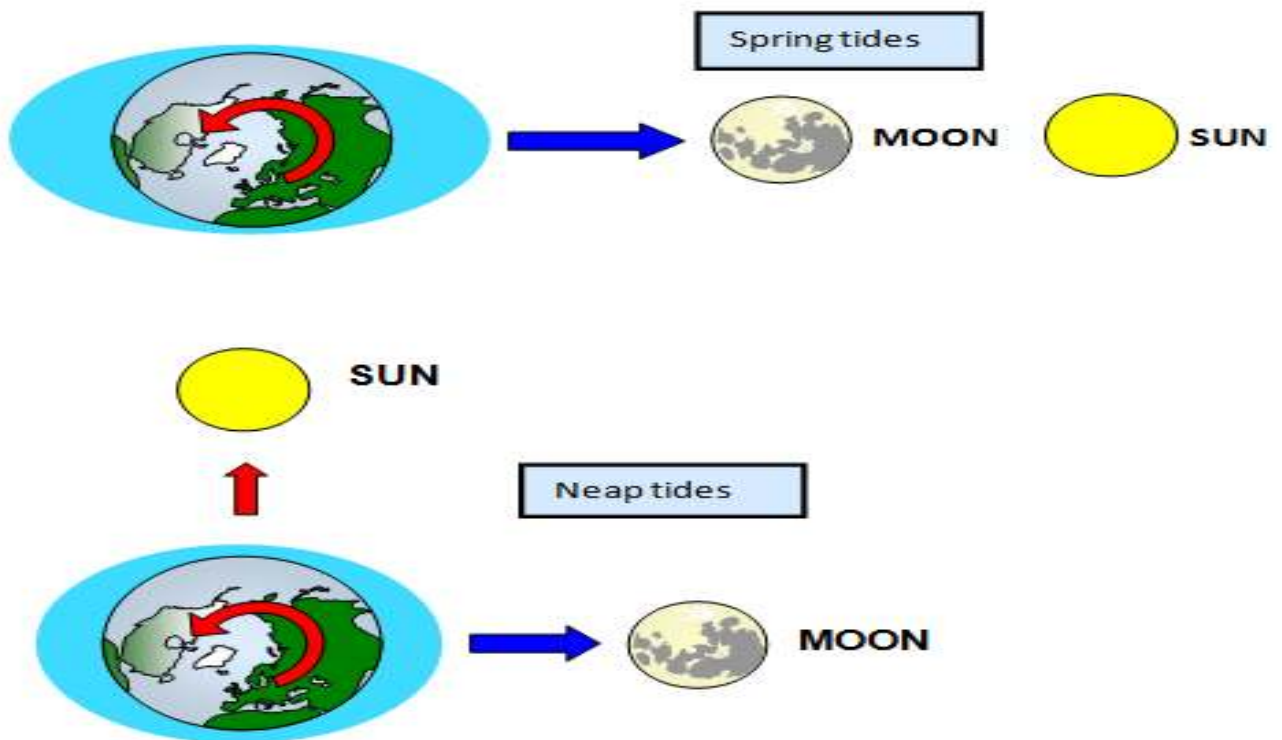


## SPRING AND NEAP TIDES:

Spring and neap tides are periodic motions of the sea which are gauged by the sun and the moons gravitational forces on the waters of the earth.

1. Spring tides occur at new- and full moon when these forces combine.
2. Neap tide occurs when the moon and the sun are at right angles to one another. This is at first and third- quarter.

This becomes very important when launching or beaching over a sandbank or shallow reef.



1. There are 28 moon days in a month.
2. 6 Hours between a high water and low water
3. 12 hours between two lows and two highs.

## CHAPTER 7

### CHARTWORK:

In this lesson we will learn about map reading, the magnetic compass and buoys. These are all important when planning a voyage and cruising in areas, like harbors, where buoys give you passage information.

### THE MAGNETIC COMPASS:

Despite the modern tendency to rely heavily on Electronic Navigational Aids (ENA), the magnetic compass is still very important for safely navigating a boat. Whether steering a course out of sight of landmarks or in poor visibility, the magnetic compass is the primary tool for guiding the boat to its destination.

The magnetic compass is standard equipment on all boats. Mechanically, it is a simple piece of equipment. The magnetic compass is used to determine the boat's heading. A prudent mariner will check its accuracy frequently realizing that the magnetic compass is influenced, not only by the earth's magnetic field (Variation), but also by fields radiating from magnetic materials aboard the boat (Deviation). It is also subject to error caused by violent movement as might be encountered in heavy weather.

The arc of the compass card is divided into 360° and is numbered all the way around the card from 000° through 359° in a clockwise direction. Attached to the compass card is a magnet that aligns itself with the magnetic field around it. The zero (north) on the compass card is in line with the magnet or needle attached to the card. When the boat turns, the needle continues to align itself with the magnetic field. This means the compass card stays stationary and the boat turns around it.

**The lubber's line** is a line or mark scribed on the compass housing to indicate the direction in which the boat is heading. The compass is mounted on the boat with the lubber's line on the boat's center line and parallel to its keel.

Direction is measured clockwise from 000° to 359°. When speaking of degrees in giving course or heading, three digits should always be used, such as 270° or 057°. The heading of 360° is always referred to or spoken as 000°.

Directions measured on a chart are in true degrees or magnetic degrees as follows:

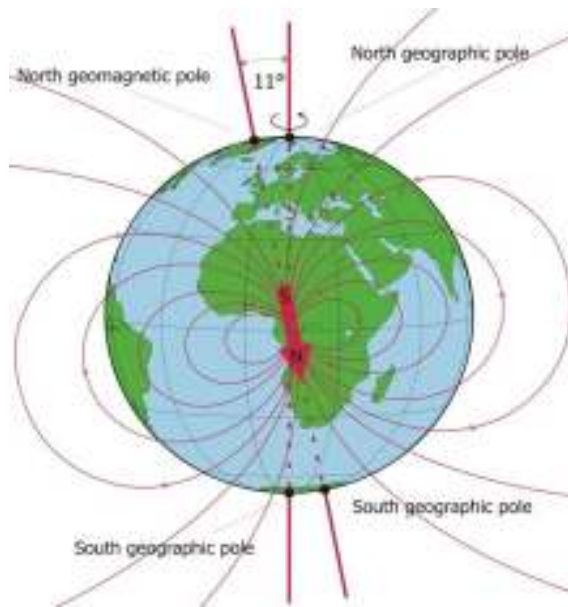
True direction uses the North Pole as a reference point.

- Magnetic direction uses the magnetic North Pole as a reference point.
- True direction differs from magnetic direction by variation.

Directions steered on the compass by the boat are **magnetic degrees**.

#### **TRUE and MAGNETIC NORTH:**

The true North Pole and the Magnetic North Pole are not in the same place. Since they are offset from each other there are two different angular measurements we can use. Our choice depends on what type of navigation we are doing. In celestial navigation we would use true north but for navigating around the bay or between islands we'd probably use magnetic north. Magnetic has an advantage because our magnetic compass aligns itself with this field. However, we will still need to be aware of true north. It is good practice to stick with one or the other and label them correctly when plotting a course on a nautical chart. If we wanted to sail a compass heading of 035°, we could use a capital 'M' after it to indicate it is magnetic.



## COMPASS ROSE:

The compass rose will be found on all navigational maps.

The outer rose (circle). This represents true bearings on the chart where '0', at the top of the rose, always points to true north. True north is often represented by a star icon, a symbol of the North Star, also known as Polaris. True north represents the axis about which the Earth rotates on a daily basis. A line drawn through '0' and '180' will always point to the north and south poles. A line drawn through '270' and '90' will always point east and west and be parallel to lines of latitude on the chart.

The inner rose (circle). This represents magnetic bearings on the chart where '0', in the upper part of the rose, points to the magnetic north pole at the time the chart was printed. Since the magnetic poles are moving and shifting we need a way to be able to update the chart to know where the magnetic pole is now. This is accomplished by reading the inside of the rose where an annual increase or decrease is written. In the above rose we can see that 23' (the slash after the 23 represents minutes of degrees) must be added to the variation every year after 2015 in order to be accurate.

**Variation:** This is the difference, in degrees, between true and magnetic. Variation can be east or west. On the above compass rose we can calculate the variation visually by drawing a straight line, starting from the center then going through the inner rose and continuing across the outer rose. The difference between the two is variation. We can also read, inside the rose, the variation (abbreviated VAR) in 2015 for this chart is  $26^{\circ} 21'$  west

**Deviation:** Is stated the same way as variation; that is, by degrees east or west. Deviation is not as simple as variation however since deviation can and does change on different compass headings. We would normally have a deviation table made up for our ship's compass so that we would know how much deviation there is on any given heading. A quick and easy way to check to see if our compass has any error is by comparing its reading with that of a hand bearing compass. If we take the hand bearing compass to a different part of the boat with no interference and then take simultaneous readings on the same object we should get a pretty good idea of the amount of error we have.

**Converting between. (true, magnetic, and compass).**

There are times when we need to convert bearings and headings from true to magnetic or magnetic to compass. For instance, the set of a current is always given in degrees true. This is because, as you will recall, magnetic headings change over time whereas true bearings never change. Also, we may have a significant compass error (deviation) and need to correct for that.

The easiest way to convert between true, magnetic, and compass is mathematically by adding or subtracting the appropriate amount. For example, if we are sailing where the above illustrated compass rose is accurate, assuming no compass error, and our goal is to sail true north this is the way we would figure out the appropriate compass heading to sail: True north is  $0^{\circ}$  and the variation is  $26^{\circ}$  west (we round it off to the nearest whole degree) then the magnetic heading to sail would be  $0^{\circ} + 26^{\circ} = 26^{\circ}$ . So, we would sail a compass heading of  $26^{\circ}$ . Or, more appropriately we would round  $26^{\circ}$  to the nearest  $5^{\circ}$  increment and sail that course as our ship's compass is graduated in  $5^{\circ}$  increments. The rule is: when we are converting from true to magnetic we add

west variation but subtract east variation. You can verify this by drawing a line; Start from the center of the rose and continue out through true north then simply read off the magnetic heading number the line crosses over.

**Example:**

We have drawn a route on the map which is 49° True North. By using the above compass rose and a deviation of 2°W, we need to calculate the compass bearing.

**Calculate the Variation.**

For calculations from True North to Magnetic compass you must add west and subtract east of both Deviation and Variation

From Magnetic North to True North you must add east and subtract west

The compass rose states that the variation in 2015 was 26 degrees west. It further states that the variation decreases with 23 minutes per annum.

2015 Variation in minutes to variation in 2020 =  $[(23' * 5) / 60'] + 26° = 27° 9'W$

2020 Variation = 27°9'W

Calculate the Magnetic Bearing for the compass – > 49 degrees + 27°9' -> 76°9'

Add 2°W Deviation. You will thus cruise on a compass reading of 78°9' to reach your destination.

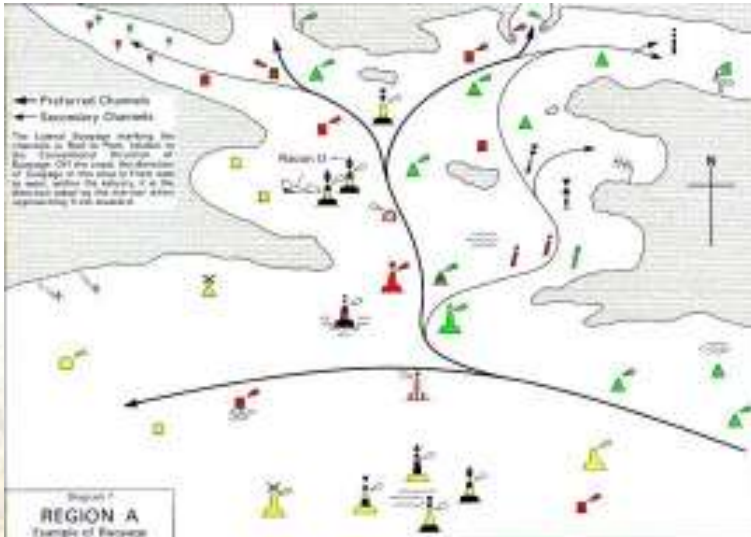
**Buoys:**

Buoys are important to know, especially if you intend to have a sea license, or when you are going to skip your boat in a harbor. Keep a copy of the buoys on your vessel and revise them when you attend to go in an area where they are in use

**Port Hand and Starboard buoys:**

Port hand buoys, red in color. They can be shaped as Cans, Spars and pillars.

Starboard hand buoys are green in color and can be shaped as Conical, Spars and pillars.



#### Red port hand buoys:

- marks the port (left) side of a channel or the location of a danger and must be kept on the port (left) side of a pleasure craft when proceeding in the upstream direction from the sea;
- it is colored red;
- displays identification letter(s) and odd number(s);
- if it carries a top mark, the top mark is a single red cylinder;
- if it carries a light, the light is red and is a flashing (FI) 4 s or quick flashing (Q) 1 s;
- if the buoy does not carry a light, it has a flat top.

#### Green starboard hand buoys:

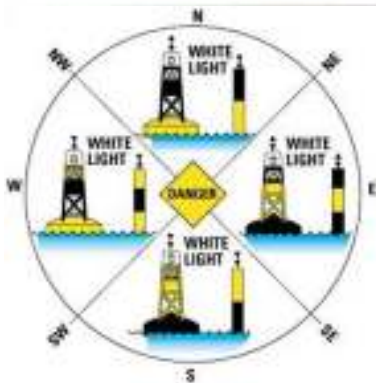
- Marks the starboard (right) side of a channel or the location of a danger and must be kept on the starboard (right) side of a pleasure craft when proceeding in the upstream direction from the sea;
- It is colored green;
- Displays identification letter(s) and even number(s);
- If it carries a top mark, the top mark is a single green cone, pointing upward;

- If it carries a light, the light is green and is a flashing (F1) 4s or quick flashing (Q) 1 s;
- If the buoy does not carry a light, it has a pointed top.

### Cardinal buoys:

There are four types of cardinal buoys: north, south, west and east. Cardinal buoys are used to indicate the direction of the safest waters. A north cardinal buoy indicates that the deepest or safest water exists to the north of the buoy. The vessel must travel north past the north buoy; in this way, the buoy is between the hazard and the craft. The same principles apply to all of the cardinal buoys. For more details on the hazard indicated by the buoy, a nautical chart must be consulted; the buoyage system is therefore used in tandem with nautical charts.

There are two ways to distinguish among cardinal buoys: by color and by the shape of their conical top marks. The direction of the point indicates the type of cardinal buoy. Accordingly, the cones on a north cardinal buoy point north, and on a south cardinal buoy, point south.



#### North Cardinal Buoy North Cardinal Buoy

A north cardinal buoy is located so that the safest water exists to the north of it

It is colored black and yellow

The top half is painted black indicating that it is a north buoy...the lower half is painted yellow

If this buoy does not carry a light, it will be spar shaped

If it carries a top mark...they will both point upwards to indicate north





**North Cardinal buoy.**

### South Cardinal Buoy

- A south cardinal buoy indicates that the safest water exists to the south of it.
  - It is coloured black and yellow
  - The black is positioned on the bottom indicating that it is pointing south...the upper portion is painted yellow
  - If this buoy does not carry a light, it will be spar shaped
- If it carries a top mark...they will both point downward to indicate south



**South Cardinal buoy.**

### East Cardinal Buoy

- An east cardinal buoy is located to indicate that the safest water exists to the east of it
- It is colored black and yellow
- The black is positioned on the top and the bottom with the yellow portion in the middle to indicate that it is an east buoy
- If this buoy does not carry a light, it shall be spar shaped
- If it carries a top mark...they will point in opposite directions to indicate that it is an east buoy



**East cardinal buoy.**

### West Cardinal Buoy

- West cardinal buoy is located to indicate that the safest water exists to the west of it.
- It is colored black and yellow

- The black is positioned in the Centre to indicate that it is a west buoy...the yellow is positioned top and bottom.
  - If this buoy does not carry a light, it shape be spar shaped
- If it carries a top mark...they will point in towards each other to indicate that it is a west buoy



**West Cardinal Buoy.**

### **Signals:**

Sound signals are called “blasts”. There are two different blasts used for warning and steering signals.

- Short blast – Lasts about one second
  - Prolonged blast – Lasts from four to six seconds
1. One short blast - means I am going to pass you on your starboard side, my Port side.
  2. Two short blasts - means I am going to pass you on your port side, my Starboard side
  3. Three short blasts - means you are operating astern (reverse), for example you are backing away from the dock or jetty, or backing up to give him space to maneuver.
  4. Five short blasts is the DANGER signal. You are not familiar with his intentions.
  5. One Prolonged blast – means you are leaving dock or slipway. You are getting underway. Can also be used if you are approaching a bend in the river and cannot see oncoming traffic. Also known as the “blind man signal”
  6. One Prolonged blast with three short blasts – means you are underway and leaving dock or slipway by backing up (reverse)

## CHAPTER 08

### ABBREVIATIONS, PHONETIC ALPHABETH, KNOT'S, SAFETY ITEMS FOR YOUR VESSEL.

#### Abbreviations

RSA: Republic of South Africa.

SAMSA: South African Maritime Safety Authority.

COF: Certificate of Fitness, ( Water worthy certificate )

COC: Certificate of Competence. (Skippers ticket).

CPR: Cardio Pulmonary Resuscitation.

Kg: Kilograms.

cm. Centimeters.

m: Meter.

mm: Millimeters.

ml: Milliliters

RPM: Revolutions per minute.

MHz: Megahertz.

#### Phonetic Alphabet

**A - alpha**

**B - bravo**

**C - charlie**

**D - delta**

**E - echo**

**F - foxtrot**

**G - golf**

**H - hotel**

**I - india**

**J - juliet**

**K - kilo**

**L - lima**

**M - mike**

**N - november**

**O - oscar**

**P - papa**

**Q - quebec**

**R - romeo**

**S - sierra**

**T - tango**

**U - uniform**

**V - victor**

**W - whiskey**

**X - x-ray**

**Y - yankee**

**Z - zulu**

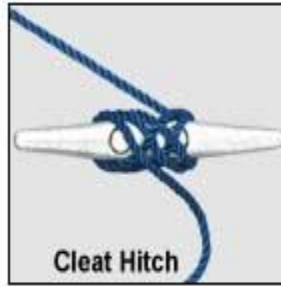
## Grog's Index of Boating Knots



Bowline



Round Turn and  
Two Half Hitches



Cleat Hitch



Rolling Hitch



Anchor Hitch



Buntline Hitch



Constrictor Knot



Bowline on a Bight



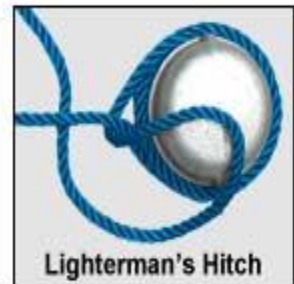
Rat-Tail  
Stopper



Ashley Stopper Knot



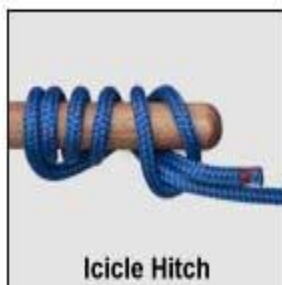
Running Bowline



Lighterman's Hitch



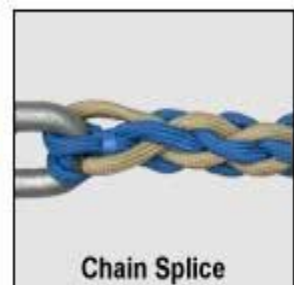
Carrick Bend



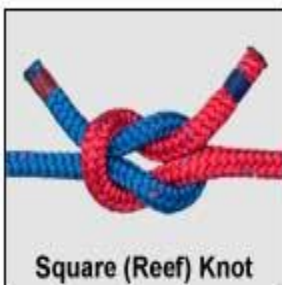
Icicle Hitch



Eye Splice



Chain Splice



Square (Reef) Knot



Sheet Bend

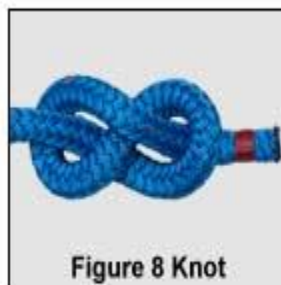


Figure 8 Knot



Clove Hitch

### FISHERMAN'S KNOT:

STEP ONE:



STEP TWO:



STEP THREE:



STEP FOUR:



STEP FIVE:



**MOSSY OAK**



### BLOOD KNOT:

STEP ONE:



STEP TWO:



STEP THREE:



STEP FOUR:



**MOSSY OAK**

## PALOMAR KNOT:

STEP ONE:



STEP TWO:



STEP THREE:



STEP FOUR:



**MOSSY OAK**

## SNELL KNOT:

STEP ONE:



STEP TWO:



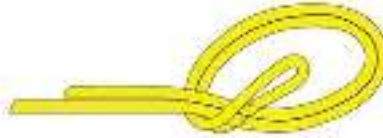
STEP THREE:



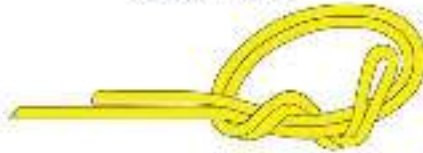
**MOSSY OAK**

## SURGEON'S LOOP KNOT:

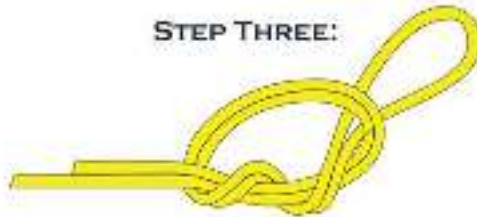
STEP ONE:



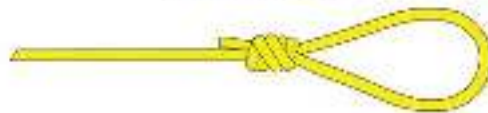
STEP TWO:



STEP THREE:



STEP FOUR:



**MOSSY OAK**



**EMERGENCY ITEMS TO OBTAIN COF FOR YOUR VESSEL; Cat R & E**



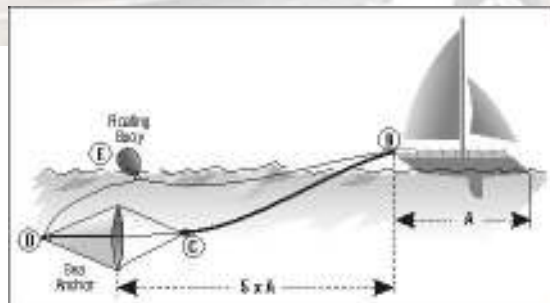
**Dry powder 1.5kg per engine**



**Fire striker**



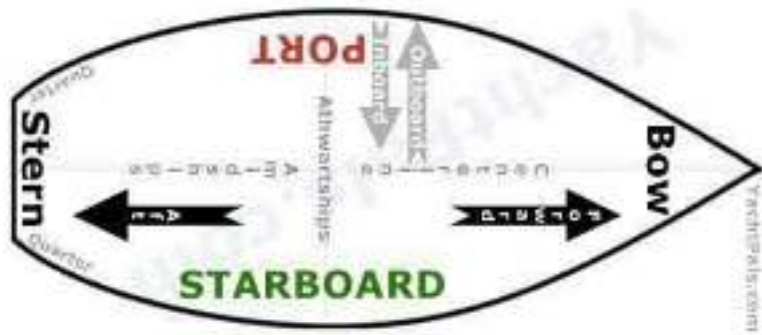
**Suitable anchor for your vessel with 5mm x 3m chain and 50m rope for cat R 100m for Cat E.**



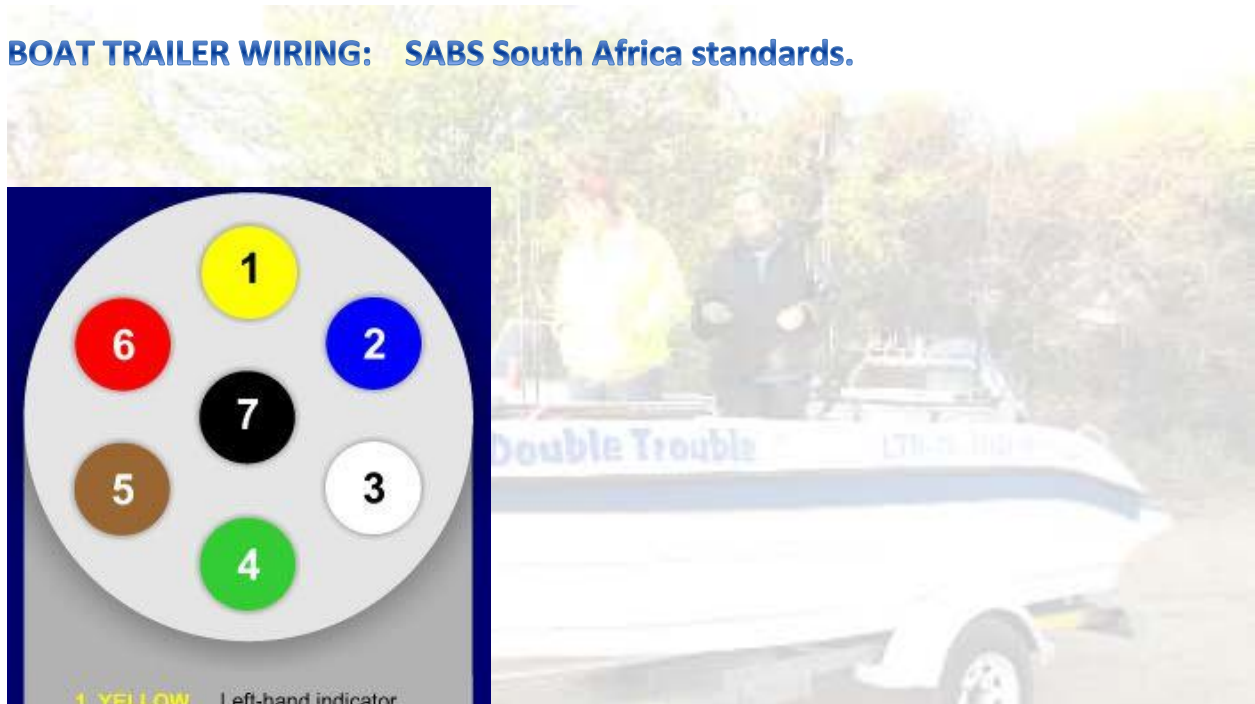
**Drogue, Sea anchor for Cat E –A**



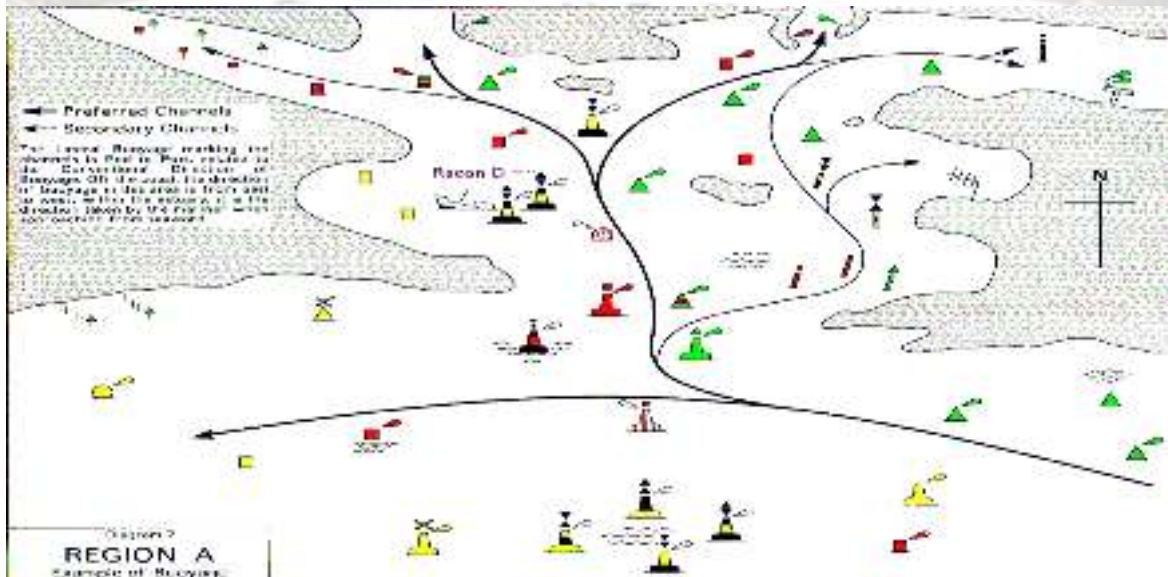
## KNOW YOUR BOAT



## BOAT TRAILER WIRING: SABS South Africa standards.



**Compass: Install compass with lubber line on compass and keel line of boat equal distance apart.**



**Buoys starboard green and Port red entering harbor from the ocean.**

CAT D – B Safety items needed:



Life jackets and flotation aids:



Life jackets.



Flotation aid.



Self inflating flotation aid.

