED (Series) Radio Transmitter	C-2 M-2
		CARD OF
SUB-SYSTEM	RELATED M.R.	RATES M/H
Radio Communication Systems		RMSN 0.2
MAINTENANCE REQUIREMENT DESCRIPTION		TOTAL M/H 0.2 ELAPSED TIME 0.2
1. Clean air filters.		

TOOLS, PARTS, MATERIALS, TEST EQUIPMENT

1. Vacuum cleaner
2. Shorting bar

PROCEDURE

NOTE: Air filter is located on rear of RF chassis.

1. Clear air filters:
   a. Secure all power to the equipment.
   b. Loosen the captive wing nuts on the front panel.
   c. Withdraw the unit from the cabinet to its normal stops.
   d. Discharge all capacitors with the shorting bar.
   e. Release the fasteners on the air filter frame and remove air filter.
   f. Vacuum the filter causing the air to reverse flow through the filter.
   g. Reinstall the filter in the equipment if cleaning by this method is satisfactory; if not, proceed with the following steps.
   h. Wash the filter in warm water and detergent and rinse in warm water.
   i. Blow excess moisture from the filter with low pressure air or shake out, whichever is desirable.
   j. Allow filter to dry thoroughly, then reinstall.
   k. Replace and secure chassis in cabinet.
   l. Return equipment to normal operation.

C-30470 MAINTENANCE REQUIREMENTS CARD OPNAV FORM 4700-1 (REV. 1-64)

98.176

Figure 13.5.—Maintenance requirements card.

information needed by supervisory and scheduling personnel (frequency of accomplishment, minimum skill level required, time to accomplish, and so on).

A complete working set of applicable MRCs, with a container, is installed in each maintenance group working area, where they are available to those performing maintenance tasks. A master deck of all cards for each department is retained in the department office with the PMS manual. If a card becomes lost, soiled, or torn, it is replaced by typing a duplicate card from the master deck.

DATA COLLECTION SYSTEM

For the planned maintenance system to be successful, there must be an adequate method that will enable commanders and the technical bureaus to carry out their management functions in support of the program. Accordingly, a maintenance data collection (MDC) system was implemented in parallel with the PMS for gathering, processing, analyzing, and distributing feedback information. The MDC system currently is being tested and evaluated through the efforts of the Maintenance and Material Management Project Center (MMPC). The Center is under the direct control of the Chief of Naval Operations.

The shipboard test plan (aircraft squadrons are included in the total project effort) utilizes the destroyer ship class. The test applies to designated destroyer squadrons and tender repair departments reporting on equipment maintenance. Data generated in individual ships are key-punched, edited, and forwarded to an electronic data processing facility in the tender. There they are machine-processed to produce the required management reports. The MMMPC provides mobile training teams to selected ships to train personnel in the mechanics of implementing the system.

It is planned to introduce the data collection system to the fleet on a progressive basis. It is expected to include all surface force activities by January 1966.

COORDINATED SHIPBOARD ALLOWANCE LIST

The coordinated shipboard allowance list (COSAL) consolidates the repair parts needed to support all the equipment aboard a given ship. Tailored to meet the needs of individual ships, it is distributed by the Bureau of Ships on a progressive basis according to regular overhaul schedules.

Aboard ship, the COSAL is divided into segments in conformity with equipment category, such as electronic and ordnance segments. A complete copy of the COSAL is retained by the supply department. Other departments receive only the segment for which they have primary responsibility.

Each COSAL segment contains an introduction (of interest to all users) and three parts.

Part I (fig. 13-6) of each COSAL division is an alphabetical equipment index. For the user's convenience, the index is divided into two sections. Section A lists items alphabetically by equipment name; section B lists them alphabetically by function.

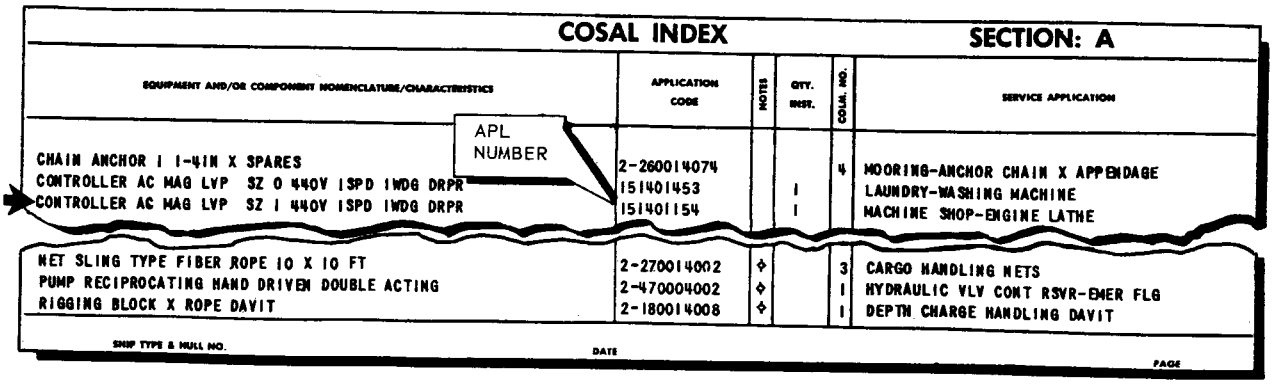
Part II of each COSAL segment contains the allowance parts/equipage lists (APLs). As shown in figure 13-7, each APL describes a component shown in part I and lists repair parts, manufacturers' numbers, nomenclature, and stock numbers. For ordering purposes, the last item is the most important. The APLs, then, constitute standardized parts lists for particular equipments. This section of the COSAL is the one used most frequently. For ships not yet utilizing the COSAL, stock numbers required for ordering parts are obtained from the ship's stock number identification table (SNIT) for each equipment.

Part III is a stock number sequence list (SNSL) of all items allowed for support of equipment shown in part I. It also indicates the unit of allowance and storeroom quantity for each repair part in the COSAL. Consolidation of all the SNSLs received on board provides a single source for effecting stock and inventory control.

ORDERING PARTS

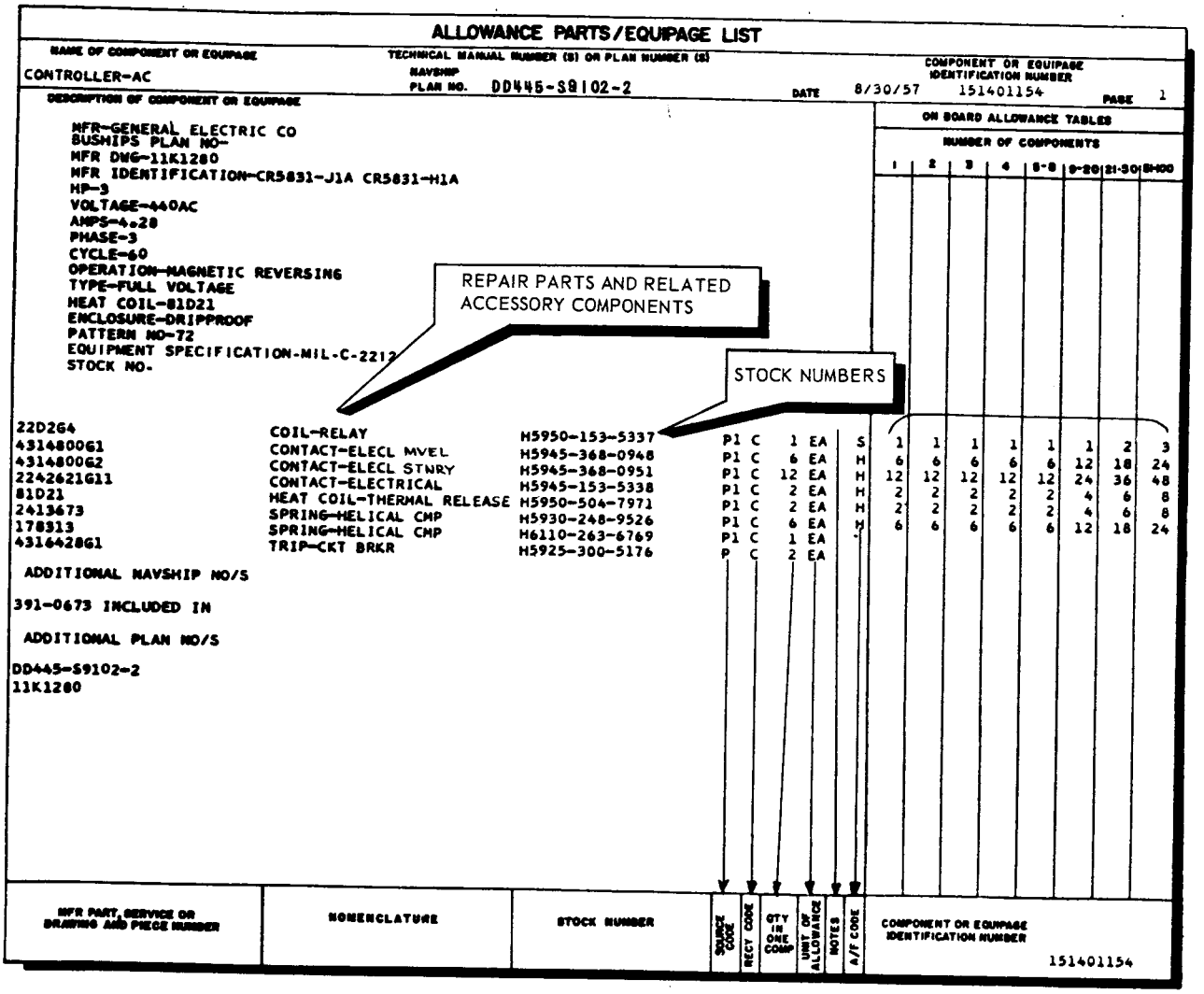
Aboard ships having central storerooms, material for general use of all departments is maintained in storerooms and other spaces under the custody and control of the supply department. Supply personnel keep stock record cards for all items stored. On these cards they record receipts and issues of material in order to estimate future requirements of the ship.

On board ships without central storerooms (in general, ships smaller than destroyers), received supplies are turned over directly to department heads. To the extent that space



17.61

Figure 13-6.—Part I of the COSAL.



17.63

Figure 13-7.—Part II of the COSAL.

permits, each department maintains its own storeroom. Department heads then are responsible for the accuracy of departmental inventories and for the timely submission of requests for additional repair parts and supplies.

To order parts, a requisition signed by an officer is submitted to the supply officer. Currently, the same form may be used for issues from the ship's storeroom and as a request to procure materials from sources outside the ship. Each requisition bears the part stock number, if available, and a brief description of the requested item. If the stock number is unavailable, a complete written description accompanies the requisition on an additional form provided by the supply department.

APPENDIX I

TRAINING FILM LIST

Certain training films that are directly related to the information presented in this training course are listed below under appropriate chapter numbers and titles. Unless otherwise specified, all films listed are black and white, with sound, and are unclassified. For a description of these and other training films that may be of interest, see the United States Navy Film Catalog, NavPers 10000 (revised).

Chapter 2

YOUR ROLE IN COMMUNICATIONS

MN-2621A Radio Operator Training—The Radio Man Fights. (7 min.—1944.)

MN-8099A Radio Teletype Systems Afloat—General Principles of Operation. (15 min.—1956.)

MN-9235 The Communicator's Job. (10 min.—1954.)

Chapter 7

SECURITY

MN-2621D Radio Operator Training—Transmission Security. (19 min.—1944.)

MN-6947 Security Control—You Never Can Tell. (36 min.—1951.)

MN-8333 Radio Transmission Security. (28 min.—1955.)

MA-8580 Defense Against Radio Jamming. (24 min.—1955.)

Chapter 10

TELETYPEWRITER EQUIPMENT AND OPERATION

MN-7467A TT-47/UG Teletypewriter—General Principles and Operation. (16 min.—1953.)

MN-9237A Mechanical Operation of the Model 28 Teletypewriter—Keyboard Transmitting Mechanism. (12 min.—1954.)

MN-9237B Mechanical Operation of the Model 28 Teletypewriter—Automatic Typer Selecting Mechanism. (11 min.—1954.)

MN-9237C Mechanical Operation of the Model 28 Teletypewriter—Type Box Positioning Mechanism. (18 min.—1954.)

MN-9237D Mechanical Operation of the Model 28 Teletypewriter—Function Mechanism. (13 min.—1954.)

MN-8099A Radio Teletype Systems Afloat—General Principles of Operation. (15 min.—1956.)

MN-8099B Radio Teletype Systems Afloat—Tone Modulated System. (11 min.—1956.)

MN-8099C Radio Teletype Systems Afloat—Carrier Frequency Shift Transmitting System. (6 min.—1956.)

MN-8099D Radio Teletype Systems Afloat—Carrier Frequency Shift—Receiving System. (10 min.—1956.)

Chapter 12

SAFETY

MN-6754 Safety Precautions for Electronics Personnel—Introduction. (15 min.—1951.)

Chapter 13

MAINTENANCE PROCEDURES

MN-1540P Radio Technician Training—Tube Tester Operation. (9 min.—1944.)

FN-7467C TT-47/UG Teletypewriter—Preventive Maintenance. (5 min.—1953.)

MN-6942 Lubrication of Electronic Equipment. (8 min.—1953.)

APPENDIX II

SPELLING

In your job, you must know how to spell and use correctly an extensive vocabulary of a rather technical nature. You can acquire this vocabulary only by constant effort and attentiveness. An up-to-date dictionary is one of the most important tools of your trade. When you meet a new word, learn the meaning as soon as possible. Study how it is used. This helps to fix the word in your mind. When the spelling or meaning of a word is questionable, recheck it in your dictionary.

There are certain basic rules for spelling which will aid you greatly in mastering words. The most useful of these rules are listed below. It must be remembered that there are exceptions to all rules; your dictionary will be the final authority.

1. When a one-syllable word or a longer word keeping the accent on the last syllable ends in a single consonant preceded by a single vowel, double the final consonant before adding a suffix beginning with a vowel.

Examples:
a. Clan, clannish
b. Plan, planned, planning
c. Control, controlled
d. Refer, referring—but, reference (because the accent has shifted away from the last syllable of the basic word)
e. Occur, occurred, occurrence

2. Words ending in a silent e generally retain this e before a suffix beginning with a consonant. When the suffix begins with a vowel, the silent e is usually dropped.

Examples:
a. Excite, excitement; late lately.
b. Tide, tidal; shape, shaping; force, forcible.

3. When the final sound of the word is a soft c, g, or ng, the final e is retained before some suffixes beginning with vowels.

Examples:
a. Peace, peaceable.
b. Advantage, advantageous; courage, courageous.
c. Change, changeable, but changing.

4. Words ending in y preceded by a consonant usually change the y to i before a suffix. Words ending in y preceded by a vowel do not change the y before a suffix.

Examples:
a. Icy, iciest; mercy, merciless; modify, modifies, modifiable; pity, pitiable, pitiful.
b. Obey, obeying; joy, joyful, joyous.

5. For the sound of ee, remember the rhyme, "i before e except after c."

Examples:
a. Believe, belief, relieve, relief.
b. Receive, conceive, perceive, conceit.

Exceptions: Weird, seize, neither, leisure, financier, inveigle.

6. Verbs ending in ie generally change ie to y before ing.

Examples: Die, dying; lie, lying.

BASIC SPELLING LIST

The following list of words represents a minimum working vacabulary for Navy personnel. Study them carefully. Be sure you can define, pronounce, and spell them correctly, as you will be using them daily in your work.

abbreviate	accidentally
abnormal	accommodate
absence	accompanying
absolutely	accredited
accept	accrue
accessible	accruements
accessory	accumulate

accumulators
accused
accustomed
acetate
acknowledgment
acquitted
activities
adequate
administration
admissible
admonition
advancement
advantageous
advisable
aerial
aerodynamics
aerograph
aeronautics
affidavit
aggravation
aircraft
airplane
alcohol
alcoholic
alidade
alignment
alkaline
allocation
allotment
alloy
all right
alteration
alternate
altimeter
altocumulus
aluminum
always
amended
ammonia
ammunition
among
amphibian
analysis
anchorage
aneroid
annunciator
annular
antenna
anthem
anxiety
apparatus
apparently
appended
application
appointment
appreciate
apprehended
apprehension
appropriate
appropriation
approval
armament
armature
arraign
arrested
article
artificer
ascertain
assembled
assignment
athletics
athwartship
atmospheric
atomizer
attached
attendance
authentication
authority
authorization
authorize
automatic
auxiliaries
availability
awkward
azimuth

baffle
ballistic
baritone
barometer
barracks
barrage
battalion
batteries
battery
battleship
bearing
beforehand
beginning
believable
believe
belligerency
belligerent
beneficiary
benefit
berth
besiege
biased
biennial
bilateral
bilge
binnacle
biscuit
bitts
blockade
boatswain
bomb
bombardier
bona fide
booster
boundaries
bouquet
bowline
breadth
breaker
breathe
brickwork
brilliant
Britain
Britannia
bulkhead
bulletin
buoy
buoyancy
bureau
business

cafeteria
caisson
caliber
calked
camouflage
campaign
cancel
cancellation
candidate
canteen
canvassed
capstan
carburetor
cardinal
career
Caribbean
carlings
carriage
casualties
catapult
catastrophe
category
cavalry
ceiling
cemetery
centrifugal
ceremonies
certificate
certify
challenge
changeable
channel
characteristic
chauffeur
checkage
chief
chloride
chock
chronometer
circular
circularize
circulation
circumference
circumstantial
cirrostratus
cirrus
classification
clearance
cofferdam
cognizance
cognizant
collapsible
collision
column
combination
combustion
commandant
commander
commendable
commendatory
commensurate
commissary
commissioned
commitment
committal
committee
commodore
communication
communique
commutation
comparatively
compass
competent
competition
competitive
complaint
complement
compliance
complicate
complying
composition
compression
comprise

comptroller
compulsory
compute
concealed
concede
conceive
concentration
concur
concurrent
condenser
conference
conferred
conferring
confidential
confinement
confirmation
connoisseur
conscientious
consciousness
consensus
constitute
consul
consular
contagious
contaminate
contemplate
contemptible
continental
continually
continuance
continuation
continuous
contrivance
controllability
controller
controversy
convenient
convening
conveyance
conviction
convoy
corps
correspondence
corroborate
corroboration
corrugated
council
counsel
counselor
counterfeit
coupling
course
courteous
courts-martial
cowls
coxswain
creditable
criticism
criticize
critique
crosshead
crucial
cruiser
crystallize
culpable
currents
curriculum
custodian
custody
customary
cycle
cylindrical

dangerous
davit
debatable
deceased
decedent
deceive
decommission
defendants
defense
deferred
deficiency
definite
deflection
delegated
departure
dependable
dependents
deposition
derelict
description
desertion
designation
desirable
desirous
destitute
destroyer
detachment
detention
deterioration
determine
develop
diagonal
diagram
diaphragm
difference
diffuser
dihedral
diminish
dinghy
dioxide
diphtheria
diplomatic
dirigible
disapproval
disapproved
disastrous
disbursement
discipline
disciplinary
discontinue
discrepancy
discretion
discriminate
discussion
disease
dishonorable
dismantle
dismissal
disobedient
disobey
dispatch
dispensable
disposition
disregard
dissipate
distillation
distiller
distortion
disuse
divide
document
domicile
dormitories
dovetailed
drainage
drunkenness
duly
duplex
duplicate
durable
dynamo

easement
eastbound
echelon
economical
effectuate
efficient
either
electrical
electricity
electronics
elementary
eligible
eliminate
emanate
embarrass
emergency
emissary
empennage
emphasize
emulsion
endorse
endorsement
engineer
engineering
engineroom
en route
ensign
enthusiastic
entitled
envelope
environment
equipage
equipment
equivalent
erroneous
escort
espionage
essential
et cetera (etc)
eventually
evidence
exaggerate
exceed
excerpt
exclusive
exercise
exhaust
exhibition
exhilarate
existence
expedite
expend
experiment
experimental
expiration
explanation
explosive
extension
extenuation
exterior
extinguisher
extraordinary
extravagance

facilities

facsimile
familiar
familiarize
fascinate
fathom
feasible
Filipino
financial
fittings
flagship
flange
flareback
flexible
flotilla
fluctuate
fluctuation
flukes
forecastle
foreign
foreigner
forfeit
formation
formulas
forty
fourteen
fragmentation
fraudulent
fueling
fulfill
function
fundamental
furnace
furniture
further
fuselage

galley
gangway
gaskets
gauge (gage)
generated
generators
government
governor
gradient
grammar
grapnel
gravity
grievance
grievous
grommet
grooving
guarantee
guardian
gudgeon
guidance
gunnery
gyro pilot
gyroscopic

halyard
hammock
handkerchief
harass
harbor
hatch
hazardous
haven't
hawsepipe
hawser
headers
height
hereby
herewith
hideous
hindrance
honorable
hoping
horizontal
horsepower
huge
humorous
hydraulic
hygiene

identical
identification
idiosyncrasy
illiterate
imaginary
immediately
imperative
imperceptible
impracticable
impromptu
improperly
inappropriate
inboard
incapacitated
incendiary
incidentally
inclement
inclinometer
incumbent
indefinite
independence
indicator
indiscriminate
indispensable
induction
inevitable
inexhaustible
infectious
inference
inferior
inflammable
infliction
ingenious
ingenuous
injector
innocence
inoperative
inquiry
insert
inspect
installation
instance
institute
instructions
instrument
insubordinate
integral
intelligence
intercede
interceptor
interest
interfered
interlocutory
interrogatories
intoxicating
introduction
invariably
investigation
involving
iridescent
irregularities
irrelevancy
irrelevant
irresistible
isobar
isotherm
itinerary

jeopardy
journals
judgment
judicial
judiciary
judicious
jurisdiction
justifiable

kedge
keel
keenness
khaki
knowledge

labeled
laboratory
lacquer
latitude
launch
liaison
lieutenant
lighthouse
likable
likelihood
liners
Link trainer
linoleum
liquefy
liquor
longeron
longevity
longitude
longitudinal
lose
louvers
loyalty
lubrication

machinery
magnesia
magnetic
magnetism
maintained
maintenance
malingering
management
mandatory
maneuver
manifold
manometer
manual
marital
maritime
marline
martial
maximum
medicine
medieval
Mediterranean
memorandum
mercurial
mercury
meridian
merit
metallurgical
meteor

meteorological
micrometer
mileage
mineral
minimum
minor
minority
misbehavior
miscellaneous
mischievous
misconduct
mission
mitigation
modification
monsoon
mooring
morale
mortise
mosquitoes
multicoil
multilith
multiple
murmur
muscle
mysterious

nacelle
naphtha
narcotic
navigation
navigator
neap
necessarily
negligence
neutral
nickel
nomenclature
northeasterly
northerly
northwesterly
noticeable
notification
nucleus
nuisance

oakum
obedience
obligate
obligation
obscene
observed
occasion
occurrence
offense
offensive
offered
officially
omission
omitted
operation
opinion
opportunity
optical
optimistic
orderlies
ordinarily
organic
organize
orientation
orifice
original
oscillator
outboard
overhaul
oxyacetylene
oxygen

Pacific
pamphlet
Panama
pantomime
parachute
parallel
paralysis
parenthesis
parliament
participate
partition
peaceable
pelorus
penalties
penetrate
pennant
perceive
percent
percussion
peremptory
performance
periodical
periscope
permanent
permissible
persecution
perseverance
personal
personnel
persuade
pertaining
pertinent
petroleum
Philippines
photostatic
physical
physician
pinion
Plimsoll mark
pneumatic
pneumonia
polyphase
poppets
practicable
practice
prairie
precede
precedence
precept
precipitation
precise
preferable
preference
preferred
prejudice
premeditated
preparation
preparatory
prerogative
prescribed
presents
preservation
presumption
prevalent
preventer
previous
prime
principal
principle
prior
privilege
procedure
proceed
professor
proffered
prohibited
projectile
promotion
promulgate
propellant
propeller
property
prophecy
prosecution
prospective
protracted
provisioning
provisions
psychology
Puerto Rico
purchased
pursue
pylon

qualification
qualify
quarantine
quarterly
questionnaire

range finder
rebuttal
receipt
receive
reciprocating
reciprocity
recognize
recommend
recommendation
reconnaissance
reef
reenlistment
reeve
reference
referred
refrigerant
register
registrar
regulation
regulator
relevant
religious
remission
rendezvous
renovation
repellant
repetition
representative
reproachful
repulse
requirement
requisition
resistance
respective
respiration
restaurant
restitution
restoration
restraint
restriction
resume
revolution
rhythm

rivet
rotor
salable
salve
salvo
sanitary
satisfactory
scantlings
schedule
scuppers
scuttle
searchlight
seaworthy
secretariat
secretary
seize
semaphore
separate
sergeant
serviceable
sextant
shackle
shafting
sheathed
sheave
shellac
shortage
shrapnel
sick bay
siege
signature
significant
silicates
similar
sincerely
sodium
solemnity
sortie
southeasterly
southerly
southwesterly
sovereign
specification
squadron
squeegee

stability
stanchions
starboard
statistical
statistics
stopover
storeroom
strafe
straggler
strategic
strategical
strategy
strenuous
submarine
subpoena
subsequent
subsistence
substitute
succeed
summary
superintendent
superior
supersede
supervise
supervision
suppress
surface
sustenance
swage
symmetrical
synchronous

tachometer
tactical
taffrail
tandem
tangency
tangent
tangible
tarpaulin
technical
temperature
tempered
tempering
template

temporarily
temporary
tendency
tentative
theoretical
thermometer
thwart
toggle
tonnage
torpedoed
torsion
traceable
transferable
transferred
transformer
translation
transportation
traveling
turbine
turnbuckles
turpitude
twist
twelfth
typhoon
typical

unanimous
unauthorized
underway
undesirable
unfavorable
unforeseen
unmistakable
unnecessary
unprecedented
unquote
until
upkeep
urgency
usage
useful
usually

vacancy
vaccination

vacuum
vehicle
velocity
vertical
vigilance
village
visa
visaed
viscosity
visibility
visual
voltage
volume
vouchers

waist
waiver
wardroom
warrant
wartime
waste
watertight
wattmeter
weapon
weather
Wednesday
weird
welding
welfare
westbound
westerly
whaleboat
wherry
wield
willful
withdrawal
writing

yacht
yeoman

zenith
zinc

APPENDIX III

EQUIPMENT DESIGNATING SYSTEMS

A nameplate on the front of each item of electronic equipment carries a group of letters and numbers to identify the equipment. This group is assigned in accordance with either the Joint Electronics Type Designation System (commonly called AN nomenclature system) or the Navy Model System, depending upon the relative age of the equipment. Most new electronic equipment procured for the Navy, Army, Air Force, Marine Corps, and Coast Guard is assigned model letters under the Joint Electronics Type Designation System.

JOINT ELECTRONICS TYPE DESIGNATION SYSTEM

The first two letters of the Joint Electronics Type Designation System are AN. This group is the system indicator. It does not mean that all the services use the equipment, but only that the type number was assigned under the AN system. The AN is followed by a slant sign and three identifying letters. The letters to the right of the slant sign are significant, because they give a brief description of the equipment. The explanation follows.

First letter: Where installed—whether designed for use in aircraft, submarine, surface craft, shore station, etc.

Second letter: Type of equipment—radio, radar, sonar, visual, etc.

Third letter: Purpose of equipment—communications, direction-finding, receiving, transmitting, etc.

The three equipment indicator letters are followed by the model number. After the model number may appear additional letters to indicate a modification of the original equipment.

Consider, as an example, the equipment designation AN/SRT-15. The AN represents the system indicator. A glance at table III-A gives the meaning of the equipment indicator letters:

S-Water surface craft;
R-Radio;
T-Transmitting.

The figure 15 is the model number.

NAVY MODEL SYSTEM

The AN nomenclature system was adopted by the Navy in 1946, but you still find a considerable amount of equipment marked and identified by the older Navy Model System.

Table III-A. --Equipment Indicator Letters, a Nomenclature System

1st letter (designed installation classes)	2d letter (type of equipment)	3d letter (purpose)
A—Airborne (installed and operated in aircraft).	A—Invisible light, heat radiation.	A—Auxiliary assemblies (not complete operating sets).
B—Underwater mobile, submarine.	B—Pigeon.	B—Bombing.
C—Air transportable (inactivated).	C—Carrier.	C—Communications (receiving and transmitting).
D—Pilotless carrier.	D—Radiac.	D—Direction finder and/or reconnaissance.
F—Fixed.	E— Nupac (nuclear protection and control).	E—Ejection and/or release.
G—Ground, general ground use.	F—Photographic.	G—Fire control or searchlight.
K—Amphibious.	G—Telegraph or teletype.	H—Recording and/or reproducing (graphic, meteorological, and sound).
M—Ground, mobile (installed as operating unit in a vehicle which has no function besides transporting the equipment).	I—Interphone and public address.	L—Searchlight control (inactivated; use G).
P—Pack or portable (animal or man).	J—Electromechanical (not otherwise covered).	M—Maintenance and test assemblies (including tools).
S—Water surface craft.	K—Telemetering.	N—Navigational aids (including altimeters, beacons, compasses, racons, depth sounding, approach and landing).
T—Ground, transportable.	L—Countermeasures.	P—Reproducing (inactivated).
U—General utility (includes two or more general installation classes, airborne, shipboard, and ground).	M—Meteorological.	Q—Special, or combination of purposes.
V—Ground, vehicular (installed in vehicle designed for functions other than carrying electronic equipment, etc., such as tanks).	N—Sound in air.	R—Receiving, passive detecting.
W— Water surface and underwater.	P—Radar.	S—Detecting and/or range and bearing.
	Q—Sonar and underwater sound.	T—Transmitting.
	R—Radio.	W—Control.
	S—Special types, magnetic, etc., or combinations of types.	X—Identification and recognition.
	T—Telephone (wire).	
	V—Visual and visible light.	
	W—Armament (peculiar to armament, not otherwise covered).	
	X—Facsimile or television.	
	Y—Data processing	

The assignment of Navy model letters to electronic equipment depends on the primary function of the equipment, such as receiving, transmitting, direction-finding, etc. In this system only the first letter (in a few instances, the first two letters) indicates the basic purpose of the equipment. The remaining letters were assigned in alphabetical sequence as newer equipments were designed. Some first letters (and their meaning) on equipment nameplates are—

D —Radio direction-finding;
FS—Frequency shift keying;
L —Precision calibrating (such as frequency meters);
R —Radio receiving;
T —Radio transmitting (includes combination transmitting and receiving).

In the list you can see that the letter R means radio receiving. The first receiver designated under the system was RA, RB the second, and so on. When the alphabet was exhausted, 3-letter designators were used. For example, RAA came after RZ, then RAB after RAA; RAZ was followed by RBA, and so on.

Numbers succeeding the model letters indicate a modification of the equipment or the award of a new manufacturer's contract.

Although the Navy model letter system of equipment identification no longer is in primary use, some equipments under this system are of comparatively recent design and manufacture—for example, the model TED transmitter.

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