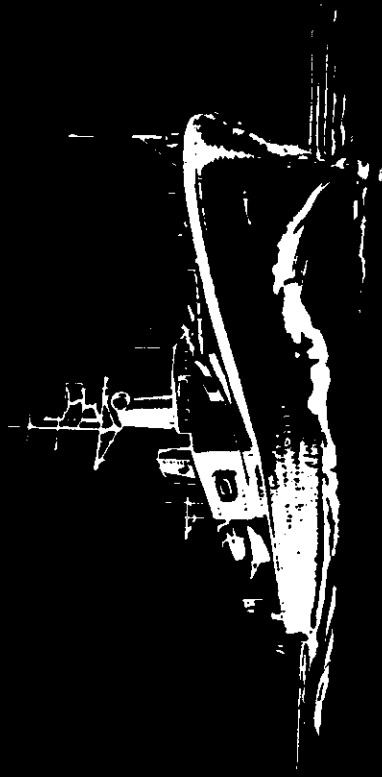


ROYAL CANADIAN NAVY
TRADE MANUAL



RADIOMAN

TRADE GROUP ONE

BRCN 3037 (63)

BRCN 3037(63)



THE ROYAL CANADIAN NAVY

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D. Salmon
NAVAL SECRETARY

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PREFACE

This manual is written for men of the RCN who are studying for advancement to Radioman Trade Group One. It is not intended to be a complete course for Radioman - this is done in the Fleet School, Communication Division. It is, rather, a condensed study of communications and equipment as applying to radiomen.

Those who work in communications know how fast procedures and equipment change. This manual was up to date when published and it will be revised or re-written from time to time. Between revisions some obsolescence may be unavoidable. For this reason it is suggested that the student with access to official communication publications use them as much as possible in his study.

CHAPTER 1

INTRODUCTION

The fleet needs good men in all trades, for a modern naval force is only as good as the men who man the ships. Even with the most modern equipment, a naval force would be almost powerless without good men to operate and maintain that equipment.

The Navy needs intelligent, devoted men. The Navy needs GOOD RADIOMEN. Effective communications are vital to the success of a modern navy. A battle could be lost because of a communication failure or by the mistakes of poorly trained communication personnel.

Radiomen, in effect, are part of the operating forces, whether stationed aboard ship or at a shore station that transmits vital information to the fleet. Wherever you are stationed as a radioman you won't be loafing. It's a tough job, often requiring long hours of work. But it is rewarding -- not in extra pay, but in the realization of a job well done, a vital job well done.

The radioman is primarily an operator, but he does have responsibilities as a technician. Look at the TRADE SPECIFICATIONS in this introduction. They will show you that radiomen must have a knowledge of how their gear operates and be able to perform preventive maintenance routines. Prior to the Second World War, electronics in the RCN was

still in its infancy, but since the war great strides have been made in this field. Today, electronics is used in many ways in the Navy - from locating the enemy to firing the guns. With these changes it became necessary to revise the training syllabus to include more electronic training. It is necessary to train radiomen for the operation, maintenance and repair of radio equipment.

But - and this is important - in order to learn electronics so that you really understand it, you must first have a good knowledge of mathematics. It is impossible to over-emphasize this point. **START NOW** to prepare yourself for the training you will receive. Get a copy of **BRCN 5422** or see the Education Training Officer for assistance in obtaining a course in mathematics.

Radiomen are used in all important segments of the Navy - from large shore radio stations to small outlying stations; from aircraft carriers to small patrol craft. They keep vital information flowing. In shore radio stations radiomen are concerned with getting messages to and receiving them from naval and merchant ships, and also monitoring other circuits. Radiomen operate teletypewriters, facsimile equipment, radio direction finders, and electronic countermeasures equipment.

Afloat, the radioman is a "jack of all trades" in the communication business. His assignments include a little bit of everything, such as manning radiotelephone circuits, copying fleet broadcasts and operating countermeasures equipment. Along with operating this equipment, the radioman must be prepared to keep it in operation and perform maintenance when necessary.

Life aboard ship for a radioman is never routine. It is sometimes exciting and always interesting. As a new member of the staff, your job may be copying the area broadcast - on radioteletype (RATT), or Morse code, using a typewriter. Or it may be guarding the international distress frequency (500 Kcs). If you have a good "fist" and a good knowledge of procedures, your job may be transmitting messages to other

ships in the group on a direct circuit. Whatever the job, it is an important one, of this you may be certain.

Other duties of radiomen include emergency destruction of communication publications. Each man on the staff shares this responsibility. Should a boarding party be required, a radioman equipped with a portable transmitter/receiver is included in the party. Occasionally a ship is caught in a sudden storm and sustains damage to transmitting and receiving antennae. Here you may be required to assist in rigging emergency or jury antennae. During wartime of course, such damage could also result from enemy fire. All ships carry out regular drills to train men for such emergencies. Your job as radioman is **MORE IMPORTANT THAN EVER DURING SUCH EMERGENCIES**, so learn your job well. The safety of the ship may depend on how well you learn.

Your duties aboard ship will also include a share of the "housekeeping" chores, such as routine cleaning of offices and compartments which come under the control of the Communication Department, the communicators' mess, the cafeteria, and other areas that carry joint responsibility.

Provisioning and ammunitioning a ship is a giant task which cannot be handled by the Supply and Gunnery Departments alone. You will be called upon from time to time, to lend a hand in this important job. Accept it in the cheerful manner expected of a communicator, and you'll see the truth in the adage, "many hands make light work".

Have you ever asked yourself this question: "How does the Navy determine what a radioman has to know?" Briefly, this is how it is done. Decisions are made at command level regarding the amount of communication facilities necessary to a modern warship - fifty years ago this would be very little, but today the requirement is large indeed. Next to consider, is the amount of equipment and the number of men essential to operate this equipment. Contracts are then awarded to companies which will build the radio equipment, and a board of officers meets to determine what knowledge each man

should have in order to perform the job he will be doing. This information is then compiled and distributed as the RCN TRADE SPECIFICATIONS.

The "trade specs" for radiomen are forwarded to the Communication Division where a training syllabus is prepared to meet the specifications. Your course for RM1 is built around this syllabus.

So that you will more readily understand what you are required to learn, here is an extract from the RCN TRADE SPECIFICATIONS for radiomen:

RCN TRADE SPECIFICATIONS - RADIOMAN (RM) TG1

Scope

The work in this trade includes:

Operation - operating all types of radio communication and radioteletype. (RATT) equipment.

Receives and records Morse, voice and radioteletype transmission. Transmits by Morse, voice and radioteletype.

Process messages under direction, encrypt and decrypt call signs.

Employ basic electronic countermeasures (ECM) techniques under direction.

Morse typing and manuscript reception at 22 wpm and manual Morse transmitting at 15 wpm. Teletyping at 35 wpm. Basic knowledge of military and commercial Morse and voice procedures, military teletype procedures, Basic knowledge of Canadian Naval Communication System, NATO and British Commonwealth world-wide radio organization, US Naval broadcast and ship-shore services, fleet radio organization, procedures for emergency destruction and disposal of classified communication material. Must be able to speak English clearly and write legibly.

Maintenance

Preventive - Assists more qualified tradesmen in performing preventive maintenance routines on all equipment of his trade.

Performs routine testing and tuning and makes minor adjustments on all equipment of his trade.

Corrective - Makes repairs as directed by more qualified tradesmen. Must have sufficient knowledge to replace fuses, tubes and lamps. Limited skill in use of common hand tools including soldering iron. Basic knowledge of repair techniques. Comprehensive knowledge of safety precautions required when dealing with electrical and electronic equipment, regulations for safety when working aloft, first aid for burns, shocks, etc.

Administration/Clerical

Amends publications and handbooks peculiar to the department as directed. Must have basic knowledge of applicable publications, special terminology and amendment procedures.

ADVANCEMENT

It is natural that a man be concerned about his advancement and promotion. This shows a very desirable quality - **AMBITION.**

Everyone looks forward to promotion or advancement. The extra pay and prestige are incentive enough for some, while others have a desire to meet the challenge of higher learning. The reasons for wanting to advance are generally the same for each man - the methods employed to achieve these aims are many and varied.

Once you have attained the rank of ABRM1 your next interest will be trade group two. How fast you qualify will depend on how much effort you put forward. The most important step toward your trade group two will be the recommendations you receive as RM1. In other words, by learning all you can and by doing a good job as a radioman you will make yourself a better prospect for the next step up the ladder. As your experience grows and you become better suited to carry out your duties, you will find time to learn much more detail about

the work you have chosen as a career. The required waiting period of approximately 24 months and the seetime between courses are designed to allow each man a chance to gain experience. They also make it possible for a man who is willing to work hard to get ahead of the man who is content to sit back and let things take their course.

Let's look beyond RM1 and RM2. Let's assume that you have studied hard, worked hard, passed with flying colours and are going on to bigger and better things.

As you advance from RM2 to RM3, you will be expected to assume more responsibility in the communication division. You will be required to help train and supervise other radiomen. You will be expected to be able to work on more complicated mechanisms and to assume a greater administrative burden.

To advance to chief radioman, you must be ready to organize a communication office either at a shore station or aboard ship. You will be asked to assign personnel to various jobs. You must have the ability to plan, organize, and supervise the training program for radiomen.

The Navy encourages ambitious men and provides many opportunities for self-improvement and advancement. How well you do depends to a large degree on you. If you conscientiously apply yourself, you'll get the promotions. And if you have talent to spare, the door is wide open. From chief radioman, you can advance to commissioned officer. This requires a lot of hard work and study, but it can be done by those with the necessary talent and ambition. The climb from ordinary seaman to Director of Naval Communications is a long and difficult one, but it has been done by several of our officers. So start now to prepare for your future. See your divisional officer to get some help in planning a sound educational program. Advanced planning is necessary to success.

Complete details on the requirements for advancement in trade group and promotion in rank are contained in BRCN 113, *Manual of Advancement and Promotion (short title MAP)*. You

should become familiar with the sections of this BRCN which apply to your trade.

Your course for RM1 will be based on the Radioman Trade Group One Manual which you now have in your hands so start studying it. Carry it around with you. Study it when you have a spare moment or two. Read it and re-read it, because you'll never learn what's in the book by reading it just once. But don't try to absorb too much at one time. After reading a page or two, see if you can restate the main points in your own words. It is a mistake to try to memorize the text. Instead, a summary in your own words will be your ticket to understanding. Put the major points in writing - in other words, take notes on what you have learned. It will help to fix the ideas firmly in your mind.

Work steadily. You are much better off studying a little bit often than studying a lot occasionally. Steady progress is the keynote to success.

Test your progress by answering the questions at the end of each chapter. If you can't answer one, go back over the material. If it still puzzles you, see your petty officer - he'll be glad to help you.

A table of contents in the front of the book lists the chapter headings. Develop the habit of referring to this table when looking for a particular subject. Thumbing through the book page by page is time-consuming and unnecessary.

Another important item - this book does not have ALL the answers. It's only the beginning. In Chapter 7 you will find a reading list of books which are used in your trade. You should become familiar with all of these publications. They make up a study guide to help you learn as much as possible about your job.

SECURITY

Security applies to all men in all branches of the Navy. However, because of the nature of your work as a radioman, security has a rather special application to you.

There are many rules designed to protect classified information. Observation of these rules on board ship or where you are working will protect the information you are handling. While you are ashore, or writing letters to the folks at home, you must observe rules of your own. This personal responsibility is part of your job and you should always bear in mind that the lives of many people depend on security.

Foreign agents are well trained and can derive much important information from seemingly harmless conversations. Information you learn from communications is quite safe as long as you keep it to yourself. You know how important it is and how it must be treated. Other men in your ship, or friends and relatives ashore, are not always aware that what they learn from you would be very helpful to foreign powers. Because they learn something in casual conversation they feel free to discuss it with other people. They have no training or knowledge about security and this is where the trouble lies.

You are in a position to know what needs protection and the rules the Navy has designed to provide this protection. It is up to you, as a radioman, to justify the trust placed in you by keeping things to yourself. Conversations, telephone calls, and letters are possible sources of security leaks. The navy depends on you to see that they are plugged.

The following rules will help you in your observation of security:

1. Know the rules your captain has laid down and follow them.
2. Report immediately any loss of classified information.
3. Do not discuss any part of your work with anyone, even shipmates.
4. Never carry classified information on your person when ashore.
5. Always treat classified documents with the respect they require. This includes such things as waste paper, carbons, etc., used in the processing of classified messages.

You will find much more information about security in Chapter 11 of this manual. Study it carefully and obey ALL rules.

A Short History of Guglielmo Marconi

Marconi was born in Italy in 1874 of an Italian father and an Anglo-Irish mother. His family was very wealthy and he was allowed to pursue his own interests without hindrance. At an early age he developed an absorbing interest in physics and chemistry, and in 1894 first read of the work of Heinrich Hertz, who first produced electromagnetic waves, and Oliver Lodge, who developed the tunable circuit for detecting waves. From that time Marconi devoted himself to experimenting with the newly-discovered waves and attempting to develop a practical system of communication using them. Marconi was not a highly trained scientist, but a clever man who had the ability to see the practical application of other men's work. He improved on Hertz's and Lodge's inventions and by 1896 he was able to transmit and receive Morse messages over a distance of two miles. His primary interest was not the theoretical side of radio, but the perfection of a practical system of wireless communication. In 1896 Marconi went to England to try to commercialize his system. He was well acquainted with notables in England through his mother who came from the aristocratic set. Through Sir William Preece, Engineer-in-Chief of the British Post Office, he was able to demonstrate his system to potential financial backers. In 1897 he gave a demonstration in which he successfully established communication over a distance of 8 miles. The money was raised and the British Marconi Company was formed. Two years later an American subsidiary was formed and until the formation of the Radio Corporation of America (RCA) in 1919, Marconi dominated British and American radio.

Marconi continued with his experiments on long distance communication, and on December 12, 1901 he succeeded in establishing radio communication across the Atlantic Ocean.

The transmitting station was situated on a high bluff above the sea in Cornwall, England. The receiving antenna was suspended from a high-flying kite in Newfoundland 1700 miles away. The first transatlantic radio communication consisted of the single letter "S".

Forced out of Newfoundland by the Anglo-American Cable Co., Marconi persuaded the government of Canada to allow him to erect a radio station at Glace Bay, N.S. However, he soon realized that his company would not survive if it relied entirely on the field of international communication. Competition was too great in this business.

It became apparent that the most promising field was marine installation, where he would not be competing with the cable and wireless companies. Marconi had the backing of Lloyd's and the Admiralty, and in 1901 he obtained contracts to equip both naval and merchant ships. His plans for marine wireless were large and ambitious. He hoped to control all the basic patents of radio and to equip the ships of all nations with his apparatus. He also planned to erect a chain of shore stations around the world from which to control the ship-shore traffic. He almost succeeded in this grandiose scheme, but his aggressive tactics aroused antagonism which eventually led to a reduction in business. Originally, Marconi only leased his equipment to the ships, and supplied his own trained operators. The Royal Navy, however, insisted on outright purchase and eventually competition from German and American firms caused Marconi to change his policy. The U.S. Navy in particular were violently opposed to Marconi dominating the marine wireless business. They then encouraged and subsidized Marconi's German and American competitors.

From 1900 to 1910 there was little profit in the radio business. The tragic sinking of the *Titanic* in 1912 focused public attention on the importance of ships being equipped with radio and the necessity for maintaining 24-hour radio watch. At the time the *Titanic* struck the iceberg she radioed an SOS. Many ships, some over 500 miles away, heard this distress signal.

The nearest ship to hear the call, and the first one to reach the scene, was the *Carpathia* which was 58 miles away at the time of the accident. There was another ship, the *Californian*, which was less than 20 miles away. Unfortunately she had closed down her radio for the night and did not hear *Titanic's* SOS. See Chapter 4 of this manual for a description of the sequence of events aboard the *Californian*.

After the sinking of the *Titanic* many countries required that ships over 500 tons be equipped with radio. In 1913, the Marconi Company declared a dividend for the first time.

The Marconi Company was dominant in the radio industry for about another ten years, but its position was doomed. The rapid progress of continuous wave (CW) telegraphy and the development of the vacuum tube were the main causes of decline. Soon Marconi's spark and crystal system was outdated by the superior methods developed by his competitors. For the Marconi Company this meant the loss of leading position in the radio field.

Marconi deserves the title *Founder of Radio Communication*. He seized upon the discoveries of Hertz, Lodge and others, and translated them into an effective and workable method of radio communication.

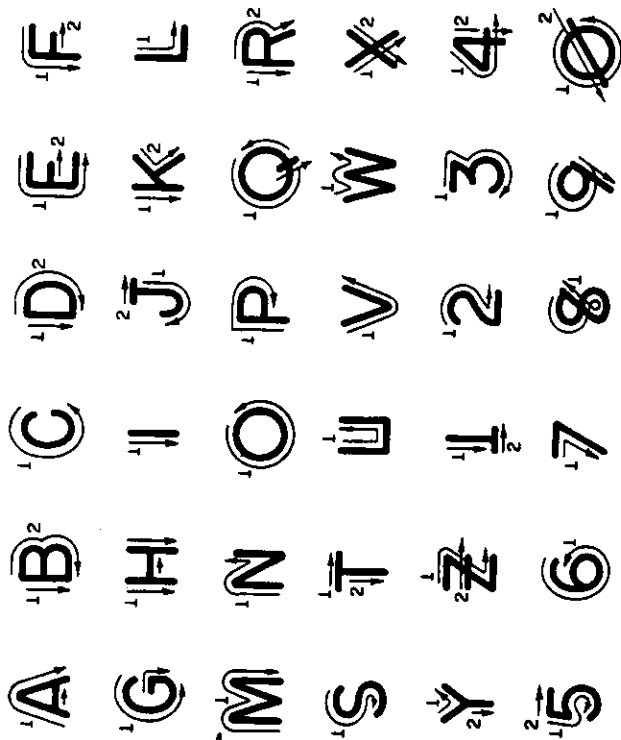
CHAPTER 2

THE INTERNATIONAL MORSE CODE

Printing

Learn to print clearly and rapidly. The messages you handle are important and someone must read what you have written without puzzling it out. Examine Figure 2-1 and compare the printed letters with your own. Notice that the sequence of strokes for some letters will be different from the way you are accustomed to forming them. This is an aid to rapid printing. The more of the letter you can form with a single stroke the better. Use this illustration as a guide to avoid confusion between printed letters and printed numerals. Especially watch the letter Z and the numeral 2. If you wish, write Z with a line through the stem, like this Z̄. Even more important is the distinction between the letter O and the figure zero. Zero is always written with a slant through it Ø. Also exercise care to avoid confusion between I and 1 and S and 5.

It is quite difficult to print the higher speeds, such as fleet broadcast CW. Therefore, touch typing is a requirement of ALL radiomen. During your course in the Communication School, pay close attention to typing instruction and develop good habits in the beginning. Accuracy is very important, most especially at the start. Get a copy of the typing manual in use and try to do exactly as it says. This will aid you later on.



OUCH

LETTERS MAY BE SLANTED IF DESIRED

Figure 2-1 How to Print

International Morse Code

The international Morse code is a telegraphic alphabet, with letters and numbers represented by sound patterns. Mastery of the code is one of the most important of the radio man's skills. If this is your first acquaintance with Morse code, you have many, many hours of hard work ahead. Do not be discouraged on this account. Of the thousands of men who have passed through the Communication School, only a very small percentage knew the Morse code before commencing their training. This means simply that the inexperienced must work harder than the experienced. Most "ham" operators are self-taught. You too can learn the code if you will stay with it.

The international Morse code is a dit and dah system. (The code is pronounced by saying "dit" and "dah", NOT "dot" and "dash". Forget about dots and dashes, and think only in terms of dits and dahs.)

The groups of dits and dahs which represent each letter must be made as one unit, with a clear break between each dit and each dah, and a much more distinct break between the letters. A dit is one-third the length of a dah.

You must never try to count the dits and dahs. Don't let yourself get in the habit of doing so. It's a temptation at first, but you won't be able to count fast enough when the code speed picks up. Learn SOUND PATTERNS instead. To understand what this means, rap out the pattern beginning "Shave and a haircut". You recognize this from its characteristic rhythm, not from the fact it has a certain number of beats in it. You must learn the code the same way. There are 36 Morse sound patterns representing the letters and numbers, plus a few others representing prosigns and punctuation marks. With study and drill you will learn to recognize each as fast as you now recognize "Shave and a haircut". The accent always falls on dahs, and you should pronounce each rhythmical combination with that in mind. Go through the alphabet several times getting the sound feel of the dit and dah combinations.

Morse Alphabet

In the pronunciation guide for sounds of letters given below, sounds are written as phonetically as possible. In the middle of a group, the short sound "dit" actually takes on the sound of "di". The phonetic alphabet is included in capitals after the letters. Get in the habit of referring to the letters phonetically.

Letter	Pronunciation
A	ALFA
B	BRAVO
C	CHARLIE
	di-DAH
	DAH-di-di-dit
	DAH-di-DAH-dit

D	DELTA	DAH-di-dit
E	ECHO	dit
F	FOXTROT	di-di-DAH-dit
G	GOLF	DAH-DAH-dit
H	HOTEL	di-di-di-dit
I	INDIA	di-dit
J	JULIETT	di-DAH-DAH-DAH
K	KILO	DAH-di-DAH
L	LIMA	di-DAH-di-dit
M	MIKE	DAH-DAH
N	NOVEMBER	DAH-dit
O	OSCAR	DAH-DAH-DAH
P	PAPA	di-DAH-DAH-dit
Q	QUEBEC	DAH-DAH-di-DAH
R	ROMEO	di-DAH-dit
S	SIERRA	di-di-dit
T	TANGO	DAH
U	UNIFORM	di-di-DAH
V	VICTOR	di-di-di-DAH
W	WHISKEY	di-DAH-DAH
X	XRAY	DAH-di-di-DAH
Y	YANKEE	DAH-di-DAH-DAH
Z	ZULU	DAH-DAH-di-dit

Punctuation Mark	Pronunciation
Dash	DAH-di-di-di-DAH
Parenthesis	DAH-di-DAH-DAH-di-DAH
Period or decimal point	di-DAH-di-DAH-di-DAH
Slant	DAH-di-di-DAH-dit
Apostrophe	di-DAH-DAH-DAH-DAH-dit
Colon	DAH-DAH-DAH-di-di-dit
Comma	DAH-DAH-di-di-DAH-DAH
Question Mark	di-di-DAH-DAH-di-dit

Hints on Studying Code

If you have any trouble learning the code, the following method may be helpful. Go through the three groupings of short, medium and long sounds with their accompanying practice words. Make up words of your own if you wish to give yourself further practice. Speak the practice words in code. Say "Mine .. DAH-DAH di-dit DAH-dit dit". It is not unusual to see beginners speaking to each other in code. This is one of the best methods of learning the proper formation of the characters, their sound and rhythm. Do not feel that you will "look silly" by practising in this manner. Many of the sights and sounds in the world of communication seem odd to outsiders.

If you can speak words in code rapidly and distinctly, you will have an easier time when you learn to receive code on the receiver. The sounds are very similar.

Figure Pronunciation

1	di-DAH-DAH-DAH-DAH
2	di-di-DAH-DAH-DAH
3	di-di-di-DAH-DAH
4	di-di-di-di-DAH
5	di-di-di-di-di
6	DAH-di-di-di-dit
7	DAH-DAH-di-di-dit
8	DAH-DAH-DAH-di-dit
9	DAH-DAH-DAH-DAH-dit
Ø	DAH-DAH-DAH-DAH-DAH

Short Sounds Practice Words

E	dit	TEE ATE EAT TEA
T	DAH	MEAT MEET
A	di-DAH	MINE TIME MAINE TEAM
I	di-dit	AIM NITE TAME TEA
M	DAH-DAH	MATE
N	DAH-dit	TAME NAME MITE MIAMI MAMA MEAN MAN MAT EMIT MINT MANE TAN ITEM TINT

Also note that the code, compared against time in the case of the 20 wpm transmission, is in the proper form of having the dit as a unit. There is one unit between each element of a character, three units between each character, and seven units between each group or word.

After learning the sound of each character at this rate of speed, it is not difficult to reduce the time between characters and to copy code at a much faster speed. If you learn the fundamentals well, it will be fairly easy for you to increase your speed. When copying code, if you miss a character, don't stop to worry about it, get the next character and let that missed one go by. BE A COMPETENT OPERATOR. Make every transmission and every reception an accurate one. Do not seek speed before accuracy.

Sending Morse

Your ability to send will depend mainly upon two things. First, you must *KNOW THE CORRECT SOUND OF THE CHARACTER* you are attempting to transmit. Second, you must *KNOW THE PROPER METHOD FOR KEYING WITH PERFECT CONTROL*. Practising the code out loud, as well as having received it by oscillator, has given you a good knowledge of code sound. The proper method for keying is your next concern.

The key you will use is the standard unshielded telegraph key, normally employed on practise oscillators and on ship-board and station circuits. It must be properly adjusted before you can transmit clearcut characters. Use the screws on the key to obtain good control. The gap between contacts should be adjusted to suit your wrist movement. Some operators like a closed key, others an open. "Closed" and "Open" are terms for a short gap and a wide gap.

Side screws should be centred and adjusted by tightening to prevent the keying bar from moving sideways. The spring screw should place just enough tension on the key so that the key is easily depressed yet springs upward at the end of each dit or dah.

Learn from the beginning the correct way to grasp the key. Do not hold the key tightly, but let your fingers rest lightly on the key knob. Your thumb rests against the side, your forefinger rests on top of the key, with your third finger bent and relaxed lightly with the remaining two fingers. Check Figures 2-3 and 2-4 for the correct method of keying. To ensure correct movement of your wrist and forearm, your arm should lie on the operating desk. The muscle of your forearm - not your elbow - should support the weight of your arm. Your elbow should not protrude over the edge of the table, as the pressure of the underside of your forearm will obstruct circulation and cause fatigue. Sit upright, with your arm in line with the key.

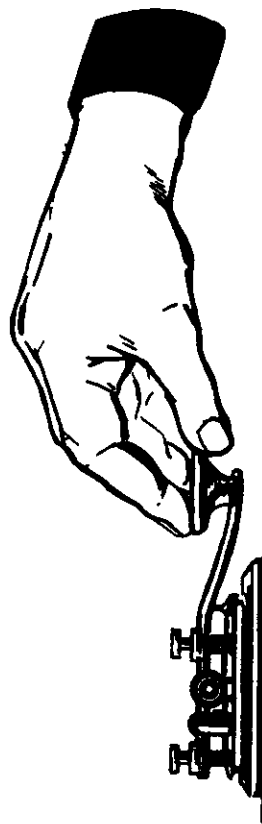


Figure 2-3 Correct Position of Hand

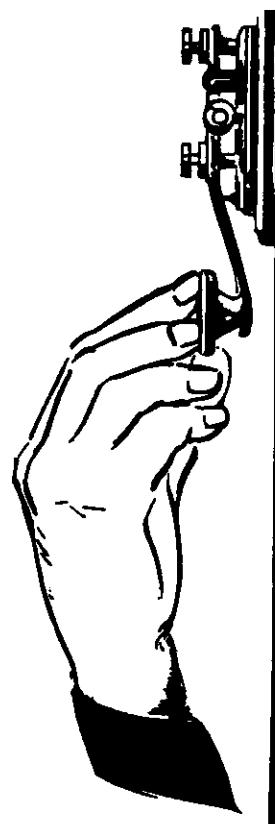


Figure 2-4 Correct Position of Fingers

YOUR ABILITY TO TRANSMIT DEPENDS TO A VERY LARGE EXTENT ON ACQUIRING THE PROPER MOVEMENTS OF YOUR WRIST AND HAND WHILE OPERATING THE KEY. To close the key, your wrist moves upward and your hand rocks downward toward your finger tips. To open the key, these two movements are reversed — your wrist comes down and your hand rocks back.

Make your wrist flexible. Limber it up. Correct wrist action may be developed by exercising your wrist up and down like a hinge. Another exercise is rotating your hand in clockwise circles, with your wrist held in a stationary position. These exercises will relieve any undue tension you may experience when first beginning to transmit.

Tips on Sending

Good operators have "sending rhythm", and you can acquire it in just one way. That is by PRACTISING. It may be difficult for you to key correctly at first, because your wrist is unfamiliar with the type of movement required for sending telegraphic code. Your wrist will be stiff and you'll have to get rid of that stiffness by concentrated practice. Don't favour the stiffness of your wrist. If you do, your sending will be choppy. The following exercises have been carefully prepared. Use them as an instruction guide.

E —

The dit characters require an adept "first". They must be transmitted quickly and rhythmically. Make a series of E's (dits). These are made with a pronounced movement of your wrist upward, returning to the normal position after each dit. At first, maintain a fairly long interval between dits. To assist you in limbering your wrist, exaggerate the movement upward. To prevent tenseness and tiredness of your wrist, remove your hand from the key periodically and flex your wrist. After practising E's for 15 or 20 minutes, decrease the interval between dits until you are making them rather rapidly.

Each sound should continue to be a definite dit, however. Keep at it until you can control each dit.

I —

When you feel that your wrist is limbering up, make the character I (di-dit). Start with your wrist in the normal relaxed position, raise it for the first dit, lower it quickly halfway back, and make the second dit with another quick movement of your wrist upward. Your transmission, made slowly, will produce the sound di-dit. As you practice and develop more rhythm, this character will have the sound of di-dit.

T —

Send a series of T's (DAH) with a good interval between them. Instead of a quick movement of your wrist upward, make a slower, more definite movement of your wrist and exert more pressure on the key. Send dahs for a few minutes, gradually diminishing the interval between characters.

Now try sending strings of M's (DAH-DAH). As with the character I, you will not return your wrist to the beginning position at the end of the first dah, but will bring it to the halfway point and then make the last dah. With practice, you'll soon change the hesitant DAH DAH sound to the snappy DAH-DAH. DON'T FORGET THE CORRECT WRIST MOVEMENTS. If you find that your sending requires exertion of forearm muscles or that your shoulder is moving, STOP and recheck your wrist motions. Now try these practice groups several times, backward and forward. Make them clearly and distinctly, spending more time on characters which cause you any trouble.

MEET EMIT MITE ITEM

A -

The character A (di-DAH) will give you practice in making a dit and a dah together. Sending motions in their proper order are:

1. a slight pressure of your fingers alongside the key,
2. a quick surge upward of your wrist,
3. a slight relaxing of your wrist to the halfway point, and
4. a final definite upward movement of your wrist.

This will produce the sound dit DAH when you begin to practise it. But keep at it - you'll soon have the proper di-DAH sound. Avoid tenseness, relax your forearm muscles when sending.

U -

You're ready for the character U (di-di-DAH). Start slowly, sending dit dit DAH. Practise it until you're getting a di-di-DAH sound.

N -

The character N (DAH-dit) requires little pressure on the sides of the key, a strong wrist movement upward, a half return, and a quick, short, upward motion for the dit. Practise this for several minutes until you are able to send DAH-dit easily and with complete relaxation.

D -

Try the letter D (DAH-di-dit). At first, with the correct wrist movement, it will be DAH dit dit. But the sound you

want to hear is DAH-di-dit - with a swing. Send D's until you can transmit them with perfect control.

Check yourself on the following groups. You should have less difficulty than you did with the first groups: MINED UNITE TIMER MAUDE TEAMED

S -

Go back to the dits for S which is di-di-dit. Get a good position on the key and put your wrist to work. See how quickly you can change the dit dit sound to di-di-dit. Relax your forearm.

V -

The letter V is di-di-di-DAH, so you'd better learn how to send it that way. Relax. If you've got your wrist tied up in a knot, you'll be sending dit dit DAH. Move your wrist up and down easily until you are sending di-di-di-DAH with perfect control. Practice this letter carefully. It is used in every radio test.

O -

DAH-DAH-DAH is O. Keep at it until it stops sounding like three T's. Test your skill with these words: VITAMIN ISSUED INUNDATE UNANIMOUS VIVA INSISTED

H -

Character H is di-di-di-dit. Send one. If it sounds similar to four E's, your wrist is too stiff. Develop the di-di-dit sound.

B -

Send DAH-di-di-dit. That's the Morse code equivalent of
B. Practice for perfect control, then try the groups below:
SOUSE BASSINET VINE BESTED HESITANT DIVAN
NAUSEOUS

K -

At this point you should be prepared to tackle the other
characters. They are mostly combinations of the letters you
have practiced. Each one has a distinct over-all sound. For
instance, K should not have the sound DAH-dit-DAH. It
should be DAH-di-DAH. Think of the tune OVER THERE.
DAH-di-DAH has the same rhythm as oh-ver THERE - DAH-
di-DAH.

Q -

A (DAH-DAH-di-DAH) has the same rhythm as the words,
"Payday today". Say in a monotone "payday today", and
then say DAH-DAH-di-DAH. When transmitted, these com-
binations have the same swing given them as when speaking
of chanting. Practice the remaining letters of the alphabet
and the numerals. When you think you're ready for it, practice
the code exercises on the following pages. The above 15
characters have taught you proper wrist movement. You know
the remaining 11 letters and 10 figures. Following are 14
practice exercises. Use these for self-drill.

CODE PRACTICE

1. E E E T T T A A A N N N I I I S S S H H H
M M M O O O E E E T T T A A A N N N I I I

S S S H H M M O O O E E E T T T I I I
M M M A A A N N N S S S O O O H H H E E E
T T T E E E T T T I I I M M M I I I M M M
A A A N N N A A A N N N S S S O O O S S S
2. U U U V V V D D D B B B K K K C C C W W W
J J J P P P U U U V V V D D D B B B K K K
C C C W W W J J J P P P W W W J J J P P P
U U U V V V K K K C C C B B B D D D U U U
D D D V V V B B B P P P J J J C C C K K K
W W W D D D B B B V V V U U U W W W J J J
3. R R R L L L F F F G G G Z Z Z X X X Y Y Y
Q Q Q R R R L L L F F F G G G Z Z Z X X X
Y Y Y Q Q Q G G G Z Z Z F F F L L L R R R
Y Y Y Q Q Q R R R X X X Z Z Z R R R F F F
L L L Q Q Q Y Y Y G G G Q Q Q Y Y Y R R R
4. 1 1 1 2 2 2 3 3 3 4 4 4 5 5 5 6 6 6 7 7 7
8 8 8 9 9 9 0 0 0 1 1 1 2 2 2 3 3 3 4 4 4
5 5 5 6 6 6 7 7 7 8 8 8 9 9 9 0 0 0 1 1 1
2 2 3 3 4 4 5 5 6 6 7 7 8 8 9 9 0 0 1 1 2
2 3 3 4 4 5 5 6 6 7 7 8 8 9 9 0 0 1 2 3 4
5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 1 2 3 4 5 6
5. V U I Y Q Z C X G R S L K J P Q X Z R I F
C V B W F K D S H Q Z A L K F B V R S T U
O T M E G Y Z X V E G N I W S L H M U A E
V U A E W Q G H V C I X Z L N R Y U K V U
6. E 8 Y 7 B 6 X 1 W 0 Z 2 A 3 C 5 S 4 I 2 F
U 1 F 5 D 8 Q 4 T 6 U 9 Q 2 E 0 S 5 U 1 Y
G 2 J 4 S 3 E 5 T 7 Z 8 K 6 M 9 R 1 A 2 R
S 7 W 8 E 9 R 2 A 3 Z 3 X 6 U 8 B 7 C 6 T
7. M I A N S Y N L Y T C E D O P S C X Z W Q A P K L N H U W C V N
B M Z S C D Q A I U S D L M U H G Y T R D C V T A R Y U F D S A
I G W Q X T Z I N Y O T E D B M L P Y U G H B Y R E D F L S W Q
X S Z I T Y B G N H J V K L M D M I A N S Y N L T Y C E D O P S

8. EF TS 16 29 83 ZJ 45 07 WR ND KW IC UX 91 02 IB
 LO FG 84 63 XW AC TM SU 50 72 XR RJ ZM 43 65 VH
 97 LM 12 46 70 FC FE EY 34 56 27 FT FY JU IT 98
 76 75 52 DE WE QT 13 36 57 KF RI YT 19 93 35 41
 FK YU 96 01 MC AR TH 19 25 30 UR BO UL 32 05 21

9. NDT EGH RTS LYB FCC ZEX PIH CWE LKJ QIE NUG
 CVT EPL SZW QAU SH
 GBT VRT GIK GYO DCM XSD ZAU YER DLN URG HNB
 VDX ZWS QTA GHI PT
 MBY PLK RDC ESX IUP PKJ NYH GHT DFR VED SWN
 VBT XFZ RDA SEN FU
 GBC YRF DSE WNJ GVA SWQ QIX ZOT MEH GKD BGV
 CFI ATA RUR SAC LT
 NVR DAB GLM INY EGB LKO MWD SKZ QLD YGB NDT
 EGH RRS FLM FCC ME

10. O V L H M Y B L U R X O H I Z O V I C T
 F I N X X C X S H T Y V I Q N T U B M L
 A B L B E J L N C Y Z B Z W C N J N D Z
 U T L Z K L A B D E F Z V N U W K F R E

11. J I C O Y T X S T Y 38095 RDIHAJXTDZ
 O X Y D W X P Z S Y R S P H D 89706 CUSPI
 R N B R J 65289 ZONIG FYEQUARQNV
 R N L P T K A K O Z 87840 BVGANWKOT
 S R Q M T U J V W N 45872 YXBCXAFKOZ
 O G L C T N I H G P 12349 ATUSKSL EWQ

12. O L M X M V N H U W Q R N V U T K U X F
 C D E H L Y H E D I P A Z Q W I A Y S K
 Q I Q A W M N W Z I H Z C A K D B T G W
 W N L I P W B U O X A D X F R J I Q C A

13. Z M J X I U R Y N C 93470 P Q A Z M D E G V M
 N C B V G H U G H Y 13267 P H R A N Q U E C C
 12890 M C N D H E U I R Y W Q A Z X I R S V Z
 M C U R I 72439 O Y T R W P I Q A W C N J W O
 O W Q A J O I S K M 10706 D G F H G K S B O U

14. U T H A V N C B R F D S E D C D C X V D
 R W Q I M N J F S T R O T N B L U J H K
 N I O Q J U Y R G B N S V C X T R J T U
 B C D V C G F H 5 7 8 1 J H V X H G J D

Continue Your Study

Continue sending to yourself with the practice key and oscillator. If you can operate with another student, so much the better. Sit down at an operating position and tune in some code; it is not hard to find, especially on amateur frequencies. Copy as best you can. Don't worry too much about missing letters. Get what you can no matter how fragmentary it is. As your speed picks up, tune in faster code. If you find you are copying a certain speed solidly, the code is too slow. Keep it faster than you can copy comfortably. Make the transition from pencil copying to the typewriter as soon as possible.

You are going to need lots of practice. The Communication School runs a full day, and for about four months a man copies code several hours daily. As you gain proficiency, try copying the slower types of traffic, such as commercial, on broadcasts. Don't be afraid to use some of your off-duty time.

It is common for a student learning code to hit a PLATEAU. The regular progress to higher speeds stops and for a time the student finds himself unable to copy faster than a certain speed. If this happens to you, just stay with it until your speed picks up. Never lose confidence in the fact that any man of ordinary aptitude can learn the code if he puts in the necessary time and work.

QUIZ

1. A dit is what fraction of the length of a dah?
2. In receiving code, why should you never count the dits and dahs?
3. Counting a dit as a unit, how many units are there between each element of a character? Between each character and the next? Between groups or words?

4. When printing, how can you avoid confusion between zero and the letter O?
5. What is meant by the terms CLOSED and OPEN as applied to a telegraph key?
6. How much tension should you place on the spring screw of the key?
7. When you are operating a key, why must you be sure that your elbow does not protrude over the edge of the table?
8. What is a good way to develop rhythm in sending Morse code?

CHAPTER 3

RADIOTELEGRAPH

A message is a written thought or idea, expressed briefly in plain or secret language and prepared for transmission by the most suitable means of communication.

Most messages have at least one addressee responsible for taking action on the contents and for originating any necessary reply. These are known as ACTION addressees. 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. These are known as INFORMATION addressees. 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. For example, CANFLAGLANT sends the following message to SAGUENAY for action and to MARGAREE for information....

R-121517Z -
FM CANFLAGLANT -
TO SAGUENAY -
INFO MARGAREE
BT Unclassified x
On arrival Halifax berth alongside MARGAREE at Jetty
five
BT

In this case MARGAREE will be prepared for the arrival of SAGUENAY. Men will be detailed for the handling of SAGUENAY's lines, etc. Some messages have only information addressees.

Messages may be divided into types according to the way they are addressed:

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 (as in the previous example message to SAGUENAY info MARGAREE), each of whom is informed of the other addressees. 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 every 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 relay stations which serve them. A separate message is prepared and transmitted to each relay station, the message 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. Since many book messages are meant for dozens of addressees, substantial time and expense are saved by the shortened headings.

A GENERAL message has a wide standard distribution. There are many types of general messages, each of which carries an identifying title, e.g. CANGEN or CANCOM, which is intended for a certain standard set of addressees. They also carry a sequential serial number, e.g. CANGEN 23, indicating that this is the 23rd CANGEN message originated to date.

Maintenance of general message files is often a radioman's duty. General messages are grouped according to type and filed in order of serial numbers. They are kept until cancelled or superseded.

Following is a list of the more common general messages with which you should become familiar.

<i>Title</i>	<i>Originator</i>	<i>Description</i>
CANGEN	CANAVHED	On miscellaneous subjects, addressed to all ships, establishments and authorities of the RCN.
CANCOM	CANAVHED	On RCN communication and crypto subjects, addressed to all ships, establishments and authorities of the RCN.
CANAIR	CANAVHED	General messages on Canadian naval air subjects — addressed to all RCN air stations, aviation supply depots and ships carrying aircraft.
CANLANT	CANFLAGLANT	On miscellaneous subjects, addressed to all ships and establishments in the Canadian Atlantic Command.
CANPAC	CANFLAGPAC	On miscellaneous subjects, addressed to all ships and establishments in the Canadian Pacific Command.

In addition to these general messages listed, there are several others, the details of which can be found in relevant communication publications.

Call Signs and Address Groups

Call signs and address groups are both used to identify addressees and to assist in transmission and delivery of messages.

Address Groups

Call signs and address groups are used by the Navy in exactly the same way. Most holders of address groups are shore-based commands, authorities, or activities. Among other uses, address groups facilitate delivery of messages in instances where a communication centre serves so many activities that its own call sign is not enough to identify the addressee. Holders of address groups are not always ashore. All commands afloat (other than individual ships) hold address groups as well as call signs. Address groups, like call signs, are divided into types.

1. **COLLECTIVE ADDRESS GROUPS** represent two or more commands, authorities, activities, units, or combinations of these. The group includes the commander and his subordinate commanders. **EXAMPLE:**

OFBJ-----CANCORTRON ONE (The whole of 1st Canadian Escort Squadron)

BMRQ-----CANCOMCORTRON ONE (The Commander 1st Canadian Escort Squadron).

2. **CONJUNCTIVE ADDRESS GROUPS** are used only with one or more other address groups. The conjunctive address group DRHG, for example, represents the Naval Control of Shipping Officer at-----, This particular group must be followed by a geographic address group.

3. **GEOGRAPHIC ADDRESS GROUPS** represent geographical locations or areas, and are always preceded by conjunctive address groups. Assuming the geographic address group for Kodiak, Alaska to be SAAN, the Naval Control of Shipping Officer, Kodiak, would be addressed DRHG SAAN.

4. **ADDRESS INDICATING GROUPS (AIG'S)** represent a specific set of action and/or information addressees. The originator may or may not be included. YRHG is the AIG for eight particular oilers as action addressees and Commander Service Force Pacific Fleet and Commander Military Sea Transportation Service, as information addressees. The

originator is Commander Military Sea Transportation Service, Pacific Area. In this case ten call signs and address groups are eliminated from the heading of the message by use of one AIG.

In addition to the above are the **SPECIAL OPERATING GROUPS** which are used by certain allies of Canada, U.S.A. and U.K. These are 4-letter groups, identical in appearance to address groups, and provided to pass special instructions in headings of messages. **EXAMPLE:** EUBJ---Pass to the first addressee.

Precedence

Precedence is one of the most important concepts in naval communications. To communication personnel it indicates the relative order in which a message must be handled and delivered, and to the addressees 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. The various precedences have the same force through all the means of transmission.

Use of higher precedences is limited to certain types of urgent traffic, and standards for handling each precedence are prescribed. Study the Precedence Table (Figure 3-1).

Originator, Drafter, Releasing Officer

The **ORIGINATOR** of a message is the command by whose authority the message is sent. The **DRAFTER** is the person who actually prepares the message for release. Usually department heads, e.g., Engineer Officer, Supply Officer, Medical Officer, etc., are authorized to draft messages. The **RELEASING OFFICER** authorizes transmission of the message for and in the name of the originator. The Commanding Officer is usually releasing officer, but he may delegate releasing authority if he wishes.

A radioman charged with accepting locally originated messages must know who has releasing authority. Check every message for his signature.

Call Signs

Call signs--letters, letter-number combinations, or one or more pronounceable words--identify some communication activity. This is true in both civil and military use, but military call signs may also designate the command served by the station. There are several categories of call signs. Some call signs belong to more than one category.

1. 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. Three or more letters generally identify stations as follows:

Three letters -- Shore stations. Example -- CFH
(Halifax Radio)
Four letters -- Ship stations. Example -- CGJR
(HMCS COLUMBIA)
Five letters -- Aircraft stations. Example --
VGRLB (RCN Aircraft)

Here are some of the call sign letters which have been allocated. There are many more but space limitations must be considered.

AAA	to	ALZ	U.S.A.
CFA	to	CKZ	Canada
CYA	to	CZZ	Canada
GAA	to	GZZ	Great Britain
KAA	to	KZZ	U.S.A.
MAA	to	MZZ	Great Britain
NAA	to	NZZ	U.S.A.
VAA	to	VGZ	Canada
VOA	to	VOZ	Canada
WAA	to	WZZ	U.S.A.
XJA	to	XOZ	Canada

The U.S. has the first half of the A block (AAA through ALZ) and the whole of the K, N, and W blocks. The U.S.

reserves A calls for the Army and Air Force. W and K blocks are assigned to commercial and private stations, merchant ships, and others, and the N block is for use only by the Navy, Marine Corps, and Coast Guard. Naval shore communication stations have 3-letter N calls. Naval vessels have 4-letter N calls. Examples..Naval Radio Station San Francisco-----NPG USS Duke's County (LST 735).....
.....NGCY
2. INDEFINITE CALL SIGNS represent no specified facility, command, authority, or unit, but may represent any one or any group of these.

Examples:

CGNS----- (to) Any or all Royal Canadian Naval ship(s).
CGH ----- Any or all RCN shore radio stations.
NERK----- (to) Any or all US Naval ships).
NQG----- Any or all US Naval shore radio stations.

During wartime or large peacetime exercises it may become necessary to conceal the identity of the transmitting ship, originators and addressees. Codress procedure and indefinite ships call signs are then ordered. The originator and all addressees are concealed within the encrypted text, and the transmitting ship uses a 2-letter call sign beginning with G, (Canadian) and (British); or N, (U.S.).

3. NET CALL SIGNS represent all stations within a net. (A net is a group of stations in direct communication with one another on a common channel).

4. TACTICAL CALL SIGNS are composed of letters, numerals, letter-numeral combinations, or pronounceable words. They identify tactical commands or communication facilities.
5. RADIOTELEPHONE CALL SIGNS are words or combinations of words; such as SUNSHINE or HIGH-HAT -- used only in radiotelephone communications.

6. VISUAL CALL SIGNS are groups of letters, numerals, special flags and pennants, or combinations of any of these, for use in visual communications.

PRECEDENCE TABLE

Pre- sign	Designation	Definition and use	Handling requirements
Z	FLASH	A FLASH message must be short and must deal with an emergency situation of vital proportions. The precedence is reserved (1) for initial enemy contact reports; and (2) special emergency operational-combat traffic originated by specifically designated high commanders, or by operational commanders of units directly affected.	FLASH messages must be hand-carried, processed, transmitted and delivered in the order received, and ahead of all other messages. Messages of lower precedence are interrupted as necessary until the FLASH message is cleared.
Y	EMERGENCY	Reserved for messages which demand immediate delivery to the addressee, such as those meeting one or more of the following qualifications: (1) supplying reports of initial enemy contact; (2) emergency communications which affect current implementation of a tactical action; (3) distress traffic; (4) messages which affect gravely the national security; and (5) messages concerning weather of a destructive nature—hurricanes, typhoons, tidal waves, etc.	EMERGENCY messages are processed, transmitted and delivered in the order received and ahead of all messages of lower precedence, even to the extent of interrupting processing and transmission of lower precedence messages.
O	OPERATIONAL IMMEDIATE	Used only for messages whose value depends on prompt delivery, such as (1) tactical messages pertaining to operations in progress; (2) traffic concerning immediate movements of ships, aircraft or ground forces; (3) most weather messages; and rarely (4) important administrative messages bearing directly on tactical operations.	OPERATIONAL IMMEDIATE messages are processed, transmitted and delivered in the order received, and ahead of messages of lower precedence, even to the extent of interrupting processing and transmission of lower precedence messages.
P	PRIORITY	Reserved for important messages which must have precedence over routine traffic. PRIORITY IS THE HIGHEST PRECEDENCE WHICH NORMALLY MAY BE ASSIGNED TO MESSAGES OF AN ADMINISTRATIVE NATURE.	PRIORITY messages are processed, transmitted and delivered in the order received and ahead of all messages of lower precedence. ROUTINE messages being transmitted should not be interrupted unless they are very long.
R	ROUTINE	Reserved for all types of messages which are not of sufficient urgency to justify a higher precedence, but must be delivered to the addressee without delay.	ROUTINE messages are processed, transmitted and delivered in the order received and after all messages of higher precedence.
★	DEFERRED	To be employed for all types of messages which justify transmission by rapid means, but which will admit of the delay necessary for prior transmission of messages of higher precedence.	DEFERRED messages are processed and transmitted in such order as will clear traffic with due regard for messages of a higher precedence.

Figure 3-1

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 by radiotelegraph, radiotelephone, manual teletypewriter, or by automatic tape equipment, although the format exists in four versions—one adapted to the special requirements of each of these primary transmission media. Here we will study the radiotelegraph message format, which is the most important to the radioman. You will meet the other formats later on, 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, TEXT, 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, the accompanying table (Figure 3-2) divides the message into its PARTS, COMPONENTS and ELEMENTS. The heading, for example, consists of the following components: Procedure, Preamble, Address, and Prefix. Elements of the 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, and the prosign DE and designation of station calling.

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 is 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.

BASIC FORMAT FOR THE RADIOTELEGRAPH MESSAGE

Parts	Components	Format line	Contents
H		1...	Not used.
E	Procedure	2... 3... 4...	Station(s) called; pre-sign XMT (except) and exempted calls. Pre-sign DC (from) and designation of station calling. <i>STATION SECRET NUMBER</i>
A	Preamble	5...	Pre-sign T (relay); G (equal this transmission back to me exactly as received); F (do not answer); operating signals; call signs, address groups, address indicating groups, routing indicators; plain language.
D	Address	6...	Precedence pre-sign; date-time group and zone suffix; operating signals. <i>PROSIGN IX</i>
I	Information	7...	Pre-sign PH (originator of this message is); originator's designation expressed as call sign, address group, or plain language.
N	Text	8...	Pre-sign TO; action addressee designation(s).
G	Prefix	9...	Pre-sign INFO (this message addressed for information to); information addressee designation(s).
		10...	Pre-sign XMT; exempted addressee designation(s).
		11...	Accounting symbol; group count; <i>XXXXXXXXXX</i>
		12...	Pre-sign BT (Break).
		13...	Internal instructions; basic idea of originator.
		14...	Pre-sign BT.
		15...	Hours and minutes expressed in digits and zone suffix, when appropriate.
		16...	Pre-signs B (were to follow); AS (I must pause); C (I am about to correct a transmission error in some foregoing part of this message); operating signals. <i>XX 5 SECOND DASH</i>
		17...	Pre-sign K (go ahead and transmit), or AR (end of transmission).

Figure 3-2

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 reserved for teletype-writer and tape relay work, and is omitted in radiotelephone and radiotelegraph. The abbreviated plaintext heading (which we will meet just a little later) may omit any or all of the following: PRECEDENCE, DATE, DTG and GROUP COUNT. Many messages not in abbreviated plaintext will 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 will seldom see a message that uses every format line, and you may never see one that uses all the contents. But remember that the sequence actually used in any one message must be in accordance with the proper message format.

It is not possible in a training manual such as this to show you how to construct headings to meet every eventuality. The relevant communication publications will be available to you on the job, and are the ONLY valid, up-to-date reference sources for operational communication information. However, a few sample messages follow. Compare them with Figure 3-2 as you read. If you learn them well you will have a good grounding in the construction of the radiotelegraph message.

Radiotelegraph Message Examples

Radiotelegraph communication is usually established by a preliminary call prior to transmission of the message. The station with a message to transmit identifies itself to the station for which it has a message—if in direct communication—or otherwise, to the station that will effect relay or delivery of the message. Let us begin here with a simple preliminary call (a single call): CGLE DE CZCW K.

From the previous discussion of call signs, it is apparent that this transmission is sent from one RCN ship to another.

part correctly, he obtains repetitions of those portions. When he is sure he has the message complete and correct, he sends a transmission to OTTAWA, so informing her operator. This transmission is called a RECEIPT: CZCW DE CGLE R AR

In the above example two ships are in direct communication and the call has served as the address in the message. A message that must undergo relay to reach the addressee will require a somewhat longer and differently constructed heading, inasmuch as it must be apparent to every station handling the message:

1. who originated the message;
 2. who receives the message for relay purposes; and
 3. to whom the message is ultimately destined.
- Assume that HMCS BONAVENTURE, steaming off Bermuda, has completed her mission of qualifying carrier pilots and wishes to so report to CANFLAGLANT in Halifax and to the Naval Air Station, Dartmouth, N.S. Communication is established with Naval Radio Station, Albro Lake (CFH) on one of the ship-shore bands, and transmission of the message commences. Note the use of the information addressee prosign. Address groups in subsequent examples are fictitious because the actual ones are classified.

Format	Line	Transmission	Explanation
	2 & 3	CFH3 DE CGLE	Halifax radio from BONAVENTURE.
	4	NR2	Station serial number (only used between ships and shore stations when ordered).
	4	-T-	Transmit this message to all addressees.
	5	-R-	ROUTINE precedence.
	5	051700Z--	DTG.
	6	FM CGLE--	Originator, HMCS BONAVENTURE.
	7	TO BLMQ--	Action to CANFLAGLANT.

A check of the call sign book shows that CGLE is HMCS BONAVENTURE (RRSM 22), and CZCW is HMCS OTTAWA (DDE 229). This call translates literally, "BONAVENTURE from OTTAWA, go ahead and transmit". From the very fact OTTAWA is attempting to establish communication, BONAVENTURE's operator knows OTTAWA has a message to send. Accordingly, he inserts a message blank in his type-writer and tells OTTAWA to go ahead.

EXAMPLES

CZCW DE CGLE K

With communication established, OTTAWA commences clearing traffic. The message may be analysed as follows:

Format Line	Transmission	Explanation
2 & 3	CGLE DE CZCW	BONAVENTURE from OTTAWA.
5	-M- 222345Z	DEFERRED precedence, DTG indicating that this message was originated at 2345 GMT on the 22nd day of the month.
10	GR7	Group count. This message has seven groups in the text.
11	BT	Break. Separation between the heading and text.
12	UNCLAS. GUARD MAIL FOR YOU AT FIRST LIGHT	Text.
13	BT	Break. Separation between the text and ending.
16	K	Go ahead and transmit.

On hearing the prosign K, BONAVENTURE's operator checks the message and counts the groups. If he has missed some of the message, or is in doubt whether he received some

8	INFO ETVO -	Information to Naval Air Station, Dartmouth, N.S.
10	GR8	Group count (optional with plain language).
11	BT	Long break.
12	UNCLAS. CARQUALS COMPLETED. ETA BERMUDA 061800Z	Text. Certain authorized abbreviations, standard throughout the services, are often used in messages for sake of brevity. The version as sent is considerably shorter than the expanded text, which reads: UNCLASSIFIED. CARRIER QUALIFICATION LANDINGS COMPLETED. ESTIMATED TIME OF ARRIVAL BERMUDA 061800Z
13	BT	Long break.
16	K	Go ahead and transmit.

CFH3 gives BONAVENTURE a receipt for the message, and by doing so assumes responsibility for relay.

Here is an example of a type of message which you may be seeing often. This is a fleet broadcast message from Halifax Radio (CFH) originated by CANFLAGLANT. Note the use of conjunctive address groups and the exempted addressee prosign. CW fleet broadcast headings are sent "words twice", except when plain language is used instead of call signs and address groups.

Format

Line	Transmission	Explanation
2	CGNS CGNS -	Any or all RCN ships.
4	NR L325 NR L325	Station serial number. This is the 325th message placed on this broadcast during current month.
5	P P -	Priority precedence to action addressees.

5	R R -	ROUTINE precedence to information addressees.
5	121608Z	DTG.
6	121608Z	
6	FM FM	Originators prosign.
6	BOSS BOSS -	CANFLAGLANT.
7	TO TO	Action addressee prosign.
7	EATG EATG	All ships operating under.....
7	CABR CABR -	COMCANLANT.
8	INFO INFO	Information addressee prosign.
8	SKAT SKAT -	NAS Dartmouth, N.S.
9	XMT XMT	Exempted addressee prosign, meaning that stations or addressees which follow are exempted from foregoing collective address - in this case the action address.
9	PINS PINS	Destroyer Division 3 (Operating under COMCANLANT).
10	GR 130 GR 130	Group count (optional with plain language text).
11	BT	Break.
12	(130 groups of text)	
13	BT	Break.
15	GR 130	Group count repeated in final instructions when used.
16	AR	This is the end of this transmission and no reply is expected.

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.

nations 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 plaintext form. When call sign encryption plans are in force, call signs and address groups in plaintext messages may be encrypted for a degree of security.

Plaintext, Call Serving as the Address

This form may only be used when the originator is in direct communication with the addressee(s). Example: CHAUDIERE (CZGJ) has a PRIORITY message for BONAVENTURE (CGLE) information COLUMBIA (CGJR).

CHAUDIERE is in direct communication with both addressees. CGJR CGLE DE CZGJ - ZFH2 CGJR - P - 241315Z BT Unclas. No trace torpedo area Yankee BT K

This form is considerably shorter than the Plaintext form, which would have to be used if CHAUDIERE were in contact with BONAVENTURE ONLY. Example:

CGLE DE CZGJ - T - P - 241315Z -
FM CZGJ -
TO CGLE -
INFO CGJR BT Unclas. No trace torpedo area Yankee
BT K

Abbreviated Plaintext

Operational requirements for speed of handling - of contact reports, for example - may dictate the abbreviation of plaintext message headings. In such cases any or all of the following may be omitted from the heading: Precedence, date, DTG, and group count. Following is an example of an abbreviated plaintext message:

CGRV DE CYVN - R - 1516Q BT Sent diver for briefing BT K

In this example, the DATE has been omitted. The same message could also be sent:

CGRV DE CYVN - 1516Q BT Sent diver for briefing BT K

In this case, both DATE and PRECEDENCE have been omitted.

There is a distinct difference between PLAINTEXT, CALL SERVING AS THE ADDRESS and ABBREVIATED PLAINTEXT form. Learn the forms well.

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. It conceals the identity of units and prevents an enemy from making inferences from originator-addressee patterns. Plaintext and codress may be compared from the following messages prepared in both versions:

TF 301 is exercising in the Western Atlantic. CTF 301 in HMCS BONAVENTURE wishes to report to COMCANLANT ashore that he is sending two Tracker aircraft to area Charlie to investigate suspicious object sighted by a reconnaissance aircraft. CTU 301.1.2 is also given the message for information. Assume the following call signs and address groups.

CTF 301.....E2L4
CTU 301.1.2.....K3M3
COMCANLANT.....FLOT

Plaintext Version:

CFH3 DE E2L4 - T - O - 221547Z -
FM E2L4 -
TO FLOT -
INFO K3M3
BT

Unclas. Intend detail two Trackers to investigate object sighted area Charlie
BT

Codress Version:

CFH3 DE GB-T-PH8K/RFW5/-O-221547Z GR48 BT
(48 groups of encrypted address and text)

The only information an enemy might recover from this encrypted message is that:

1. It has been sent from a British or Canadian ship.
2. There are at least two authorities in the address whose designations have been disguised by encryption. (Other possibilities exist here, but you will learn them later).
3. It is of operational immediate precedence.
4. The message was originated at 1547 GMT on the 22nd, and
5. It contains 48 groups of encrypted text.

NOTE: The indefinite call sign (GB) and encrypted call signs (PH8K/) (RFW5/) are not presently in force. Plain call signs and address groups are used in the call and transmission instructions. However, this or any other system may be ordered at any time.

PROSIGNS

Procedure signs, or PROSIGNS, are groups which convey in short standard form certain frequently sent orders, instructions, requests, reports, and the like relating to communications. In radiotelegraph, 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.

Following is a complete list of authorized prosigns. Memorize them now. It may be helpful to prepare a number of small cards, the prosign on the front and its meaning on the back. Use the cards for self-drill.

Precedence Prosigns:

Z.....FLASH
~~A~~.....~~EMERGENCY~~
 O.....~~OPERATIONAL~~ IMMEDIATE
 P.....PRIORITY
 R.....ROUTINE
~~M~~.....~~DEFERRED~~

Prosigns Used to Identify Portions of a Transmission:

AA.....All after.
 AB.....All before.
 WA.....Word after.
 WB.....Word before.

Ending Prosigns:

K.....Invitation to transmit.
 AR.....End of transmission; no reply expected.

Pause Prosigns:

AS.....I must pause for a few seconds.
AS AR.....Wait an undetermined period.
AS 5 AR.....Wait 5 minutes.

Separation Prosigns:

BT.....Long break. (Separates text of message from heading and ending.)
 II (Written as short dash)....Separative sign. Used for all other separation in messages.

Prosigns Always Followed by One or More Call Signs and/or Address Groups:

DE.....From (in call).
 FM.....Originator's sign.
 INFO.....The addressee designations immediately following are addressed for information.

XMT..... Exempt.

TO..... The addressee designations immediately following are addressed for action.

Prosigns Used in Transmission Instructions of a Message:

T..... Transmit this message to all addressees or the addressee designations immediately following.

G..... Repeat this entire transmission back to me exactly as received.

F..... Do not answer.

Group Count Prosigns:

GR (plus numeral).... There are (numeral) groups in this message.

GRNC..... The groups in this message have not been counted.

Prosigns Used With the Executive Method:

IX..... Action on the message or signal which 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.

General

AA..... Unknown station.

B..... More to follow.

C..... Correct.

EEEEEEEE..... Error.

EEEEEEEEEE AR.... This transmission is in error.

Disregard it.

HM HM HM..... Emergency silence sign.

IMI..... Repeat.

INT..... Interrogatory.

J..... Verify with originator and repeat.

NR (followed by Numeral)..... Station serial number.

R..... Your last transmission received satisfactorily. (also Routine Precedence)

OPERATING SIGNALS

Radio operators and teletypists very 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 the use of OPERATING SIGNALS - 3-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. Q signals are employed in both military and civil communications, and are understood by ships and shore stations of any nationality. Z signals are used only in Canadian and allied MILITARY communications, and represent meanings not found in the Q code. Operating signals are published in ACP 131. This publication has decode sections for both Q and Z signals tabbed alphabetically, and an encode section tabbed by subject matter.

Use of Operating Signals

Operating signals are prescribed for every form of electrical telecommunications except radiotelephone. Instead, the radiotelephone operator transmits operating information in brief spoken phrases. An exception is when there are language difficulties, at which time an operating signal may be spoken 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: HMCS BONAVENTURE asks Halifax Radio:

CFH3 DE CGLE INT QRT... (Shall I stop sending?)
CGLE DE CFH3 QRT... (Stop sending.)

The signal ZUG is used as a negative answer when there is no operating signal with the desired negative meaning;

CGLE DE CFH3 ZUG QRT.... (Do not stop sending.)
Some signals must be accompanied by a numeral suffix which is used to complete, amplify, or vary the basic meaning. Commercial ships and stations do not use the INT sign, but ask a question by use of prosign IMI following the operating signal, like this:

QRT IMI... (Shall I stop sending?)
QRV ... (I am ready.)
QRV IMI... (Are you ready?)

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 which are filled in to convey specific information, 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 ___ KCS (MCS)". The operator fills in the necessary information:

CGXC DE CYVX ZRE 8470. (I hear you best on 8470 KCS.)

Other signals have, in their meanings, blanks enclosed in parentheses. Filling in such a blank is optional. INT ZHA means "Shall I decrease frequency very slightly (or ___ kcs) 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 are often encrypted, especially those which reveal:

1. Specific frequencies.

SOME COMMONLY USED 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 ---).
QRH	Does my frequency vary?	Your frequency varies.
QRK	What is the readability of my signals (or those of ---)?	The readability of your signals (or those of ---) is --- (1 to 5).
QRL	Are you busy?	I am busy (or I am busy with ---). Please do not interfere.
QRN	Are you being interfered with?	I am being interfered with.
QRM	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 (... BPM).
QRS	Shall I send more slowly?	Send more slowly (... BPM).
QRU	Have you anything for me?	I have nothing for you.
QRV	Shall I inform --- that you are calling him on --- KCS (or MCS)?	Please inform --- that I am calling him on --- KCS (or MCS).
QRY	What is my turn?	Your turn is No
QRZ	Who is calling me?	You are being called by --- on --- KCS (or MCS).
QSA	What is the strength of my signal (or those of ---)?	The strength of my signals (or those of ---) is --- (1 to 5).
QSB	Are my signals fading?	Your signals are fading.
QSD	Can you communicate with --- direct or by relay?	I can communicate with --- direct (or by relay through ---).
QSY	Shall I change to transmission on another frequency?	Change to transmission on another frequency (or on --- KCS (or MCS)).
QTB	Do you agree with my counting of words?	I do not agree with your counting of words; I will repeat the first letter or digit of each word or group.
QTC	How many telegrams have you to send?	I have --- telegrams for you (or for ---).
ZAA		You are not observing proper circuit discipline.
ZAL		I am closing down (until ---) due to ---.
ZAN		Transmit only messages of and above precedence ---.
ZAO		The last word (or group) --- (1. Received from you was ---; 2. Transmitted to you was ---).
ZAX		You are --- (1. Causing interference. Listen before sending; 2. Causing interference by location in order to wait; 3. Sending at the same time as --- (call sign); 4. Causing delay by slowness in answering; 5. Causing delay by slowness in answering my service or procedure messages; 6. Answering out of turn.)
ZBO	Will you repeat what you (or ---) sent (at ---)?	Following is what I (or ---) sent (at ---).
ZBH		Make preliminary call before transmitting traffic.
ZBM		Place --- on watch on this frequency. (1. qualified speed key operator; 2. A competent operator.)
ZBR	Of what precedence and for whom are your messages?	I have (or --- has) --- message(s) (numeral indicating number of message(s) may be followed by V, O, P, R, or M to indicate precedence for you (or for ---).)
ZBP	When and on what frequency was message --- received?	Your --- (1. Characters are indistinct; 2. Spacing is bad.)
ZBQ		Message was received at --- on --- KCS (or MCS).
ZBU		Negative (No).

2. Cryptographic data.

3. The organization of networks.

4. Ship movements (estimated times of arrival, departure, etc).

At all other times operating signals must be regarded as the equivalent of plain language.

Some of the most commonly used operating signals are listed in Figure 3-3 on page 53. Remember that the Q code is used internationally, where the Z code is used only within the services.

Use of Operating Signal "ZBO"

Here is the meaning of ZBO as given in ACP 131: "I have (or ____ has) ____ message(s) (numeral indicating number of messages may be followed by precedence prosign to indicate the precedence) for you (or for ____).

ZBO2 means: "I have two messages for you". However, it is usually good practice to indicate the precedence (especially when working a shore station where a lot of traffic is handled).

ZBO 3P means: "I have three messages for you, all priority precedence".

ZBO 3P-2R means: "I have three PRIORITIES and two ROUTINES for you".

ZBO 2R-CGWF means: "I have two ROUTINES for GATI-NEAU".

CGWF ZBO 2R-CZCC means: "GATINEAU (CGWF) has two ROUTINES for CRESCENT (CZCC)".

This operating signal may be used in the final instructions as well as in the call. For example, CZCW calls CGNJ and tells him that he has two PRIORITIES. In the final instructions of the first message, CZCW may send B K. But during transmission of the second message, the operator (CZCW) is handed another *PRIORITY*. In the final instructions he may send: BT ZBO 1P K.

It is *INCORRECT* to send: CGNJ DE CZCW ZBO P K.

Circuit Discipline

Every operator must govern himself by the following rules:

1. Obey promptly orders and instructions of the control station.

2. These practices are forbidden:

a. Violation of radio silence.

b. Incorrect and unauthorized procedure.

c. Gossip between operators.

d. Excessive tuning and testing.

e. Misuse or confusion of call signs and address groups.

f. Unauthorized plain language.

g. Unnecessary procedure transmission, particularly those dealing with readability and signal strength.

h. Unnecessary breaking in.

i. Transmitting at speeds beyond the capability of the receiving operator.

j. Tuning a transmitter with the antennae connected.

3. A station given a message for relay is responsible for clearance of that message until either a receipt has been obtained or instructions are received to take no further action.

4. Answer calls immediately (provided radio silence is not in effect). IT IS IMPOSSIBLE TO OVER-ESTIMATE THE VALUE OF AN IMMEDIATE ANSWER.

Correcting an Error

When an error is made in transmitting, the operator sends a series of eight or more E's. This is the error sign. It is sent immediately after the error. The operator goes back to the last correctly sent word, group, or prosign, repeats it, and continues with the correct version.

Example:

CVVX DE CGWN -P- 171025Z BT

RETURNING TO BASTEEEEEEEE TO BASE BT K

This procedure applies regardless of where the error occurs except in the heading, where the error sign is followed by the

last prosign or Op. Signal sent correctly. When followed by the prosign AR the error sign means "This entire transmission is in error, disregard it".

Examples: CFH DE CGWN -P-201345Z - FM EEEEEEEEE

AR (Disregard this transmission - cancel it.)

CYVX is sending a message to CGWN and makes an error in

the heading: CGWN DE CYVX -R- 161300Z -

FM CYVX -

TO BRKL

BRMX

CGWN

CGXEEEEEEEE

TO BRKL

BRMX

CGWN

CGWQ

BT Etc.

Note - The operator returned to the last PROSIGN sent correctly.

Procedure and Service Messages

PROCEDURE messages are used to 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. It may contain any of the components shown in the basic message format, except that the LONG BREAK 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 message.

SERVICE MESSAGES pertain to any phase of traffic handling, communication facilities, or circuit conditions. They are prepared and transmitted as regular messages, and may be encrypted. Most service messages concern traffic originated at, destined to, or refilled by a station (but remember they do

not request or give corrections, verifications, or repetitions). A service message pertaining to another message usually carries an equal precedence. You can recognize a service message 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. The fact that it is specifically addressed to a communication centre.

Counting Groups

The group count of a message is the number of groups in the text, and is found in the message just before the first long break prosign (BT). In a message, GR followed by numeral(s) means "This message contains the number of groups indicated". In a message containing a text of six words the group count is written GR6. If the message is encrypted, the group count indicates the number of code groups in the text. Rules to follow when counting groups:

1. Count groups between BT and BT.

2. Count every word as one group.

3. Count each group of figures, letters, symbols NOT interrupted by a space as one group. Example, "part number IX3498/2-45" is counted as three groups.

4. Hyphenated words and hyphenated names, when transmitted as one word, count as one group.

The LONG BREAK prosign BT is placed before and after the text of a message, but is not a part of the text. It is the prosign separating the heading from the text and the prosign separating the text from the ending. The text of a message is always between the two long break prosigns. Here is a list of examples that will help you to learn the correct method of counting groups.

Example:

Bray Hyphen Corbie 3

Group Count

Bray-Corbie	1
New York	1
XFUY	1
CNYR NKLY JVRN	3
/France/	1
Paren France Paren	3
125/3	1
CG	1
125-3/3-55-X56	1
35 Dash 567P	3
Mr J.F. Adams	4
BF6 311845Z	2
/124.0-130-6/	1

Acknowledgement

An acknowledgement is a communication announcing that the message to which it refers has been received and is understood. An acknowledgement may only be sent by the addressee of the message. It goes back to the originator, and assures him not only that the addressee has received the message, but that he UNDERSTANDS it.

You will receipt for a message containing a request for an acknowledgement just as you would any other. The meaning of "received" contained in an acknowledgement is an additional receipt from your Commanding Officer.

Acknowledgements are usually obtained by means of a request within the text. The acknowledgement itself is made by the transmission, YOUR (DTG) ACKNOWLEDGED.

An acknowledgement may be requested AFTER transmission of the message. Perhaps there was no need for an acknowledgement at the time the message was sent, but the need came up later. On the other hand, an acknowledgement may have been requested in the first message, but the addressee was slow in complying. After transmission of a message, an acknowledgement may be gained either by an operating signal or another message. In the following example, CAYUGA

(CGWN) requests ALGONQUIN (CZJX) to acknowledge a message which has been transmitted. Instructions to acknowledge were not included in the text.

CZJX DE CGWN INT ZEV 152321Z K ("Request you acknowledge message with date-time group 152321Z")

After receipting for the above, CZJX acknowledges the message indicated: CGWN DE CZJX ZEV 152321Z K

If it is desired to hasten an acknowledgement previously requested, the same procedure as indicated in the example above, or the following message form may be used: CZJX DE CGWN -P- 160300Z BT Unclas. MY 152321Z.

(Hasten acknowledgement)
Comply BT K

After receipting for the above, CZJX originated the following acknowledgement:

CGWN DE CZJX -P- 160320Z BT Unclas. Your 152321Z.
Acknowledged BT K

Verification and Repetitions

There are occasions when messages or parts of messages must be verified, corrected, or repeated. To do this the prosigns AA (All after) WB (word before), and WA (word after) are used in procedure messages in conjunction with IMI, C, J, and certain operating signals. IMI or J used alone means "Repeat" or "Verify and repeat" the entire transmission. The prosign INT may be used in conjunction with prosigns AA, AB, WA, WB to question a portion of a message.

Example: INT WA serial -13B means, "Is the word after serial 13B?"

When a message must be verified, corrected, or repeated, it is necessary to identify the message in question. This may be done by using the date-time group and/or the station serial number. In either case, the message may be further identified by adding the call sign of the originating station, the group count, or both. If even more identification is needed, the complete preamble, or address, or the complete (or partial) text may be included.

When it is necessary to use a code group of an encrypted message as a reference point, reference is made to it by number - that is, according to the numerical order in which it appears in the text. Use of numbers as reference to encrypted groups will be illustrated further on in this study.

For a plain language message the reference point is a plain language word. If a word or group used to identify a part of a message appears more than once in that message, the first occurrence of that word or group is meant. If otherwise intended, amplifying data such as adjacent words or groups must be included.

The following message is transmitted:

CGXG DE CZJX -R- 150800Z -

FM CZJX -

TO CGXG -

INFO BRKL

GR5

BT

XRDT MNCR TYQO MNSA PWCT

BT

B K

The prosign BT is used in the message twice. Therefore a request using:

1. AB BT denotes all before the text (the first BT),
2. AA BT denotes all after the heading (the first BT),
3. AA PWCT BT denotes the message ending, where PWCT is the last group in the text (the second BT).

It is important that you learn the correct usage of these prosigns. Make sure you understand the rules and examples that follow. Here is the encrypted message that will be used throughout the examples:

CGXG DE CZJX -R- 231408Z -

FM CZJX -

TO CGXG -

INFO CVVX GRII

BT

JAPY BOQU LAJY KUPY FOQO MUCU KAWC GUZO
XAVA RATU SABO

BT K

Use of IMI

The prosign IMI means REPEAT. It may be used by the receiving operator to mean "Repeat last transmission", or, with identifying data, to mean "Repeat portion indicated". It may be used by the sending operator to mean "I will repeat the difficult plain language word I just transmitted", or "I am going to repeat this message". IMI is never used to request repetition of a message for which a RECEIPT has been given.

CGXG desires the entire message (given above) to be repeated. He sends:

CZJX DE CGXG IMI K

CZJX replies with the message, just as he sent it the first time. CGXG desires a repetition of the heading.

Request: CZJX DE CGXG IMI AB BT K

Reply: CGXG DE CZJX AB BT - CGXG DE CZJX -R-

231408Z - FM CZJX - TO CGXG - INFO CVVX

GRII BT K

Special Note: When a request "IMI AB BT" is made, the BT is sent again in the repetition. This is the only occasion on which this is done. For example, "IMI AB WRECKING", would be replied to with a repetition of all before (but not including) the word WRECKING. CGXG desires all after the eighth group repeated.

Request: CZJX DE CGXG IMI AA 8 K

Reply: CGXG DE CZJX AA 8 - XAVA RATU SABO BT K

In plain language messages, portions of the text are identified as words rather than as group numbers.

Request: CGJD DE CGXY IMI WA CARRY K

Reply: CGXY DE CGJD WA CARRY - OUT K

Request: CGJD DE CGXY IMI CARRY TO SIXTEEN K

Reply: CGXY DE CGJD CARRY TO SIXTEEN - CARRY OUT

PLAN SIXTEEN K

You have already learned that the prosign INT means "Interrogatory". It is used to question transmissions - messages or parts thereof. For instance, in a plain language message you believe the word after "carry" is "out", but you are not sure:

CGJD DE CGXY INT WA CARRY - OUT K

CGXY DE CGJD C K

or, if the word happens to be "off", CGJD would reply,

CGXY DE CGJD C WA CARRY - OFF K

CGXG asks for a repetition of the ninth group.

Request: CZJX DE CGXG IMI 9 K

Reply: CGXG DE CZJX 9 - XAVA K

CGXG wants portion of a message from third to eighth group repeated.

Request: CZJX DE CGXG IMI 3 TO 8 K

Reply: CGXG DE CZJX 3 TO 8 - LAJY KUPY FOQO MUCU KAWC GUZO K

Use of "J"

J means VERIFY AND REPEAT. It is used when an addressee does not understand all or a portion of a message which he has received. It is important to understand that the operator does not originate the request. It must be released just as any other message. It is not an exchange of information between operators, it goes back to the originator of the message.

When used with AA, AB, WB, and WA, J means "Verify and repeat message or portions indicated". An operating signal or an encrypted message is used when the encipherment alone needs checking.

CGXG wants the message verified by the originator and repeated.

Request: CZJX DE CGXG J 231408Z K (the DTG is used as reference)

Reply: (CZJX finds message correct as sent) CGXG DE

CZJX C 231408Z -R-231408Z - FM CZJX - TO CGXG-INFO CYVX GRIL BT JAPY BOQU LAJY KUPY FOQO MUCU KAWC GUZO XAVA RATU SABO BT K

CGXG desires the text of the message verified by the originator and repeated.

Request: CZJX DE CGXG J 231408Z AA BT K

Reply: (originator finds the text correct) CGXG DE CZJX C 231408Z AA BT - JAPY BOQU LAJY KUPY FOQO MUCU KAWC GUZO XAVA RATU SABO BT K

CGXG wants the heading of the message verified by the originator and repeated.

Request: CZJX DE CGXG J 231408Z AB BT K

Reply: (heading found to be correct) CGXG DE CZJX C 231408Z AB BT -R- 231408Z -FM CZJX - TO CGXG - INFO CYVX GRIL K

CGXG desires that the third group and groups six to eight of the message be verified by the originator.

Request: CZJX DE CGXG J 231408Z 3 - 6 TO 8 K

Reply: (groups found by originator to be correct) CGXG DE CZJX C 231408Z 3 - LAJY - 6 TO 8 - MUCU KAWC GUZO K

Should the portion be found INCORRECT by the originator, the same procedure is used, the originator sending back the corrected version.

Break-In-Procedure

There are times when you will need to break in on someone's transmission. This is permissible if you observe break-in-procedure. When only one station is involved in the reception of a message, breaking in is permitted, IF NECESSARY. The station desiring to break in makes a series of dashes. When the transmitting operator hears these dashes between his transmitted characters, he stops - at least momentarily - to discover the reason for the break-in. This pause allows the station breaking to ask for repetitions, a shift of frequency,

etc. When two stations are working directly on a circuit, the most frequent use of the break-in-procedure is for on-the-spot repetitions of portions missed.

Any station on the circuit having a message of higher precedence than the one being handled has the privilege of breaking in and transmitting his message. Of course, discretion is to be used in these cases. If a low-precedence message lacks only a few groups of being completed, the station transmitting it should not be expected to give way for the higher-precedence message unless it is of an urgent nature. This would cause unnecessary loss of circuit time.

During poor reception a station may break in to request that the transmitting station send the standard test signal (a series of V's) in order that the receiver may be retuned for better reception.

When communication is good, it frequently speeds traffic handling for one station to send several messages to another without interruption. Normally five messages should comprise a string. However, the receiving station may use an operating signal to indicate the number of messages to be sent in a given string. This procedure is more commonly used between fixed shore stations where a greater volume of traffic is handled.

Example: After establishing communication at a scheduled time, CFH30 tells GYC21 that he has ten messages to transmit:

GYC21 DE CFH30 ZBO10 K

GYC21 answers and tells CFH30 to send his traffic in strings of five: CFH30 DE GYC21 QSG5 K

Relay

When a message begins the journey from point of origin to destination, it may or may not need to be handled by other stations along the way. If a message is transmitted from one station to another WITHOUT the aid of a relaying station, the two stations are said to be in DIRECT communication. In this case, remember, the originator may use the call as the

address, and the originator's sign FM is not necessary. However, in order to do this, the originator must be in direct communication with ALL addressees.

If a relay is required, it is known as INDIRECT communication. In such a case the complete address as well as appropriate transmission instructions must be included. The specific relay requires use of the prosign T. When a message is received with the prosign T alone, it means: "Station called transmit this message to all addressees".

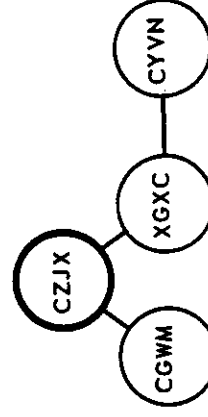
Example: Suppose CZJX sends a message to CGXC with instructions for CGXC to relay to all addressees—in this case, CYVN...

CGXC DE CZJX -T-R-151600Z-FM CZJX-TO CYVN
GR4 BT GOLF WHISKEY FOXTROT TWELVE BT K

The prosign T followed by one or more address designations means: "Station called transmit this message to addressee(s) whose address designation(s) follow".

Example:

CZJX is in direct communication with CGWM and CGXC. CGXC is in touch with CYVN. Picture it like this.



CZJX sends a message to CGXC and CGWM; CZJX instructs CGXC to relay to CYVN. The transmission would read as follows:

CGWM CGXC DE CZJX -CGXC-T-CYVN -R-091345Z-FM CZJX-TO CGWM-INFO CGXC CYVN GR38 BT (etc.)
When this has been accomplished, all addressees will have received the message.

The prosign XMT (exempt) is not used in conjunction with T. T instructions may be modified by use of the operating signal ZWL to denote that no forwarding action is required to addressee designation(s) immediately following ZWL.

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 - is in charge. The station serving the senior commander is usually designated as net control, although it may be another station if another station is in better position to control the net. The duties of the net control station are to speed flow of traffic on the net, 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.

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 which do not require strict control may operate as FREE nets. In this case the controlling station authorizes member stations to send their messages without obtaining prior permission.

Executive Method

To speed tactical movements of ships and planes, the executive method is frequently used. It is sent when some action must be executed at a certain instant, especially when two or more ships must take action at the same time. While the executive message is usually associated with visual and radiotelephone messages, it may be used with radiotelegraph.

The procedure for executive method messages may seem complicated at first. Actually, the steps are simple, and a

few drills will do much toward squaring you away on this method. You can start by getting in mind three rules for handling executive messages:

1. Only abbreviated PLAINDRESS messages may be sent by this method.
2. A message which requires a signal of execution carries IX immediately before the first BT
3. In executive method messages, a group count and date are NEVER used. However, a time group may be used. Normally, if a time group is used it is placed either in the preamble or ending but not in both.

The signal of execution is known as the EXECUTIVE SIGNAL and consists of IX followed by a 5-second dash. When transmitted by radio, it is always preceded by a full call. The instant of execution is the termination of the 5-second dash. The executive signal (IX 5-second dash) alone after a call means: "Execute all unexecuted messages which I have transmitted". IX may be repeated a few times while awaiting transmission of the 5-second dash.

Assume G7F3 is the call sign for Task Unit 301.1.2 and D4L2 is the call sign for Commander Task Unit 301.1.2
Example: G7F3 DE D4L2 IX IX (5-second dash) AR.

An executive method message is identified if it is one of several outstanding unexecuted messages. It is also identified if a considerable length of time passes between transmission of the message and the time to execute it. However, when a receipt is requested, it is indicated by transmission of K after the 5-second dash, instead of AR.

Once the executive signal has been given, it cannot be annulled. If the originator wishes to cancel all outstanding UNEXECUTED messages, he will transmit NEGAT.

Example: G7F3 DE D4L2 IX BT FORM ONE EIGHT ZERO BT K

Before executing the signal, D4L2 desires to annul it. He transmits G7F3 DE D4L2 BT NEGAT BT K

Each ship in the task unit then receipts for the annulment

in alphabetical/numerical order. To annul a particular signal or one of several outstanding unexecuted signals, NEGAT is transmitted, followed immediately by the signal which is to be annulled. Assume D4L2 sent the following messages and had executed none of them:

G7F3 DE D4L2 IX BT PAPA OSCAR TACK DELTA GOLF
BT K

G7F3 DE D4L2 IX BT TURN SIX BT K

G7F3 DE D4L2 IX BT SPEED TWO SIX TACK GOLF KILO
BT K

D4L2 desiring to annul TURN SIX sends:

G7F3 DE D4L2 BT NEGAT TURN SIX BT K

To show verification of an executive method message by using the prosign J, let us assume D4L2 transmits a message with the text: "FORM NINE TACK SPEED FIVE":

G7F3 DE D4L2 IX BT FORM NINE TACK SPEED FIVE
BT K

All ships receipt except CZCC, who asks for a verification of the speed. It is checked by the originator and found to be correct:

DE CZCC J AA TACK K CZCC DE D4L2 C AA TACK -
SPEED FIVE BT K DE CZCC R AR

Should the originator have found the speed signal to be incorrect, he would have cancelled it to the task unit in the following manner:

G7F3 DE D4L2 BT NEGAT SPEED FIVE BT K

QUIZ

1. What is a message?
2. Differentiate between ACTION and INFORMATION addressees.
3. Name the four types of messages.

4. What is a CANGEN?
5. List the PARTS of a message.
6. List the COMPONENTS in the heading of a message.
7. What elements may be omitted from an ABBREVIATED plaintext message?
8. Give an example of a SINGLE call.
9. A military message may be drawn up in any one of three forms. What are they?
10. What is a PROSIGN?
11. May an OPERATING SIGNAL beginning with "Q" be used when communicating with a merchant ship?
12. Are OPERATING SIGNALS generally used on radiotelephone circuits?
13. Show an example of an INTERNATIONAL call sign of a ship of the RCN, the call sign of an RCN shore station, and the INTERNATIONAL call sign of an aircraft of the RCN.
14. What does PRECEDENCE indicate to communication personnel? To the addressee?
15. Define ORIGINATOR, DRAFTER, RELEASING OFFICER.
16. List four practices which are forbidden radio operators so that CIRCUIT DISCIPLINE may be maintained.

CHAPTER 4

COMMERCIAL PROCEDURE

Commercial (International) procedure is used for communication between naval and commercial ships or stations. There are a few differences between commercial procedure and military procedure which you should note. Here are some of them:

1. The signs used to facilitate communications which we call prosigns, are divided into two categories. Some are known as prosigns while others are known as authorized abbreviations. A list of each is included in this chapter.
2. The prosign IMI has two meanings - interrogatory and repeat. In military procedure, to ask "What is the strength of my signal?" you send INT QSA. The same question is asked in commercial procedure by sending QSA IMI. The prosign IMI when used to obtain repetitions is used in quite the same manner as in military procedure. Also note the use of prosign RP'T which will be defined later.
3. The prosign AR "End of message sign" indicates the end of a telegram or other message, but NOT necessarily the end of the transmission.

PROSIGNS AND ABBREVIATIONS

Prosigns

1. AR "End of message sign". See explanation above.

2. AS "Wait". Used the same as in military procedure.
3. BT "Break sign". Used to separate the various sections of a telegram.
4. CT "Commencing sign". Precedes a call, answer, or preamble of a telegram.
5. DE "From". Used in the same manner as DE in military procedure.
6. DU "Hyphen" or "Separation sign". Used in transmission of fractional numbers. Example: $1\frac{1}{4}$ is transmitted as "I DU I XE 4". It is NOT counted either as a word or punctuation mark.
7. EEEEEEEE "Error sign". Used in same manner as Error sign in military procedure.
8. K "Invitation to transmit". Used the same as in military procedure EXCEPT that it may follow AR.
9. R "Received". Indicates reception of a message in the same manner as military procedure.
10. RPT "Repeat". May be used instead of IMI. For example, a commercial ship may ask for a repetition of the preamble of a message by sending, "IMI PBL" or "RPT PBL". (see abbreviations below)
11. VA "End of work sign". Used to indicate that a series of transmissions is ended.
12. XE "Stroke" and "Fraction bar". Used to transmit an oblique stroke. Example: RP15/ is sent as RP15XE. Also used to indicate fractions. Example: the fraction $\frac{1}{2}$ is sent as 1XE2. Prosign XE is counted as one character.
13. IMI "Repeat" and "Interrogatory". Explained above.

Abbreviations

Here is a list of the more commonly used abbreviations in commercial procedure. A full list is contained in BRCN 1224, Handbook for Radio Operators.

AA "All after" Used after IMI (or RPT) to obtain
 AB "All before" repetitions as in military procedure.
 WA "Word after"
 WB "Word before"
 CK "Word check" Used after IMI (or RPT) to obtain
 BN "Between" repetitions.
 ADR or ADDS "Address" (of a telegram)
 CFM "Confirm"
 COL "Collation". Used at end of telegram to give repetition
 of difficult words or figures.

OK "Agreed"
 PBL "Preamble"
 REF "Referring to"
 SIG "Signature" (of a telegram)
 TU or TKS "Thanks for your co-operation".
 TXT "Text" (of a telegram)
 C "Yes" (Correct)
 N "No"

There are also lists of Prefixes and Paid Service Indicators with which you should become reasonably familiar. However, as space here is limited, you are advised to study the "Commercial Supplement" to ACP 124(B). This publication also will show you complete operating instructions for working with commercial ships and stations.

Commercial Form

As a navy radioman you will find frequently that traffic from commercial radio circuits will be channelled over navy systems, and navy traffic, in turn, must make use of commercial facilities. The procedures used by the Navy and by commercial activities are not the same. To handle such traffic efficiently you need an understanding of commercial

practices. The subject in itself is a big one. The next few pages will give you an introduction to the commercial form message. Your best source of information on commercial traffic is: *Final Acts of the International Telecommunication and Radio Conferences*, (BRCN 1214) and *Handbook for RADIO OPERATORS* (BRCN 1224). Following is an example of an INTERNATIONAL COMMERCIAL radiotelegram, with an explanation and break-down:

CFH3 DE CZJX CT P WARSHIP ALGONQUIN11515 0900 GMT
BT
MRS DOROTHY JONES
615 CEDARLANE
MONCTONNB
BT

UNABLE VISIT AUNT MARTHA DETAILS FOLLOW BY MAIL
BT
ARTHUR AR CZJX K

Here is a break-down of the above example:

CFH3 DE CZJX Call.
CT P Commencing sign, prefix (P) meaning "private message from passenger or member of the crew".
WARSHIP ALGONQUIN Office of origin.
1 Telegram number one of the day.
15 15 chargeable words.
15 0900GMT Date 15th, handed in at 0900 Greenwich mean time.

BT Separation between pre-
amble and address.

MRS DOROTHY JONES, etc. Name and address of per-
son to whom telegram is
to be delivered.

BT Separation between ad-
dress and text.

UNABLE VISIT, etc. Text of message.
BT Separation between text
and ending.

ARTHUR Signature of sender.
AR End of message.
CZJX K Call sign of transmitting
ship, go ahead and answer.

Tolls, Commercial

In a merchant or passenger vessel, the following tolls for a radiotelegram would be levied: ship charge (an amount per word), coast station charge (an amount per word - at present 12½ cents), and land-line charge (an amount per word - at present 5 cents). However, since there is no toll collected aboard naval ships for the use of radio equipment, the only charges made are for coast station and land-line. Remember, this type of message is called a "Class D". Tolls are calculated on the total number of words in the address, text and signature. In the previous example, the sender would pay 15 x 17½ cents = \$2.63. This money is forwarded to Naval Headquarters monthly together with an account of all information necessary for accounting purposes.

Distress Communications

To increase safety at sea and in the air, methods of communication have been worked out for use in times of distress. The international (and primary) distress frequency is 500 kcs. However, the frequency has another use. In routine communications, merchantmen contact each other (or shore stations) on 500 kcs and then shift to a "working" frequency. To make sure that other use of the frequency will not interfere with distress traffic, two SILENT PERIODS have been designated. These periods of 3 minutes each are from 15 to 18 minutes and 45 to 48 minutes past each hour. Except for actual distress messages, all traffic ceases at this time on frequencies between 480 and 520 kcs. Guarding the distress frequency is an important function of shore radio stations;

some stand continuous watch while others keep only a loud-speaker watch.

When a Navy ship is operating singly at sea, the ship keeps a continuous watch if operators and equipment are available. In any case, a receiver watch is always kept during the silent periods. When ships are operating in a group, the officer in tactical command (OTC) arranges for a distress guard. Usually one ship will guard for the group. Under certain conditions, the OTC may request a shore station to handle the guard for his ships when in the area of the shore radio station.

You have already learned that the international distress signal is SOS. It is important that you now learn the correct manner in which this signal is used. When a ship is in distress it will make the fact known by transmitting a DISTRESS CALL. If circumstances permit, the most opportune time to do this would be during one of the silent periods when other ships and stations are listening. The DISTRESS CALL takes the following form:

----- (12 4-second dashes with 1 second interval) followed by:

SOS SOS SOS This will set off automatic alarm systems in ships equipped with them. Some ships' alarm systems will ring on receiving three consecutive 4-second dashes, while others will operate only on the distress signal. Therefore, both are made. A two minute interval should be allowed for radio operators to get on watch, then:

SOS SOS SOS DE GBRQ GBRQ GBRQ

The distress call is now followed by the DISTRESS MESSAGE, which gives the ship's name, position, nature of distress and any particular assistance required, like this:

SOS SOS SOS DE GBRQ GBRQ GBRQ

BT

SOS WESTERN LOADER 43.23 NORTH 39.16 WEST STRUCK OBJECT HOLED FORWARD IMMINENT DANGER SINKING REQUIRE BOATS

BT

MASTER AR 10 sec. dash 10 sec. dash GBRQ K
NOTE: The two 10-second dashes are made to give receiving ships a chance to take a D/F bearing of the distressed vessel.

(Acknowledgement) - Receipt of Distress Message

It is very important that you remember that a serious moral obligation is placed on the Commanding Officer of the vessel acknowledging receipt of a distress message. Therefore, do not receipt for a distress message until ordered to do so. If ordered, here is an example of how you would receipt for the above distress message made by WESTERN LOADER.

SOS GBRQ GBRQ GBRQ DE CGJD CGJD CGJD RRR SOS AR

Message of Assistance

As previously stated, the Commanding Officer of the vessel receipting for a distress message is obliged to render all possible assistance. This is an international law of the sea. So, having decided he is in a position to help the distressed ship, your captain now wants to tell WESTERN LOADER that he is on the way.

EXAMPLE:

SOS GBRQ GBRQ GBRQ DE CGJD CGJD CGJD BT WARSHIP
HAIDA 42.00 N 37.10 W PROCEEDING YOUR ASSISTANCE
28 KNOTS ETA 2100Z BT AR CGJD K

If your ship is not in position to give assistance to the ship in distress, you may help by relaying the distress message. In the relay the distress message is repeated word for word (OMITTING THE TWO 10-SECOND DASHES) on the distress frequency, with full power on the transmitter. The authority to relay the message must come from your commanding officer.

To handle rescue operations successfully, distress traffic must be controlled. The vessel making the distress call is the control station for distress traffic. However, control may be exercised by another ship at the scene. Any ship can impose silence on any radio stations in the zone, or on a

particular station which happens to be interfering with the distress traffic. To impose silence, the signal QRT is used, followed by the word DISTRESS. This may be addressed TO ALL (CQ) or to a particular station.

When distress traffic is ended (or radio silence is no longer necessary) a message is sent to inform all ships. This message is originated by the control vessel. Assume your ship (CGJD) was control vessel for GBRQ. At the end of distress traffic, your commanding officer would originate the following: SOS CQ CQ CQ DE CGJD CGJD CGJD 0200Z SS WESTERN LOADER CBRQ QUM AR

Note that DE is followed by the call sign of the ship transmitting and this in turn is followed by the time and the name and call of the ship that originated the distress call. QUM means: "Distress traffic ended."

A naval vessel in distress does not ordinarily use the international distress signal SOS. Instead, navy communication channels are used.

While SOS is the international distress signal sent by radiotelegraph, in radiotelephone the signal is the spoken word MAYDAY. This is the same as the native pronunciation of the French words m'aider ("Help me"). MAYDAY is also used by aircraft in distress. Further information concerning distress, emergency and rescue traffic can be found in ACP 135.

Here are five signals you should memorize. They are used by merchant vessels in wartime to indicate distress due to enemy action.

Class of Distress When used	
Distress Signal	
Warship WWWW	On sighting or when attacked by an enemy warship.
Armed merchant ship raider QQQQ	On sighting or when attacked by an armed merchant ship raider.
Submarine SSSS	On sighting or when attacked by a submarine.

Aircraft AAAAA On sighting or when attacked by aircraft.
Mine MMMM On striking a mine.

The following story is reprinted here for the purpose of pointing up the importance of maintaining a good watch on the International Distress Frequency 500 kcs.

DEAF TO DISASTER

The date was April 14, 1912. The time was 1930 when the SS CALIFORNIAN sighted the first iceberg. For the next three hours the freighter, nine days out of London, moved steadily through the clear North Atlantic night. Then Captain Stanley Lord, concerned, called his Third Officer. "We're surrounded by ice, Mr. Groves," he said. "Heave to." TIME - 2300. On his way below, Lord stopped in the wireless room and asked if there were other ships in the vicinity. Marconi operator Frank Evans said there was only one. Groves, standing watch on the bridge of the immobile CALIFORNIAN, spotted the lights of what he took to be a large liner about five miles off the port bow. He reported to Captain Lord, who told him to contact the ship with Morse lamp.

TIME - 2330. The Marconi operator switched off his transmitter and closed down for the night. Wireless was still new, and maritime laws did not require 24-hour monitoring. On the bridge, Groves began signalling. In the middle of the message, he noticed the lights of the unknown ship suddenly dim. THE TIME WAS 2340. A few minutes later, the Captain joined Groves. "That doesn't look like a liner," Lord said, "she's hardly showing any lights." "Probably heaved to for the night, sir," answered Groves. TIME - 0003. Second Officer Stone relieved Groves on the bridge. Stone, too, sent a signal by lamp, but received no reply.

TIME - 0030. A rocket arched upward and lit the sky above the unknown ship. Others followed. The Second Officer notified Lord. "Captain, we've seen five white rockets coming from that ship." "Keep on sending Morse signals," Lord replied.

TIME - 0140. Stone sent a message to the Captain's cabin that more rockets had been observed near the liner, and that she seemed to be disappearing to the southwest. Then there was nothing further for him to do but watch the fading lights. Finally they vanished. THE TIME WAS THEN 0220. At 0540, the CALIFORNIAN'S wireless operator switched on his set. Suddenly he heard another ship sending: "CQ...CQ...CQD". Then came the tragic message: "SS TITANIC SANK 0220 THIS MORNING AFTER HITTING ICEBERG AT 2340 LAST NIGHT. 711 SURVIVORS PICKED UP. 1590 LOST. SHE WENT DOWN 10 MILES SOUTHWEST YOUR POSITION."¹

¹ Reprinted from *Coronet*, May 1953 (© 1953 by Esquire, Inc. - by courtesy of Esquire, Inc.

QUIZ

1. How many times may call signs be made in commercial procedure?
2. What prosign is used with an operating signal to ask a question?
3. What is the meaning of the prefix A?
4. How does the ending of a commercial form message differ from the ending of a naval message?
5. In the preamble of a radiotelegram, what do the figures "1 15 15 0900GMT" mean to you?
6. What is a class D message?
7. What is the international CW distress signal? Its voice equivalent?
8. Show an example of an automatic alarm signal.
9. For what purpose are two 10 second dashes made following a distress message?
10. Is it permissible to acknowledge receipt of a distress message without waiting for orders to do so?
11. What is the operating signal used to silence interfering stations? To indicate "distress traffic ended"?

CHAPTER 5

RADIOTELEPHONE

Radiotelephone, commonly known as voice radio, is one of the most effective and convenient methods of naval communications. It supplements both radiotelegraphy and visual methods of communication; it does not replace either. It has the advantages of simplicity of operation and direct transmission of the spoken word, but ease of operation has led to abuse. Careless use of voice procedure, plus overloaded circuits, has caused much confusion at times when good communications were imperative.

Because of its directness, convenience, and simplicity of operation, radiotelephone is utilized by ships and aircraft for comparatively 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 OTC and with other ships. Radiotelephone procedure can be mastered by persons without prior training in communications. There is no delay while a message is prepared for transmission.

Acknowledgements can be returned instantly. Radiotelephone equipment is usually operated on frequencies that are high enough to have line-of-sight characteristics - that is, the waves will not follow the curvature of the earth. This limits the usual ship-to-ship range of radiotelephone from 10 to 20 miles.

With these advantages of radiotelephone go corresponding disadvantages. Voice transmissions may be unreadable because of static, enemy interference and a high local noise level caused by shouts, gunfire, and bomb or shell bursts. Propagation characteristics of radiotelephone frequencies are sometimes erratic, and transmission may be heard at great distances. Most radiotelephone messages are in plain language, and if violations of security are to be avoided, users must keep their messages short, adhere strictly to prescribed procedures, and be guarded in what information they reveal.

Radiotelephone Security

ANY RADIO TRANSMISSION IS LIABLE TO INTERCEPTION, and operators must therefore assume that every transmission is received by unauthorized persons. Although some frequencies are normally limited to short distances, there is no known method of accurately restricting their range. Trained operators keep this hazard to security in mind at all times and follow the rules laid down to protect radio transmissions.

Untrained personnel are sometimes obliged to use voice radio circuits. This increases the need for strict control and adherence to prescribed procedure by those who understand the risks involved. Departures from the rules, even if they appear shorter or give the impression of being better for a given purpose, must not be employed. Such unauthorized transmissions are responsible for much confusion and needless delays in the transmission of messages. To protect our circuits from these deviations, controlling stations and monitoring stations keep a close watch and do not hesitate to call attention to dangerous practices. Always remember, everything you say is being copied — not only by the stations you have called, but also by opposing forces who gain much valuable information through thoughtless operating practices.

Transmission Range

Anyone using the radiotelephone should know how far he can expect his transmission to be heard. An inexperienced

operator can waste a lot of circuit time attempting to reach a ship outside normal range. Aboard ship, some of the transmitters which operate on medium and high frequencies can be used interchangeably for both radiotelephone and radiotelegraphy. Transmitters in the medium frequency band (300 to 3000 kcs) have a transmission range greater than VHF and the reception obtained is comparable to that of radiotelegraph on the same frequencies. Reception at distances of from one to several thousand miles is fairly common, even when low power is used. Although transmissions in the VHF band (30 to 300 mcs) have a limited range, there have been numerous instances of VHF reception at distances varying from 400 to more than 1500 miles. This is especially true of transmissions at the lower end of the band. Remember that although voice transmissions in the VHF and UHF bands have line-of-sight characteristics, there is no guarantee that they will not be heard for a far greater distance.

Prowords

Prowords are words and phrases used to speed the handling of radiotelephone messages. They perform the same functions and are used in the same manner as prosigns are used in the other procedures. Many prosigns and prowords are exactly equivalent in meaning.

Following is a complete list of prowords (except for precedence prowords) together with an explanation of each and the corresponding prosign, if one exists. Learn them now.

Proword	Meaning	Corresponds To
UNKNOWN STATION	Unknown station.	AA
ALL AFTER	All after.	AA
ALL BEFORE	All before.	AB
OUT	End of transmission, no reply expected.	AR
WAIT	I must pause a few seconds.	AS

WAIT OUT	I must pause longer than a few seconds.	AS AR	I SAY AGAIN	I am repeating transmission or portions indicated.	
BREAK	Long break.	BT			
THAT IS CORRECT	Correct.	C			
THIS IS	From.	DE	I SPELL	I shall spell the next word phonetically.	
TIME	That which follows is the time or date-time group of this message.				
CORRECTION	Error.	EEEEEEEE	WORDS TWICE	Communication is difficult. Transmitting each phrase twice.	
DISREGARD THIS	This transmission	EEEEEEEE		(Can be used as an order or request).	
TRANSMISSION	is in error. Disregard it.	AR			
DO NOT ANSWER	Do not answer.	F	INFO	The addressee designations immediately following are addressed for information.	INFO
FROM	Originator's sign.	FM			
READ BACK	Repeat this entire transmission back to me exactly as received.	G			
I READ BACK	The following is my response to your instructions to read back.		EXECUTE TO FOLLOW AND IMMEDIATE EXECUTE	Action on the message or signal which follows is to be carried out upon receipt of EXECUTE.	IX
GROUPS	Group count.	GR		EXECUTE TO FOLLOW is used with the normal and delayed executive methods.	
GROUP NO COUNT	The groups in this message have not been counted.	GRNC		IMMEDIATE EXECUTE is used with the immediate executive method.	
SILENCE	Emergency silence sign.	HM HM HM			
SILENCE LIFTED	Resume normal transmissions.	ZUG HM HM HM	EXECUTE	Carry out the meaning of the message or signal to which this applies.	IX (5-second dash)
SPEAK SLOWER	Your transmission is at too fast a speed.				
	Reduce speed of transmission.		VERIFY	Verify with the originator and repeat.	J
SAY AGAIN	Repeat.	IMI	I VERIFY	I have verified with the originator and am repeating.	C

OVER MESSAGE FOLLOWS	Invitation to transmit. A message which requires recording is about to follow.	K	Phonetic Alphabet Any letter of the alphabet that occurs in radiotelephone is identified by using the standard phonetic alphabet equivalent. The accent for pronunciation is shown here in capital letters.
NUMBER FIGURES	Station serial number. Numerals or numbers follow.	NR	
ROGER	I have received your last transmission.	R	
RELAY (TO)	Transmit this message to all addressees or to the addressee design- ations immediately following.	T	
TO WILCO	Action addressee. I have received your message, understand it and will comply.	TO	
WORD AFTER WORD BEFORE WRONG	Word after. Word before. Your last trans- mission was incorrect. The correct version is.....	WA WB C	
EXEMPT SERVICE	Exempt. The message that follows is a service message.	XMT SVC	
SIGNALS FOLLOW	Groups which 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 non-tactical nets.)		

Radiotelephone Procedure

Most of what you learned about radiotelegraph nets is
equally applicable to radiotelephone. Just as in radiotele-

graph, 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, is in charge. Radiotelephone nets may be either free or directed.

The lessons you learned about operation and circuit discipline are also just as important in radiotelephone. Abide by the instructions of the net control station, keep a good log, and stand a conscientious watch.

DOs and DON'Ts of Microphone Technique

DOs

1. **DO LISTEN BEFORE TRANSMITTING.** Unauthorized break-in is annoying, time-consuming and causes confusion. Often neither transmission gets through.
2. **DO SPEAK CLEARLY AND DISTINCTLY.** Slurred syllables and clipped speech are both hard to understand. A widespread error among untrained operators is a failure to emphasize vowels sufficiently.
3. **DO SPEAK SLOWLY.** Unless the addressee is listening, he will have to rely on the copy being typed or written. Give the receiving operator a chance to get it all the first time. You will save time and repetitions that way.
4. **DO AVOID EXTREMES OF PITCH.** A high voice cuts best through interference, but is shrill and unpleasant if too high. A lower pitch is easier on the ear, but is hard to understand through background noises.
5. **DO BE NATURAL.** Maintain a normal speaking rhythm. Group words in a natural manner. Send your message phrase by phrase rather than word by word.
6. **DO USE STANDARD PRONUNCIATION.** Speech with sectional peculiarities is difficult for persons from other parts of the country. Talkers using the almost standard pronunciation of a broadcast network announcer are easiest to understand.
7. **DO SPEAK IN A MODERATELY STRONG VOICE.** This will override unavoidable background noises and prevent drop-outs.

8. **DO KEEP CORRECT DISTANCE BETWEEN LIPS AND MICROPHONE.** If the distance is too great, speech is inaudible and background noises creep in; if too small, blaring and blasting result.
9. **DO SHIELD YOUR MICROPHONE.** Turn your head away from noise-generating sources while transmitting.
10. **DO KEEP THE VOLUME OF A HAND SET EARPHONE LOW.**
11. **DO KEEP SPEAKER VOLUMES TO A MODERATE LEVEL.**
12. **DO GIVE AN ACCURATE EVALUATION IN RESPONSE TO A REQUEST FOR A RADIO CHECK.** A transmission with feedback and/or a high level of background noise is not loud and clear even though the message can be understood.
13. **DO PAUSE MOMENTARILY, WHEN POSSIBLE, AND RELEASE YOUR PRESS-TO-TALK BUTTON.** This allows any other station with higher precedence traffic to break in.
14. **DO ADHERE STRICTLY TO PRESCRIBED PROCEDURES.** Up-to-date radiotelephone procedure is found in the effective edition of ACP 125.
15. **DO TRANSMIT YOUR BUSINESS AND GET OFF THE AIR.** Preliminary calls only waste time when communication is good and the message short. It is not necessary to repeat portions of messages when no repetition has been requested.

DON'Ts

1. **DON'T transmit while surrounded by other persons loudly discussing the next manoeuvre or event.** It confuses receiving stations, and a serious security violation can result.
2. **DON'T hold the microphone button in the push-to-talk position until absolutely ready to transmit.** Your carrier will block communications on the net.
3. **DON'T hold a hand set in such a position while speaking**

Code and Cipher Messages

Code words (such as LIMA in the text -- "EXECUTE PLAN LIMA") are sent as plain language words. Encrypted groups such as BAXTO are spelled phonetically, that is, BRAVO ALFA XRAY TANGO OSCAR.

The phonetic alphabet is applied not only to letters of the alphabet, it is also applied to the names of the alphabetical flags. Flag A is ALFA, flag B is BRAVO, and so on.

Tactical signals are sent as coded groups which have meanings of their own. ECHO KILO TWO, for example, means "anchor is dragging". The meaning of such code groups may be found in appropriate signal publications.

These signals may be sent by radiotelephone. You must be able to recognize whether you are hearing a code group or word spelled phonetically. Here is how you will know. If the phonetic alphabet is used to spell a word 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 the word "do". Without that proword, you can assume that signals are intended, and record the transmission as DO, which must be looked up in the signal book.

There is no need for the radioman to be an expert in visual signalling, but you should be acquainted with the names of flags and pennants. Flag signalling employs the alphabet flags we have already mentioned, numeral flags, numeral pennants, and a set of additional flags and pennants with special meanings. The alphabet flags are used as letters, and numeral pennants as numbers. Numeral PENNANTS are used only in calls. The SPECIALS are used in tactical manoeuvres to direct changes in speed, position, formation, and course, to indicate units, to identify units, and for other specialized purposes. The specials are:

<i>Flag or Pennant</i>	<i>Spoken</i>	<i>Written</i>
CODE or ANSWER	CODE or ANSWER	CODE or ANS
BLACK PENNANT	BLACK PENNANT	BLACK
CORPEN	CORPEN	CORPEN

that there is a possibility of having feedback from the earphone added to other extraneous noises.

4. DON'T hold a hand set loosely. A firm pressure on the microphone button prevents unintentional release and consequent signal drop-out.
5. DON'T send test signals for longer than 10 seconds. When testing, DON'T blow into the microphone; test by counting instead.

Pronouncing Numerals

Care must be taken to distinguish numerals from similarly pronounced words. Pronounce numerals as follows:

<i>Numeral</i>	<i>Spoken as</i>
1	Wun
2	Too
3	Thuh-ree
4	Fo-wer
5	Fi-yiv
6	Six
7	Seven
8	Ate
9	Niner
0	Zero

Numerals are transmitted digit by digit except that exact multiples of hundreds and thousands may be spoken as such.

Examples:

<i>Number</i>	<i>Spoken as</i>
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
16000	Wun six thow-zand
16400	Wun six fo-wer hun-dred
812681	Ate wun two six ate wun

DESIG	DESIG
DIVISION	DIV
EMERGENCY	EMERG
FLOTILLA	FLOT
FORMATION	FORM
INTERROGATIVE	INT
NEGATIVE	NEGAT
PREPARATIVE	PREP
PORT	PORT
SPEED	SPEED
SQUADRON	SQUAD
STARBOARD	STBD
STATION	STATION
SUBDIVISION	SUBDIV
TURN	TURN

There are, in addition, the 1st, 2nd, 3rd, and 4th SUBSTITUTES, but these are used only for flag communication and are of no concern to the radiotelephone operator.

Separations in flag signals are indicated by the TACK-LINE. This is spoken and written TACK.

The PREPARATIVE, INTERROGATIVE, and NEGATIVE pennants are known as the GOVERNING pennants. In flag signalling they are hoisted either above or below a signal, while in radiotelephone operation they are transmitted as the first or last part of a signal. Their meanings in either case are as follows:

<i>Preceding the Signal</i>	<i>Pennant</i>	<i>Following the Signal</i>
Prepare to -----.	PREPARATIVE	My present intention is to -----.
Questions or inquiries	INTERROGATIVE	Request permission to -----.
Cease, do not	NEGATIVE	Action is not being carried out.

Radiotelephone Messages

Radiotelephone uses a 16-line message format that is closely comparable to the formats used in radiotelegraph and in teletypewriter communications. It also uses the same three military message forms..PLAINDRESS, ABBREVIATED PLAINDRESS and CODRESS. By far the most common form in radiotelephone traffic is abbreviated plaindress. In fact, it is sometimes so abbreviated that its resemblance to the basic message format is barely detectable. But the three major message parts are still there..HEADING, TEXT, and ENDING. Each of these, as in teletypewriter and radiotelegraph, can be reduced to parts, components, elements and contents.

Figure 5-1 is a table showing the correct arrangement of a radiotelephone message. Not all 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 shown in the table.

Heading

The heading of a radiotelephone message may include any or all of the first 10 procedural lines shown in Figure 5-1. More often than not it will include only the call, preceding the text. One explanation for such general use of the abbreviated form is that radiotelephone communication is nearly always conducted with station originating and station addressed being 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.

SPECIAL NOTE:

On tactical circuits, voice call signs are to be used in the text of plain language messages and in tactical code messages, when referring to ships' names and task designators.

Ending

Every radiotelephone message ends with one of the words, OVER or OUT. With use of 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 use of OUT, the sender tells the receiver, "This is the end of my transmission to you and no response is required." There is never a need for using OVER and OUT together.

RADIOTELEPHONE PROCEDURE

Before you continue your study of radiotelephone, you should be warned that there is no "final" word on any communication procedure. This chapter will help you, but you can keep up with changes only by continued study of current communication procedures publications.

Radiotelephone transmissions used for illustrative purposes are assumed to pass over the net shown in Figure 5-2. Words are printed in italics to help you recognize them and see how they are used. Dashes indicate natural pauses.

Calling and Answering

Radiotelephone communication is established by a preliminary call, which will always take one of the following forms:

Single Call

BLACKTOP Call sign of station called.

This Is From.

BOSS Call sign of station calling.

Over, Go ahead, transmit.

The reply is in the same form: BOSS - *This Is* BLACKTOP - Over. In this case a single station has been called. If two or

Figure 5-1

Parts	Components	Elements	Format	Comments
H	Procedure	a. Call b. Message c. Transmission identification d. Transmission instructions	2 and 3 4 --- 5 ---	Station(s) called (proword EXEMPT, exempted calls). Proword THIS IS and station calling. Proword NUMBER and station serial number. Provides RELAY TO: READ BACK; DO NOT ANSWER. Operating signals; call signs; address groups; address indicating groups; plain language.
		Preamble	5 ---	Precedence designation. Proword TIME; date and time expressed in digits and zone suffix, operating signals
D	Address	a. Originator's sign; originator b. Action addressee sign; action addressee. c. Information addressee sign; information addressee. d. Exempted addressee sign; exempted addressee.	6 --- 7 --- 8 --- 9 ---	Proword FROM; originator's designation as address groups; call sign, or plain language. Proword TO; action addressee designation as address groups; call sign, or plain language. Proword INFO; information address designation as address groups; call sign, or plain language. Proword EXE; PT; exempted addressee designations as address groups; call signs, or plain language.
		Prefix	10 ---	Accounting symbol; group count; groword SERVICE.
SEPARATION				
E	Text	a. Subject matter	12 ---	Internal instructions; thought or idea as expressed by the originator.
		Proword BREAK.		
SEPARATION				
F	Procedure	a. Time group b. Final instructions c. Ending sign	14 --- 15 --- 15 ---	Proword TIME; hours and minutes expressed in digits and zone suffix, when appropriate. Provides FROM; CORRECTION; station designation Provides OVER; OUT.

RADIOTELEPHONE MESSAGE FORMAT

more were called they would reply in alphabetical order of call signs, or in the order in which they were called.

Collective Call

When stations on the net are assigned a collective call (as GANG in the Figure 5-2), 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.

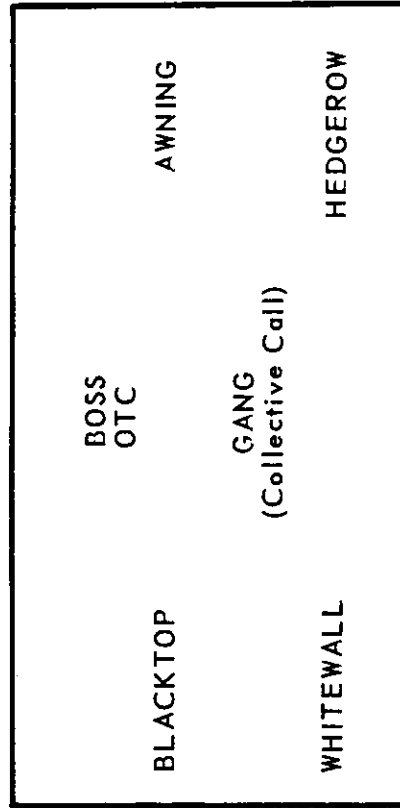


Figure 5-2 Radiotelephone Net

Example:

GANG Collective call.
Exempt Exempt.
 WHITEWALL Call sign of exempted station.
This Is From.
 BOSS Call sign of station calling.
 Over Go ahead and transmit.
 AWNING, BLACKTOP and HEDGEROW now answer in alphabetical order of call signs. When no confusion could result, answers may be abbreviated. This is done by omitting the call sign of the station called.

Example: *This Is* AWNING Over.

After establishing communication, a message may be sent in the following form:

	Transmission	Meaning
H	AWNING.....	Call signs of receiving stations.
e	HEDGEROW.....	
	<i>This Is</i>	From.
	BOSS.....	Call sign of transmitting station.
a	<i>Message Follows</i>	A message that requires recording follows.
d	ROUTINE.....	Precedence.
	<i>Time</i>	Time of origin is -----.
	ONE TWO ONE SIX	DTG
	THREE ONE ZULU	
i	<i>From</i>	Originator of this message is -----.
	BOSS	Call sign of the originator.
n	<i>To</i>	Action addressee is -----.
	AWNING	Action addressee's call sign.
	<i>Info</i>	Information addressee is -----.
g	HEDGEROW	Information addressee's call sign.
	<i>Groups</i> SEVEN	Group count.
	<i>Break</i>	Long break.
	*UNCLAS	Security classification.
Text	GO ALONGSIDE	Thought or idea conveyed by the message.
	HEDGEROW AND	
	EFFECT PERSONNEL	
	TRANSFER	
	<i>Break</i>	Long break.
	<i>Ending Over</i>	Go ahead, transmit.

On hearing the proword **Over**, receiving stations check the message to see that it has been received fully and correctly. If so, they receipt by use of the proword **Roger**, which means "I have received your last transmission satisfactorily".

This Is AWNING - **Roger** - **Out**
This Is HEDGEROW - **Roger** - **Out**

*The security classification "Unclassified" is always written "UNCLAS". It is transmitted as "Unclassified" by voice and "Unclas" by CW and teletype.

Repetitions

When words are missing or are doubtful, repetition is requested by the receiving station. The proword **Say Again** (used alone, or with **All Before**, **All After**, **Word Before**, **Word After**, --to--) is used for this purpose. In complying with such requests, the transmitting station identifies that portion to be repeated. Example: In the above message, AWNING has missed the word "effect":

This Is AWNING - **Say Again** - **Word After** AND - **Over**
This Is BOSS - **I Say Again** - **Word After** AND - **EFFECT** - **Over**

Having received the requested portion, AWNING receipts for the entire message with: **Roger**.

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:

WHITEWALL - **This Is** BOSS - **Time** ONE THREE TWO ZERO ZULU - **Break** - CONVOY ROMEO THREE - **Correction** - CONVOY SIERRA ROMEO THREE - **SHOULD ARRIVE** - ONE SIX THREE ZERO QUEBEC - **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:

WHITEWALL - **This Is** BOSS - **Time** ZERO SIX THREE ZERO ZULU - **Break** - ARE YOU RIGGED FOR HEAVY WEATHER - **Break** - **Correction** - **Time** ZERO SIX FOUR ZERO ZULU - **Over**.

Cancelling a Message During Transmission

During the transmission of a message and prior to the transmission of the ending proword **Over** or **Out**, the message may be cancelled by use of the proword **Disregard This Transmission**. (A message which has been completely transmitted can be cancelled only by another message.) Example: During the transmission of a message, BOSS discovers he is giving it to the wrong station:

AWNING - **This Is** BOSS - **ROUTINE** - **Time** ONE SIX THREE ZERO ZULU - **Break** - **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. The complete transmission is sent twice. Example:

GANG - **This Is** BOSS - **Do Not Answer** - **OPERATIONAL** **IMMEDIATE** - **Time** ONE SIX ZERO ZERO ZULU - **Break** - DELTA YANKEE FOUR FIVE - **Break** - **I Say Again** - GANG - **This Is** BOSS - **Do Not Answer** - **OPERATIONAL** **IMMEDIATE** - **Time** ONE SIX ZERO ZERO ZULU - **Break** - DELTA YANKEE FOUR FIVE - **Break** - **Out**

Verifications

When verification has been requested on a message, the originating station will verify with the originating person, check the message or portion in question and send the correct version.

Example 1:

BOSS - *This Is* HEDGEROW - *Verify* ONE ZERO THREE ZERO ZULU - *All Before Break* - *Over*.

BOSS transmits: *This Is* BOSS - *Roger* - *Out*.
BOSS, after checking with the originating officer, finds the heading correct as previously transmitted, and sends:

HEDGEROW - *This Is* BOSS - *I Verify* ONE ZERO THREE ZERO ZULU - *All Before Break* - HEDGEROW - *This Is* BOSS - ROUTINE - *Time* ONE ZERO THREE ZERO ZULU - *From* BOSS - *To* HEDGEROW - *Into* BLACKTOP - *Break* - *Over*.

HEDGEROW transmits: *This Is* HEDGEROW - *Roger* - *Out*

Example 2:

BOSS - *This Is* HEDGEROW - *Verify* ONE ZERO THREE ZERO ZULU - *Word After* PROCEED - *Over*.

BOSS transmits: *This Is* BOSS - *Roger* - *Out*

BOSS, after checking with the originating officer, finds that he means INDEPENDENTLY instead of INDIVIDUALLY as the word after PROCEED. BOSS transmits:

HEDGEROW - *This Is* BOSS - *Correction* - ONE ZERO THREE ZERO ZULU - *Word After* PROCEED - INDEPENDENTLY - *Over*.

HEDGEROW transmits: *This Is* HEDGEROW - *Roger* - *Out*

Read Back and Words Twice

Further checks on transmission accuracy can be had by using the prowords *Read Back* and *Words Twice*. You use *Read Back* when you want your own message (or a portion of it) repeated back to you as received. This is generally done when a message is very important or of a type which is difficult to transmit or receive. If you want only a portion of the message read back, don't forget to identify that portion. Transmit the *Read Back* proword immediately after the call.
Example:

BLACKTOP - *This Is* BOSS - *Read Back* TEXT - *Time* ONE SIX THREE ZERO ZULU - *Break* - CONVOY DELAYED ONE TWO HOURS - *Over*.

BLACKTOP replies: *This Is* BLACKTOP - *I Read Back* TEXT - CONVOY DELAYED ONE TWO HOURS - *Over*.

BOSS then sends: *This Is* BOSS - *That Is* Correct - *Out*

If a message is repeated back incorrectly, it may be corrected by use of the proword *Wrong*, followed by the correct version. In the last example, let us assume that BLACKTOP made a mistake when he read the message back:

This Is BLACKTOP - *I Read Back* TEXT - CONVOY DELAYED TWO ONE HOURS - *Over*.

BOSS corrects BLACKTOP by sending: *This Is* BOSS - *Wrong* - CONVOY DELAYED ONE TWO HOURS - *Over*.

BLACKTOP reads back again: *This Is* BLACKTOP - CONVOY DELAYED ONE TWO HOURS - *Over*.

BOSS ends the exchange with: *This Is* BOSS - *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. Do not repeat the proword *This Is*.
Example:

AWNING - AWNING - *This Is* BOSS - BOSS - *Over* - *Over*.

AWNING replies: BOSS - BOSS - *This Is* AWNING - AWNING - *Over* - *Over*.

BOSS sends his message: AWNING - AWNING - *This Is* BOSS - BOSS - *Words Twice* - *Words Twice* - ROUTINE - ROUTINE - *Time* ONE SIX THREE ZERO ZULU - *Time* ONE SIX THREE ZERO ZULU - *Break* - UNCLAS - UNCLAS - MAIL FOR YOU - MAIL FOR YOU - RECEIVE AT FIRST LIGHT - RECEIVE AT FIRST LIGHT - *Over* - *Over*.

AWNING receipts: BOSS - BOSS - *This Is* AWNING - AWNING - *Roger* - *Roger* - *Out* - *Out*

Executive Method

The executive method is used to execute tactical signals

cannot be returned at the moment, the operator receipts for the message with **Roger**, and **Wilco** is sent later. The return transmission to a request for an acknowledgement is either **Roger** or **Wilco**; never use these prowords together.

In the following example the OTC sends a tactical signal. He desires acknowledgement from two ships:

GANG - This Is BOSS - Execute To Follow - Break - TANGO BRAVO ONE FIVE - TACK - ZERO ZERO ZERO - AWNING - BLACKTOP - ACKNOWLEDGE - Over

Ships now receipt in normal sequence. The Commanding Officer of AWNING wishes to consider the message before acknowledging. His operator transmits:

This Is AWNING - Roger - Out

The Commanding Officer of BLACKTOP heard the message, understood it, and can comply. He directs his operator to acknowledge:

This Is BLACKTOP - Wilco - Out

This Is HEDGEROW - Roger - Out

This Is WHITEWALL - Roger - Out

When the Commanding Officer of AWNING is ready to acknowledge, he has two choices of reply:

BOSS - This Is AWNING - Wilco - YOUR LAST TRANSMISSION - Out or

BOSS - This Is AWNING - Wilco - YOUR Execute To Follow - Break - TANGO BRAVO ONE FIVE - TACK ZERO ZERO ZERO - Out

When ready to execute, the OTC transmits:

GANG - This Is BOSS - STANDBY - Execute - WHITEWALL - Over.

WHITEWALL receipts as directed:

This Is WHITEWALL - Roger - Out

Signal Strength and Readability

A station is understood to have good readability unless otherwise notified. Strength of signals and readability are not exchanged unless there is good reason for it.

The response to the question, "How do you hear me?" is a

short concise report of actual reception, such as "Weak, but readable", "Strong, but distorted", "Loud and clear", and so on. Reports such as "Five by five," "Four by four", etc. must never be used to indicate quality and strength of reception. Examples... ship (AWNING) and plane (CATFISH ONE) establish communication.

AWNING - This Is CATFISH ONE - HOW DO YOU HEAR ME - Over

This Is AWNING - LOUD AND CLEAR - Over

Had AWNING not received CATFISH ONE strongly, the following transmission might be sent:

This Is AWNING - YOU ARE WEAK AND BARELY READABLE - Over

This Is CATFISH ONE - Roger - Out

Later, further communication is desired. Conditions are good, so no exchange of strength and readability is needed:

AWNING - This Is CATFISH ONE - Over

This Is AWNING - Over

This Is CATFISH ONE - SECOND LEG COMPLETED - Over

This Is AWNING - Roger - Out

Relay

The proword **Relay** used alone indicates that the station called is to relay the message to all addressees. Example: **AWNING - This Is BOSS - Relay - PRIORITY - Time ZERO NINE ONE ZERO ZULU - From BOSS - To HEDGEROW - Break - UNCLAS - REPORT NUMBER ROUNDS EXPENDED LAST RUN - Over**

After AWNING receipts for the message, he relays it to the action addressee:

HEDGEROW - This Is AWNING - PRIORITY - Time ZERO NINE ONE ZERO ZULU - From BOSS - To HEDGEROW - Break - UNCLAS - REPORT NUMBER ROUNDS EXPENDED LAST RUN - Over

This Is HEDGEROW - Roger - Out

The proword **Relay To**, followed by an addressee, means

SETTING UP A NET

Free Net

The procedures described here are for use either when opening a net for the first time or when re-opening a net that has been temporarily secured. In the next example BOSS opens a FREE net:

GANG - This Is BOSS - Over

All stations included in the collective call sign GANG now answer in alphabetical order of call signs:

This Is AWNING - Over

This Is BLACKTOP - Over

This Is HEDGEROW - Over

This Is WHITEWALL - Over

BOSS then calls the net and informs all stations that their transmissions have been heard:

GANG - This Is BOSS - Out (or proceeds with a message).

If some station does not reply to a collective call within 5 seconds the next station goes ahead and answers. The delinquent station then answers last, if able to do so. If the station is having some difficulty that makes it impossible to answer the call at all, the operator reports in to the net when he can. In the example above, assume BLACKTOP had equipment failure and could not answer. HEDGEROW waits 5 seconds and answers as usual. When BLACKTOP is able to transmit, he calls BOSS:

BOSS - This Is BLACKTOP - REPORTING IN TO THE NET - Over

This Is BOSS - Roger Out

Directed Net

In the next example, BOSS calls the member stations and announces that the net is DIRECTED. He requests the precedence and addressees of traffic to be transmitted:

GANG - This Is BOSS - THIS IS A DIRECTED NET - OF WHAT PRECEDENCE AND FOR WHOM ARE YOUR MES-
SAGES - Over

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:

AWNING - BLACKTOP - This Is BOSS - Message Follows -
AWNING - Relay To WHITEWALL - ROUTINE - Time ZERO
ONE TWO TWO ZULU - From BOSS - To AWNING - Info
BLACKTOP - WHITEWALL - Break - UNCLAS - PROCEED
TO SEARCH AREA DELTA - Break - Over

This Is AWNING - Roger Out

This Is BLACKTOP - Roger Out

AWNING now relays to WHITEWALL as instructed:

WHITEWALL - This Is AWNING - Message Follows -
ROUTINE - Time ZERO ONE TWO TWO ZULU - From
BOSS - To AWNING - Info BLACKTOP - WHITEWALL -
Break - UNCLAS - PROCEED TO SEARCH AREA DELTA -
Break - Over

This Is WHITEWALL - Roger Out

Occasionally it is necessary to relay by radiotelephone a message which is received by some other means of communication. In our next example BLACKTOP (CGXC) has received a radiotelegraph message from BOSS (CGLE) for relay to WHITEWALL (CGRV):

CGXC DE CGLE - T - P - 141500Z

FM CGLE -

TO CGRV

BT Unclas. Return to base BT K

BLACKTOP places the message in radiotelephone form and relays:

WHITEWALL - This Is BLACKTOP - Message Follows -
PRIORITY - Time ONE FOUR ONE FIVE ZERO ZERO
ZULU - From BOSS - To WHITEWALL - Break - UNCLAS -
RETURN TO BASE - Over

GANG answers in alphabetical order of call signs, each station indicating the traffic on hand:

BOSS - *This Is* AWNING - I HAVE ONE OPERATIONAL IMMEDIATE AND ONE ROUTINE FOR YOU - *Over*

BOSS - *This Is* BLACKTOP - NO TRAFFIC - *Over*

BOSS - *This Is* HEDGEROW - I HAVE ONE PRIORITY FOR BLACKTOP - *Over*

BOSS - *This Is* WHITEWALL - NO TRAFFIC - *Over*

BOSS informs all stations that their transmissions have been heard, and commences to clear traffic in order of precedence:

GANG - *This Is* BOSS - *Roger* - AWNING SEND YOUR OPERATIONAL IMMEDIATE - *Over*

When AWNING has sent and obtained a receipt for his message, net control gives the station with the next highest precedence message permission to transmit.

HEDGEROW - *This Is* BOSS - SEND YOUR PRIORITY - *Out*

BLACKTOP, hearing the authorization, tells HEDGEROW to go ahead. This saves HEDGEROW the trouble of making a preliminary call:

This Is BLACKTOP - *Over*
HEDGEROW goes ahead with his message at once:

BLACKTOP - *This Is* HEDGEROW - PRIORITY - *Time* (etc.)

When BOSS hears the proword *Out* that ends the exchange between BLACKTOP and HEDGEROW, he directs AWNING to send the ROUTINE message that is still outstanding.

As operators are handed messages to be sent out, they call net control and request permission to transmit. WHITEWALL, for example, has a DEFERRED for HEDGEROW:

BOSS - *This Is* WHITEWALL - I HAVE ONE DEFERRED FOR HEDGEROW - *Over*

BOSS replies, (assuming no other station wishes to send a message of higher precedence):

This Is BOSS - SEND YOUR MESSAGE - *Out*
Hearing this, WHITEWALL sends his message. If, however,

higher precedence traffic awaited transmission, BOSS would send: *This Is* BOSS - *Wait* - *Out*
When traffic conditions permit, BOSS would call WHITEWALL and give him permission to transmit....

WHITEWALL - *This Is* BOSS - SEND YOUR DEFERRED - *Out*

HEDGEROW answers WHITEWALL to save a preliminary call, and WHITEWALL clears his message.

Authentication

A radiotelephone message must be authenticated if there is any chance it might be of enemy origin. Be alert and be quick to be suspicious. You can sometimes (but not always) spot an enemy deceptive message by the operator's mistakes in procedure or in English grammar or pronunciation.

QUIZ

1. Why should you listen before transmitting?
2. In what publication can you find up-to-date radiotelephone procedure?
3. What are prowords? What do they correspond to in other procedures?
4. How would you know that you are receiving a word phonetically spelled?
5. Name the governing pennants.
6. What proword would you use to cancel a message during transmission?
7. What is the purpose of the executive method?
8. What is an acknowledgement? Who can authorize sending an acknowledgement?
9. In what order do stations reply to a collective call?
10. If some station does not reply to a collective call, what should the next station do?
11. What proword is used to correct transmission errors?
12. When is the proword WORDS TWICE used?
13. What is the proper way to test a microphone?

14. What is the reply to VERIFY when the original transmission is found to be correct as sent?
15. The proword READ BACK is used when transmitting messages which are 1.....2.....

CHAPTER 6

RADIO ORGANIZATION

The subject of organization with regard to radio communication is a vast one. It is therefore not intended that this chapter be a complete course of instruction; rather it is intended to serve as a guide. Much of the subject is of a confidential nature. Make good use of reference materials which are available in your ship or station. A list of the more commonly used communication publications will be found in Chapter 7.

World-Wide Organization

Since December 12, 1901 when Marconi spanned the Atlantic by radio, ships and stations have depended on each other for clearing their messages. Over the years an organization has come into being whereby a ship may make contact with shore or the shore with a ship from any place in the world. Study Figure 6-1. Notice that the world is divided into areas, each of which covers a certain portion of the navigable waters. With a few exceptions, these areas serve ships with a fleet broadcast and ship-shore facilities. For example, area Delta is served by Halifax Radio (CFH) under the operational control of CANFLAGLANT. The broadcasts emitting from CFH are operated on a continuous schedule for RATT and CW. The are copied by ships of the RCN and Commonwealth Navy operating in the Western Atlantic areas. Merchant ships also

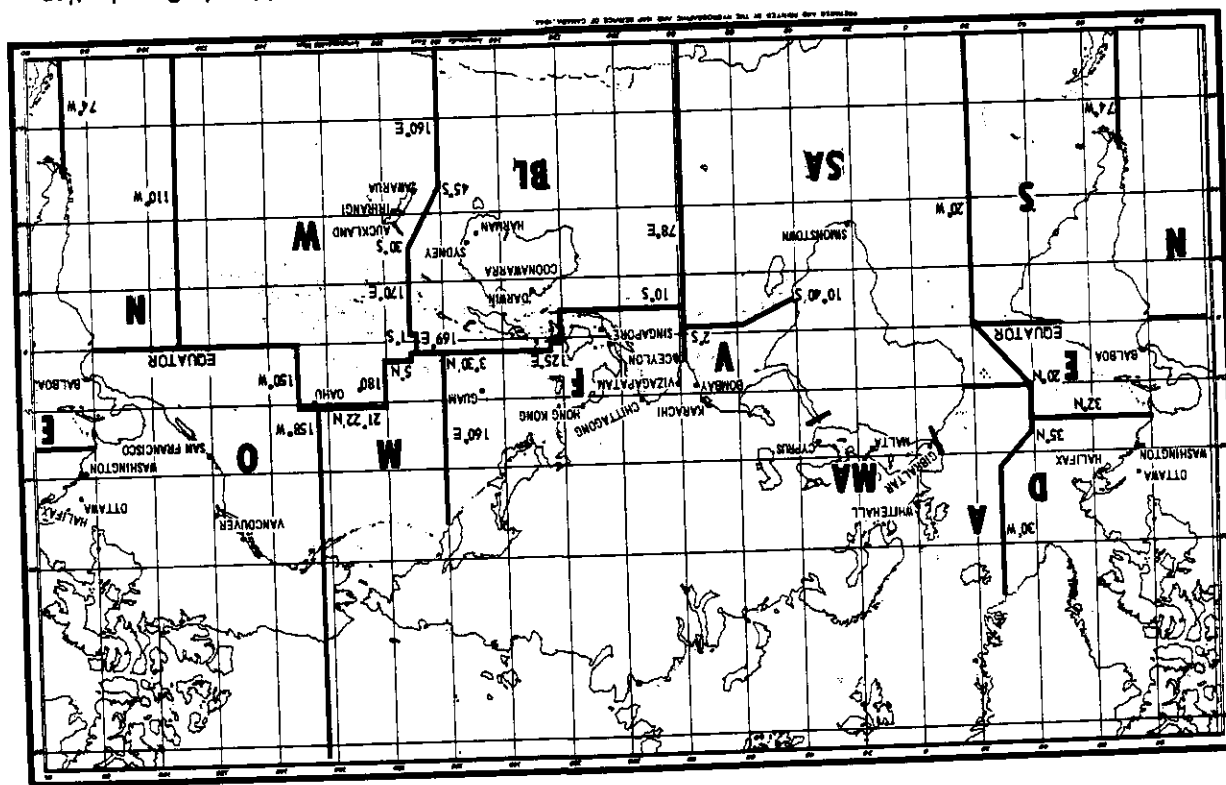
are served by these broadcasts, but they copy only the CW schedules - six 2-hour periods beginning at 0001Z. The remaining six 2-hour periods, beginning at 0200Z are naval traffic periods.

Fleet Broadcasts

Let us discuss the problem of getting a message to a ship. Broadcast is the primary method of passing messages to ships. Several frequencies are keyed simultaneously, using high-power transmitters, and the ship copies the frequency giving best reception in her area. Since each message is serially numbered and transmitted on several frequencies at the same time, it is reasonable to assume that ships will receive all messages placed on the broadcast. Therefore, no receipt is given to a message received by this method, except by merchant ships. You will see that this system is quite fast and makes it possible to clear large volumes of traffic in a 24-hour period. Types of traffic handled are operational and administrative. Merchant ships receive a large number of personal radio telegrams, business messages, etc. Broadcasts are also keyed to give the latest advice regarding ice conditions, storms and other navigational hazards.

Broadcasts are typed according to the area they serve and the kind of traffic they handle. Three of these types are: *Primary*, *Secondary* and *Special*. A *primary* broadcast is generally of very high power and transmits on several frequencies simultaneously. It will serve a major ocean area and handle pretty well all types of traffic, i.e., naval administrative, operational, weather, etc. A *secondary* broadcast is high-powered, but not as powerful as a *primary* station. Its purpose is to serve a local or coastal area with the types of naval messages required for ships operating in the area. Special broadcasts are designed to meet special requirements of operating forces. A *special* broadcast may carry traffic for merchant ships *only*, or for submarines *only*. On the other hand, it may be a *ME* broadcast for certain commands.

Figure 6-1 Limits of Naval Radio Communication Areas and Stations in the World-Wide Organization



FIXED SERVICES

You may ask, "How does a ship in area Alfa receive a message from its operational commander who is in area Delta?" This is accomplished by means of point to point circuits, or FIXED SERVICES. These stations normally operate on a 24-hour basis, and are nearly all RATT equipped. Circuits are generally quite busy, for on Commonwealth circuits, commercial traffic is relayed as well as naval traffic.

Let's say that HMCS BONAVENTURE is exercising in the West Indies, which lies in area Echo. She would be maintaining a continuous receiver watch (copy) on the fleet broadcast being transmitted from Halifax Radio. All BONAVENTURE's OUT messages would be cleared directly to Halifax for addressees in that area or anywhere in Canada or U.S.A. However, if there were a mixture of addressees for Canada, U.K. and U.S.A., she could simply transmit the message to Halifax Radio with instructions for Halifax Radio to relay to all addressees. Delivery to Canadian and American addressees would be made using the tape relay network. Delivery to British addressees would be made via Fixed Service 5 (Halifax to Whitehall) and British tape relay circuits.

Suppose now that BONAVENTURE had been ordered to proceed from the West Indies exercise area to the Mediterranean, for exercises with the Mediterranean Fleet. She would continue to copy the fleet broadcast from Halifax until crossing into area Alfa (Figure 6-1). A change would then be made, and at a specified time BONAVENTURE would commence copying the fleet broadcast transmitted from the U.K. Operational and administrative traffic from Naval Headquarters at Ottawa and from the Flag Officer Atlantic would now flow by fixed service to U.K. Here it would be placed on the fleet broadcast for BONAVENTURE.

The ship is now nearing Gibraltar and the Mediterranean Sea. Once more a change in organization has to be made, and at a certain time BONAVENTURE shifts to copy the broad-

cast in the Mediterranean area. Messages from home will now reach the ship by fixed service from Halifax to U.K. to Malta, then by broadcast method to complete delivery. This may sound like quite a complication of relays, with resultant delays. In fact the service is quite fast and very reliable.

By selecting the correct frequency for use in ship-shore communications, BONAVENTURE may still work Halifax direct to clear her OUT traffic. However, if conditions are bad, i.e., ionospheric disturbances, she may relay her messages through U.K. or Malta to Canada by means of the same fixed service which carried messages TO her.

A similar organization exists for ships based on Canada's west coast. Here, Vancouver Radio serves the seagoing ships with a primary fleet broadcast, ship-shore facilities, and is linked with the U.K. by Fixed Service 202 (Vancouver - New Zealand).

Ship-Shore Organization

In the discussion of world-wide organization, you learned that ships operating anywhere in the world could be sure of passing messages ashore and receiving messages. It is important that you now learn which stations are capable of accepting traffic from you. The publication AFO S7 contains a list of such stations. Study it closely, as it is one of the most useful books written to aid operators in clearing ship-shore traffic. Some sixteen Commonwealth stations are listed and details of hours during which a watch is kept, frequencies, etc., are given for each. Included in this book also, is a guide to optimum frequencies for use in ship-shore work. By proper reference to the guide, you may determine fairly accurately, the station from which you are most likely to receive an answer. However, if you fail to receive an answer from the station called, another station may answer and offer to accept your traffic. This is part of the ship-shore organization. Co-operation between stations frequently reduces the time during which a ship is required to be "on the air".

To determine the best frequency to use, first ask the officier of the watch for the latest position in latitude and longitude. Next, note the time (GMT). Using these positions and time elements, enter in the book at the appropriate page and proceed in accordance with the instructions contained in the front of the book. There are several important notes regarding coastal common circuits, etc., so read the instructions carefully.

Long Distance Organization for Merchant Ships

Before discussing the means by which a merchant ship may clear traffic to shore, let's differentiate between "long distance" and "short distance" organization. "Short distance" simply means that a merchant ship transmits its messages to a commercial coast station - such as VCS Camperdown, N.S., or VAI Vancouver, B.C. - for delivery. The MF band would be used between coast station and ship, suitable for ranges up to approximately 300 miles - a relatively short distance. The coast station would pass the messages to the telegraph office in its vicinity (CNR/CPR) who completes the delivery to the addressee. "Long distance" makes use of the HF bands, suitable for long distance day or night working. However, the conditions may be poor for direct working to the station of destination, and, in case this occurs, the merchant ship may make use of the fixed services between the Commonwealth countries. There is no charge for this relay.

In the following example, SS EMPIRE STAR/GXCW has a radiotelegram for an addressee in Edmonton, Alberta. The ship has just left Liverpool, England so calls Portishead on 8 mcs - call sign GKL. Instructions to relay the radiotelegram to Halifax/CFH are given in the preamble:
GKL DE GXCW CT P EMPIRE STAR 1 14 23 1500 GMT
CFH QSP VIA GKL

BT
Mrs Richard Brown
1853 Rupertsstreet
Edmontonalta
BT

Will probably see you sixth July love

BT John AR GXCW K

Portishead, which is located at Burnham, England, will now relay this radiotelegram to Whitehall, London, where it is placed on the fixed service to Halifax. On receipt, Halifax forwards the message to the CNR telegraph office for onward transmission to Edmonton. Delivery is completed by the CNR telegraph messenger, who would be astounded if he were aware of the distance the message had travelled, the number of relays and equipment used to carry the message and the number of skilled operators who had handled it.

ABBREVIATIONS AND TERMS

Let's have a look at some of the abbreviations and terms that you are sure to meet up with while doing your job as radioman. It is more important that you fully understand the meaning of them, rather than the wording. That is to say, don't memorize them "PARROT FASHION" unless you really understand them. These abbreviations will generally be seen in communication plans, and notes referring to such plans.

<i>Abbreviation</i>	<i>Meaning</i>
CTF	Commander Task Force.
CTG	Commander Task Group.
LF	Low Frequency (30 to 300 kcs).
MF	Medium Frequency (300 to 3,000 kcs).
HF	High Frequency (3,000 to 30,000 kcs).
VHF	Very High Frequency (30 to 300 mcs).
UHF	Ultra High Frequency (300 to 3,000 mcs).
OCA	Operational Control Authority.
P	Primary.
IFL	International Frequency List

S
V
O

Secondary.
Voice.
Overload.

Terms

Meaning

GUARD

To maintain a continuous receiver watch with transmitter ready for immediate use. A complete log to be kept.

COVER

To maintain a continuous receiver watch with transmitter calibrated and available but not necessarily ready for immediate use. A complete log to be kept.

COPY

To maintain a continuous receiver watch, keeping a complete log.

LISTENING WATCH A continuous receiver watch establishment for the reception of traffic addressed to, or of interest to own unit with complete log optional. May be kept on loudspeaker.

SERIES

A group of several harmonically related frequencies.

PRIMARY

The normal channel of communication between stations.

SECONDARY

The channel of communication used whenever the primary becomes unsuitable for any reason. The secondary must be constantly available for use, but not necessarily manned. Secondary nets are not restricted from other uses if required.

OVERLOAD

An overload circuit is used when the volume of traffic on the primary channel requires an additional channel. Overload nets are guarded only when ordered. A net may have only one secondary, but as many overloads as desired or as circumstances permit.

CHANNEL

A facility of telecommunications on a system or circuit. The number of independent channels on a system or circuit is measured by the number of separate communication facilities that can be provided by it.

CIRCUIT

An electronic path between two or more points capable of providing one or more channels.

NET

An organization of stations capable of direct communication on a common channel or frequency.

HARBOUR ORGANIZATION

When a ship enters harbour, it usually does so for a number of reasons. Among these would be provisioning, overhauling engines, getting all or part of the crew off for leave, etc. The details connected with projects of this nature are innumerable and must be handled by messenger, mail, visual signalling, radio, telephone, teletypewriter, or radioteletype. It follows then, that facilities must be provided in the dockyard area to enable ships to send and receive their administrative traffic by the most reliable means.

Details regarding harbour communication facilities are contained in **LANTCOMOS** (*Atlantic Coast Communication Orders*) and Maritime Command Atlantic Communication Operating Instructions (**MCOI**) for the Atlantic Command and **PACOM** (*Pacific Coast Communication Orders*) for the Pacific Command.

TRAINING

In order to achieve communication efficiency in the fleet, and to prepare junior men for advancement, a considerable

training effort in each command is necessary. The major part of this effort must be made in individual ships. It is to your advantage if you make full use of the exercises which are conducted while your ship is in harbour. Whether you are based on the Atlantic or Pacific coast, an organization for harbour exercises is in effect to help you to improve your operating. Try to arrange your dental appointments, clothing store purchases, etc., so they won't conflict with exercise times. You'll be glad you did.

During your period in the Communications Division, you will be given the necessary training to get you started as a radio-man. You will learn to read and send Morse code. You will learn the basic procedures that will enable you to "speak the language" of communications. However, this training is soon valueless to you without practice. Practice in any skill is very necessary to success. A mechanic requires practical training in the shop, or his classroom lectures are of little value. A stenographer must put in long hours of practice on typewriter and shorthand before being considered eligible for an office position. Consider that you are learning three skills: Morse receiving, Morse sending, and typing. Proficiency in all three skills means a competent operator. Competent operators advance more quickly. Remember - practice makes perfect, so strive for perfection. Much of your spare time will be used for practising receiving and sending Morse as well as typing, but you will find the time well spent. Keep in mind the fact that all worth while ventures - and this includes learning a trade - require energy, enthusiasm, sincerity of purpose. These qualities must be evident all the time, not just during class hours.

DISTRESS, SEARCH AND RESCUE ORGANIZATION

Whenever ships and aircraft are operating, either singly or in units, there is danger of accident. The Navy and Air Force stand ready to offer assistance to any ship or aircraft which

encounters difficulty, whether due to accident, storm or other cause. Some of the distress frequencies which you should know are listed below. Learn them well. Under normal conditions, checking the books for a frequency is relatively simple and doesn't take very long. In an **EMERGENCY**, every second counts. Save time and possibly life, by knowing these frequencies:

PROPAGATION DISTURBANCE WARNINGS

The ionosphere sometimes acts in a manner that would try the patience of even the most level-headed radioman. Certain disturbance of the ionosphere causes weird things to happen to radio waves. The effect is sometimes very helpful, at other times a serious hindrance. Scientists have been able to predict quite accurately the disturbance that may be expected during a given period, just as a meteorologist forecasts the weather. This information is compiled and distributed to ships and stations within the Fleet.

WWV AND WWVH

The Central Radio Propagation Laboratory of the National Bureau of Standards maintains two radio transmitting stations: WWV near Washington, D.C., and WWVH at Punnene, Hawaii, for broadcasting radio frequencies of high accuracy. WWV broadcasts are on 2.5, 5, 10, 15, 20 and 25 megacycles per second, and those from WWVH are on 5, 10, and 15 megacycles. The radio frequency signals are modulated by pulses at one cycle per second, and also by standard audio frequencies alternating between 440 and 600.

Transmissions are continuous, with the following exceptions: the WWV transmissions are interrupted for a four-minute period beginning at approximately 45 minutes after the hour (as indicated in Figure 6-2); the WWVH transmissions are interrupted for a three-minute period beginning approximately 10 seconds after the hour and at 15-minute intervals thereafter. WWVH is also silent each day for a 34-minute period beginning at 1900 GMT.

Accuracy

Transmitted frequencies are accurate within 1 part in 100 million. The WWV transmissions are generally stable to 1 part in one billion in any given day, although this is not guaranteed. Frequencies are based on an atomic standard, and daily corrections to the transmitted frequencies are subsequently published each month in the Proceedings of the IRE.

Time Schedules

The 1 cps modulation is a five-millisecond pulse at intervals of precisely one second, and is heard as a tick. The pulse transmitted by WWV consists of 5 cycles of 1000-cycle tone; that transmitted by WWVH consists of 6 cycles of 1200-cycle tone. On the WWV transmissions, the 440- or 600-cycle tone is blanked, beginning 10 milliseconds before and ending 25 milliseconds after the pulse. On the WWVH transmissions, the pulse is superimposed on the tone. The pulse on the 59th second is omitted, and for additional identification the zero-second pulse is followed by another 100 milliseconds later. On WWV, during the minutes identified by coarse cross-hatching (Figure 6-2), a high-speed pulse code is transmitted, giving the time of day and the accuracy of the time. It sounds like an erratic "buzz".

Time Announcements

When you tune in WWV you will hear the audio frequency of 440 or 600 cycles as a steady tone. Superimposed on the tone is a series of clock-like ticks. You can determine time and

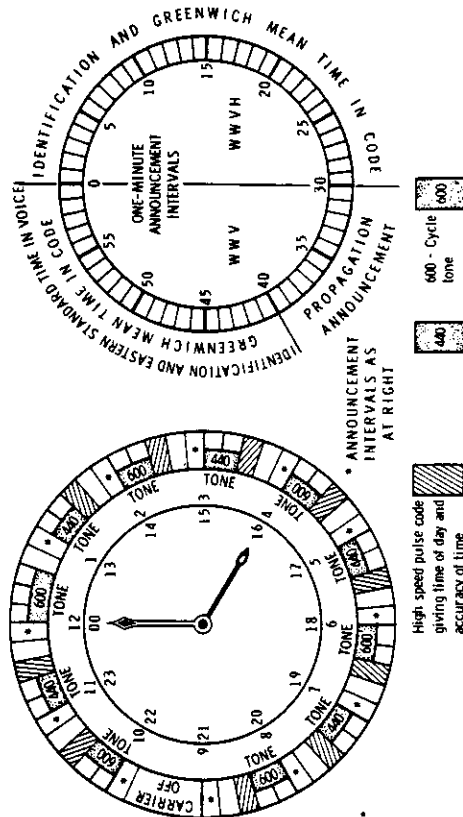


Figure 6-2 Standard Frequencies and Time Signals

intervals of time to the finest degree through:

1. regular interruptions of the audio frequency;
2. regular interruptions and ticking; and
3. Morse code and time announcements.

The time (GMT) is broadcast in telegraphic code each five minutes and is followed by a voice announcement of the Eastern Standard Time. These transmissions are made in the silent period when the audio frequency is off, and refer to the time it will be when the audio frequency or tone is resumed; for example, just before 1655Z you will hear 1655 in Morse code followed by a voice. "National Bureau of Standards WWV. When the tone returns it will be 11.55 a.m. Eastern Standard Time, 11.55 a.m.". If you were correcting the message centre clock, you would pre-set the hour and second hands to exactly 16.55 while the announcements were going on. You would start the clock the instant the tone resumed.

The ticking is a pulse on the carrier frequency of 5 milliseconds' duration, which occurs at intervals of precisely one second (see previous paragraph). When the observer hears

the ticking stop he stands by; the ticking will resume one second later and the second hand of an accurate chronometer will, at the instant of the first tick, be at 12 o'clock.

However, your chances of working with the ship's chronometers are small, as they are normally the responsibility of the Navigators Yeoman. Your duties in this regard will probably be limited to tuning a receiver and making the connections that will pipe the time signal to the bridge or operations room.

Radio Propagation Disturbance Warnings

During the announcement intervals at 19.5 and 49.5 minutes after the hour, propagation notices applying to transmissions to be passed over the North Atlantic are transmitted from WWV. Similar forecasts for the North Pacific are transmitted from WWVH during the announcement intervals at 9 and 39 minutes after the hour.

These notices, in telegraphic code, consist of the letter N, W or U, followed by a number. The letter designations apply to propagation conditions at the time of the broadcast, and have the following significance:

- W - ionospheric disturbances in progress or expected.
- U - unstable conditions, but communication possible with high power.
- N - no warning.

Digit (forecast)	Propagation Condition	Letter (current)
1.....	Impossible	W
2.....	Very poor	W
3.....	Poor.....	W
4.....	Fair to poor	W
5.....	Fair	U
6.....	Fair to good	N
7.....	Good	N
8.....	Very Good.....	N
9.....	Excellent	N

CHU

CHU, the Canadian time signal station at the Dominion Observatory in Ottawa transmits on 3330.0, 7335.0, and 14,670.0 kcs. Voice announcement of the minute is made each minute; the 29th second time-tick is omitted.

Special Igy Transmissions

The special broadcasts instituted during the International Geophysical Year may be continued through the next few years (i.e., 1963 onwards). These broadcasts include information on the IGY "alerts" and "special" world intervals. The broadcasts from WWV are at 4.5 and 34.5 minutes past the hour and those from WWVH are at 14 and 44 minutes past the hour. Each such transmission is preceded by the letters "AGI" in international Morse code. The code used for the information is as follows:

Five "A's" - State of alert

Five "E's" - No state of alert.

Five "S's" - Special world intervals begin at 0001Z the following day.

Five "T's" - Special world interval terminates at 2359Z. Three long dashes - Special world interval in progress.

COMPLANS TO OPORDER

An OPORDER is a directive outlining procedure to be followed for some particular operation, such as invasion, air strike, or convoy. That part of the oporder of interest to you is the communication plan, which is usually contained in Annex "C". The complan sets forth instructions that will govern radio and visual communications during the operation. It typically deals with such topics as:

1. Contact reports -- to whom made, how authenticated and acknowledged, and whether to be sent plain or encrypted.

2. Recognition and identification, including IFF.

3. When radio silence will be observed.

4. Use of UHF.

5. Radio procedures and circuit discipline.

6. Use of command circuits.

7. Use of call signs and address groups.

8. Use of radiotelephone codes and ciphers.

9. Visual communications.

10. Frequency plans for surface ship nets, CIC communications, and for aircraft communications.

11. Movement reports.

Departures from, or modification of, communication doctrine for a particular operation are carefully described in the command plan. Departures from standard doctrine are not made except for good reason.

The information you are required to have from the command will be furnished you through the chain of command. From the Captain it passes to the Communication Officer, who in turn passes it on to the senior radioman and signalman. Information will be given to you by your senior petty officer.

QUIZ

1. What is the primary method of passing messages to ships?

2. What publication contains a list of commonwealth ship-shore stations?

3. In what publication would you find the optimum frequency for ship-shore working?

4. What information is required before entering the optimum frequency tables?

5. With regard to merchant ship organization, what is meant by SHORT DISTANCE?

6. What is the meaning of the term GUARD?

7. Lantcomos is the short title for what publication?

8. What is the frequency 500 kcs used for?

9. What frequencies does WWV transmit on?

10. What does the abbreviation CTG mean?