

# Sea Training Handbook Part 2



COXSWAIN'S  
BADGE



Cumann Gasoga na hÉireann

**SCOUT**  
ASSOCIATION OF IRELAND



## SEA TRAINING HANDBOOK PART 2

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This book is designed to provide the necessary background information for you to obtain the Coxwain's Badge, and is arranged in the same way as the Part 1 Handbook - each "chapter" covering one section of the badge.

Many thanks to Frances Killen and Dermot Keogh for typing and to Martin Kennedy for help and advice in the printing.

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### INTRODUCTION

You have already achieved a certain standard of boatwork in Coxwain's Mate Training, and now you are working for a higher standard, and gaining expertise in managing different types of craft and their crews. The Coxwain's Badge is an all-round qualification - the syllabus includes some basic navigation and chart reading, a knowledge of the buoyage system and of the rules to prevent collision at sea, rules for safety and survival, expedition planning, boat repair and maintenance, etc. Also included is a "project", which may be undertaken in a number of different categories - the choice is wide. The practical boatwork is to the standard of the **Intermediate Charge Certificate in Sail or Power**. The climax of these activities is a water-borne expedition.

**Note that this badge is also available to Venture Scouts.**

### Proficiency Badges

There are many Proficiency Badges in sea subjects - two of these have been mentioned in Part 1 of the Handbook - **Swimmer** and **Canoeist**. The other badges include - **Sail Helmsman, Power Helmsman, Boatswain, Marine Mechanic, Sea Navigator, Pilot, Meteorologist** and **Signaller**. Sea Scouts are particularly encouraged to think about working for some of these badges during their Coxwain's training. Requirements for them and for all the other Proficiency Badges will be found in the **Proficiency Badge Book**.



**POWER  
HELMSMAN**



**PILOT**



**BOATSWAIN**



**SAIL  
HELMSMAN**



**NAVIGATOR**



**MARINE  
MECHANIC**



**METEOROLOGIST**



**SIGNALLER**

You must not forget your ordinary Scouting - you will be working for the Explorer Scout Badge at the same time as working for the Coxwain's. This is why the Explorer Badge is mentioned in the next section of the book, giving you some ideas on how to amalgamate various activities when following both training schemes simultaneously.

## THE EXPLORER BADGE



It is not necessary to be an Explorer Scout in order to gain the Coxwain's Badge, but it usually turns out that way. It seems a bit difficult for Sea Scouts to have two separate Training Schemes to work on simultaneously. However, while working for Explorer and Coxwain's Badges you can get credit for certain activities in both schemes together if you plan carefully. We will look through the Explorer Scout requirements and see where credit can be obtained for some Sea Training activities which you have already done or will be attempting for the Coxwain's Badge.

Consider the first section of the Explorer Badge - **Water and Physical Activities**. The various requirements are numbered in your "**Scout Passport to Adventure**". Items 49, 50 and 51 have all been covered in the Boatman and Coxwain's Mate Badges. Item 52 requires you to complete two out of a choice of three activities - the third choice is itself a choice: either row a boat for one kilometer or paddle a canoe for one kilometer. A Sea Scout may use **both** these activities to count for the whole section.

The **Skills and Crafts** Section has four subsections, each with a number of choices. You are expected to complete one challenge in each subsection - any of the projects given in **Part 8** of the **Coxwain's Badge** will also count as a challenge in the **Skills and Crafts** section of Explorer. For example -

Explorer	Coxwain Project
Item 55 - Hobbies and Crafts -	Projects on Sea Fisheries, Inland Waterways, Lifeboats, etc.
Item 56 - Technology -	Outboard Engines
Item 58 - Communications -	Signalling VHF Radio Certificate

The **Exploring** Section (Item 59) of the Explorer Badge requires you to undertake several expeditions during which some small projects must be undertaken. Some or all of these expeditions may be waterborne, provided that **all the boating rules** are observed. The **Navigator** and **Pilot Badges** also require certain waterborne expeditions and explorations, and these could be used for this section of the Explorer Badge also. The final requirement for the Pilot Badge is the compiling of a "**Sailing Directions**". If this is of sufficiently high standard it could also be considered for the Coxwain's project (Part 8).

The main **Expedition** for Explorer Scout - **Item 60** - may be by foot, bicycle or canoe. With the agreement of your Skipper, and appropriate safety measures (including the attendance of someone possessing a Charge Certificate) a rowing or sailing expedition may be allowed. A properly planned and executed waterborne journey could possibly count both for the Explorer and Coxwain's Badges, if both sets of requirements were fulfilled, and a **logbook of high standard** was submitted.



## COXSWAIN'S BADGE

### 1. Possess the Coxswain's Mate Badge

#### COXSWAIN'S MATE BADGE

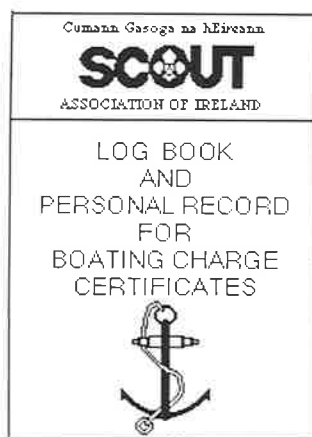


The Sea Training Scheme is progressive. The work which you have done for the Coxswain's Mate grade leads on naturally to the Coxswain grade.

During your Coxswain's Mate Training you developed a reasonable expertise in basic general seamanship and boatmanship. You reached a level of ability to take charge of a boat under oars and learned some useful theory. You will now progress to more advanced theory, further practical experience and greater responsibility. When you have gained enough experience you should try to get an **Intermediate Charge Certificate in oars. A Charge Certificate requires -**

1. **Technical ability** to steer and take charge of a boat.
2. **Experience** to maintain boat discipline and to deal with emergencies.
3. **Local knowledge.**
4. **Sound common sense.**

Not everyone who gains the Coxswain's Mate Badge will get a Charge Certificate. The detailed requirements will be found in the "**Yellow Book**". The standard for the practical assessment for a Charge Certificate is higher than that required for the Coxswain's Mate Badge, but you will find that much of the theory coincides in both schemes.



### 2. Read a chart and plot a position.

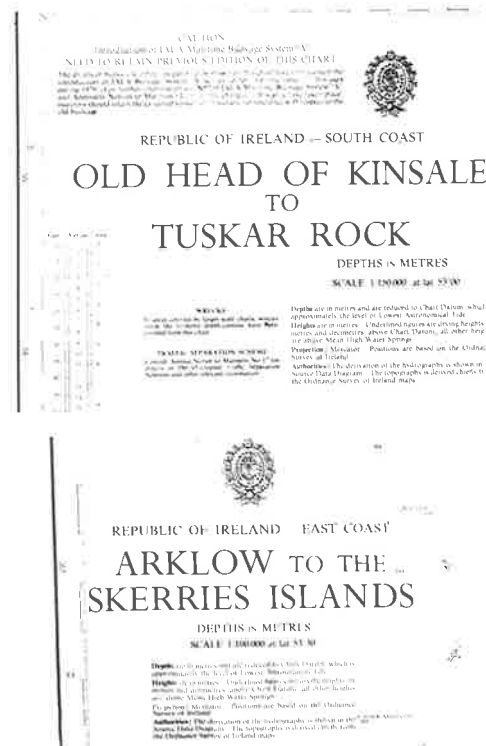
A knowledge of chartwork is essential for making Coastal expeditions. You will be expected to "read" charts - i.e. to understand the information that is symbolised, summarised and tabulated on the face of the chart. Some of the main symbols are shown here, but a complete list is given on **Chart 5011**, which is available as a booklet. The first thing to note about a chart is whether the depths are given in **feet, fathoms or metres**. All modern charts now use metres but many of the old **fathom or foot charts** are still available. The characteristics of the new metric charts are as follows -

1. **Labelling** - "**Depths in Metres**" will be printed underneath the chart title. It is also printed in magenta coloured letters at the top and bottom of the chart.

2. **Colour** - **yellow** for **land** which is always above high water **spring tides (HWS)**, **green** for "**drying**" areas (between high water springs and chart **datum**), **blue** for shallow water.

Like Ordnance Survey Maps, which you have already learned to read, charts come in various "**scales**". A large scale chart covers a comparatively small area, but will show a lot of detail. Large scale charts are therefore used for harbours, anchorages and dangerous areas. Smaller scale charts are used for passage making.

Charts show prominent shore features which are visible from seaward and therefore can be used for taking bearings. Lighthouses, navigation buoys and their lights, dangerous rocks, etc., are all marked. In an Ordnance Survey map the height of the land is important, but in a chart it is the depth of the water which is most important. All over the sea areas of the chart you will find small figures indicating the depth of water.



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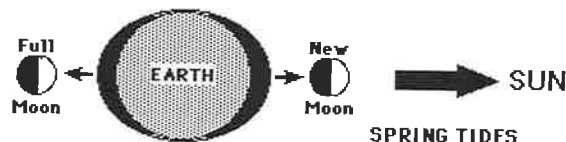


## Tides

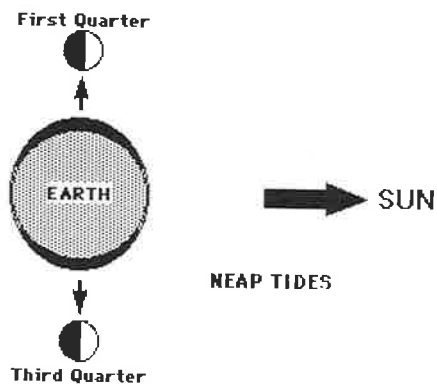
The moon's gravitational pull on the water of the Earth's surface causes high water on the side nearest to the moon, and also on the opposite side from the moon.



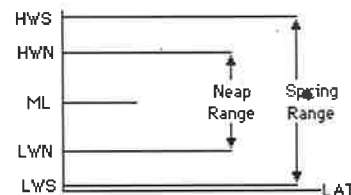
At **full moon** and **new moon**, the pull of the Sun augments that of the moon, causing very high waters - "**Spring Tides**".



When the moon is in its **first** or **third quarter**, its pull is at right angles to that of the sun, and the effect is lessened - high waters are not so high and low waters are not so low - these are called "**Neap Tides**".



Spring Tides therefore occur at **fortnightly** intervals, just after the time of the full and new moon. Neap Tides occur between the Spring Tides.



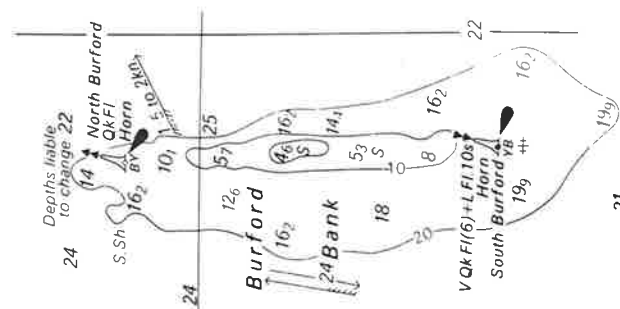
HWS - High Water Springs  
HWN - High Water Neaps  
ML - Mean Tide Level  
LWN - Low Water Neaps  
LWS - Low Water Springs  
LAT - Lowest Astronomical Tide

## Depths

The charted depth of water is usually the least depth, based on the lowest level that the tide can be predicted to reach by calculating the gravitational pull of the moon, and to a lesser extent the Sun. The lowest tide that can be calculated is called the "**Lowest Astronomical Tide**" (LAT). This level may be altered by unpredictable events such as wind strength and direction. Most of the time the actual depth of the water will be greater than that marked on the chart.

The difference between the **charted depth** and the **actual depth** is the "**Height of the Tide**" at that time. Areas of sand, mud or rocks which are covered by high tide, but exposed at low tide are coloured green in metric charts, and the height above the Lowest Astronomical Tide is indicated by a figure with a line underneath. This is known as the "**Drying Height**". All heights or depths are related to the Lowest Astronomical Tide except the heights of lighthouses and clearances under bridges which are related to the height of High Water Springs.

The "**Range of the Tide**" is the difference between the height of High Water and the height of the preceding or following Low Water.



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## Tide Tables

By reference to the position of the sun and moon, and sometimes other heavenly bodies, astronomers can calculate accurately the height of high and low water on any day in advance. These predictions are published as **"Tide Tables"**. The lowest possible low water that can be predicted has already been described, and is the **zero** height in the tables. Tide Tables may be found in various Nautical Almanacs, or the Admiralty Tide Tables. The bigger ports produce their own Tide Tables and abbreviated versions are also found in many diaries. Times are usually given in GMT, and when using a Tide Table, you must make sure to make allowance for Summer Time if necessary.

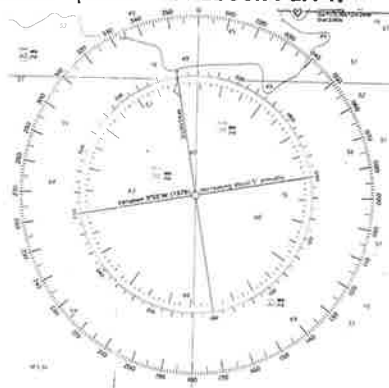
Lat. 53°16'N. Long. 9°03'W. **GALWAY 589**  
GMT ADD 1 HOUR MARCH 29—OCTOBER 25 FOR B.S.T. HIGH & LOW WATER 1987

JANUARY			FEBRUARY			MARCH			APRIL		
Time	in	Time	Time	in	Time	Time	in	Time	Time	in	Time
1 0620	5.5	16 0556	4.8	1 0031	0.6	16 0021	0.8	1 0550	5.4	16 0542	4.9
1 1140	0.5	1207	1.1	1 0652	0.5	16 0641	4.9	1 1156	0.0	16 1144	0.0
1 1803	5.2	F 1821	4.6	1 1259	0.3	W 1246	0.6	1 1817	5.2	M 1803	5.0
2 0618	5.5	17 0010	1.3	1 1921	5.0	1904	4.8	2 0608	0.3	17 0612	5.0
2 1228	0.5	Sa 1241	1.0	2 0113	0.7	17 0113	4.9	2 0651	5.4	17 1214	0.4
2 1852	5.1	1656	4.6	2 0801	0.7	M 1232	0.1	2 1232	0.1	Tu 1834	4.9
3 0640	1.0	18 0643	1.2	2 0857	0.7	17 0857	4.8	2 1903	5.1	1903	5.0
3 1257	5.4	Su 1312	4.8	2 1155	0.9	18 0126	0.8	2 0957	0.7	17 0957	4.8
3 1941	5.0	1901	4.8	2 1819	5.0	18 0819	4.8	2 1231	1.0	18 1231	4.7
4 0134	1.1	19 0117	1.3	2 2046	4.6	2011	4.6	2 1335	1.0	18 1335	4.7
4 0758	5.2	19 0737	4.7	3 0155	0.9	18 0126	0.8	2 1801	1.2	18 1801	4.9
4 1406	0.6	M 1347	1.1	3 0819	5.0	18 0819	4.8	2 2001	1.2	18 2001	4.9
4 2032	4.6	2006	4.5	3 1422	0.8	W 1349	0.6	2 2135	1.3	18 2135	4.9
5 0223	1.3	20 0152	1.3	3 2046	4.6	2011	4.6	2 2135	1.3	18 2135	4.9
5 0847	5.0	20 0813	4.6	3 2720	4.2	2011	4.6	2 2135	1.3	18 2135	4.9
5 1459	1.1	Tu 1423	1.2	3 3377	1.8	20 0242	1.2	2 2135	1.3	18 2135	4.9
5 2122	4.5	2044	4.4	3 4023	1.8	20 0842	4.4	2 2135	1.3	18 2135	4.9
6 0216	1.6	21 0222	1.4	3 4651	4.7	20 1452	1.2	2 2135	1.3	18 2135	4.9
6 0835	4.7	21 0813	4.5	3 5285	4.4	20 2050	4.3	2 2135	1.3	18 2135	4.9
6 1454	1.4	W 1503	1.3	3 5914	4.1	20 2650	4.3	2 2135	1.3	18 2135	4.9
6 2116	4.2	2125	4.1	4 0541	3.9	21 0248	1.0	2 2135	1.3	18 2135	4.9
7 0413	1.8	22 0416	1.6	4 1168	3.6	21 0842	1.4	2 2135	1.3	18 2135	4.9
7 1035	4.3	22 0816	4.1	4 1794	3.3	21 1442	1.4	2 2135	1.3	18 2135	4.9
7 1647	1.7	Th 1649	1.5	4 2421	3.0	21 2038	1.4	2 2135	1.3	18 2135	4.9
7 2218	4.1	2219	4.0	4 3048	2.7	21 2638	1.4	2 2135	1.3	18 2135	4.9
8 0520	2.0	23 0408	1.8	4 3674	2.4	21 3234	1.5	2 2135	1.3	18 2135	4.9
8 1142	4.1	23 0806	4.0	4 4301	2.1	21 3830	1.5	2 2135	1.3	18 2135	4.9
8 1751	1.9	F 1647	1.7	4 4928	1.8	21 4426	1.5	2 2135	1.3	18 2135	4.9
		Su 2313	4.0	4 5555	1.5	21 5022	1.5	2 2135	1.3	18 2135	4.9
				5 0182	1.2	21 5618	1.5	2 2135	1.3	18 2135	4.9
				5 0809	0.9	22 0214	1.2	2 2135	1.3	18 2135	4.9
				5 1436	0.6	22 0810	0.9	2 2135	1.3	18 2135	4.9
				5 2063	0.3	22 1406	0.6	2 2135	1.3	18 2135	4.9
				5 2690	0.0	22 2002	0.3	2 2135	1.3	18 2135	4.9
				5 3317	0.7	22 2598	0.0	2 2135	1.3	18 2135	4.9
				5 3944	1.4	22 3194	0.7	2 2135	1.3	18 2135	4.9
				5 4571	2.1	22 3790	1.4	2 2135	1.3	18 2135	4.9
				5 5198	2.8	22 4386	2.1	2 2135	1.3	18 2135	4.9
				5 5825	3.5	22 4982	2.8	2 2135	1.3	18 2135	4.9
				6 0452	4.2	22 5578	3.5	2 2135	1.3	18 2135	4.9
				6 1079	4.9	23 0174	4.2	2 2135	1.3	18 2135	4.9
				6 1706	5.6	23 0770	4.9	2 2135	1.3	18 2135	4.9
				6 2333	6.3	23 1366	5.6	2 2135	1.3	18 2135	4.9
				6 2960	7.0	23 1962	6.3	2 2135	1.3	18 2135	4.9
				6 3587	7.7	23 2558	7.0	2 2135	1.3	18 2135	4.9
				6 4214	8.4	23 3154	7.7	2 2135	1.3	18 2135	4.9
				6 4841	9.1	23 3750	8.4	2 2135	1.3	18 2135	4.9
				6 5468	9.8	23 4346	9.1	2 2135	1.3	18 2135	4.9
				7 0095	10.5	23 4942	9.8	2 2135	1.3	18 2135	4.9
				7 0722	11.2	23 5538	10.5	2 2135	1.3	18 2135	4.9
				7 1349	11.9	24 0134	11.2	2 2135	1.3	18 2135	4.9
				7 1976	12.6	24 0730	11.9	2 2135	1.3	18 2135	4.9
				7 2603	13.3	24 1326	12.6	2 2135	1.3	18 2135	4.9
				7 3230	14.0	24 1922	13.3	2 2135	1.3	18 2135	4.9
				7 3857	14.7	24 2518	14.0	2 2135	1.3	18 2135	4.9
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				8 2246	19.6	25 0690	18.9	2 2135	1.3	18 2135	4.9
				8 2873	20.3	25 1286	19.6	2 2135	1.3	18 2135	4.9
				8 3500	21.0	25 1882	20.3	2 2135	1.3	18 2135	4.9
				8 4127	21.7	25 2478	21.0	2 2135	1.3	18 2135	4.9
				8 4754	22.4	25 3074	21.7	2 2135	1.3	18 2135	4.9
				8 5381	23.1	25 3670	22.4	2 2135	1.3	18 2135	4.9
				9 0008	23.8	25 4266	23.1	2 2135	1.3	18 2135	4.9
				9 0635	24.5	25 4862	23.8	2 2135	1.3	18 2135	4.9
				9 1262	25.2	25 5458	24.5	2 2135	1.3	18 2135	4.9
				9 1889	25.9	26 0054	25.2	2 2135	1.3	18 2135	4.9
				9 2516	26.6	26 0650	25.9	2 2135	1.3	18 2135	4.9
				9 3143	27.3	26 1246	26.6	2 2135	1.3	18 2135	4.9
				9 3770	28.0	26 1842	27.3	2 2135	1.3	18 2135	4.9
				9 4397	28.7	26 2438	28.0	2 2135	1.3	18 2135	4.9
				9 5024	29.4	26 3034	28.7	2 2135	1.3	18 2135	4.9
				9 5651	30.1	26 3630	29.4	2 2135	1.3	18 2135	4.9
				10 0278	30.8	26 4226	30.1	2 2135	1.3	18 2135	4.9
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				10 2786	33.6	27 0610	32.9	2 2135	1.3	18 2135	4.9
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				11 5564	43.4	28 2954	42.7	2 2135	1.3	18 2135	4.9
				12 0191	44.1	28 3550	43.4	2 2135	1.3	18 2135	4.9
				12 0818	44.8	28 4146	44.1	2 2135	1.3	18 2135	4.9
				12 1445	45.5	28 4742	44.8	2 2135	1.3	18 2135	4.

## Compass Rose

At this stage you should re-read the section on the Compass in **Handbook Part 1**.

The "Compass Rose" is printed in various parts of the chart. It usually consists of inner and outer circles marked in degrees. The zero of the outer circle points to the True North and the zero of the inner circle points to the Magnetic North. The **Magnetic Variation** is the difference between the True and Magnetic, and is expressed in degrees East or West of True North. Magnetic Variation changes a little each year - the figure for the year that the chart is printed will be found inside the Compass Rose, with a note of its annual increase or decrease.



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## Bearings

A bearing is the direction of one position from another. Bearings are usually given in degrees for accuracy - three figure method. Sometimes compass points are used if general directions only are given, such as describing the direction of the wind (e.g. South veering South West), or a general course (e.g. vessel heading ESE), or to give approximate positions (e.g. 10 miles East of the Kish). **Note** - Wind direction is the direction that the wind is **coming from**, but tidal stream direction means the direction that it is **going to**.

A hand-bearing compass is a small compass with some form of sighting device or attachment - the best ones have a prismatic sight. When using any compass, make sure that no iron or steel objects are nearby, causing **deviation**.



## Plotting a Position

A position may be plotted on a chart by using "**position lines**". The most accurate type of position line is a "**Transit**" - this means that two prominent objects are in line with each other. If you are at a point where two transits cross each other, this is a very accurate "**fix**". However, plotting a position is usually done by finding the compass bearings of two or preferably three prominent objects on land, which are accurately marked on the chart. Draw in these bearings on the chart with the help of a parallel ruler or other plotting instrument, **always using a soft pencil**. Take the directions from the inner (Magnetic) circle of the compass rose, or convert the Magnetic figures to True, and using the outer circle. Your position is where these lines meet. Because it is difficult to get accurate compass bearings in a small boat, you will usually find that the three lines do not meet at a single point, but form a triangle. This is called a "**cocked hat**". You should assume that your position is in the centre of this triangle. If the "cocked hat" is very large, the level of accuracy is obviously poor - the bearings should be taken again and the position replotted. A common error in plotting a position is to use the outer (True) circle of the compass rose for directions, without converting the compass bearings into True bearings.

If you are particularly interested in navigation or chartwork, you should consider doing more work for the Sea Navigator Badge.





**3. Have a good knowledge of the buoyage system, local day marks, navigation lights, sound signals, and the standard danger signals, fog and distress signals.**

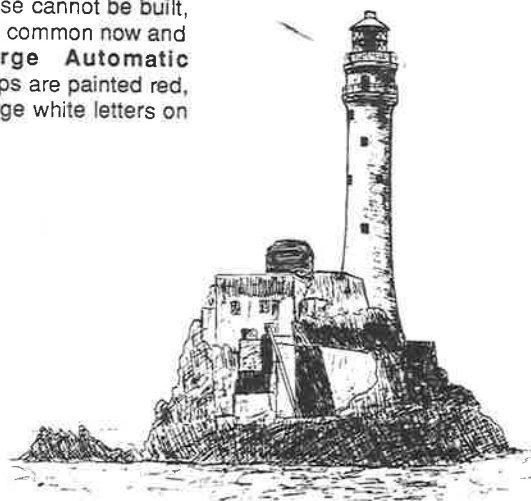
**NAVIGATION MARKS**

The navigation marks around the Irish Coast are maintained by the Commissioners of Irish Lights except in harbour or port areas which are marked by the local port authority. These aids to navigation include lighthouses, lightships, buoys and various shore beacons and marks. Most of these marks are lit for night use. Those which carry no lights are usually referred to as "day marks".

**Buoys** are floating structures which by their shape, colour and light characteristics indicate the presence of dangers or the direction of safe water. **Perches** are posts, usually on rocks in shallow water, or on the shore which also give this information by their colour and the shape of the top mark.

**Leading Lights or Leading Marks** - these are certain marks which are set up to guide vessels into a channel or harbour or between hazards. By keeping the marks in line with each other - i.e. "in transit" - the vessel is lead in through the safe channel, over the deepest part of the bar or between hazards.

**Lighthouses** are built on headlands, offshore islands or rocks or sandbanks. Where a lighthouse cannot be built, **lightships** may be used. These are not common now and some have been replaced by **Large Automatic Navigation Buoys (LANBY)**. Lightships are painted red, and have the name of the station in large white letters on the side



**Visibility Range** is the maximum distance at which a light can be seen in conditions of clear visibility, if the observer is high enough above water level to be able to see it - i.e. provided that the light is not below the horizon. This figure is given on the chart in Sea Miles (M) beside the symbol for the light. The visibility range therefore depends on the **brightness** of the light.

**Rising or Dipping Distance** of a light is the distance at which it rises above or dips below the horizon. This depends on the **height of the light** and the **height of the observer's eye**. This can be worked out by trigonometry, but a much easier way to find this out is to look up the special tables in one of the Nautical Almanacs.

**LIGHT CHARACTERISTICS**

All navigation marks have special characteristics in order to help in identification. Lights which are near each other are usually given different characteristics so that they can be distinguished from each other - these characteristics are noted on charts in a standard abbreviated form.

**Colour** - unless otherwise stated, lights are white (W).  
Other colours used are red (R) and green (G).

**Type** - "Fixed" (F) means a continuous steady light.  
"Flashing" (Fl.) means that the light shines for only a very short period compared with the length of darkness.  
"Occulting" (Oc.) means that the light shines longer than it is dark.  
"Isophase" (Iso.) means alternating **equal periods** of light and darkness.

**Rhythm** - Lights flash or occult in various patterns. There may be a single flash or groups of 2, 3, 4, etc. in a given time, expressed in seconds. The number of times that a light flashes or occults is noted in brackets after the abbreviation for the type. This is followed by the length of the cycle -  
e.g. - **Fl. 10 sec.** - one flash every 10 seconds,  
**Fl.(3) 15 sec.** - groups of three flashes every 15 seconds.  
**Oc.(2) 10 sec.** - occulting twice every 10 seconds.

**Quick Flash (Q)** means flashing at a rate of about 60 per minute.  
**Very Quick Flash (VQ)** means a rate of about 120 per minute.  
**Long Flash (LFI.)** means a duration of about 2 seconds.

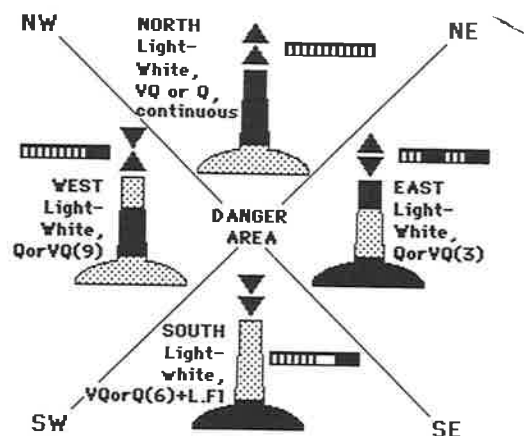
**Sector Lights** - Some lights have different coloured sectors, e.g. showing white over a safe channel but red over a dangerous rock. These sectors are marked on the chart. In Pilot Books the segments of the light are given as **bearings from seaward**, and **NOT** from the light itself.

## BUOYAGE SYSTEM

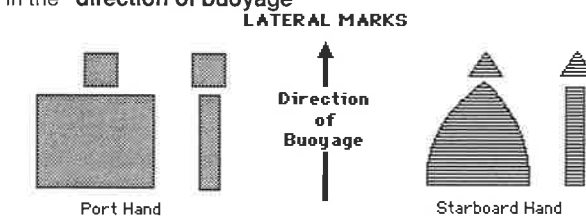
The **International Association of Lighthouse Authorities (IALA)** introduced a new system of buoyage a few years ago. This consists of Cardinal marks, Lateral marks, Safe Water marks, Isolated Danger marks and Special marks.

**Cardinal Buoys** are placed at the appropriate direction from the danger or "Point of Interest" (e.g. wreck, sand bank, rock, etc.) - North, South, East or West. The Cardinal Buoys are all coloured yellow and black and all have a "top mark" consisting of two black triangular shapes. Their lights are always white. The buoys are distinguished as follows -

- North Cardinal** - Top marks - both points upwards.  
Colours - black over yellow.  
Lights - white, quick or very quick flash (continuous).
- East Cardinal** - Top marks - base to base.  
Colours - black on top and bottom, yellow middle.  
Lights - white, group of three.
- South Cardinal** - Top marks - both points downwards.  
Colours - black below, yellow above.  
Lights - white, group of six flashes, followed by one long flash.
- West Cardinal** - Top mark - point to point.  
Colours - black middle, yellow top and bottom.  
Lights - white, group of nine.



**Lateral Buoys** are used to mark channels, and indicate port or starboard hand when proceeding in the "direction of buoyage"



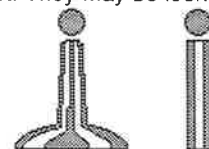
Port Hand -

Shape - can  
Topmark (if present) - can  
Colour - red  
Light - red, any rhythm.

Starboard Hand -

Shape - cone  
Topmark (if present) - cone  
Colour - green  
Light - green, any rhythm.

**SAFE WATER MARKS** - These marks are used to indicate the centre of a channel, or the entrance to a wide-mouthed channel, or as "land-fall" buoys some way off a coast. They may be looked on as a form of sign-post and do not mark any hazards.



SAFE WATER MARKS

Shape - Any, but usually pillar  
Colour - Red / White vertical stripes  
Topmark - Spherical, red  
Light - White, and may be either isophase, occulting or one long flash every ten seconds.

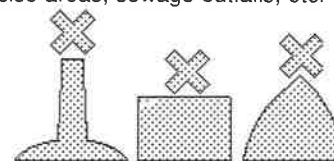
**ISOLATED DANGER MARKS** - These are used to mark isolated dangers, which have deep water all around.

Shape - Usually pillar  
Colour - Black / Red horizontally  
Topmark - Two, spherical, black  
Light - White, groups of two flashes.



ISOLATED DANGER MARKS

**SPECIAL MARKS** - These indicate special areas or features - recreational or military exercise areas, sewage outfalls, etc. They do not mark navigational hazards.



SPECIAL MARKS

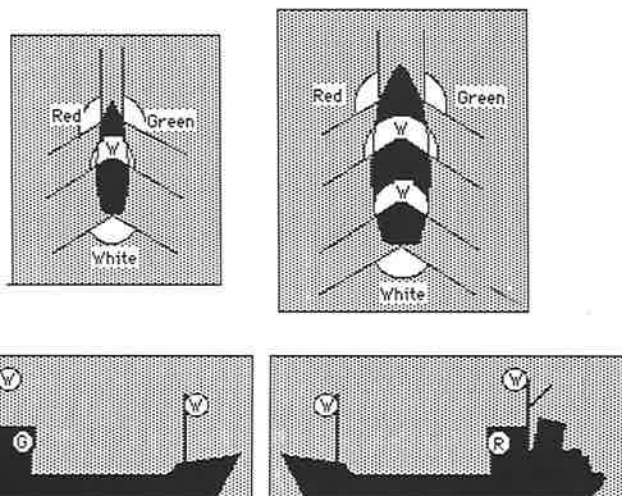
Shape - Optional, not conflicting with navigational marks nearby  
Colour - Yellow  
Topmark - Single X, yellow  
Light - Yellow, rhythm not conflicting with white navigational lights.

## Navigation Lights

This is a summary of "Part C - Lights and Shapes" of the **International Regulations for Preventing Collision at Sea**. A summary of "Part B - Steering and Sailing Rules" is given in the Handbook Part 1. Only the main rules are given here, and this is all that will be required for the Coxswain Badge.

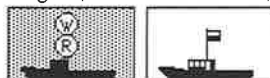
### Power vessel under way -

1. Mast lights - **white** light on the foremast visible from dead ahead to 22.5° (two points) abaft the beam, and a similar light on the mainmast (unnecessary on vessels under 50 m long). The forward light should be 5 m lower than the after light.
2. Side lights - on starboard a **green** light and on port a **red** light, each visible from dead ahead to 22.5° abaft the beam on its own side.
3. Stern light - **white** light visible from dead astern to 22.5° abaft the beam on each side.



### Pilot vessel -

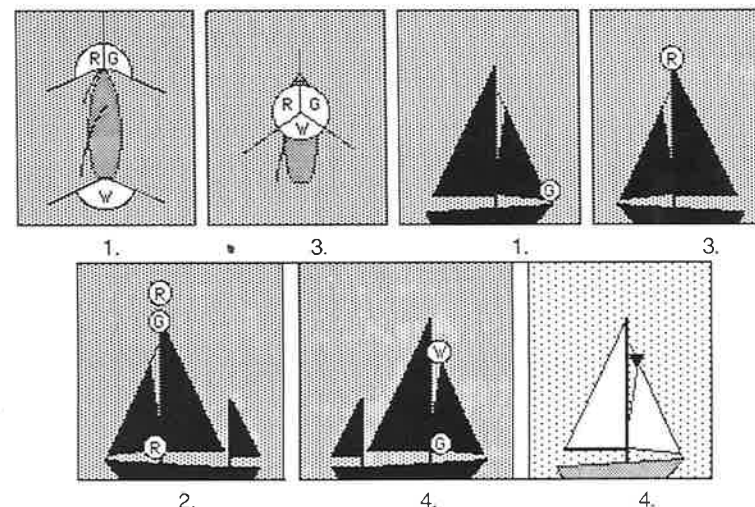
1. When on station, two vertical lights, **white above red**, both visible all round.



2. White flare at intervals.
3. When under way, side and stern lights as before.
4. By day a flag, white over red horizontally.

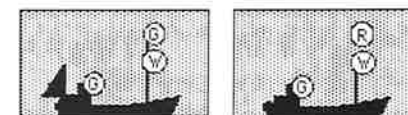
### Sailing vessel under way -

1. Side and stern lights as before.
2. No mast light, **except** - optional red over green all-round lights on the foremast.
3. A sailing vessel under 12 m may have a tricolour light at the masthead, showing red, green and white in the appropriate sectors, instead of separate side and stern lights.
4. A sailing vessel under sail and under power simultaneously, must show lights of a power vessel by night, and by day must carry a black cone, apex down, in the rigging.



### Fishing vessels -

1. Normal lights when not fishing.
2. When fishing-
  - a green over a white light (visible all round) for trawling
  - a red over a white light for other types of fishing.

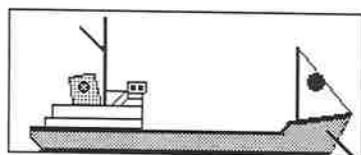
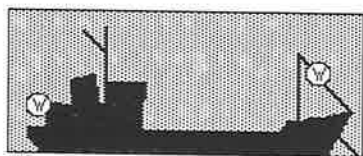


3. Side and stern lights when under way.
4. By day, fishing vessels display two black cones, points together, in fore rigging. A vessel less than 20 meters long may hoist a basket instead of the two cones.



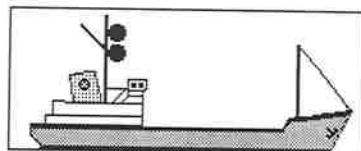
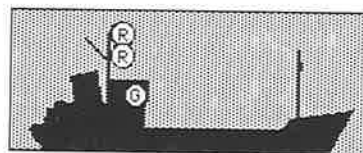
### Vessel at anchor -

1. All-round white light forward.
2. Vessel over 50 meters long will have another white light near the stern, lower than the forward light.
3. By day, one black ball in place of the forward light.



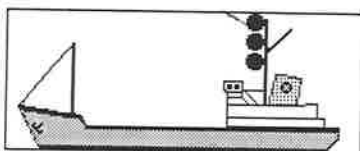
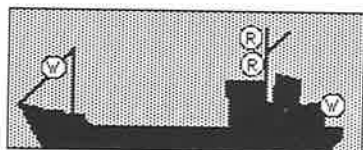
### Vessel not under command -

1. If making way, side and stern lights.
2. Two all-round red lights vertically.
3. By day, two black balls vertically.



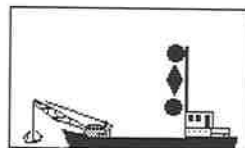
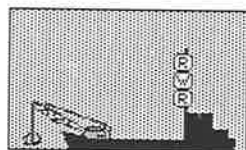
### Vessel Aground

1. Anchor lights as described above
2. Two all-round red lights vertically
3. By day three black balls vertically.



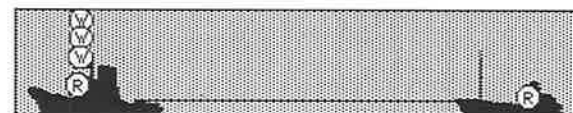
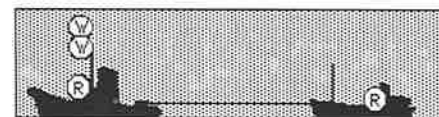
### Vessel restricted in ability to manoeuvre

1. Side, stern and mast lights when making way.
2. Three vertical all-round lights, red over white over red.
3. By day, three vertical black shapes, a ball above a diamond above a ball.



### Vessel towing -

1. Side and stern lights as above.
2. Two vertical white mast lights, visible from right ahead to 22.5° abaft the beam on each side. If the length of the tow, (i.e. the distance from the stern of the towing vessel to the stern of the tow) exceeds 200 meters, three vertical white lights will be shown.



3. A "towing light" - **yellow** light vertically over the stern light, visible through the same arc as the stern light.
4. By day, when the length of the tow exceeds 200 meters, a black diamond shape will be shown.



**Note** - A vessel engaged in a towing operation which **restricts her ability to manoeuvre** will also carry the lights and shapes described on the previous page.

### Vessel being towed -

1. Side and stern lights.
2. No mast lights.
3. By day, when the length of the tow exceeds 200 meters a black diamond shape will be shown.

**A vessel engaged in diving operations** will also usually fly **flag A** of the International Code. A very small vessel will exhibit a rigid replica of Code Flag A (not less than one meter in height).



### Small open boats -

Under oars or sail a lantern or torch should be carried to display a white light in sufficient time to prevent a collision.



## SOUND SIGNALS

"Short blast" means about one second's duration.

"Prolonged blast" means from 4 - 6 seconds duration.

### Manoeuvring and Warning signals -

1. One short blast ("E" in Morse) - "I am altering my course to starboard".



2. Two short blasts ("I" in Morse) - "I am altering my course to port".



3. Three short blasts ("S" in Morse) - "My engines are going astern".



4. Two long and one short blasts - "I intend to overtake you on your starboard side".



5. Two long and two short blasts - "I intend to overtake you on your port side".



6. Long, short, long, short ("C" in Morse) - acknowledge signal.



7. Five short blasts - to attract attention, or to warn another vessel of your presence.



## Sound signals in restricted visibility - eg. fog signals.

1. **Power vessel making way** - one prolonged blast every two minutes.



2. **Power vessel under way but stopped** - two prolonged blasts every two minutes.



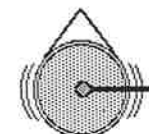
3. **Sailing vessel under way, or a vessel not under command, or a vessel towing, fishing or otherwise hampered** - one long and two short blasts every 2 minutes.



4. **Vessel being towed** - one long and three short blasts, if possible coming immediately after the signal made by the towing vessel.



5. **Vessel at anchor** - a bell rung rapidly for 5 seconds every one minute in the forepart of the vessel. If over 100 meters long, a gong is sounded for a further 5 seconds in the after part of the vessel. Also one short, one long and one short blast on the whistle may be used to give extra warning.



6. **Vessel aground** - as a vessel at anchor, with the addition of three separate and distinct strokes on the bell immediately before and after the five seconds rapid ringing.

7. **Pilot vessel on duty**, in addition to its ordinary signal, may sound four short blasts ("H" in Morse) as an identity signal.



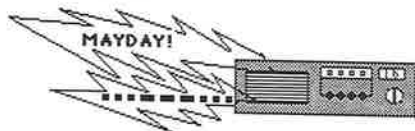


## DISTRESS SIGNALS

1. A **gun** or other **explosive** signal fired at intervals of about one minute.
2. A continuous sounding of any fog-signalling apparatus (now recommended to use "SOS").

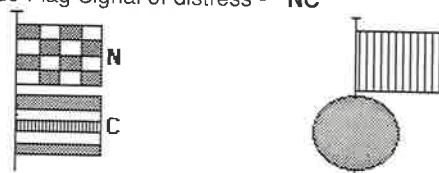


3. Rockets or shells throwing **red stars**, fired one at a time at short intervals.
4. A signal made by wireless telegraphy (W/T) or by any other signalling method, consisting of **SOS** in Morse Code.

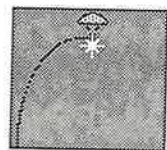


5. A signal by radiotelephony (R/T) consisting of the spoken word - "**MAYDAY!**"

6. International Code Flag Signal of distress - **NC**



7. A signal consisting of a square flag having above or below it a ball or anything resembling a ball.
8. **Flames** on the vessel - as from a burning tar barrel, oil barrel, etc.
9. A rocket **parachute flare** or a **hand flare** showing a **red** light.
10. A smoke signal giving off a volume of **orange coloured smoke**.
11. Slowly raising and lowering of arms outstretched to each side.



**NOTE** - An Ensign raised upside-down can be regarded as a distress signal, but it is not one of the officially designated signals.

## FLARES

**Red flares** are well known as emergency or distress signals. A **hand flare** gives a bright red light for 1 minute. It is used within 3 miles of land, or to pinpoint the position of an emergency when help is on the way. Obviously a hand flare will not be seen far away, and for long range distress signals a **parachute flare** is used. A rocket projects a very bright flare up to about 1000 feet, and this slowly descends on a parachute, burning for about 40 seconds. Anyone seeing a flare will assume that help is urgently required. This means of course that flares must not be used thoughtlessly or "for fun", as the consequences of setting off a flare may involve many other people, and may include launching a lifeboat, diversion of vessels, dispatch of a helicopter, etc. Red flares are **not** fireworks for entertainment or amusement, they are essential **Signals of DISTRESS**.

**White flares** are not distress signals - they are used to draw attention to a vessel's position, particularly as a collision warning signal if a vessel on a collision course does not appear to have seen you. White flares are usually only available as hand flares.

**Orange smoke** is the daylight equivalent of a red flare. A handheld signal produces a cloud of orange smoke lasting about 40 seconds. A **buoyant orange smoke signal** is dropped into the water after ignition - it floats and produces a cloud of orange smoke for three minutes.

The recommended **minimum** numbers and types of flares that should be carried by vessels are as follows -

**Inshore** - for boats which usually stay within 3 miles of the coast

- 2 red hand flares
- 2 hand orange smoke signals

**Coastal** - for boats which may travel up to seven miles off the coast

- 2 red parachute rockets
- 2 red hand flares
- 2 hand orange smoke signals

**Offshore** - for boats cruising offshore

- 4 red parachute rockets
- 4 red hand flares
- 2 buoyant orange smoke signals

Most Scout boating expeditions and open boat cruising will be in inshore waters, and therefore the flares that should be carried are as given above - **Inshore**. When on an expedition always keep your flares readily available in case of emergency - don't keep them packed in the bottom of a bag or under a pile of gear. In the boat, store flares in a dry waterproof container if possible, or at least in a plastic bag. Ashore, store them in a dry place, but keep well away from heat and naked flames. Flares should not be out of date. They have a life of three years after manufacture, and either the date of manufacture or date of expiry will be printed on each flare. They are expensive items and it is very tempting to keep old, out of date ones. This could be a false economy as an out of date flare may not function properly, or at all.

**4. Discuss the Beaufort Wind and Sea Scales, and know at least two natural signs for fine weather and characteristic signs for the approach of bad weather in your area.**

**Beaufort Wind and Sea Scales**

This is a very useful way of describing wind strength and its effects on sheltered waters. It was originally described by an admiral in the British Navy, Admiral Beaufort who had been born in County Meath, and became Hydrographer of the Navy in the last century. The scale is from zero (calm) up to twelve (hurricane). Force 8 is known as Gale Force, but Force 6 is often called the **small boat gale**. The following details will help to identify the wind strengths -

FORCE	NAME	SPEED (Knots)	DESCRIPTION
0	Calm	<1	Mirror smooth.
1	Light air	1 to 3	Ripples on water.
2	Light breeze	4 to 6	Pennant moves, very small waves.
3	Gentle breeze	7 to 10	Light flag extends, crests on small waves.
4	Moderate breeze	11 to 16	Small waves with some white horses.
5	Fresh breeze	17 to 21	Moderate waves with many white horses.
6	Strong breeze	22 to 27	Large waves with white foam crests everywhere.
7	Near gale	28 to 32	Sea heaps up with white foam blown into streaks from breakers.
8	Gale	33 to 40	Sea very rough and disturbed with well marked streaks of foam.

In **Force 0**, a sailing boat is stationary in the water making no progress.

In **Force 1** a light boat starts to move very slowly, but sailing is not very interesting or exciting.

In **Force 2** a BP 18 moves along slowly, but does not heel over.

In **Force 3** she moves much better, heeling a little, but not requiring the crew to "sit out" for balance.

**Force 4** gives a good exciting sail, heeling over with the crew sitting out. If the crew is light you may have to consider reefing.

**Force 5** is getting too strong for comfortable sailing and you must reef or shorten sail.

**Force 6** is the "**Small Boat Gale**" and you should not be out sailing in winds of this strength. But if the wind should increase unexpectedly to this strength, you will certainly require to shorten sail. You may even have to drop the mainsail and sail under jib and mizzen.

A good safety precaution for Scouts is to avoid sailing if the forecast is for winds over Force 4. However do not forget that wind strength is not the only factor to be taken into account when going afloat. You must consider the tidal stream, the type of boat and the experience of the crew.

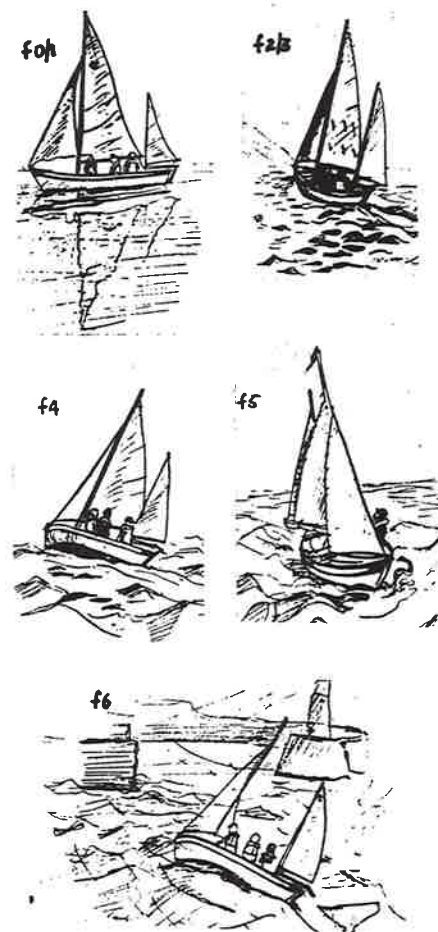
For wind strengths above Force 1, up to and including Force 8, a simple rule-of-thumb formula may be used to convert Beaufort Force into average wind speed, and vice versa.

$$(\text{Force} \times 5) - 5 = \text{Knots}$$

$$\text{Alternatively} - (\text{Knots} + 5) \div 5 = \text{Force}$$

$$\text{Examples} - \text{Force } 5 \times 5 = 25 - 5 = 20 \text{ kn.}$$

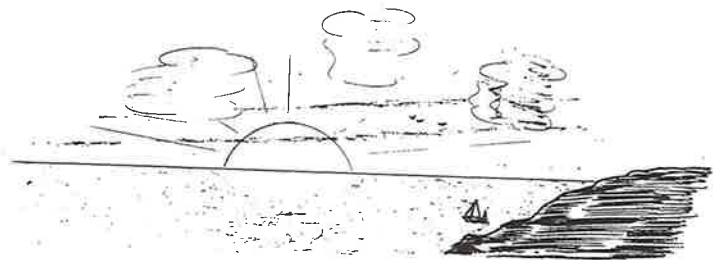
$$15 \text{ kn} + 5 = 20 \div 5 = \text{Force } 4.$$



## Natural Weather Signs

In many parts of the country experienced boatmen or fishermen can often tell from various natural signs that the weather is going to be fair or bad. Many of these signs depend on local knowledge - a combination of appearance of the sky, visibility of landmarks, direction of wind, etc. If there are any such well recognised signs in your area you should try to find out about them, and perhaps keep a particular record of the weather following these signs to see if they are true or not. Many well known rhymes about the weather are of no value at all. Some rhymes have developed from observations in certain areas, but when taken to another area, or when applied to the country in general, do not work. However, some of the rhymes work part of the time, and it would be an interesting exercise for you to gather a number together and see how often they are right or wrong. The following is a selection of some of them -

1. A red sky at night, a sailor's delight.  
A red sky in the morning, a sailor's warning.
2. Mackerel sky and mares' tails,  
make tall ships carry low sails.
3. Rain from the east, means a day's rain at least.
4. Farther the sight, the nearer the rain.
5. When rain comes before the wind  
Halyards, sheets and braces mind,  
But when wind comes before the rain  
Soon you may make sail again.
6. When the wind shifts against the Sun  
Trust it not, for back 't will run.
7. If clouds are gathering thick and fast,  
Keep sharp lookout for sail and mast,  
But if they slowly onward crawl,  
Shoot your lines, nets and trawl.



## Weather Forecasts

The best way to learn about the approach of fine or bad weather is to get the up-to-date weather forecast from the Meteorology Service.

**Radio** - The times of the **Shipping Forecasts** on the radio are as follows -

R.T.E.1	B.B.C. 4
07.45	00.33
12.02 (12.10 Sun)	05.55
18.02	13.55
23.55	17.50

**Telephone** - **Dublin area** forecasts may be obtained by telephone - **1199**.

Local forecasts may also be obtained by telephoning the Meteorological Office in Cork Airport or in Shannon Airport.

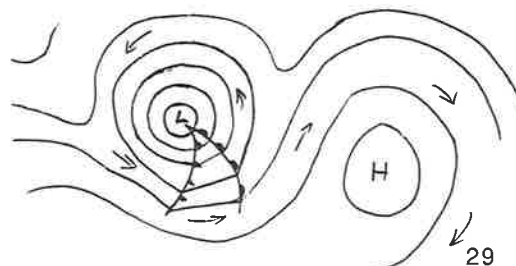
**Newspapers** - Most newspapers give a daily weather forecast, usually illustrated with a weather map. Get used to looking at these maps and interpreting them.

The RTE Shipping forecasts give the expected weather for Irish Coastal Waters, up to 30 miles offshore, and for the Irish Sea. The sea areas are defined by reference to various headlands around the coast. The BBC forecasts use standard sea areas covering all Northern European waters. See Appendix for diagrams.

Shipping Forecasts have a standard pattern -

1. **Gale warnings** (if any)
2. **General situation**
3. **Sea area forecasts**
4. **Reports from coastal stations.**

Weather changes in this part of the world are usually due to the development of depressions and associated fronts. These weather patterns may be understood by learning to read a simple weather map. Most newspapers give daily weather maps - get into the habit of looking at them regularly. For the Coxswain's Badge your knowledge of the weather does not need to be as advanced as this, but if you find the subject interesting and would like to go further, why not try for the Meteorologist Proficiency Badge?



- L - Low PRESSURE; DEPRESSION
- H - HIGH PRESSURE; ANTICYCLONE
- WIND DIRECTION
- "WARM FRONT"
- "COLD FRONT"



### 5. Know the skills of personal survival for emergencies in the water.

At this stage you should revise the Swimming and Boating Rules - look these up in the Sea Training Handbook Part 1 (Boatman Badge).

#### **Lifejackets and Buoyancy Aids**

A Lifejacket must conform to British Standards Institute (BSI) Specification 3595, and have permanent or inflatable buoyancy of 16 kilograms (35 lbs.). There are various types of lifejacket which come under this broad classification, but the type recommended for Scout use has 6 kilograms (13 lbs.) of permanent buoyancy, inflatable to 16 kilograms (32 lbs.) total buoyancy. These jackets are normally worn without being inflated so that they are not too much of an encumbrance to you when you are boating. If you should fall into the water this type of jacket will act as a buoyancy aid at first but may then be inflated into a full lifejacket. A jacket with full buoyancy is so designed that it will keep an unconscious person floating face upwards.

A Buoyancy Aid should conform to SBBNF (Ship and Boat Builders National Federation) requirements (or equivalent) - eg. permanent buoyancy of 8 kilograms (18 lbs.) for persons under 63.5 kilogram (10 stone) weight, or permanent buoyancy of 9.5 kilograms (21 lbs.) for persons over that weight. The advantages of a buoyancy aid are that it is easy to wear, does not encumber you too much or interfere with your ability to work the boat and is often in the form of a waistcoat, thereby providing further insulation against the cold. However, a buoyancy aid does not necessarily keep an unconscious person floating face upwards.

**Note** - Buoyancy aids with less buoyancy than mentioned above may be recognised by the ICF (International Canoe Federation) for canoeing on rivers - however these types of buoyancy Aids are **not** recognised by the Boating Rules of the Scout and Guide Associations in Ireland as suitable for Scout or Guide boating or canoeing.

For Scout purposes lifejackets should be worn for most boating activities except those close inshore, in rivers, etc., or with close supervision, when buoyancy aids may be worn. Jackets should not be inflated when boating, particularly dinghy sailing or canoeing. It can be dangerous to wear an inflated lifejacket in a canoe or sailing capsized as the amount of buoyancy may trap you under the craft and not allow you to go deeper and come up outside. Jackets should therefore be inflated when you are on the surface and waiting to be picked up.

**Always wear your lifejacket or buoyancy aid properly closed and secured.**

#### **Exposure -**

Exposure can lead to the dangerous condition of **Hypothermia**. This happens if your body loses so much heat that your temperature drops to dangerous levels, and may end in death. It can occur while mountain walking, boating in cold weather or submersion in cold water. To prevent or delay the onset of hypothermia have plenty of layers of clothing or a wet suit. If immersed, do not expend energy by moving your limbs or trying to swim or to "keep warm". Lie quietly in the water with lifejacket fully inflated and adopt the "Heat Escape Lessening Position" (HELP). This means bending up your knees to your chest and holding them there with your hands, and keeping your upper arms close to the chest wall. This reduces heat loss from the big blood vessels in the chest, in the groin and in the arm-pit.

People are sometimes in danger of hypothermia while on a yacht at sea, particularly at night, feeling sea-sick and not wishing to stay below. It is important to make sure that a sea-sick crew member has plenty of warm clothes, with water-proof trousers and anorak, or oilskins. Some of the symptoms of sea-sickness may be due to a fall in temperature - unexpected behaviour, complaints of coldness and tiredness. The misery of sea-sickness may merge gradually into hypothermia, and it is important for other members of the crew to keep a close watch on someone who is sea-sick. Physical and mental lethargy, shivering and uncharacteristic behaviour or language should be regarded with suspicion.

**Warm clothing** is essential when you go boating - it may be much colder at sea than ashore. Even in the middle of Summer the nights can be very cool. Clothing must be warm and water-proof - wet clothing allows loss of heat more rapidly than dry clothing. Do not become an emergency on the water, by suffering from exposure while still on a boat. The best type of clothing is woollen, covered by at least a wind-proof jacket, or better still a waterproof. Do not forget a woollen hat also.

**Wet Suits** - wear one when canoeing or dinghy sailing in cold weather. Heat lost from your body is considerably reduced and survival time increased. They also have a some buoyancy and will increase your ability to stay afloat.

#### **Treatment of hypothermia**

Try to stop further heat loss. DO NOT try to heat the patient with hot water bottles or such like. Do not rub his limbs to "help the circulation". Do not give any alcohol - this will open up surface blood vessels and allow more heat loss. Cover the patient in sleeping bags or in a survival bag and get him below decks out of the wind. If possible get him ashore quickly. If he is conscious give him **warm** drinks, but **not hot**. Take off all wet clothing and wrap the victim in blankets if available. If blankets or dry clothing are not available replace wrung out clothing. Place other blankets or covering close on either side of victim. If possible, administer sugar, glucose, condensed milk or warm (not hot) sweet drink. DO NOT GIVE VICTIM ALCOHOL UNDER ANY CIRCUMSTANCES.

## 6. Undertake the repair of a boat using the relevant materials:

The type of repairs that you will be expected deal with are those required by your own Group boats. You will not be expected to be an expert boatwright, but you should be capable of carrying out simple repairs or of being in charge of a party doing a bigger job. You may have to do minor repairs to decking, gunwale, thwarts, bottom boards etc. If your Group has a wooden craft, you should know how to apply a "tingle" and under what circumstances this should be done.

Glass fibre repairs are particularly important nowadays. This material may also be used for temporary repair jobs to wooden boats if the area of damage is not too large.

One of the secrets of good glass fibre repair is good preparation - make sure the area is completely dry, remove any loosened and splintered areas and roughen up the surrounding surface with coarse sandpaper or a file. The repair is usually done from the inside if possible. If the hole is not too big, cover with masking tape on the outside. If however, the hole is quite big, it may require covering with something like celophane supported by stiff cardboard or wood, all taped to the outside of the hull. Pieces of glass fibre chopped strand mat (CSM) are cut, allowing about 1" overlap around the edges of the defect, for canoes and light craft. Three pieces of CSM will usually be sufficient. Resin is prepared by mixing in the appropriate amount of hardener and this is then brushed over the area of the repair. A piece of CSM is placed over this, and more resin is brushed on top, stippling thoroughly to exclude all air bubbles. This is followed by a second and a third layer. When the resin has set, the tape is removed from the outside.

In a wooden craft, particularly plywood, an emergency repair may be made as described above, but a piece of wood may be included between the layers of the glass fibre to give additional strength. The temporary repair should be removed later and a proper job done.

A full-scale repair, restoring the quality of the "gel-coat" may be undertaken to give a better result, but this is not done in temporary repairs. In canoes especially, a good temporary repair may be achieved even on a wet surface, by using a special water-proof tape.

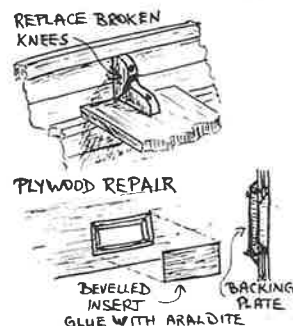
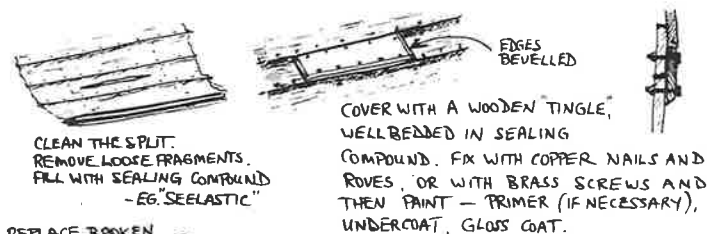
### Rigging

Boat repair work may also include dealing with repairs to rigging, both running and standing. Because of the importance of rigging, damage to a halyard or to a shroud usually means replacement rather than repair, but such things as whipping the ends of halyards, or putting in eye-splices may be required at times. If a rigging screw becomes damaged, it can be replaced by a lanyard. Temporary repairs to sails may be effected by stitching the tear using a "herring bone stitch", and perhaps covering with a small patch of the appropriate material. The next section of this badge gives some information on this subject.

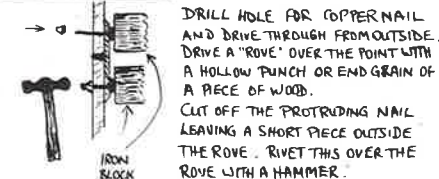
## BOAT REPAIRS

### WOODEN CRAFT.

SMALL CRACKS - FILL WITH EPOXY GLUE (EG. ARAIDITE) MIXED WITH SAWDUST.  
LARGER CRACKS OR SPLITS - APPLY A "TINGLE"



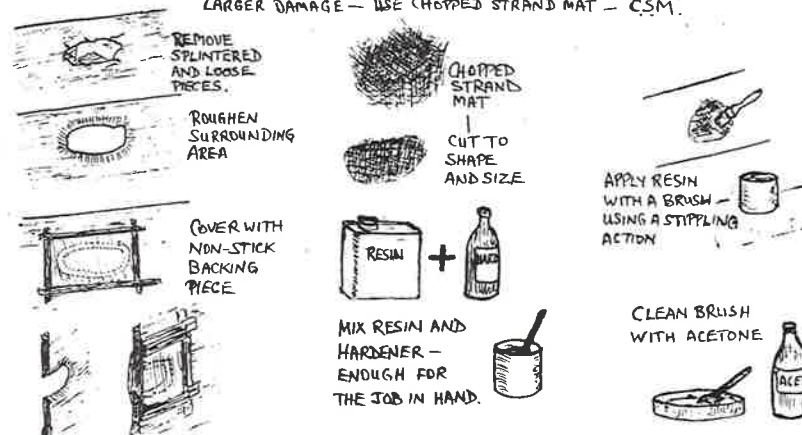
### COPPER NAILS AND ROVES:



### FIBREGLASS CRAFT.

SMALL CRACKS - FILL WITH RESIN.

LARGER DAMAGE - USE "CHOPPED STRAND MAT" - "CSM."





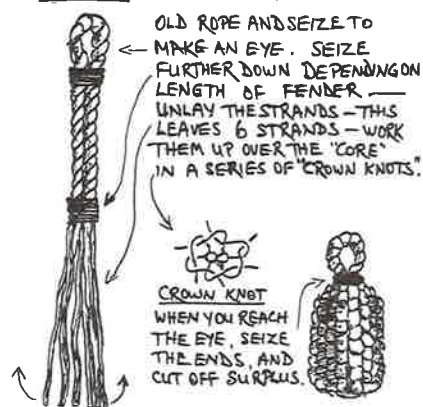
## 7. Make rope-fender, boat bag out of canvas or demonstrate worm, parcel and serve.

These items with previous test number 6, are taken from the Boatswain Badge. You might consider looking further into the Boatswain Badge, as this is a very useful summary of seamanship. It will help you pass some of the tests for the Coxswain Badge, and also cover some of the Sea Scout alternative tests for the Explorer Scout Badge. The items chosen here are for actual use in boat maintenance and repair - you will not be asked to make a canvas bag just for the test, but hopefully one that will be used as a boat's bag. Therefore, it must be of appropriate strength and dimensions.

In the diagrams you will see some suggestions for rope fenders, and also an indication how to use the palm and needle and do a "round stitch" and "herring-bone stitch" when using canvas. An alternative to making a canvas bag might be to overhaul a sail that requires repairs, or perhaps to reshape or cut down a larger sail to a smaller size.

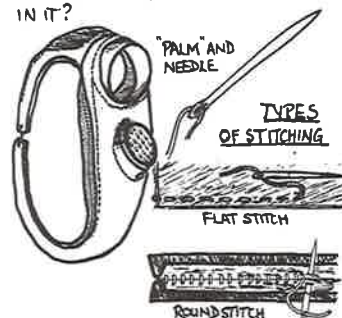
Worm, parcel and serve is probably not very useful to most Troops and will only be used occasionally. If any other items mentioned here are not applicable to your Troop's circumstances at the time, **your Skipper may substitute some other part of the Boatswain Badge**, perhaps a practical project involving blocks and tackle, or re-rigging a sailing craft, or building and sailing a raft.

### ROPE FENDER - DOUBLE A LENGTH OF

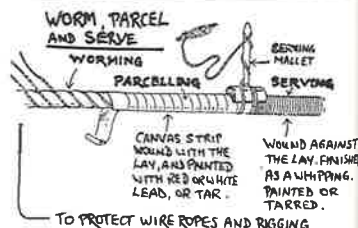


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BOAT BAG - MAKE OUT OF CANVAS, USING A SPECIAL NEEDLE AND "PALM". THE THREAD IS WAXED. THE SIZE OF BAG WILL DEPEND ON ITS FUNCTION - WHAT DO YOU WANT TO CARRY IN IT?



USE ROUND STITCH TO SEW THE SIDES OF THE BAG TOGETHER. USE FLAT STITCH OR ROUND STITCH FOR HEMMING. HERRING-BONE STITCH IS USED TO REPAIR TEARS IN CANVAS OR SAIL CLOTH.



## 8. Complete one of the tasks or projects given on the list, or Complete a project in some similar or related subject.

This section presents quite a wide choice. Five subsections are given: **Signalling, Outboard Motor, Irish Inland Waterways, Sea Fisheries, Irish Lifeboats.** This list is not final, - other marine projects of a similar standard may be accepted as alternatives. If you have a subject you would like to turn into a project or study, ask your Skipper and if he thinks that the amount of work involved and the standard you can reach is equivalent to any of the subjects given on the list, he may accept your idea as an alternative.

(a) **Signalling** - for the test you are asked to send a message of not less than twenty-five letters over a distance of 1.5 cables, between two boats, or between boat and shore, and to know the single letter hoists of the International Code of Signals. The choice of Morse Code or Semaphore is your own. The speed of signalling is not mentioned, but Grade 4 (twenty words per minute) is recommended. The only way to learn signalling is to practise, preferably with a friend or group of friends who are all interested.

Because traditional signalling is now becoming less important with the development of marine radio, especially VHF, the possession of the Restricted Certificate of Competence in Radio Telephony will also be accepted for this section.

**Note:** Scouts who take this choice will also get credit for the "Communication" part of the Explorer Scout Badge. If a high enough standard is reached, the Signaller Badge may be obtained. For Morse Code, Semaphore and International Code Flags see Appendix.



(b) **Outboard Motor:** If you choose this test you will be expected to dismantle, thoroughly service and re-assemble an outboard motor. The type of outboard motor which would be available to most Sea Scout Troops would probably be a small horse-power motor, possibly a "Seagull". Even if you think you know a lot about engines, you should never start dismantling, or doing any big job on one without having the appropriate instruction manual or booklet. All the details would be found in such a booklet and, therefore, no further points will be mentioned here.

**Note:** If you complete this test, it will also be accepted for the "Technology" item in the Explorer Scout Badge.



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(c) **Inland Waterways:** A project on the Irish Inland Waterways can be a very interesting project. Some details about Irish Canals and navigable rivers will be found in the Appendix at the back of this book. You might be expected to construct and demonstrate a model of a lock, but this need not necessarily be one which works and is water-tight - a cardboard model would suffice.

Note: Completion of this section will be accepted for the "Hobbies and Crafts" section of the Explorer Scout Badge.



Pelagic Fish



Demersal Fish



(d) **Sea Fisheries:** A project on Sea Fisheries may be very appropriate if you are based in one of the main fishing ports in the Country. A lot of information can be obtained from local fishermen and, if you write to Bord Iascaigh Mhara (BIM), you will be able to get background information about the industry in general, its history, economics, etc. Different types of fishing will be found around the coasts of Ireland and you should concentrate particularly on the type most commonly found in your area.

Organising a Day Trip on a Trawler will not be very easy, depending on the time of year and how busy you are. Some Trawler Skippers will be willing to take Scouts aboard for an educational trip like this, but others will not, as they may not wish to take responsibility for them in case of accidents. If you are interested in doing a project on fisheries, and if you do not know a skipper or fisherman, ask your Scout Leader if he can help you find someone who may be able to assist you.

Note: This project would also count for "Hobbies and Crafts" section of the Explorer Scout.



(e) **Irish Lifeboats:** In some ways this is a similar project to that of Sea Fisheries. You may get information and help from the Honorary Secretary of the local Lifeboat Branch or from the Coxswain or a member of the crew of the Lifeboat itself. You may also write to the Royal National Lifeboat Institution (RLNI) office in Dublin for information.

Note: This project would also count for the "Hobbies and Crafts" section of the Explorer Scout.

(f) **Other Projects - consider -**

**Development of your local port**  
**Irish Naval Service**  
**Off-Shore Oil Exploration**  
**Traditional Rowing and Sailing Craft**  
**History of Sea Scouting in Ireland**

These are all very academic projects and you may prefer to try activities of a more practical nature - what about -

**Hydrographic survey of local waters**  
**Pollution survey of local waters**  
**Comprehensive small boat guide**  
 - e.g. the "Sailing Directions" project in the Pilot Badge.



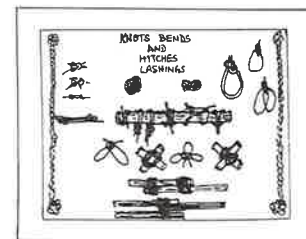
Other ideas could include -

**Knot Board** - knots, bends, hitches, splices, lashings, and perhaps various sennits and other decorative work.

**Model making** - construction of a model craft (without kit), or a "Ship in a bottle".

Note: The "Sailing Directions" project for the Pilot Badge could be accepted for item 59 - "Exploring" - of the Explorer Scout Challenges. Other subjects given here could be accepted for the "Hobbies and Crafts" section of the Explorer Scout.

The project you choose does not have to be a solo effort - two, three or more Scouts working together may be able to undertake a really good and extensive project.





**9. Take charge of a party preparing a sailing or motor craft for a short trip including gear to ensure safety of craft and crew in all conditions.**

Although only a short trip is mentioned in the text, you should ensure that all safety and reserve gear is carried. This section, and also sections 10 and 11 are part of the training preparation for the main expedition (item 12 of this badge). You should make your own checklist for the craft you are using, taking into consideration the area of water involved, and you should submit this to the examiner for comment. Depending on the size and type of the craft, the following items should be considered:

Check hull & fittings, rudder & tiller, centreboard.

Oars and spurs, and spare oar and spur.

Check standing and running rigging, sails and spars.

Bow and stern lines; heaving line.

Pump and/or bailer.

An efficient anchor and cable.

Check outboard engine mount and security line.

Check fuel and lubricating oil, engine starting and running.

Basic tool kit for essential repairs or adjustments.

Spares - e.g. spark plug, shear pin.

First-aid kit.

Emergency flares and smoke signals.

Food, cooking stove (and fuel), fresh water. Emergency rations.

Torch, battery. Navigation lights.

Hand-bearing compass, appropriate charts, parallel rulers or other plotting instruments. Log-Book or notebook, pencil, eraser.

Waterproof and warm clothing.

Efficient life-jackets, safety-harness etc.

Lashing cord for securing all loose items.

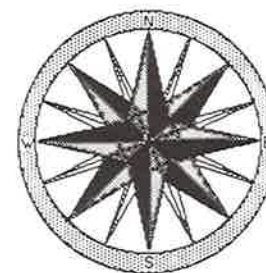
**10. Possess either the Sail-Helmsman or the Power-Helmsman Badge or equivalent qualification. Demonstrate ability to steer a compass course.**

**Sailing:** The technical standard required is that of the Sail-Helmsman Badge, or Intermediate Sailing Charge Certificate, or IYA stage 2. These qualifications are usually obtained in dinghies or day boats, and you should if possible demonstrate that you can manage some different types of craft. Try to get some experience of sailing the Sea Scout Standard Craft (BP 18). Some technical notes on sailing are given on the following pages, 40-47, and the requirements for the Sail Helmsman Badge are given in the Appendix. You will notice that many of the requirements have already been completed in your Coxswain or Coxswain's Mate Training, and the main parts to be done will be actual practical sailing and boat handling. This requires plenty of practice - sailing cannot be learnt from a book.

**Power-Boating:** You may prefer to take the Power Boat alternative - Power Helmsman Badge or the Intermediate Charge Certificate in power. Notes on power-boating are given on pages 48-55, and the Power Helmsman Badge requirements will be found in the Appendix. As in the case of sailing, you will find that you have already covered many of these requirements.



**Compass:** Steering a compass course is self-explanatory but obviously, it means that the craft concerned must be provided with a reasonable steering compass. If the compass is one with which you have not had any previous experience, you should familiarize yourself with it before taking the test.



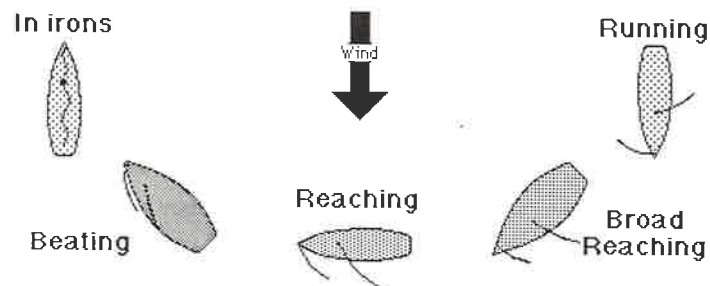
## Theory of Sail

A sailing boat cannot sail directly into the wind, but can probably "point" about 45° off the wind. Progress to windward is made in a zig-zag manner by "tacking". When sailing close to the wind like this, the sails are sheeted in tightly so that they are as flat as possible. This is called sailing "**close-hauled**" or "**beating**".

If the wind is on the beam, the sheets are eased - the sails can fill better and develop a curved shape. This is called "**reaching**" and is usually the fastest point of sailing.

When the wind is astern the boat is "**running**". If the jib is blanketed by the mainsail and does not fill, it can be set on the opposite side to the mainsail, perhaps boomed out with a spinnaker pole or a smaller spar called a "jib stick". This is known as "**goose-winging**" or "**running goose-winged**".

## POINTS OF SAILING



When beating or reaching there is a tendency to slip sideways due to the sideways push of the wind. This is called "**leeway**". The amount of leeway depends on the design of the hull and the resistance of the hull to moving sideways - "**lateral resistance**". The main part of lateral resistance is provided by the keel, or in small craft by the centre-board. Try to sail a BP 18 or a dinghy closehauled with the centre-board raised and you will find that most of the movement is sideways and you will make very little progress to windward. The more you sail "off the wind" the less important is lateral resistance. When running, you can raise the centre-board completely and this may increase speed slightly by reducing drag.

A wind dead astern used to be called "a soldiers' wind" by seamen in times past, meaning that it was easy to sail downwind. However this is not necessarily the case - a boat is often difficult to control when the wind is dead astern and there is always the danger of a "gybe". If the wind is fairly strong an accidental gybe can be dangerous, and it may sometimes be better to zig-zag downwind with a number of controlled gybes. This may even be faster because a dead run is not the fastest point of sailing.

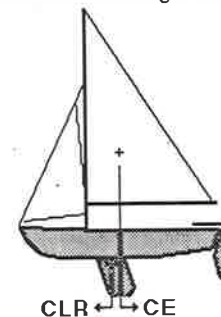
## Handling under sail

For Coxswain's Mate training you had to demonstrate that you could take the helm and sail the boat on all points of sailing - **Beating, Reaching, Running**. Now you are expected to take charge of a sailing craft and crew and show a good standard of helmsmanship.

**Sail setting** - make sure that the sails are properly and fully hoisted. Check downhauls and outhauls, and kicking strap. A well set sail should have no creases running across it. Adjust the sheets to the point of sailing - they should be pulled in tight when sailing closehauled, but otherwise should only be as tight as required to stop the sails flapping. You can judge the wind direction from the masthead pennant and by the feel of the wind on your face and neck.

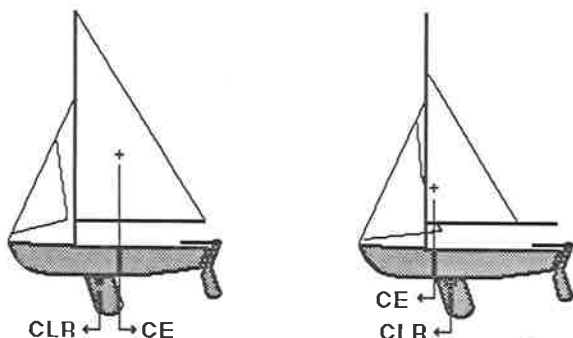
**Boat trim and balance** - it is very common to see people sailing with most of the crew weight too far aft. This causes the bow to be too high out of the water, changes the underwater profile of the hull and means that the boat will not sail so well - it will be slower and will probably have more leeway. So keep the boat properly trimmed - the weight a little forward when closehauled. This is very important in a BP 18 as the bow is naturally high. It is quite correct to bring weight further aft when running. The position of the crew is also very important in maintaining the side to side balance of the boat. Depending on the strength of the wind the crew may have to sit up to windward or even sit out on the gunwale. Therefore on different points of sailing, maintaining trim and balance by moving the crew around is almost as important as continually adjusting the sheets.

**Sail Balance** - A knowledge of sail balance will help you to get the best out of your boat. The central point of the pressure of the wind on the sails is called the "**Centre of Effort**". Sail balance depends on the relative positions of the Centre of Effort (CE) and the Centre of Lateral Resistance (CLR). The CE should be slightly behind the CLR, so that the boat will naturally tend to come bow to the wind when the tiller is let go. This is called "**weather helm**" and is a safety factor, as the boat will become upright and stop. If the CE is in front of the CLR, the boat will tend to swing away from the wind, causing more pressure on the sails, which could be dangerous. This is called "**lee helm**".



**Weather helm** is the normal condition in a sailing boat but the balance can be upset by changing the size of sails. For instance a small jib used with a large mainsail may cause too much weather helm, making it difficult to stop the boat swinging head to wind. The rudder must be kept at a marked angle in order to keep the boat on course, causing an enormous drag in the water, reducing the boat's speed and being very tiring on the helmsman.

**Lee helm** is an undesirable characteristic as explained above, and most boats and rigs are designed to avoid lee helm. However it can be caused by changing the sail balance. For instance, a large jib and a small mainsail would shift the Centre of Effort forward and this might be sufficient to cause lee helm.



Sail balance is therefore an important matter. It does not usually cause much trouble in normal circumstances unless there is a design fault in the boat. However, if you have to vary the size of sail - e.g. reefing in strong wind, experimenting with sails, or using a jury rig - you should think about the change in Centre of Effort that may occur with resulting change in balance.

### Mizzen Sail

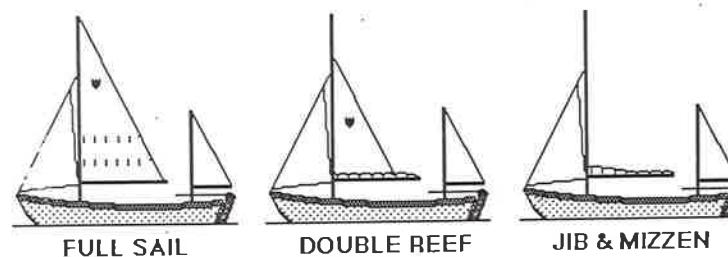
When sailing a ketch-rigged small boat such as the BP 18, you must slacken the mizzen sheet when you want to gybe. The pressure of the wind on a tight mizzen sail may be sufficient to prevent the stern coming up to windward in spite of full rudder. This is an aspect of weather helm, and may be abolished by slackening the mizzen. When tacking you may also have to remember the mizzen. In a light wind a BP 18 may be a bit slow coming around and a tight mizzen may act as "wind-vane", causing the boat to stick head to wind. If the jib has been brought across too early it may be "backed", and you will find yourself being pushed back onto the previous tack again. So, be careful of sail balance, and watch that mizzen!

### Weather helm and lee helm - practical exercises

1. Try sailing with the mainsail only. This will bring the centre of effort further back, and you will find an increase in weather helm. In a BP 18 you will get an even greater increase in weather helm if you now set the mizzen sail also - you may find that you cannot prevent the boat from coming head to wind.
2. Try sailing with the jib only. Now you will have a lot of lee helm and will probably find that the boat is very difficult to keep anywhere near the wind, and impossible to tack. This is because the centre of effort has been moved too far forward and is now well in front of the centre of lateral resistance. You will however be able to sail downwind with a jib only.
3. Leaving the jib up, now raise the mizzen sail. You will immediately find that the boat's performance improves, because you have shifted the centre of effort back a little. The boat will not sail as well as with the mainsail hoisted also, but jib and mizzen will balance well if you are reaching in a strong wind.

**Triangular course** - this is a standard sailing test as it means that all the points of sailing are demonstrated. You are expected to sail the course "to best advantage" - this means to sail around in the most efficient way, not necessarily to race. However Scouts who have experience of racing will obviously have no difficulty here. Remember that you can raise your centreboard fully when running, and partly when on a broad reach.

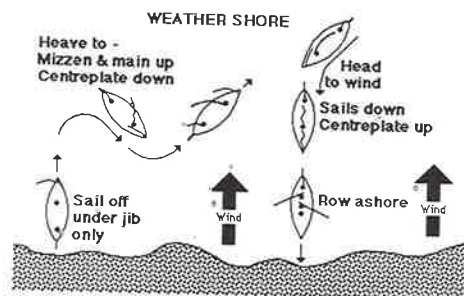
**Shortening sail** - As wind increases in strength and a boat is "overpressed", sail area should be reduced and handling then becomes much easier. The commonest way to shorten sail in a dinghy or BP 18 is by "reefing" the mainsail. In larger craft the jib may also be reefed or replaced by a smaller sail. **Reefing** a sail means making it smaller, and this may be done by tying down "reef points", by "slab" reefing or by "roller" reefing. In a BP 18 the mainsail may be lowered completely in a strong wind and the boat sailed with jib and mizzen - it will not sail very well closehauled with this rig, but will be quite comfortable on a reach. Remember the points about sail balance mentioned above when reefing.





## Sailing off and onto a beach

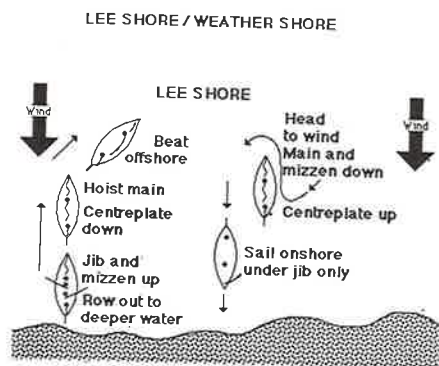
Using a beach means launching and recovering through shallow water, and being ready to get wet at least up to your knees! You must also be prepared to raise or lower your centreboard rapidly as required. The techniques for dinghies and for heavier boats such as the BP 18 are not exactly the same.



## Weather shore

Here the wind is blowing offshore. In order to sail off, the boat is put into the water and held head to wind while the sails are hoisted. The crew gets in, the helmsman turns the boat around and quickly climbs in, and sails away. When in deeper water the centre-plate can be put down. Launch a BP 18 stern to wind and sail off the beach with jib only - when in deeper water, come head to wind by hoisting the mizzen, heave-to and hoist the mainsail.

To sail onto a weather shore, approach on a beat (close-hauled). Raise the rudder blade and be ready to raise the centre-plate. The crewman must be ready to jump overboard and hold the boat as it is swung head to wind in the shallow water. In a BP 18, sail in reasonably close to the shore, ship oars, raise centre-plate and rudder blade, drop jib and mainsail, and row in.



## Lee shore

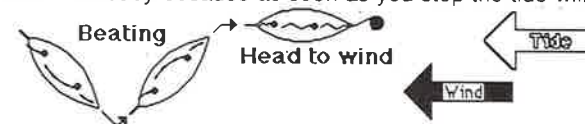
Sailing off - launch the boat bow first. Hold head to wind while sails are raised. The crewman gets in. The helmsman pushes out hard and jumps in. The sheets are trimmed and the centre-plate lowered carefully - if it hits the bottom it may stop progress, but if it is not lowered quickly enough the boat will drift sideways onto the shore. A BP 18 should be rowed off a lee shore, and the sails hoisted in deeper water.

When sailing onto a lee shore, come head to wind off the beach and lower mainsail (and mizzen), raise centre-plate and rudder blade, and sail in under jib. If there is much surf, come head to wind, lower all sails except the mizzen, stream a sea anchor from the bow, raise the centre-plate, raise or unshio the rudder and drift in stern first.

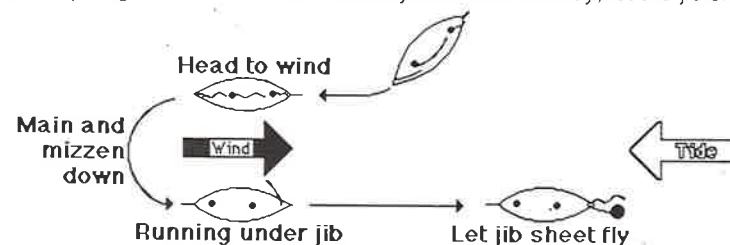
**Picking up a mooring** - you should sail to the mooring buoy in such a way that the boat comes head to wind and stops just as you reach the buoy, and your crew can pick it up and bring it on board. You then drop your sails, jib first, and raise the centreboard. Coming head to wind in exactly the right place takes practice - get used to the way that your boat handles, but remember that other boats may not handle in quite the same way. A light dinghy will stop very quickly when brought head to wind, but a heavier craft such as a BP 18 will "carry her way" further.

**Effect of tide** - The strength and direction of the tide may cause you to modify or change technique for picking up a mooring. If the tide is very weak it will make no difference and you should approach head to wind as described above. If the tide is stronger you will have to approach **head to tide**.

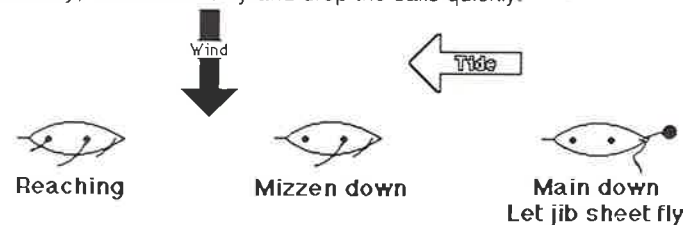
Tide and wind together - approach the mooring buoy as before, but only turn head to wind as you reach the buoy because as soon as you stop the tide will push you back.



Tide against wind - approaching the buoy head to wind will not stop the boat's forward movement - you must approach the buoy downwind. To do this take down the mainsail (and mizzen) and run downwind with jib only. You can control speed by slacking the jib sheet and spilling wind from the sail. When you reach the buoy, let the jib sheets fly.



Tide across wind - here you must approach the buoy on a reach. You may control the boat's speed by easing jib and main sheets and spilling wind from the sails. When you reach the buoy, let all sheets fly and drop the sails quickly.



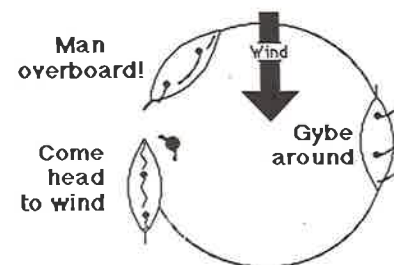
**Coming alongside** - If the wind is blowing parallel with the quay or slip you will be able to come alongside head to wind without difficulty. If the wind is blowing onto the slip, approach downwind under jib alone, drop the jib or let sheet fly some yards off, depending on the wind strength, turn beam on to the slip a few feet off and drift in sideways. If the wind is blowing off the slip, you can approach on a beat or a reach, letting sheets fly as you come alongside. Get your mainsail down quickly. If there is a strong tide running along the quay come head to tide as described under picking up a mooring.

**Capsizing** is almost inevitable at some stage in small boat sailing, and therefore you must be competent to deal with this emergency if it happens. Ability to recover from a capsize is an important aspect of helmsmanship. This has already been described in the Handbook Part 1, but more details are given here.

1. Check that all the crew are accounted for and that nobody is trapped under the sail.
2. Give clear instructions so that each person knows what to do.
3. Work quickly and efficiently and if possible prevent the boat from "turning turtle".
4. One crew member stays on the inner side of the boat and throws the lower jib sheet over the upper gunwale to the other side. NOTE - If the wind is very strong it may be necessary for this crewman to release the main halyard and lower the mainsail before righting the boat.
5. If there is another crewman, he should swim to the bow and hang on there - this will cause a drag in the water when the boat comes upright and help to keep it head to wind.
6. The helmsman swims around the stern to the centreboard on the other side, checking the rudder as he goes.
7. He catches the jib sheet which has been thrown over from the other side and uses this to help pull the upper gunwale downwards. At the same time he pushes downwards on the centreboard and climbs up on it, keeping his weight as near the boat as possible at first, in order not to break the centreboard. If the centreboard is a strong metal one he may be able to stand further out and thus speed up the recovery. This should start the boat rolling back up again.
8. As the boat comes up, the crewman should float into the hull from the mast side and be "scooped" up. This crewman then helps the helmsman into the boat over the quarter or abaft the beam.
9. If the top of the centreboard case is below the water level, it will have to be plugged with a sail-bag or sail until the water level is reduced by bailing.
10. The third and other crewmen are brought aboard when the boat is more stable and help with the bailing. When the boat is sufficiently stable to be able to sail again, you can get under way and continue bailing while moving.

**Man overboard** It does not often happen that someone falls overboard from a small craft, but a good helmsman must be prepared for such an occurrence. Man overboard drill is also useful as practice in accurate boat manoeuvring.

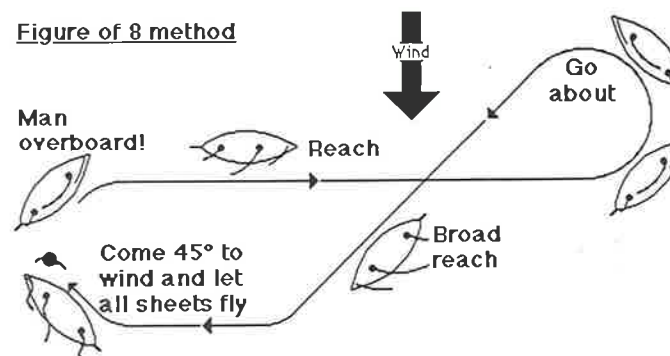
#### Gybe method



If the wind is not too strong the quickest method of getting to a man overboard is to gybe around and come up head to wind alongside him. However this method has the disadvantage of having to do a gybe which could be hazardous in a strong wind.

Another way is the "figure-of-eight" method - go immediately onto a beam reach, throw out a lifebuoy if you have one and instruct a crew member to keep watch on the person in the water (In a choppy sea it is easy to lose sight of a head bobbing about in the waves). When ready, tack and reach back again towards the casualty, steering a bit downwind of him. Then turn up towards him, about 45° off the wind, and let all sheets go, aiming to stop in the water with him abeam on the windward side. Using your crew to balance the boat, bring the casualty in over the gunwale amidships. By bringing the person in the water onto the windward side, you will be able to get him in unencumbered by the sails, boom and sheets, which will be blowing out on the opposite side.

#### Figure of 8 method



## MOTORBOATING

Motorboat handling is an alternative to sailing for the Coxswain Badge. The standard to be achieved is that of the Power Helmsman Badge or Intermediate Charge Certificate for Power. You should if possible have experience in using both outboard and inboard engines.

**Hulls** - There are two main types of hull displacement and planing.

Displacement hulls are pushed through the water by the engine, and the resistance created means that when the hull reaches a certain optimum speed it requires a very great increase in power and therefore in fuel consumption to achieve even a small further increase in speed. The natural top speed of a displacement hull is 1.4 times the square root of the waterline length and the economical speed is about 1.2 x square root of waterline length. The hull form of most displacement hulls is usually called "round bilge".

Planing hulls are designed so that when sufficient power is applied they will rise to skim on the top of the water. This reduces drag and means that much greater speeds can be obtained with less power. Some planing hulls are flat-bottomed aft, with V shape forward to reduce pounding, others are "deep V" throughout.

Also included in the planing hulls are the various inflatable boats and dinghies.

Not every hull fits exactly into these categories, and there are many compromises between both, often called semi-displacement hulls.

Many sailing craft also have engines. The hulls in this case will be sailing types - e.g. long keel, fin keel, bilge keels, maybe even centreboard. In high performance sailing craft the engine is often quite small compared with the size of the boat - but in these cases it is really only an auxiliary. Other boats may have a bigger engine but their sailing qualities may not be so good - these are called "motor-sailers".



Fig. 1 A round bilge displacement motor cruiser.



Fig. 2 This fast, planing motor cruiser has a hull with a deep V section.



## Fire prevention

Fuel - Petrol is more dangerous than diesel oil. Petrol vapourises easily and it is this heavier than air vapour which is so dangerous - it can be ignited explosively by a lighted match, electrical spark, etc. Butane gas is similarly dangerous.

1. No naked lights should be permitted in the vicinity when refueling is taking place.
2. Stop engine when refueling, and turn off gas and electrical appliances.
3. Try to avoid spillage - if this does occur, mop it up with an absorbent cloth and encourage a flow of air to dispel any inflammable vapour.
4. The filler for the fuel tank, especially petrol, should be on deck so that any overflow does not go into the bilges, and can be washed away easily.
5. Gas cylinders should be stored in a locker in the cockpit or on deck, which should drain overboard.
6. Check gas connections and tubes regularly.
7. Turn off the gas cylinder when not in use.
8. Gas is heavier than air and will sink into the bilges, under floor boards, etc. If there has been a gas leak or if you suspect one, avoid all naked lights or smoking, do not start the engine or turn on any electrical equipment. Ventilate the boat - open all hatches and encourage a stream of air through. Agitate the air in the bilges and take up floorboards. Some gas can dissolve in water in the bilges so pump out bilge water.
9. Don't hang cloths over the cooker when the gas is lit.
10. Be careful when cooking that you don't have a galley fire - e.g. burning fat.

**Fire extinguishers** - Motor cruisers, or sailing cruisers with engines should carry at least one fire extinguisher not less than 1.4kg. capacity. If they have cooking facilities, they should have at least another similar extinguisher. Dry powder extinguishers are probably the most suitable. All crew members should know where the fire extinguishers are and how to use them. It is recommended that the engine compartments of motor cruisers should also have fixed automatic extinguishers. A fire blanket should be available in the galley, and this can be used to smother a fire very effectively. A wet towel or cloth can also be used.

## Fire fighting

If a fire occurs it must be attacked as quickly as possible. Raise the alarm by shouting "FIRE!" Use the nearest fire extinguisher, aiming at the base of the fire.

Note - never throw water on an oil or fuel fire - the oil will float, continue to burn and will spread further. Never throw water on an electrical fire as this may cause more short-circuiting and more sparking. Water can however be very effective against wood or paper fires. The boat should have two buckets with lanyards attached.



AIM EXTINGUISHER  
AT BASE OF FIRE



**Engines** - Motor power may be installed as inboard, outboard or outdrive (sometimes called "inboard/outboard") engines. There are two main types of engine - petrol and diesel.

Petrol engines are lighter and quieter, and they are also usually appreciably cheaper. However petrol costs a lot more than diesel oil, it is a much more volatile fuel and therefore is a potentially dangerous fire risk. Petrol engines have an electrical ignition system which can be troublesome in a boat due to damp, corrosion, etc.

In a petrol engine, air and fuel is mixed in the carburettor, and this mixture is sucked into the cylinder on the down-stroke of the piston. It is compressed on the up-stroke and ignited by an electrical spark from the spark-plug. The expanding gases drive the piston down the cylinder again on the "power stroke", and they are then expelled through the exhaust valve as the piston comes up again. The piston has therefore had four "strokes" (two up and two down) for each firing of the cylinder. This method of action is therefore called four-stroke, and is the way that most inboard engines work.

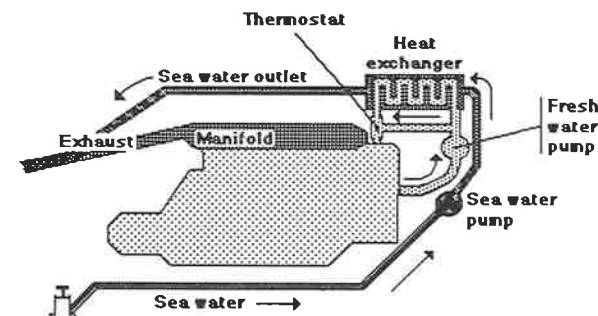
Most outboard engines have a simpler method of operation. The fuel/air mixture is sucked into the cylinder as the piston is being driven down on the power stroke of the previous firing. As the piston comes back up again it expels the burnt gases and at the same time compresses the new fuel/air mixture which is then ignited. This sequence takes only two strokes of the piston (one up and one down) and is called two-stroke. Two stroke engines are much simpler, but are less economical in the use of fuel than four-strokes. They also require lubricating oil to be mixed with the petrol - make sure that you find out the proper mixture for the engine that you use. Too little lubricating oil will cause the engine to seize, and too much will oil up the plug(s) and prevent them from firing.

Diesel engines are heavier and more expensive, but are more reliable in a boat. There is much less to go wrong, they do not depend on electrical ignition for firing and diesel oil is a much smaller fire risk than petrol.

Diesel engines usually operate on the four-stroke method. There is no carburettor. Air only is sucked into the cylinder and is compressed on the up-stroke of the piston. Compression causes the air to heat so much that it ignites a fine spray of diesel fuel which is injected by the "injector" or "atomiser". The amount of fuel that is injected is very carefully metered. The rest of the four-stroke cycle is similar to a petrol engine.

The pressures in a diesel engine are much greater than in a petrol engine and therefore they are much heavier pieces of machinery. The fuel pump which delivers the appropriate "dose" through the injectors is itself a very complex and precision machine. Although it is said above that there is much less to go wrong in a diesel than in a petrol engine, if something does go wrong it may be big and serious - fuel pump and injectors require expert attention.

**Cooling systems** - Both petrol and diesel engines require cooling systems to stop over-heating. This is almost always water cooling - air cooling is extremely rare in a marine engine. The simplest form of cooling is to suck water in from outside, circulate it through the cooling system and then discharge it overboard. Many engines have an enclosed fresh water system with its own pump, which is in turn cooled by an outside system through a "heat exchanger".



Fresh water cooling with heat exchanger

**Propulsion** - The up and down strokes of the piston are transmitted to a crank-shaft by the connecting rods and this turns the drive shaft. The drive shaft goes into the gear-box behind the engine. This provides the connection between the drive shaft and the propeller shaft, and can cause the propeller to rotate forwards or backwards, or can disengage the propeller (neutral).

The propeller shaft passes out through the stern gland, which is a grease packed tube which prevents water leaking in along the shaft. The propeller is mounted on the outer end of the shaft.

Propellers may be right or left handed. A right handed propeller turns clockwise in forward gear when viewed from astern. A left handed propeller turns anti-clockwise. Propellers are described by their diameter and by their "pitch" - i.e. the angle at which the blades are set to cut through the water. Some sailing boats have folding propellers or feathering propellers in order to reduce drag when sailing.

**Twin engines** - More powerful cruisers have two engines. These make the boat very much more manoeuvrable, and there is the added reliability of two independent power units. They are of course more expensive and use more fuel. Most twin-screw boats have outward turning propellers - i.e. the starboard propeller is right-handed and the port is left-handed. Sometimes a motor cruiser may have a main engine, and also a much smaller engine mounted to one side as a reserve - this is usually called a "wing engine". A wing engine may be used for manoeuvring in a harbour and also for battery charging when the main engine is not in use.

**Pre-start checks** - Before starting the engine for the first time each day run through the following check-list.

1. Fuel - check gauge or dip tank.
2. Oil - Check dip-stick.
3. Cooling system - check water level if fresh water cooled.

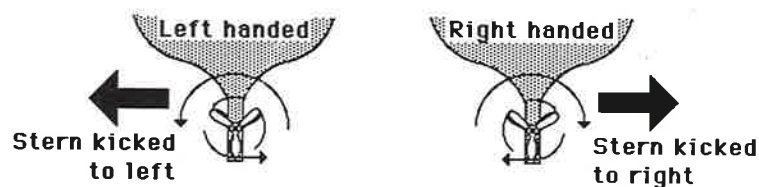
Another check which should be performed every few weeks is the battery acid level.

**Engine starting** - Most engines are started by using a key switch which activates the starter motor. In a petrol engine this also activates the ignition system. In cold weather a diesel engine may require use of the cold-start mechanism - a method of pre-heating the air that is taken in through the air intake. Some engines have to be "swung", and outboard motors have starter cords to pull. When the engine starts, where appropriate check the following -

1. Oil pressure warning light - should go out.
2. Ammeter - should show positive charging.
3. Rev.counter - raise to cruising revs. and then lower to "ticking-over".
4. Exhaust or cooling water outlet - water being expelled.

**Gear boxes** - These may be mechanical or hydraulic. The level of oil in the gear box should be checked occasionally, depending on the type of gear box fitted - consult manufacturer's instructions. The gear lever will have three positions - Forward, neutral and reverse. There is no clutch on a marine engine - just push or pull the lever in the required direction. Never change gear when the engine is revving high - always close the throttle down to operate the gear lever.

**Paddlewheel effect** - A propellor can affect the steering of a boat due to the "transverse thrust", or "paddlewheel effect". The larger the propellor the more marked is this effect. The density of water gradually increases with depth. Therefore the lower blades of a propellor are moving in denser water than the upper blades, and meet more resistance. When going ahead, a right handed propellor's lower blade is going from right to left, and this results in a "kick" of the stern of the boat to the right or starboard. When going astern of course, the stern will be pushed to port. The reverse applies to a left-handed propellor. When going ahead this effect is very easily counteracted by the rudder, but when the engine is put into reverse the effect can be quite marked and can be used to advantage.

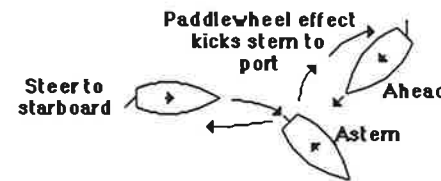


**Turning** - The rudder of a motor boat is usually mounted just behind the propellor and the flow of water gives good positive reaction to rudder movement. When the propellor is stopped the rudder is not as effective. Sailing boats usually have larger rudders than motor boats and thus can manoeuvre more easily without power. Remembering the paddlewheel effect, you can see that a boat with a **right-handed** propellor should turn a little more easily to **port** when in forward gear because the stern is being pushed to starboard. But the paddlewheel effect is more marked in reverse gear - therefore by using reverse you can turn more quickly to **starboard**.

With a right-handed propellor -

1. Steer to starboard
2. Engine ahead
3. Neutral
4. Engine astern
5. Neutral
6. Engine ahead

When the engine runs in reverse, the stern of the boat is pushed to port.



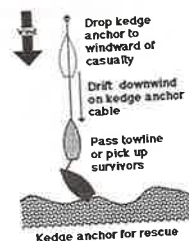
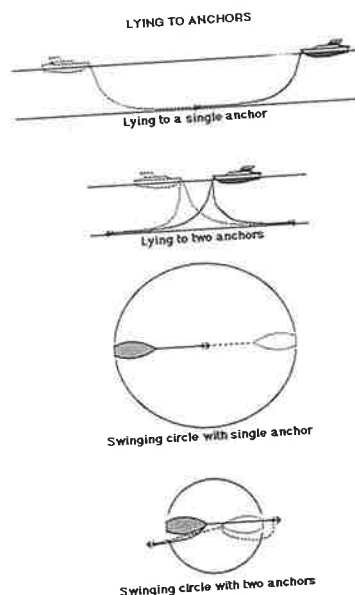
Summary - for smallest turning circle (using ahead, reverse, ahead) - steer to starboard with a right-handed propellor, to port with a left-handed.

**Towing** - Use a strong line and attach it to a strong attachment - i.e. samson post or mooring cleat. Try to tow from the centre line, as an attachment on either quarter will cause difficulty in steering. If you have no centre line attachment and the tow is heavy you should rig up a bridle. Arrange for the towed craft to be steered, if necessary by putting one of your own crew aboard. In bad conditions a tow can be very difficult - both vessels will be surging on waves and the tow-line will come under intermittent severe strain. It may be necessary under some conditions to stream a drogue or sea anchor or a number of long ropes behind the tow in order to control it. In very calm conditions towing is usually without worry, and sometimes towing alongside can be the most suitable method. When towing alongside, the important lines are a diagonal "spring" from the bow of the towing craft to the stern of the tow, and a bow breast rope. The spring is the real tow-line and the bowline keeps the bows from separating. The opposite diagonal spring and a stern line are useful to keep the combination stable if much manoeuvring is required. When towing alongside make sure that both boats are well fendered.



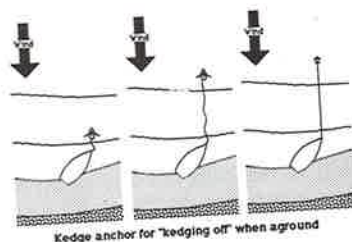
**Kedge anchor** - Any cruising boat, power or sail, should carry at least two anchors. The main, heaviest anchor is called the "bower anchor", and a second, lighter anchor is called a "kedge". The kedge may be used for temporary anchoring in quiet conditions, or as an extra anchor to supplement the bower in strong winds. In a restricted area the use of two anchors will reduce the size of the "swinging circle".

KEDGE ANCHOR

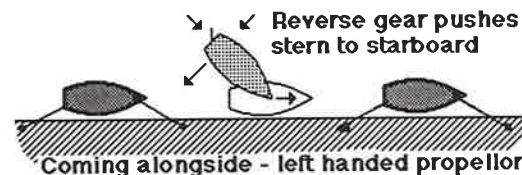


A kedge also has two very important emergency uses. If you are going to the aid of another boat which is in dangerous or shallow waters in which you cannot manoeuvre safely, you can drop your kedge anchor well upwind and then veer out the cable and drop astern towards the other craft. Your kedge will keep you head to wind. You may then be able to get close enough to the casualty to heave a line, perhaps to try a tow, or to bring survivors aboard your own boat. Your "escape route" is via the kedge cable, using manpower pulling the cable, as well as engine.

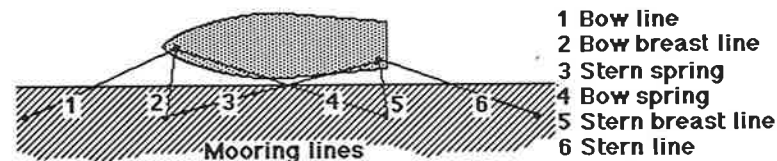
A kedge is also used to "kedge off" when aground. If you go aground on a falling tide, you may be able to get off using the kedge if you move quickly. You can also lay out the kedge while waiting for the rising tide so that you can haul off as soon as you are afloat. This can be very useful especially if there is an onshore wind which would otherwise blow you further in as the tide rose. You should take the kedge into the dinghy, hanging it over the stern. Flake the rope in the bottom of the dinghy in such a way that it runs out freely as you row away from the boat towards deeper water. Drop the anchor at the limit of the scope of the rope.



**Coming alongside** - If possible, come alongside a quay or jetty head to wind or current, whichever is the strongest. Remember the "paddlewheel effect" of the propellor and if you can use it to your advantage, do so, otherwise make allowances for it. If wind or current are not important considerations, try to come alongside on the starboard side if your propellor is left-handed, or port side if right-handed - this means that you can push the stern in to the jetty by using reverse gear.

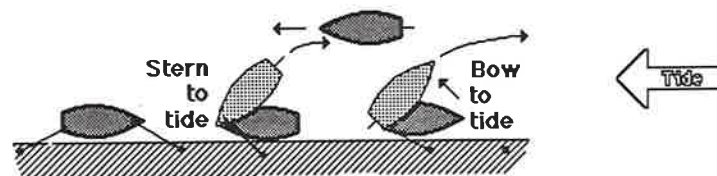


**Tying up** - Use bow and stern lines for short stops. If you are staying for long, especially if tying up to another boat, use bow and stern "springs" also - these will stop surging backward and forward movements and will help keep the boat parallel to the quayside. Bow and stern "breast lines" may also be used, usually temporarily, to keep the boat close in to the jetty. All lines, but especially the breast lines must be carefully watched and adjusted if there is any tidal rise or fall. Don't forget adequate fenders.



Coming alongside another boat is similar to a jetty. It is the duty of the newly arrived boat to provide adequate fendering between the boats. Ask permission to come alongside if there is anyone aboard. Take bow and stern breast lines to the other boat and then springs. You should also take bow and stern lines ashore - it is not fair to have a number of boats all depending on the shore lines of the inner boat of the "raft".

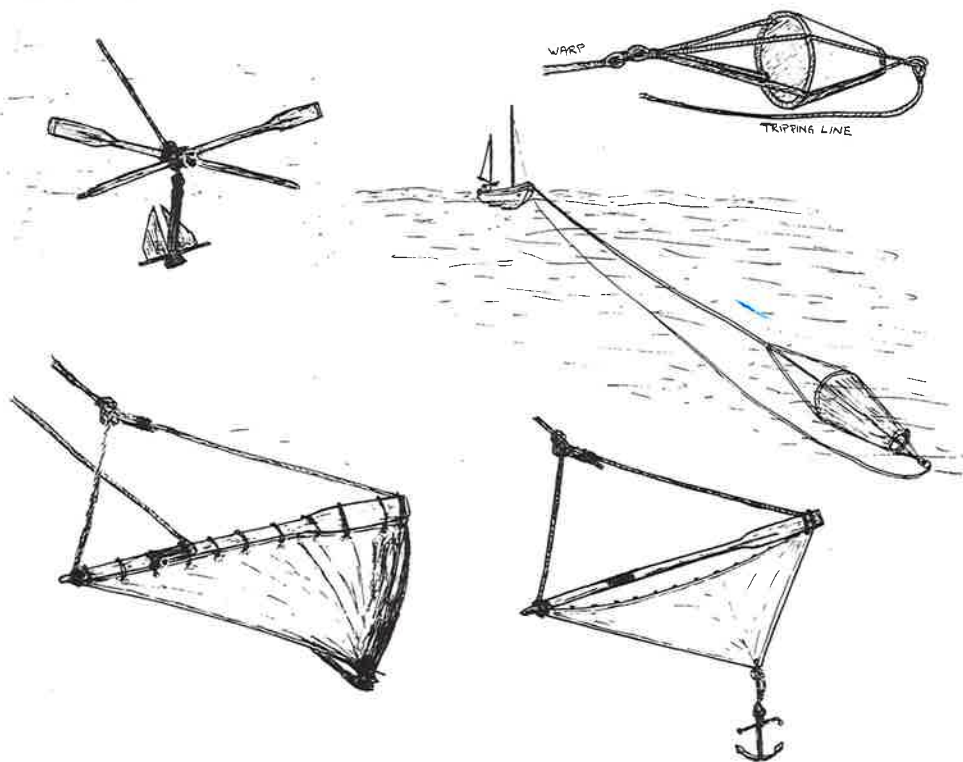
**Casting off** - With the current or strong wind ahead remove all lines except the stern spring. The bow will swing out - be careful of the stern and be ready to use a fender here. Engage forward gear, and as you move forward, cast off the stern spring. The reverse applies if the current or wind is from astern - cast off all lines except the bow spring, let the stern swing out and reverse out.





**11. Whilst afloat make up a form of sea anchor from available materials on the boat, heave-to and understand its use in an emergency.**

This activity may be staged independently, or you may be asked to deal with it during the short journey mentioned in section 9. A sea-anchor is a means of holding your boat head to wind and slowing your down-wind drift. It could be used if you had to stop for some reason, if there was an emergency on board or the weather was bad. A number of different materials may be used to make up a sea-anchor - oars lashed together with a sail suspended underneath by a weight such as an anchor. This would then act as a form of parachute. Streaming out long lines from the bow may help keep the boat head to wind but might not slow you down very much. Trailing a bucket, or a "Drogue" (a form of canvas tube or chute, wide at one end and narrow at the other end - see diagram) will have the same effect. A sea-anchor does not stop you drifting down wind, and if you have to perform this manoeuvre, you must have plenty of sea room and not be too close to a lee shore. If your boat is ketch or yawl rigged, the mizzen sail sheeted in tightly will also help to keep you head to wind.



**12. Take charge of an expedition of 24 hours minimum duration, under sail or power or by pulling boat, of approximately fifteen miles distance, to include a night in camp or sleeping aboard. Some aim or purpose should be attached to the expedition, with evidence of good planning in advance. A report of the journey should be made, including navigational details, tides, weather, etc. If the expedition is undertaken on inland waterways, the report should include full details of two camp sites adjacent to the mooring places in the area.**

This journey is the climax of your Coxswain training and should normally be undertaken in the type of craft, sail or power, in which you have qualified in Section 10. This may not be possible and so a pulling boat or canoes may be used. The plans for your proposed cruise should be submitted beforehand and checked by a competent person. If the cruise is to take place in waters for which you do not possess a Charge Certificate, you must arrange with some Leader who has the appropriate certificate, or another adult with at least equivalent qualification, to accompany you as a passenger. You must still do all the arranging and the planning yourself and your "passenger" will not take part in, or interfere with the organisation in any way. You will be expected to organise your crew properly and delegate various jobs to different people. You must go through the check-list of items mentioned in section 9 of this Badge, and any other matters or items which are considered necessary for the craft which you are to use. Other things to be thought of are:

- Passage planning -  
Correct charts and navigational equipment.  
Tides and tidal streams - plan to use them not to fight them!
- Careful storage of gear and making sure not to overload the boat.
- Latest weather forecast and further outlook.
- Contingency plans, alternative courses, details of shelter or safe moorings.

Before departing on your journey, make sure you tell someone where you are going and what your plans are. Remember when you have arrived at your destination to send a message confirming your safe arrival.

Just before you set out, the very latest weather forecast should again be obtained. You should have no hesitation in cancelling or postponing the expedition, or adopting an alternative plan if the weather conditions so dictate - this is not only wise and prudent, but also good seamanship.

## Passage Planning

A very useful code to remember in relation to boating expeditions is "WATCH IT".

- W - Weather..... Get latest forecast.
- A - Area ..... Course planning, local information.
- T - Tides ..... Look them up and note.
- C - Clothing ..... Adequate, warm and waterproof.
- H - Hazards..... Places and situations to avoid and beware of.
- I - Inventory ..... Check list of gear and spares.
- T - Tell someone ..... Route etc., etc.

The report, or log, of the journey should include text and illustrations. The account may be written in descriptive style, or in "log book" form, with columns for time, course, wind and weather, and general observations including sails carried, use of engine, sea conditions, position fixes, etc. The preamble or introduction to the report should include the expedition planning - route chosen, notes on tides and other passage planning details which were considered before the expedition. Notes on your contingency plans should also be included in the preamble, even though you did not use them. It is suggested that you should write on one side of the page only, leaving the opposite side free for diagrams, sketches, maps or photographs. The "fair" copy will, of course, be written up after this event but a rough log, or Navigator's Notebook, must be kept during the journey.

Log of "Luisal"		Date	6 <sup>th</sup> July	From	Dunloughmore to Carlingford
TIDES	Reference Port	Dublin	Secondary Port	Carlingford	
	Time	Height	Time	Height	
HW	0327	4.1	0307	4.9	
LW	0956	1.0	0940	1.2	
HW	1542	4.3	1602	5.0	
LW	2145	1.1	2150	1.3	
HW					
Time	Log	Course	Wind	Observations sails weather etc	
1100		Var 10° W		Port of Dunloughmore. Mainst & No. 1 jib hoisted	
1115	0	050° M	SW 5	Harken mouth - log gear. Weather fine.	
1200	5	005° M	W 5	Sails - main & No. 1 jib. Course not changed. In flood tide around Bally St. H. & Harold Head. Wind strong. Visibility good.	
1400	13	005° M		Course outside Deland's Gc. inside Lough	
1500	17.9	005° M	W 4	Point 1 mile E of St. Patrick's Is. Skerries.	
1535				Foghorn Blackfoot passed us.	
1600	21.6	005° M	W 4-5	Weather fine. Vis good.	
1725	26.9	320° M	WSW 4		

## Log Books in General:

Since we have discussed the log book for the Coxswain Badge Journey, this may be a good place to recommend that you keep an account of all your boat journeys or expeditions. This could be kept in a good sized, hard covered exercise book and might include not only a detailed log of those journeys for which an account is required, such as the Coxswain Badge Journey, but also shorter versions or summaries of all your water borne activities from the Coxswain's Mate Journey onwards. This would also include many of the short exploratory journeys which you might undertake for the Pilot and Sea Navigator Badges. It may even be worth considering a single log book for all your expeditions, by land and by sea, as well as the challenges for your Chief Scout's Award. This would be an invaluable document and of great interest to you in future years.



## Other Training and Activities;

The general Sea Training Scheme gives a good wide-based level of instruction in Seamanship. If you are interested in going further in any subject, you have the choice of the **Special Proficiency Scheme**. You have already gained the Sail Helmsman or Power Helmsman Badge (or equivalent) by this stage, and probably also the Canoeist Badge. You have also covered many of the requirements for some of the other Special Badges. If you would like to undertake some of these special challenges **THE SEA TRAINING HANDBOOK PART 3** gives a lot more detail on many of these subjects and on other aspects of more advanced seamanship.



### Chief Scout's Award:

During this time you have probably been working towards your Explorer Badge, and perhaps trying for **The Chief Scout's Award**. For this you must write personally to the Chief Scout, giving a detailed account of yourself, your interests and hobbies, your Scout progress, camps attended, Badges obtained etc. The Chief Scout will then send you a series of personal challenges to complete. Since you are a Sea Scout, he will probably include sea activities among these. It is important not only to complete the Chief Scout's challenges, but also to record your achievements in a Log Book. We have already discussed Log Books, mainly in relation to the Coxswain Badge expedition.

The same book could be used to record all your Scout and Sea Training progress - details of Badges passed, with dates, etc. and a summary of all your expeditions and achievements, on land and sea. Many active people do not like to write much, **but very short written notes, with photographs and sketch maps, can be adequate**. You will not be assessed on your writing, or your spelling, but you should try to take some trouble over the presentation - make the log **colourful, interesting and tidy**.

**GOOD LUCK !**



EXPLORER  
SCOUT



CHIEF SCOUT'S  
AWARD

## APPENDIX

This Appendix contains supplementary information useful to you in your training for the Coxswain Badge. The Index is by subject and not by badge requirement.

	Page
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International Code	68
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Inland Waterways of Ireland	74
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## SAIL HELMSMAN

1. Pass the Boatman grade of the general Sea Training Scheme.
2. Have a knowledge of the steering and sailing rules, distress, storm, fog, danger signals, and the Yacht Racing Rules.
3. Have a good knowledge of the parts of a sailing dinghy, including rigging, sails and other gear.
4. Understand the main points of the theory of sailing.
5. Know the main types of anchors and their uses. Know how to choose a good anchorage.
6. Be able to handle small sailing craft properly ashore, and know the different types of trailers and trolleys. Secure a dinghy to a trailer in preparation for transport elsewhere.
7. Prepare a boat for sailing and know the correct gear check.
8. Have a knowledge of buoyancy for sailing craft, and also personal buoyancy aids and life-jackets.
9. Demonstrate proficient helmsmanship by completing the following-
  - a. Sail the boat in any direction on all points of sailing.
  - b. Sail 'to best advantage' a triangular course.
  - c. Demonstrate sailing off a lee-shore.
  - d. Demonstrate picking up a buoy, and coming alongside, in different combinations of wind and tide.
  - e. Demonstrate 'man overboard' drill on different points of the wind.
  - f. Reef the mainsail while afloat.
  - g. Demonstrate capsize drill, with recovery and getting under way again.

Note - I.Y.A. Stage 2 is equivalent.



## POWER HELMSMAN

1. Pass the Boatman grade of the general Sea Training Scheme.
2. Have a detailed knowledge of Steering and Sailing Rules for power and sailing vessels, and have a practical knowledge of local waters, including tides, local hazards and navigation marks.
3. Know the safety precautions necessary in power craft, including the proper use of fire fighting appliances and 'man overboard' drill.
4. Have a knowledge of the elementary principles of a motor boat engine, and by demonstration afloat show -
  - a. Engine starting, operation of gears, understanding the effect of transverse thrust with a single screw.
  - b. Turn circles using reverse gear, control the boat in confined waters and stop the engine when going slow ahead.
  - c. Operate the correct towing procedure, including disposition of crew. Understand the use of a kedge anchor in an emergency.
  - d. Recognise minor faults in an engine, in relation to compression, ignition, battery and charging system, fuel supply and filters, water intake and exhaust outlet.
5. Take charge of a small crew and prepare the boat for service, to include the provision of all equipment. Supervise checking the engine, fuel and pump.
  - a. Demonstrate correct mooring and casting-off, with tide or current ahead at first, and then astern, making correct use of mooring ropes and springs.
  - b. Demonstrate ability to steer a compass course correctly. Anchor properly and then weigh anchor.
6. Take charge of a motor-boat and crew in a rescue exercise. Manoeuvre correctly alongside a 'stranded craft' and take a 'casualty' aboard. Also pick up another 'survivor' from the water. Carry out the whole exercise efficiently, and demonstrate proper use of crew.



The **Sea Scout Standard Boat ("BP 18")** was specifically designed as a multi-purpose boat for Sea Scouts by Mr. Kevin MacLavery M.R.I.N.A. It can be rowed with 2, 4 or 6 oars, and the various rowing configurations are shown in Handbook Part 1. It has now become well established in Sea Scouting in Ireland, and is used for general training in rowing and sailing, in competitions and for waterborne expeditions and journeys. It is also used by An Slua Muirí (Naval Reserve).

The standard sailing rig is a Bermudan Ketch, with the jib and mainsail being the same size as those of a G.P.14 - a diagram is shown on the opposite page. However some experiments are being made with other rigs and a couple of examples are also shown here.

#### Details and Specifications

**LOA:** 18' 1.5" 5.52m

**LWL:** 15' 0" 4.57m

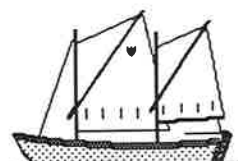
**BEAM:** 6' 2" 1.88m

**DRAFT:** 1' 2" 0.35m

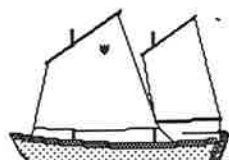
**HULL:** Moulded GRP with timber topstrake, keel and bilge protection, and rudder.

**RIG:** Bermudan ketch.  
Sail Area - 1200 sq.ft., 111.5 sq.m.

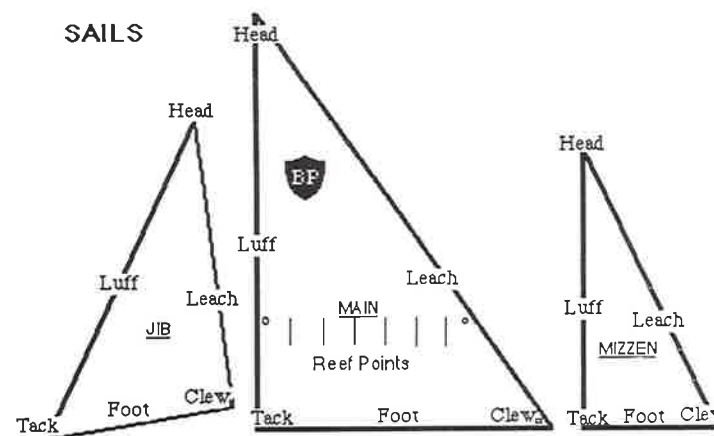
#### Suggestions for Alternative Rigs:



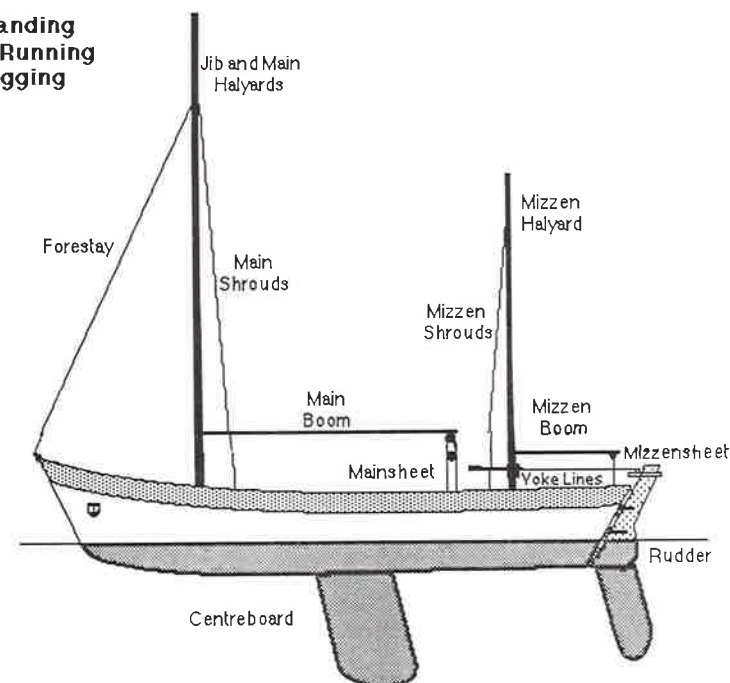
SPRITSAIL RIG



LUGSAIL RIG



#### Standing and Running Rigging



# MORSE CODE

A ■■■

B ■■■ ■■■

C ■■■ ■■■ ■

D ■■■ ■■

E ■

F ■■ ■■■ ■

G ■■■ ■■■ ■

H ■■■ ■■

I ■■

J ■ ■■■ ■■■ ■■■

K ■■■ ■■■

L ■ ■■■ ■■

M ■■■ ■■■

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5 ■ ■■■ ■■■ ■■■ ■■■

6 ■ ■■■ ■■■ ■■■ ■■■

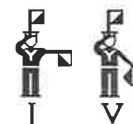
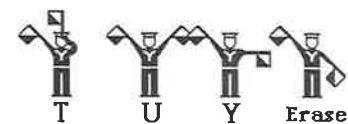
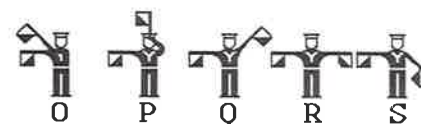
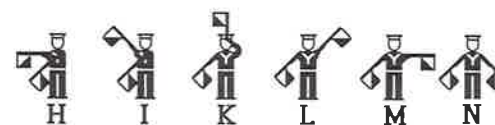
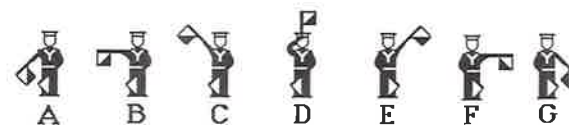
7 ■ ■■■ ■■■ ■■■ ■■■

8 ■ ■■■ ■■■ ■■■ ■■■

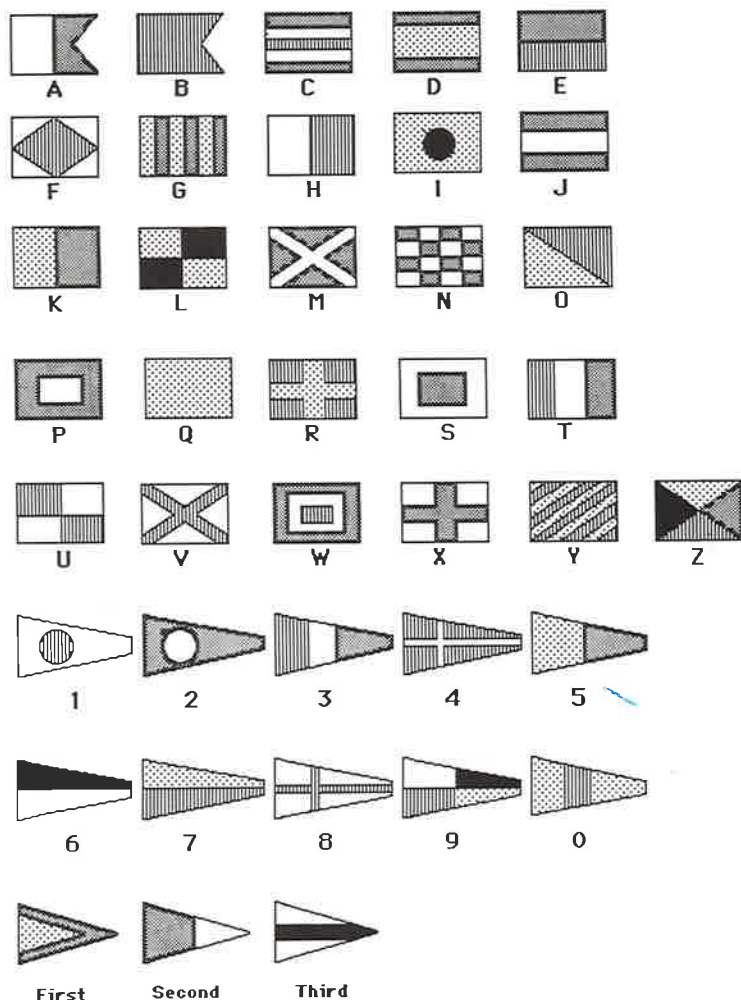
9 ■ ■■■ ■■■ ■■■ ■■■

0 ■ ■■■ ■■■ ■■■ ■■■

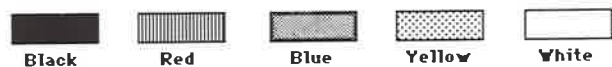
# SEMAPHORE



## INTERNATIONAL CODE FLAGS



## SUBSTITUTES



## INTERNATIONAL CODE FLAGS

### SINGLE LETTER MEANINGS

The single letter meanings of the Code Flags are those which are the most urgent or those which are used most often. These signals may also be made in Morse Code, using either light or sound (but when sound is used, some signals may only be made in accordance with the International Regulations for Preventing Collisions at Sea).

- A - I have a diver down; keep well clear at slow speed.
- B - I am taking in, or discharging or carrying dangerous goods.
- C - "Yes", 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. When made by fishing vessel - "I am hauling nets".
- H - I have a pilot on board.
- I - I am altering my course to port.
- J - I am on fire and have dangerous cargo on board: keep well clear.
- K - I wish to communicate with you.
- L - You should stop your vessel instantly.
- M - My vessel is stopped and making no way through the water.
- N - "No", negative.
- O - Man overboard.
- P - (In harbour) - The vessel is about to proceed to sea.  
(At sea, by fishing vessel) - My nets have come fast on an obstruction.
- Q - My vessel is healthy and I request free pratique (Customs clearance).
- R - (No meaning allocated).
- S - I am operating stern propulsion.
- T - Keep clear, I am engaged in pair trawling.
- 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. When made by a fishing vessel - I am shooting nets.

Code Flags are traditionally used for decoration, and this may be the commonest use of the flags that you have seen. They are also used in yacht racing but will not have the meanings given above. Each Class in a regatta is allocated a flag. The class flag is hoisted as a warning to that class that their race will start in a specified time (e.g. 10 mins.). Flag P is hoisted usually 5 mins. before the start. Both flag P and the class flag are lowered smartly as the signal for the start. A gun is usually fired each time to call attention to these flags **but the flag is the actual signal**. Other designated flags may be used for recall, changes in course, etc.

The Code Flags may also be used for special Scout signals - details of these will be found in the **Signalling Handbook**.

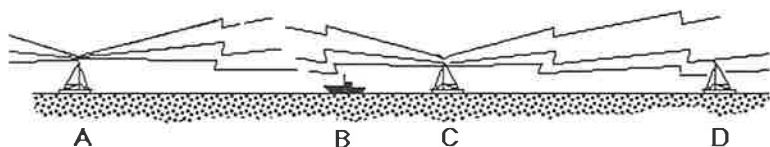
## MARINE VHF RADIO

These notes are not intended to be complete. They will give you some background information about Marine VHF, but are not sufficient for the Restricted Certificate of Competence in Radiotelephony. Those interested in gaining the Certificate will find further information in the **Signalling Handbook**.

**Marine VHF.** The International Maritime Band in VHF is divided into a number of "Channels". You will **not** be expected to know about all the channels but you should know about the most important ones. Also you do **not** have to learn the various frequencies. The Marine Band originally had 28 Channels, labelled 1 to 28. Later improvements in technology increased the number of Channels that could be accommodated in the Band - an extra channel could be fitted in between each of the original ones. But Channels 1 to 28 were already well established and could not be renumbered without a lot of trouble and confusion, and the numbers 29 to 59 inclusive had already been allocated to other uses outside the International Band. Therefore the new channels were numbered from 60 to 88. This is the reason for the strange arrangement of channel numbers - e.g. channel 61 comes between channels 1 and 2 in terms of frequency, and channel 71 comes between 11 and 12. there are thus fifty seven channels in the Marine Band.

**Characteristics of VHF** VHF radio is quite short ranged. It is usually described as being "line of sight", but under certain conditions much greater distances can be obtained. The range is therefore influenced by the height of the aerial, and also by the type of aerial. Ship to ship range is probably about 25 miles, provided that the aerials and cables are efficient.

Another characteristic is the so called "capture" effect. If two stations are transmitting simultaneously a third (receiving) station will hear only one of them, and not a jumble of both. This means much less distortion or background noise, but a more powerful or nearer station may wipe out the signals of another station. For example, vessel **A** might be talking to vessel **B**. Vessel **C** is much nearer **B** but being out of range of **A**, hears nothing and starts to transmit to **D**. This "captures" **B**'s reception thus wiping out reception of **A**'s signal.



### Priority of Calls

1. Distress - "MAYDAY" - Imminent danger; immediate assistance requested.
2. Urgency - "PAN-PAN" - Urgent message about safety of ship or person.
3. Safety - "SÉCURITÉ" - Important navigational or meteorological warning.
4. Ship-to-shore, ship-to-ship, etc.

## Channel Allocation.

### 1 Distress, Safety and Calling Channel - Channel 16 (156.800 MHz)

This is used for distress and emergency and also calling and making initial contact with other ships or shore stations. Communication is switched to a "working channel" as soon as contact has been made. When distress traffic is in progress channel 16 may not be used by any station not involved in or helping to deal with the distress. The two channels on each side of 16 (75 and 76) are called "Guard Bands" and are not available - this is to prevent possible interference with Channel 16.

2 Intership Channels. The primary intership channel is 6. Other exclusive intership channels are 8, 10, 72, 77. Other channels are also designated as intership but may also have another function also - e.g. Ch. 13 may be used for port operations, and Ch. 67 for "small boat safety".

3 Port Operations and Ship Movement Channels. Used by port and harbour radio stations to control ship movements, pilot cutters, tugs, etc. The commonest are 12 and 14. Others used are 9, 11, 13, 62, 71.

4 Public Correspondence. - Used by Coast Radio Stations for telephone calls, radio telegrams, navigational warnings, weather forecasts, etc. The most commonly used are 01 to 05, 24 to 28, 60 to 65, 84 to 88 inclusive.

**Note** - Marina Channel. Channel 37 (or Channel M.) is a special channel outside the Marine Band, allocated for communication between yachts and marinas or clubs between Committee boat and rescue boats in a regatta, etc.

## Transmission Rules

The following are strictly forbidden -

1. Transmissions not authorised by the Master or other person in charge.
2. Operation by unauthorised person - unlicensed person may use under supervision.
3. Transmission of false or deceptive distress, safety or identification signal.
4. Transmissions made without proper identification (ship's name or call-sign).
5. Use of first names or other unauthorised identification.
6. Closing down before finishing all operations following distress, urgency or safety call.
7. "Broadcasting" messages or programmes, except safety messages, to "All Ships".
8. Unnecessary transmission or superfluous signals.
9. Transmission of profane, indecent or obscene language.
10. Use of frequencies or channels other than those covered by the Ship's Licence.
11. Broadcast transmission of music.

## Phonetic Alphabet

Alpha	Foxtrot	Kilo	Papa	Uniform
Bravo	Golf	Lima	Quebec	Victor
Charlie	Hotel	Mike	Romeo	Whiskey
Delta	India	November	Sierra	X-Ray
Echo	Juliett	Oscar	Tango	Yankee
				Zulu



## Using VHF

1. Make sure that the set is switched on.
2. Adjust the "Squelch" control until the back-ground hissing noise just disappears.
3. Check power output button. High power is 25 watts. Use low power (1 watt) when close to the station that you are calling.
4. If there is a "Dual Watch" button, this facility enables you to maintain a listening watch on channel 16 and one other channel. In some sets the Dual Watch prevents transmission when it is switched on - in this case therefore make sure that it is switched off when you wish to transmit.
5. Some sets have a Channel 16 override button. This enables direct switching to Channel 16, and must not be confused with Dual Watch.

## Calling Procedure

1. Select the required channel - usually Channel 16 for calling.
2. Before transmitting, listen on chosen channel - do not transmit if in use.
3. Press the transmit switch on the microphone before you speak.
4. Say the name of the vessel or station that you are calling twice or three times.
5. Identify yourself - **"This is...."**(vessel's name, twice or three times). Note that it is illegal not to identify yourself.
6. At the end of each transmission say **"Over"**. This indicates that you expect the other station to reply. **Note** - It is unnecessary to add such sentences as "Do you receive me?", "How do you read?", etc.
7. Release the transmission button.

The station which has been called then replies in the same format, nominates a working channel and says **"Over"**. If you accept the nominated working channel you say **"Roger, Channel....."**(repeating the number), if not you suggest another. Both stations then change to the working channel and the call-up procedure is repeated again to establish contact on the new channel. Thereafter it is not necessary to keep on repeating names before each transmission, but the word "Over" should be used at the end of each transmission.

When communication is finished, and you do not expect any further reply, use the word **"Out"**. It is incorrect to say "Over and out". Unless there is any special reason to continue listening to the working channel, you should then switch back to Channel 16, or switch on the dual watch.

## Voice technique

1. Speak directly into the microphone, held a few inches in front of your mouth.
2. Pitch your voice slightly higher than normal.
3. Don't drop your voice at the end of a word or phrase.
4. Speak clearly, and don't slur words.
5. Speak slightly more slowly than normal.
6. Use the **standard phonetic alphabet** for call-signs, alphabetical abbreviations and for spelling out words.

## Examples of special calls on VHF

### 1 Distress

#### **MAYDAY, MAYDAY, MAYDAY**

**This is.....**(Name of vessel, three times)

**MAYDAY** (once)

Name of vessel (once)

**Distress Message** - Position, Nature of distress, Number of persons on board, Assistance required.

All radio traffic relating to a Mayday incident is prefaced with the word **"Mayday"**. A vessel or station receiving a Mayday call and in a position to help will acknowledge receipt and indicate what help can be provided.

A Mayday message may be relayed by another station not itself in distress by using the "Mayday Relay" procedure -

#### **MAYDAY RELAY** (three times)

**This is .....**(Name of relaying station, three times)

**MAYDAY** (once)

Name of vessel in distress (once)

**Distress Message**

While a distress incident is in progress, stations which are not involved must avoid transmitting on Channel 16. The controlling Station may impose radio silence -

**MAYDAY** (once)

**This is.....**(Name of controlling station)

**SEELONCE MAYDAY**

**Out.**

The words "Seelonce Mayday" are reserved for use by the controlling station. If any other station wishes to impose silence, the words "Seelonce Distress" should be used. When distress traffic has ceased the controlling station must let all stations know that normal radio working may be resumed - The words "Seelonce Feenee" are used.

### 2 Urgency

#### **PAN-PAN, PAN-PAN, PAN-PAN**

**All stations** (three times) - or a specific station may be called

**This is.....**(Name of vessel or station, three times)

**Urgent message** - Position, Nature of urgency, etc.

### 3 Safety

#### **SÉCURITÉ, SÉCURITÉ, SÉCURITÉ**

**All stations** (three times)

**This is .....**(Name of vessel or station, three times)

**For Navigational Warning** (or other Safety message) **listen on Channel.....**(working channel given). The message will then be given on the working channel.

## INLAND WATERWAYS OF IRELAND

- 1. Shannon Navigation** - Canalised river - Battlebridge to Limerick - 128 miles.

Locks - Main line - 6 Boyle River - 1.

Connections - 1. The sea via Shannon Estuary at Limerick

## 2. Grand Canal at Shannon Harbour

Authority - Office of Public Works

2. Grand Canal - Still-water canal. Shannon Harbour to Ringsend - 82 miles

Branches - Athy - 28 miles      Naas - 3 miles      Edenderry - 1 mile

Locks - Main line - 44 Naas Branch - 9 Naas Branch - 5

Connections - 1. Shannon Navigation at Shannon Harbour

2. The sea via Dublin Port at Ringsend Docks

### 3. Barrow Navigation at Athy

Authority - Office of Public Works.

- ### 3. Barrow Navigation - Canalised river - Athy to St. Mullins - 41 miles

Locks - 23

Connections - 1. Grand Canal at Athy

2. The sea via tidal R. Barrow and Waterford Harbour

Authority - Office of Public Works.

4. Corrib Navigation - Lake and river. Head of Lough Corrib to Galway.

Locks - 2 in Eglinton Canal - canal no longer passable.

Connections - Isolated since canal closed

Authority - Lough Corrib Navigation Trustees

- 5. Lower Bann Navigation** - Canalised river. Toomebridge to Coleraine - 32 miles.

Locks - 5

Connections - 1. Lough Neagh      2. The sea via Coleraine Estuary.

Authority - Northern Ireland Ministry of Finance.

- 6. Erne Navigation** - River and lakes. Belturbet to Belleek - 52 miles.

Locks - nil.

Connections - isolated. Canals to Shannon and L. Neagh derelict.

Authority - Northern Ireland Ministry of Finance - L. Erne Drainage and Developement.

No navigation authority in the Republic.

7. **Royal Canal** - Still-water canal. River Shannon to Dublin Port - 90 miles.

Locks - 47

Connections - 1. Shannon Navigation at Cloondra

2. The sea at Dublin port

Authority - Office of Public Works.

**Note** - At present this canal is closed to navigation, and is derelict in places. However volunteer labour has restored certain sections, and the campaign to restore the whole canal is continuing.

## INLAND WATERWAYS OF IRELAND





LIFEBOATS

47ft Tyne

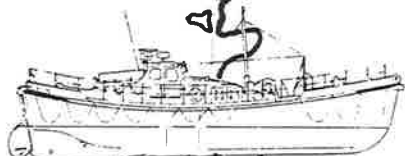
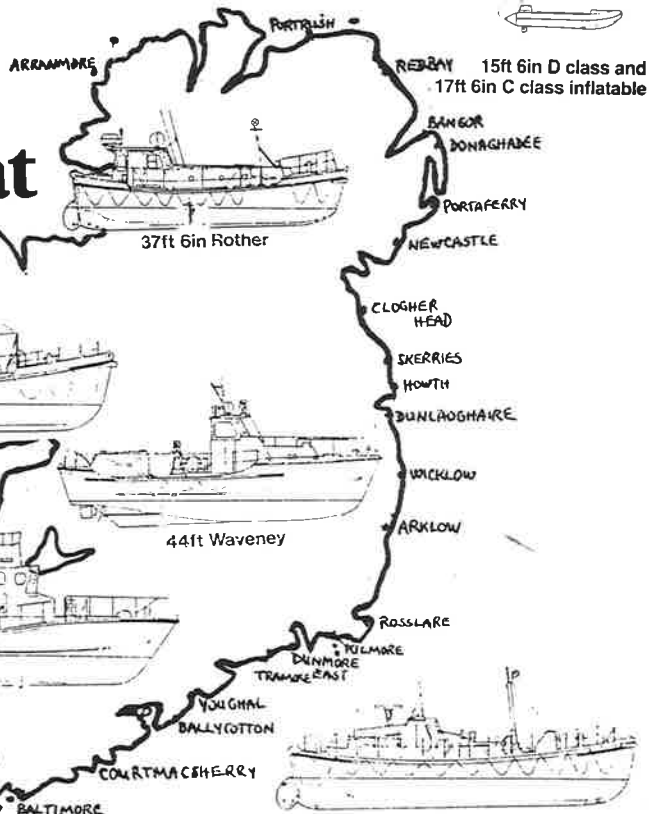


37ft Oakley

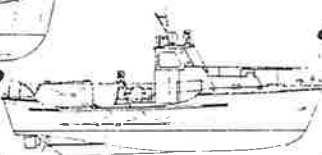


RNLI IRELAND

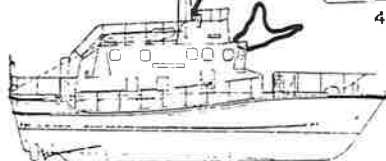
# Lifeboat Institution



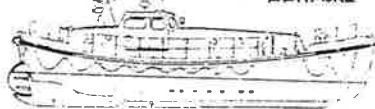
52ft Barnett  
GALWAY BAY



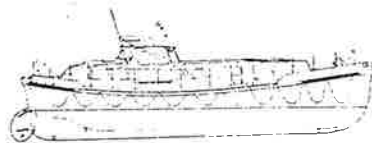
44ft Waveney



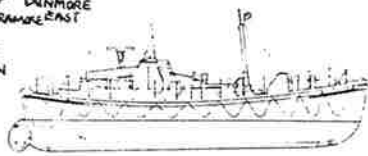
48ft 6in Oakley



Atlantic 21



47ft Watson

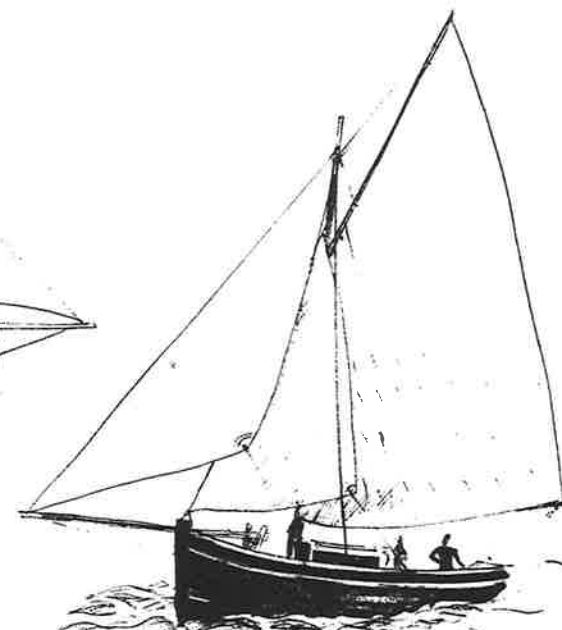


42ft Watson

## IRISH TRADITIONAL SAILING AND ROWING CRAFT



PÚÁN



GALWAY HOOKER  
— BÁC MÓR



ARKLOW COT  
WITH SPRITSAIL



CURRACH



WEXFORD COT  
GUNTER RIG  
NOTE SHORT IRON BOWSPRIT.

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