

CHAPTER 15

COMMUNICATIONS

INTRODUCTION

Communication plays a very important part in modern society. We have advanced from the days of the old land-line based telephone and postal (snail) mail to mobile phones and e-mail. Technology has given us the ability to communicate with each other instantly and anywhere in the world. It has developed to such an extent that there is hardly a facet of our lives that is not affected by modern communications. Communications forms a very important part of the maritime industry and in this module we will be discussing the communications means available to the mariner. Some of it is old technology but most is new.

MARITIME MEANS OF COMMUNICATION

What is available to the mariner? Taking a very broad look at the subject we find the following methods which are used by seafarers

- a. Visual methods
 - i. Flags.
 - ii. Semaphore.
 - iii. Flashing light.
 - iv. Pyrotechnics.
- b. Audio methods
 - i. Amplified voice (loudhailer).
 - ii. Ship's siren.
 - iii. Underwater telephone.
- c. Electronic methods
 - i. Radio

Flags. The use of signal flags goes back a long way and was made famous by Nelson shortly before the battle of Trafalgar. Although not so extensively used today, flags as a limited means of communication has managed to survive. The merchant navy make use of a total of 40 individual flags, 26 alphabetical flags, 10 numeral pennants, 3 substitute pennants and what is termed an answering pennant. A flag is rectangular in shape, whilst a pennant is tapered. See the plate indicating the shape and colours of the flags/pennants. Each of the alphabetical flags has a single meaning but used together with other flags and/or pennants in hoists of two or more can have a multitude of meanings. Used with a publication called the *International Code of Signals (INTERCO)*, it affords ships of varying nationalities the ability to converse in a common "language". How are flags used?



Flag signalling

The flags are hoisted on halyards, special lines running through sheaves on a vessel's masts or yards. There are basically three positions where flags may be hoisted, ie at the gaff at the rear of the main mast, and at the port and starboard yardarms. Although it is very unlikely that multiple flag hoists will ever again be used, it may be of interest to note the order in which the flag hoists are read. The sequence is

- a. the hoist on the gaff;
- b. the outboard hoist on the starboard yardarm;
- c. the inner hoist on the starboard yardarm;
- d. the outer hoist on the port yardarm; and finally
- e. the inner hoist on the port yardarm.

The alphabetic flags are either used singly (each has a specific single meaning) or they can be used in groups (code) with various meanings, or they can be used to spell out words (plain language). The substitutes are used to copy a particular flag in a hoist when you don't have sufficient flags. As an example, say you want to make up the following hoist: M, B, M, B, but you only have one set of flags. You would hoist the flag M, followed by flag B, followed by the first substitute, followed by the second substitute.

M
 B
 1st sub (means copy the first flag in the hoist)

2nd sub (means copy the second flag in the hoist)

The answering pennant is used as follows

You are communicating with another vessel and have hoisted the following signal from the International code of signals: C, M, T. On seeing the hoist, the other ship will hoist the answering pennant "at the dip" (two thirds of the way up the halyard). By doing this the other ship is saying "I see your hoist". Once the officer of the watch has decoded the hoist, he will hoist the answering pennant "close up" (all the way to the top of the halyard). This indicates that he understands the meaning of the hoist. When he has the reply, he will take down the answering pennant and hoist his response to the signal.

For the single meanings of the alphabetic flags see the table of meanings.

Advantages of using flags. The advantages of using flags as a means of communication are

- a. It is silent. Unless you are within range, you will not be able to make out any message.
- b. It does not require a power source to operate.
- c. It does not require a skill to operate.

Disadvantages of flags. The shortcomings of using flags is the following

- a. The range that flags can be read is extremely limited.
- b. It is very slow.
- c. The amount of traffic that can be sent is very limited.
- d. It cannot be seen at night or in restricted visibility.

Semaphore. Semaphore is a means of signalling employing two hand held flags held in various positions relative to the communicator's body. The flags used are the same, ie flag OSCAR (flag diagonally split by the colours red and yellow). This form of communicating is virtually obsolete today but it may still be employed in various parts of the world.



Semaphore

Flashing light. Flashing light was used quite extensively for ship to ship communications not too long ago and it remains a very good standby especially in a wartime situation when you do not wish the enemy to intercept your radio communications. In order to use flashing light as a means of communication a special code had to be developed and used internationally. This code is known as the **Morse code**. By altering the duration of the flashes to short and long flashes and combining them in various groups it was possible to use the light for passing messages. The code and its designations are contained in the Morse Code/Phonetic Alphabet table. To assist the communicator in cutting down the amount of time spent in using the light, certain abbreviations were developed. These are also included in the Signalling by Flashing Light table. Basically they are used in a similar fashion to flags, ie they can be used to spell out a message in plain language or they can use a combination of letters and numerals in a special code. Basically the procedure would be as follows

Ship A calls ship B using their international call signs (a combination of letters and/or figures used to identify a particular ship or shore authority) or the ships' names. The answering ship would acknowledge the call. The sending ship would then spell out the message letter by letter until a word has been completed. The sender would then wait until the other ship acknowledges that it has received the word correctly. It does this by sending one long flash after each word is sent. If he didn't get the complete word, he does not send the long flash. The sending ship will resend the particular word until it gets a long flash in return. If the sender, on completion of his message, wants a reply, he/she sends the morse equivalent of the letter "K". If it does not want a reply it sends the morse equivalent of the letters "AR" transmitted as a single entity.

The lamps/projectors used for flashing light varies from small hand-held projectors to large, mounted projectors. In this form the signalling is directional, ie the projector is aimed like a torch at the vessel with which they wish to communicate. If it is desired to talk to more than one vessel, use can be made of the masthead-mounted Omni-directional signal light. It would then be visible 360° and any vessel within range will be able to read the light. Persons using this form of communication will need to master the skill necessary to read and transmit the light flashes. This takes much time and practice.



20 inch signalling projector



Portable Aldis signalling projector

Advantages of using flashing light. The advantages of using flashing light are

- a. Like flags it is silent.
- b. It can be read during the day and at night.
- c. Compared to flags it is fairly fast.
- d. Again compared to flags it can handle a larger volume of traffic.

Disadvantages of the downside of flashing light are the following

- a. Its range is limited to line of sight.
- b. It cannot be seen in restricted visibility (fog).
- c. It is not private unless the traffic is encrypted. Anyone within the range of the light can read the messages.
- d. It requires the user to possess certain skills to operate the light and read it.

Pyrotechnics. By pyrotechnics is meant the use of flares of different colours as a means of conveying certain meanings. For example, if a vessel fires a red flare it means internationally that it is in trouble and requires assistance. The use of various coloured flares is mainly used by the military. Its use is very limited and therefore will not be discussed any further.

Amplified voice. Each vessel is equipped with a fixed and usually, a portable loud hailer. Again the vessels have to be very close to each other for inter-ship use. Again because of the limited use it will not be discussed any further.

Ship's siren. The ship's siren is used almost exclusively for rule of the road purposes. In other words, it is used to convey to all vessels in the vicinity, the manoeuvres the vessel intends carrying out. In thick fog or restricted visibility the siren is also used to identify a particular type of vessel and its presence.

Underwater telephone. This method uses underwater sound to communicate with submerged vessels, ie submarines or other submersibles. Again it is used mainly by the military and scientific research vessels. The communication can be either in voice mode or data, ie computer to computer. It has a limited use and is very susceptible to water conditions, ie layers of water could have different temperatures or densities. This would tend to block or reflect sound waves and anything lying beneath the upper layer would not be able to intercept the message. This means is not used by merchant vessels.

Radio communications. This is the most commonly used means of communication today. It is the easiest to use and the most versatile. It requires no particular skill and it has tremendous range. In addition, it supports a multitude of types of communication, ie telephony (voice), telegraphy (morse), facsimile (reproduction of original documents or graphics at the recipient), video (television), and data (computer to computer). It is not susceptible to some of the shortcomings the other methods have, ie day/night, weather, restricted visibility, etc). Because of the speed at which the system works (300 000 kilometres per second) it can handle large volumes of traffic. The down side is that there is no privacy and anyone with a receiver is able to listen in on conversations. To obtain privacy and to protect the content of messages, the transmissions have to be encrypted. Another downside is the fact that vessels can be located by interception and triangulation of transmissions by others such as pirates or the enemy during wartime.

To summarise, the advantages of using radio are

- a. Radio is capable of world wide ranges.
- b. It is a very rapid means of passing signals.
- c. Because of its speed radio can handle large volumes of traffic.
- d. It can transmit a variety of modes of communication ie Voice telephony, morse telegraphy, computer to computer data, facsimile, video.
- e. It is not dependent on the state of weather, visibility or time of day/night.
- f. Users of radio do not have to have any special skill to operate.

The disadvantages are

- a. Radios require electricity to operate.
- b. Obviously they are more expensive than the other means.
- c. They provide no privacy unless the circuit is protected by encryption.
- d. They are "noisy" electronically and during wartime and other special circumstances (piracy) it gives the enemy/opposition the ability to intercept signals and with direction finding gear to locate the transmitter.

Radio procedures. What is the procedure followed when sending a message by radio-telephony?

Firstly there are four components to each message:

- a. The call (identity of the station called) .
- b. The identity of the caller.
- c. The message (text).
- d. The ending.

When the calling ship establishes communication, it will carry out the following

The call, ie "STARLING" (ship's name) or" RTVF" (callsign)

The identity, ie "this is FIREDANCE" (ship's name) or "this is DEMF" (callsign)

"Over" (ending, asking the other ship to reply).

The called ship will reply as follows:

The call, "FIREDANCE" or "DEMF"

The identity, "this is STARLING" or "RTVF"

"Over" (ending, telling the other ship that it is standing by to receive its message)

The calling ship will answer in turn as follows

"This is FIREDANCE" (abbreviated call)

“Message” (the message is sent) Over. (ending, telling the other ship to acknowledge receipt or reply)

Let us say that the message does not require an answer other than an acknowledgement of receipt.

The receiving ship acknowledges as follows

“This is STARLING” (abbreviated call)

“Roger” (Yes or I acknowledge receipt)

“Out” (Ending, telling the other ship that it does not require a reply or further communication)

Sometimes on radio and TV dramas when the actors are speaking on a radio circuit one hears the expression “over and out”. This is obviously ignorance of proper voice procedure. Basically what the individual is saying is “answer, don’t answer”, which is ridiculous. It can only be “over” or “out”.



Fixed radio transceiver with hand held microphone



Portable hand-held radios

Vessel identities. Vessels identify one another either by their name or international callsign. The name is obviously given to the ship when it is launched. The callsign is allocated by the department issuing the vessel's radio licence/certificate, usually by the country in which the ship is registered. A callsign is a sequence of letters/figures issued by the Telecommunications authority of a country to vessels registered in that country. Personal names of individuals aboard the vessel are not used.

Commonly used words or phrases used when communicating Commonly used words or phrases on radio circuits are contained in the table marked ***Voice Communication Procedure***.

Phonetic alphabet. In order to aid clarity and avoid confusion when spelling over a radio circuit, an internationally accepted phonetic alphabet is used, ie the normal pronunciation of the letters b, c, d, and e, all sound very similar but using the phonetic alphabet they would be pronounced as Bravo, Charlie, Delta, Echo. As you can see they sound completely different. The table containing the ***morse symbols*** also gives the ***phonetic alphabet***.

Time. Time mentioned or used in a signal is always written in the 24 hour clock format, ie 2 o' clock in the morning is written as 0200, whilst 2 o' clock in the afternoon is written as 1400. Furthermore to avoid confusion with the varying time zones, the transmission time of all signal traffic is entered and recorded in GMT (Greenwich Mean Time).

PLATE OF SIGNALLING FLAGS

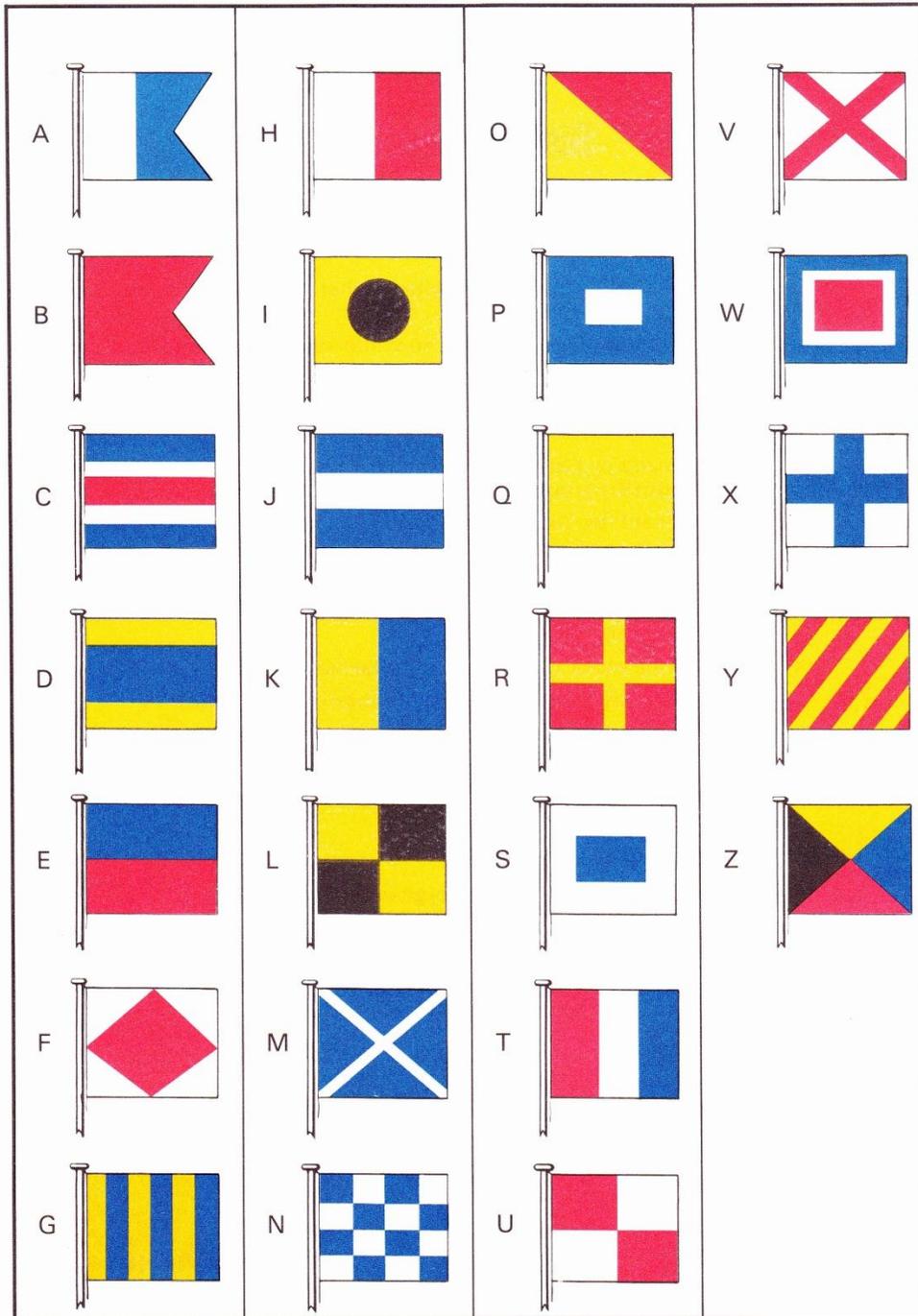
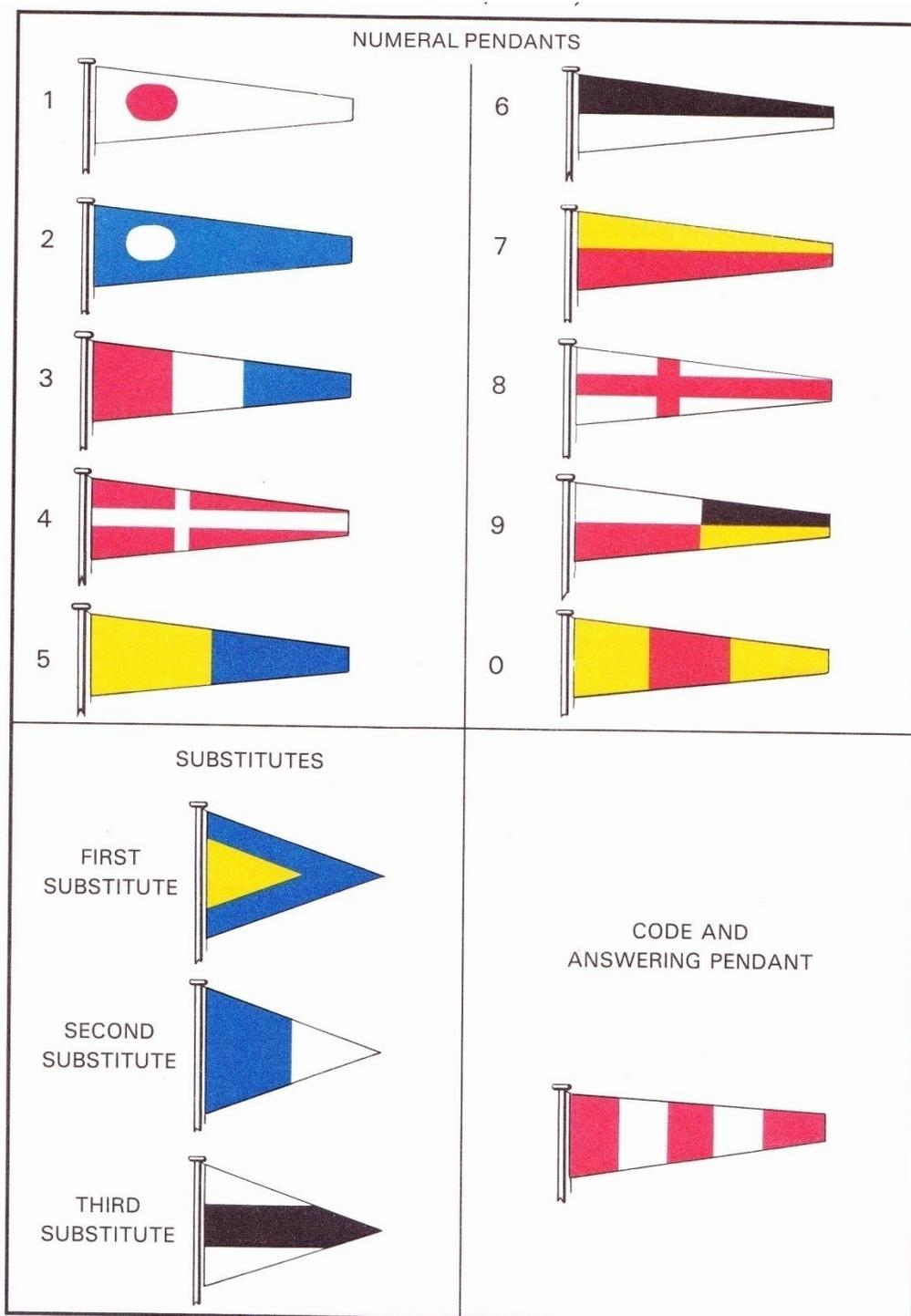


PLATE OF SIGNALLING PENNANTS



SINGLE MEANINGS OF FLAGS

FLAG MEANING

A	I have divers down. Keep well clear of me.
B	I am loading, discharging or carrying dangerous cargo or substances.
C	Yes or affirmative.
D	Keep clear of me, I am manoeuvring with difficulty.
E	I am altering my course to starboard.
F	I am disabled, communicate with me.
G	I require a pilot. <i>Fishing boats – I am hauling nets.</i>
H	I have a pilot onboard.
I	I am altering my course to port.
J	I am on fire and have dangerous cargo onboard, keep well clear of me.
K	I wish to communicate with you.
L	You should stop your vessel immediately.
M	My vessel is stopped and making no way through the water.
N	No or negative.
O	Man overboard.
P	The ship is about to sail, all personnel to report onboard. <i>Fishing vessels – My nets have come fast on an obstruction.</i>
Q	My vessel is healthy, request free pratique.
R	(with one or more numerals, it indicates distance in miles.
S	My engines are going astern.
T	<i>Fishing vessels – Keep clear of me, I am engaged in pair trawling.</i>
U	You are running into danger.
V	I require assistance.
W	I require medical assistance.
X	Stop carrying out your intentions and watch for my signals.
Y	I am dragging my anchor.
Z	I require a tug. <i>Fishing vessels – I am shooting nets.</i>

SIGNALLING BY FLASHING LIGHT

MEANING	SYMBOL	MORSE SYMBOL
General call or call for unknown ship	$\overline{AA} \overline{AA} \overline{AA}$	· - - - · - - - · - - -
Answering sign	$\overline{TTTTTTTT}$	- - - - -
Erase sign	$\overline{EEEEEEEE}$	· - - - -
Repeat sign	RPT	- - - - -
All before	AB	· - - - -
All after	AA	- - - - -
Word or group between	BN	- - - - -
Word or group after	WA	- - - - -
Word or group before	WB	- - - - -
Ending sign (out)	\overline{AR}	· - - - -
From	De	- - - - -
Yes	C	- - - - -
Message received	R	- - - - -
Word or group received	T	- - - - -
International code	YU	- - - - -
Full stop (period)	\overline{AAA}	- - - - -
Interrogative (?)	RQ	· - - - -
Wait	\overline{AS}	· - - - -
No	N	- - - - -
I wish to communicate with you (Over)	K	- - - - -
It is correct	OK	- - - - -
What is the name of your vessel	CS	- - - - -
Beginning/end of text	\overline{BT}	- - - - -

PHONETIC ALPHABET/MORSE CODE TABLE

LETTER	PHONETIC	MORSE SYMBOL
A	ALPHA	. - - -
B	BRAVO	. - - - - -
C	CHARLIE	. - - - - - -
D	DELTA	. - - - -
E	ECHO	. -
F	FOXTROT	. - - - - -
G	GOLF	. - - - -
H	HOTEL	. - - - -
I	INDIA	. - -
J	JULIET	. - - - - - - -
K	KILO	. - - - -
L	LIMA	. - - - - -
M	MIKE	. - - - -
N	NOVEMBER	. - - - -
O	OSCAR	. - - - - -
P	PAPA	. - - - - - -
Q	QUEBEC	. - - - - - - -
R	ROMEO	. - - - - -
S	SIERRA	. - - - -
T	TANGO	. - - -
U	UNIFORM	. - - - -
V	VICTOR	. - - - - -
W	WHISKEY	. - - - - - -
X	X RAY	. - - - - - - -
Y	YANKEE	. - - - - - - -
Z	ZULU	. - - - - - -
1	WUN	. - - - - - - - -
2	TOO	. - - - - - - -
3	THUREE	. - - - - - - - -
4	FLOWER	. - - - - - - -
5	FIVER	. - - - - - -
6	SIX	. - - - - - - -
7	SEVEN	. - - - - - - - -
8	ATE	. - - - - - - - -
9	NINER	. - - - - - - - - -
0	ZERO	. - - - - - - - - -

VOICE COMMUNICATION PROCEEDURE

WORD/PHRASE	MEANING
All after } All before } Word after } Word before }	These are words used when one vessel asks the other to repeat parts of a message or when one vessel is repeating parts of a message.
In figures } In numbers }	These are used when a vessel wants to inform the receiving ship that what follows are numbers.
Correct } Correction }	Used when correcting or indicating something is correct in a message.
Say again } Repeat }	Used to ask for or give a repeat of a message.
Read back }	Used when a vessel asks another vessel to read back his message to ensure that he has received it correctly.
I spell }	Used when a vessel wants to spell out a word in a message.
Over }	When the calling ship wants the other vessel to reply to his call.
Out }	When one vessel is finished passing his message and he does not want the other vessel to answer.
Wait }	When the receiving vessel requires some time to answer a query posed by Another vessel.
Stand by }	When one vessel tells the other to wait further communication.
Roger }	Means "yes" or "affirmative".
Radio check }	When one vessel wants to know whether his or the other vessel's radio is working properly, he will ask for a radio check.
Text }	Means plain language.
Traffic }	On a radio circuit this means messages.
Working frequency }	This is the frequency that is used to pass traffic between vessels.
Calling frequency }	This is the frequency used to establish communications with another vessel

SEMAPHORE TABLE

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