Boat Crew Training

On-shore

Flotilla 05-06
Crew Training
Navigation

BCM-06-01-AUX
BCM-06-02-AUX
BCM-06-03-AUX
BCM-06-04-AUX
BCM-06-05-AUX
BCM-06-06-AUX
BCM-06-07-AUX

Crew Member Qualification Tasks
Navigation

The nautical chart shows channels, depth of water buoys, lights, lighthouses, prominent landmarks, rocks, reefs, sandbars, and much more useful information for the safe piloting of the boat.

Some basic facts to know about charts:

- Charts are oriented with north at the top.
- The frame of reference for all chart construction is the system of latitude and longitude.
- Any location on a chart can be expressed in terms of latitude or longitude.
- Latitude lines are reference points in a north and south direction with the equator as their zero reference point. The latitude scale runs along both sides of the chart.
- Longitude lines are the east and west reference points with the prime meridian as their zero reference point. Along top and bottom of chart

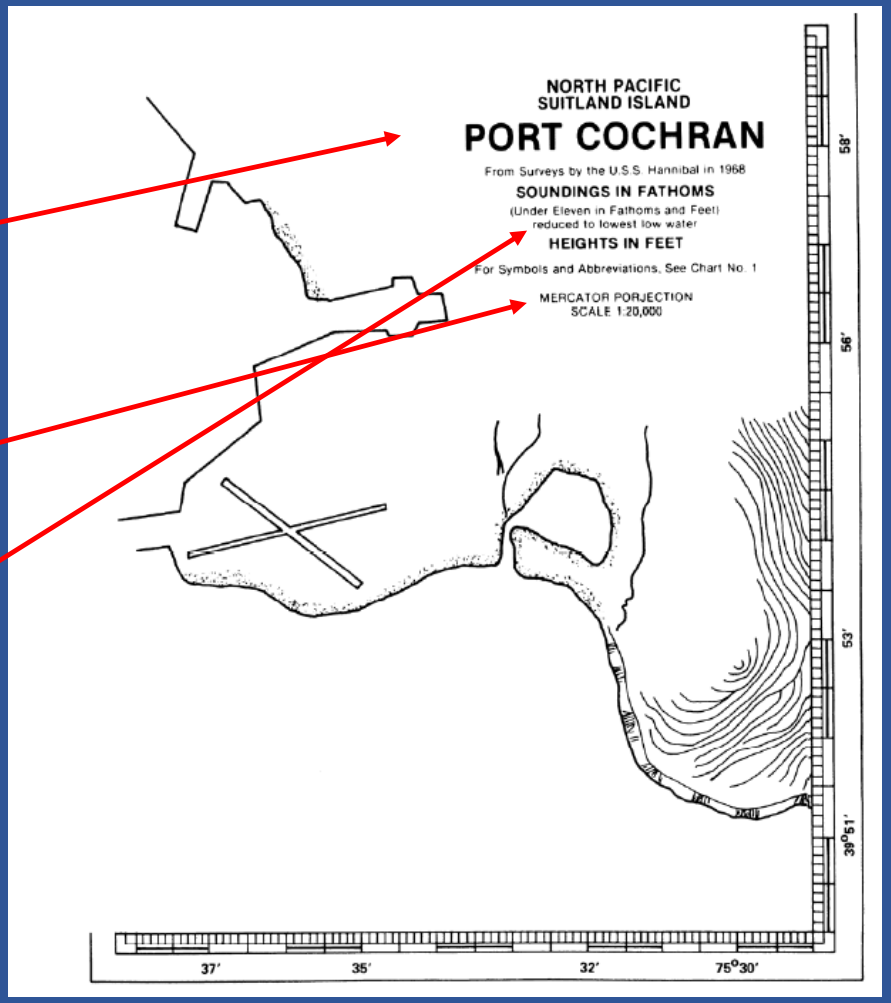
Title Block

The general information block contains the following items:

- The chart title which is usually the name of the prominent navigable body of water within the area covered in the chart.

- A statement of the type of projection and the scale.

- The unit of depth measurement, listed as soundings (feet, meters or fathoms).



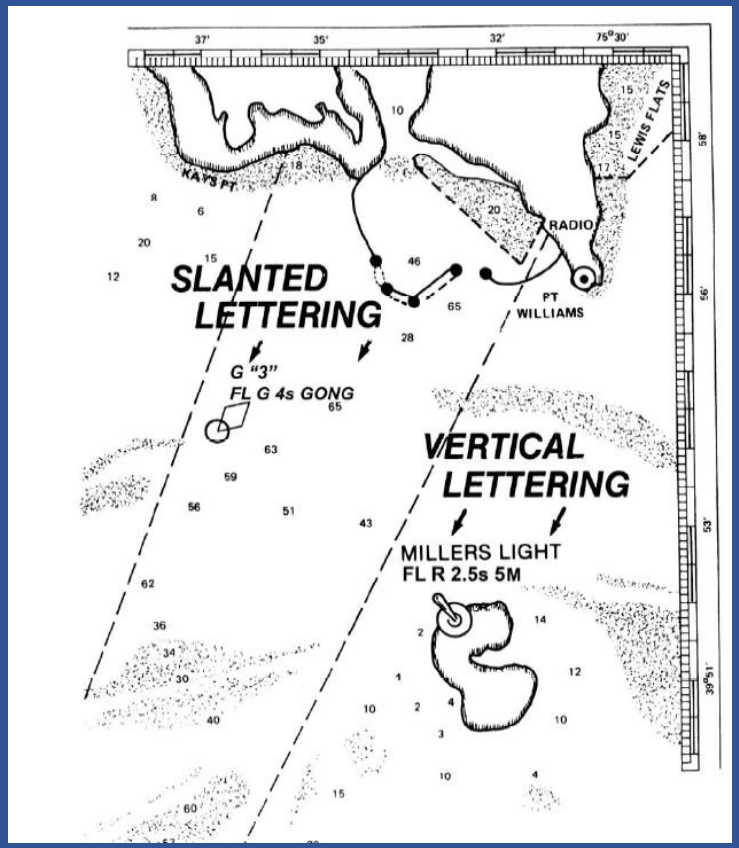
Symbols and Abbreviations

Many symbols and abbreviations are used on charts. It is a quick way to determine the physical characteristics of the charted area and information on Aids to Navigation (AtoN) They pretty much uniform standardized.

Nearly all charts employ color to distinguish various categories of information such as shoal water, deep-water, and land areas. Color is also used with AtoN to make them easier to locate and interpret. (example coming up)

Slanted Roman lettering on the chart is used to label all information that is affected by tidal change or current.

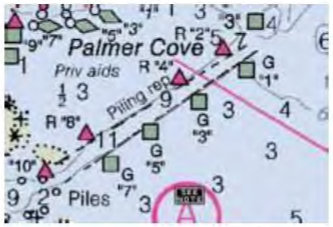
Vertical Roman lettering on the chart is used to label all information that is not affected by the tidal changes or current.



Common Aids to Navigation
AtoNs

Nunn Buoy

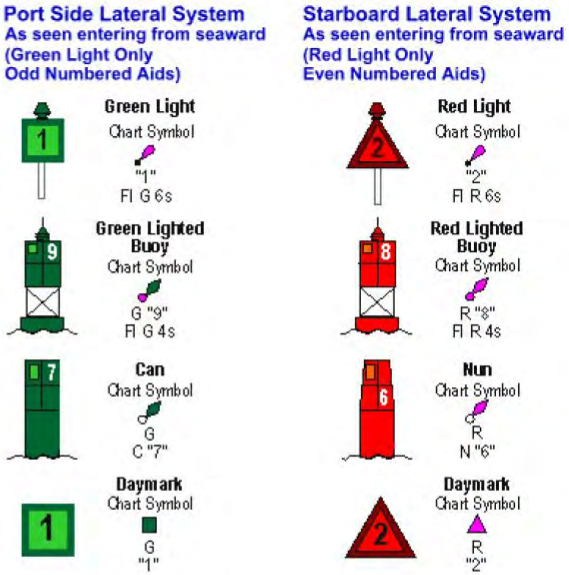
Can Buoy



Day Beacon on Chart

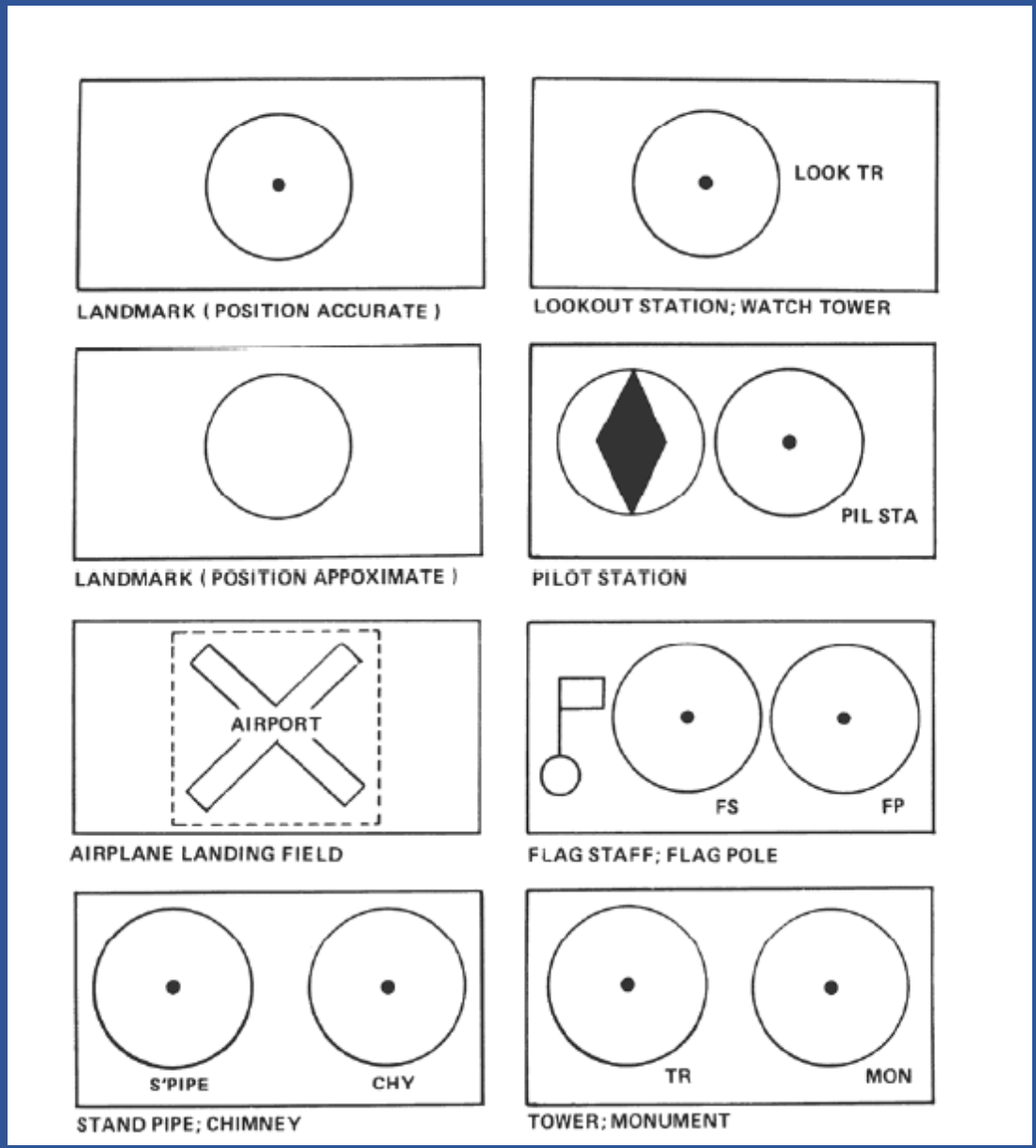
Inter Coastal Waterway buoys

Range Marker– used to line up center of channel

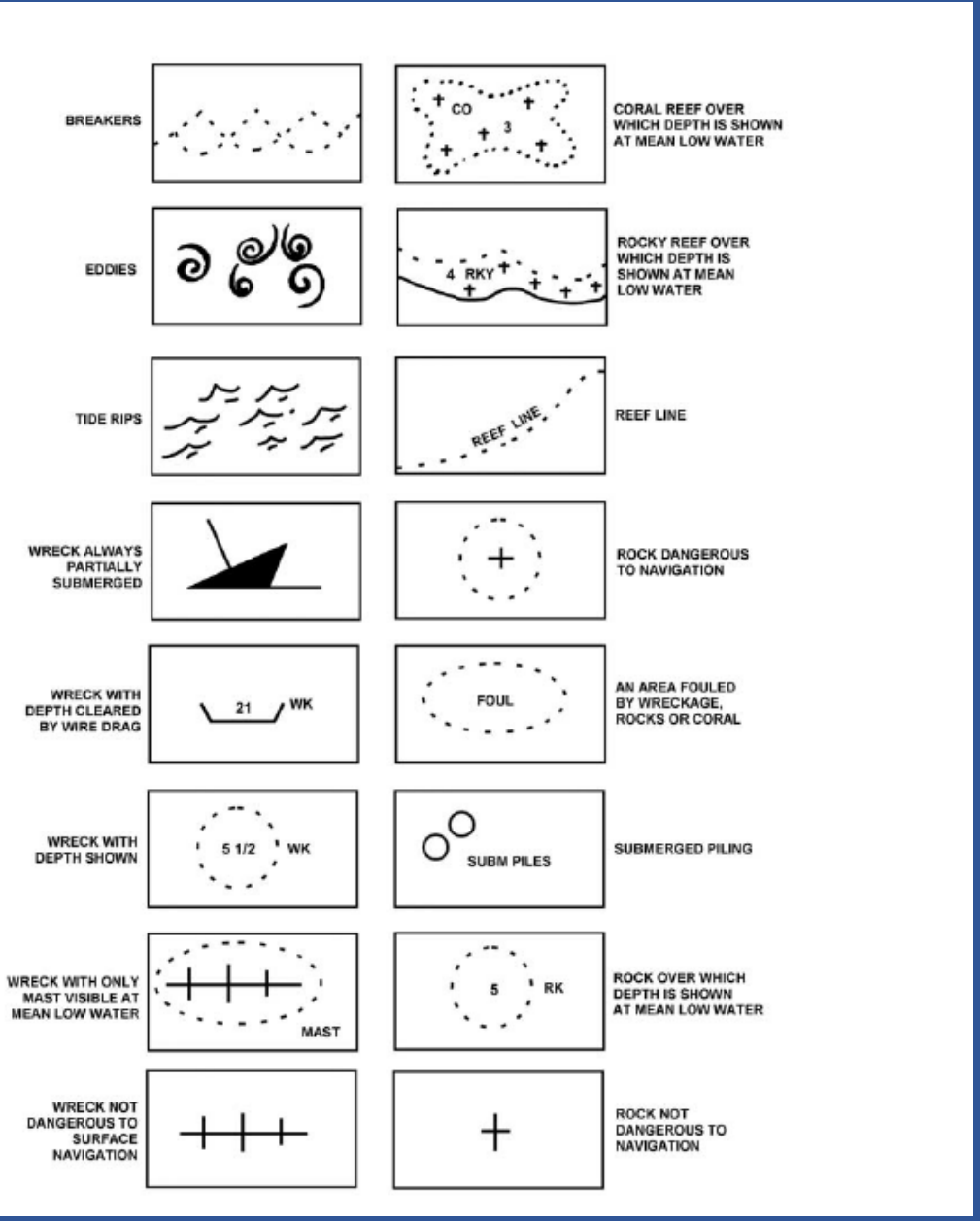


Buoy/Marker System
Notice Green are odd numbers
Red are even.
"Red Right Returning" meaning red symbols will be on the right side when returning from the sea

Common Symbols Used on Chart



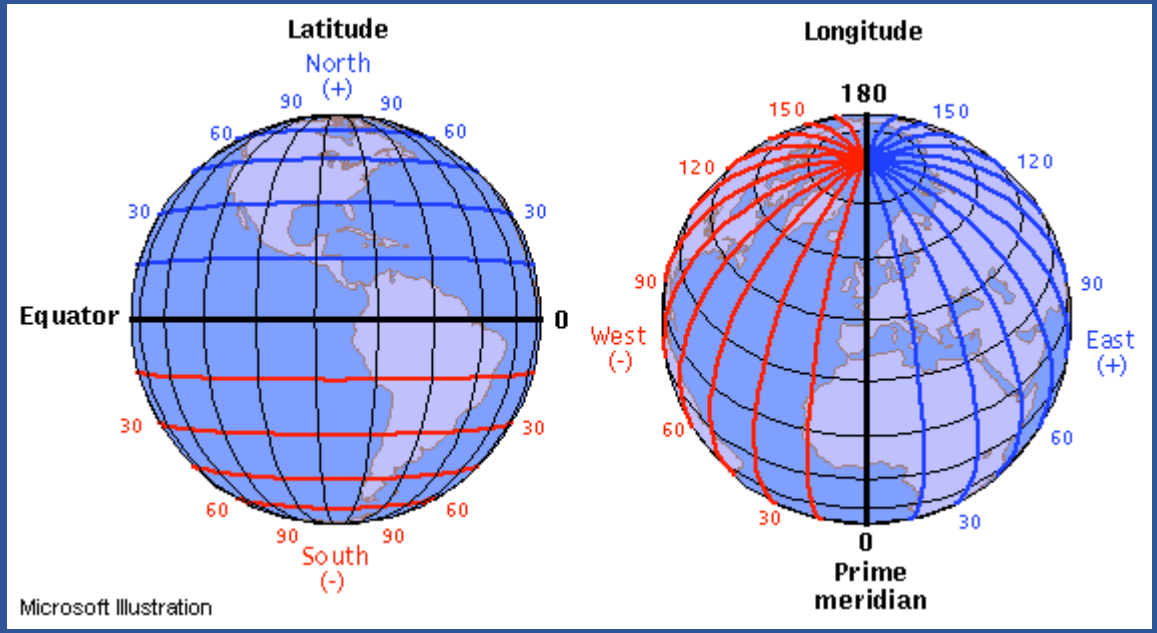
Common Abbreviations Used on Chart



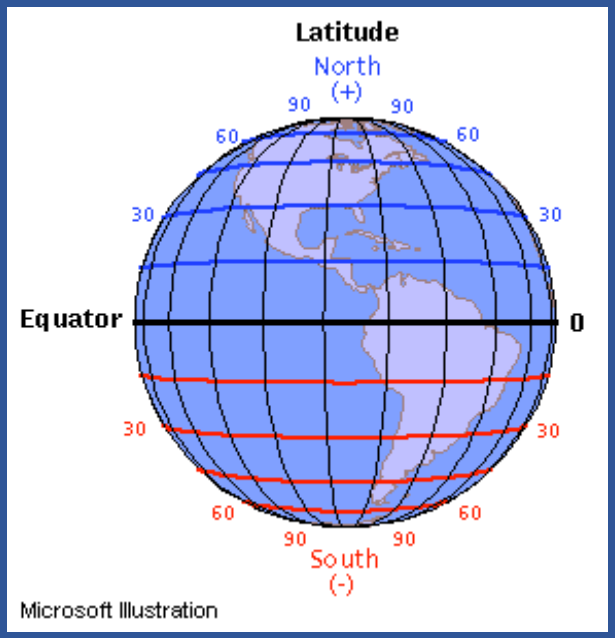
Bottom Composition

Abbreviation	Composition	Abbreviation	Composition
hrd	Hard	M	Mud; Muddy
Sft	Soft	G	Gravel
S	Sand	Stk	Sticky
Cl	Clay	Br	Brown
St	Stone	Gy	Gray
Co	Coral	Wd	Seaweed
Co Hd	Coral Head	Grs	Grass
Sh	Shells	Oys	Oysters

Understanding Latitude & Longitude

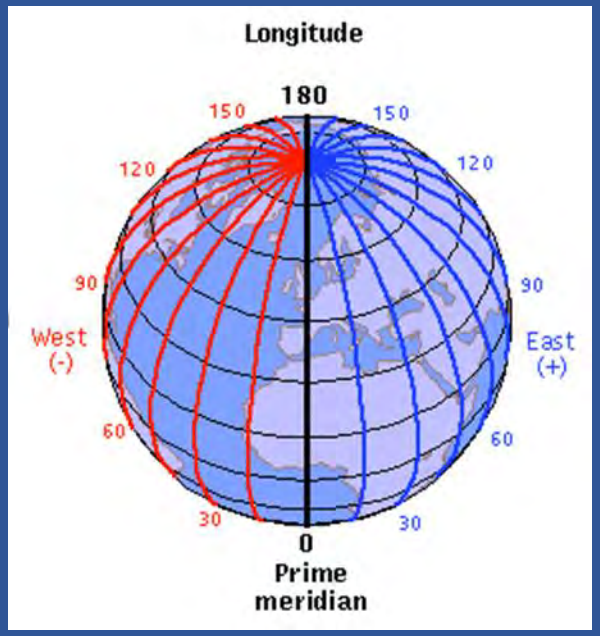


A global address is given as two numbers called coordinates. The two numbers are a location's latitude number and its longitude number ("Lat/Long").



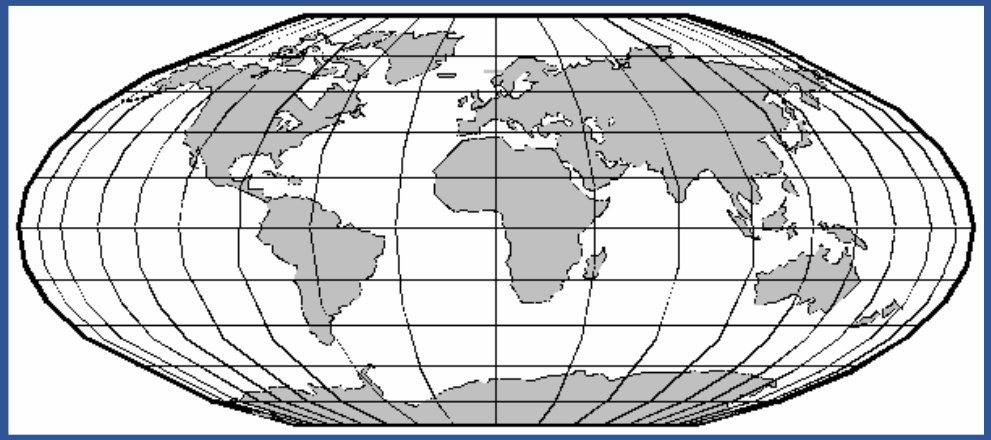
Latitude:
Horizontal mapping lines on Earth are lines of latitude. They are known as "parallels" of latitude, because they run parallel to the equator.

One simple way to visualize this might be to think about having imaginary horizontal "hula hoops" around the earth, with the biggest hoop around the equator, and then progressively smaller ones stacked above and below it to reach the North and South Poles.



Longitude:
Vertical mapping lines on Earth are lines of longitude, known as "meridians".

One simple way to visualize this might be to think about having hula hoops cut in half, vertically positioned with one end at the North Pole and the other at the South Pole.



A Great Circle is geometric plane that divides the earth into two equal parts and passes through the widest part of the earth, for example the equator. Other Great Circles pass through the North and South Pole.

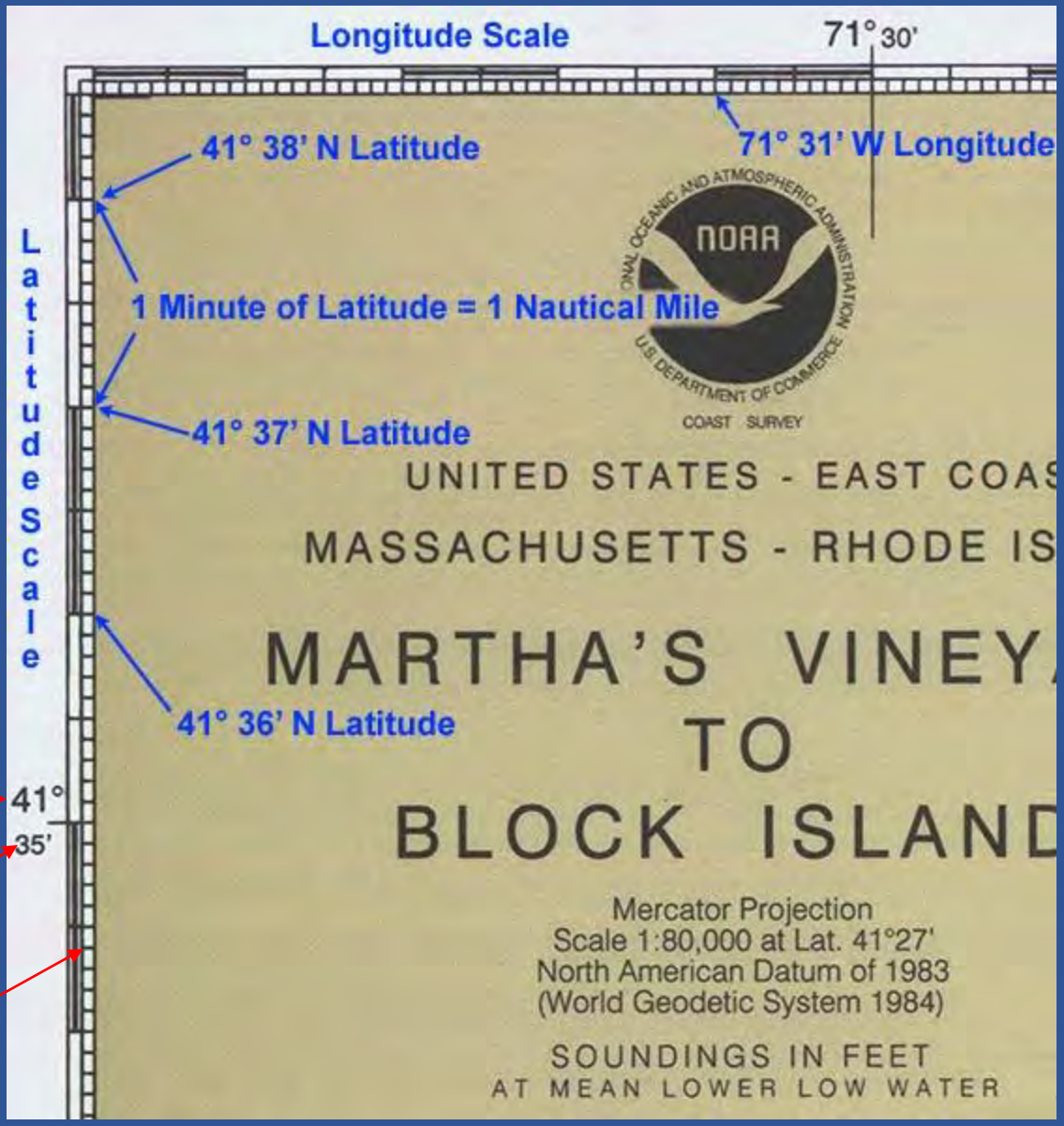
This is important in understanding GPS coordinates. Picture a Great Circle as a clock, it has 360 degrees of arc. (360°)

There is 60 minutes in each degree of arc. Minutes are written with this symbol: (‘)

There are 60 seconds for each minute of arc. Seconds are written with this symbol: (“)

36°37’47”N

36 degrees, 37 minutes, 36 seconds North.



Degrees

Minutes

Seconds

Plot a position
and find this location on the chart:

41°19’7”N
71°25’8”W

What do you find near that location?

Headings

The compass on the boat.

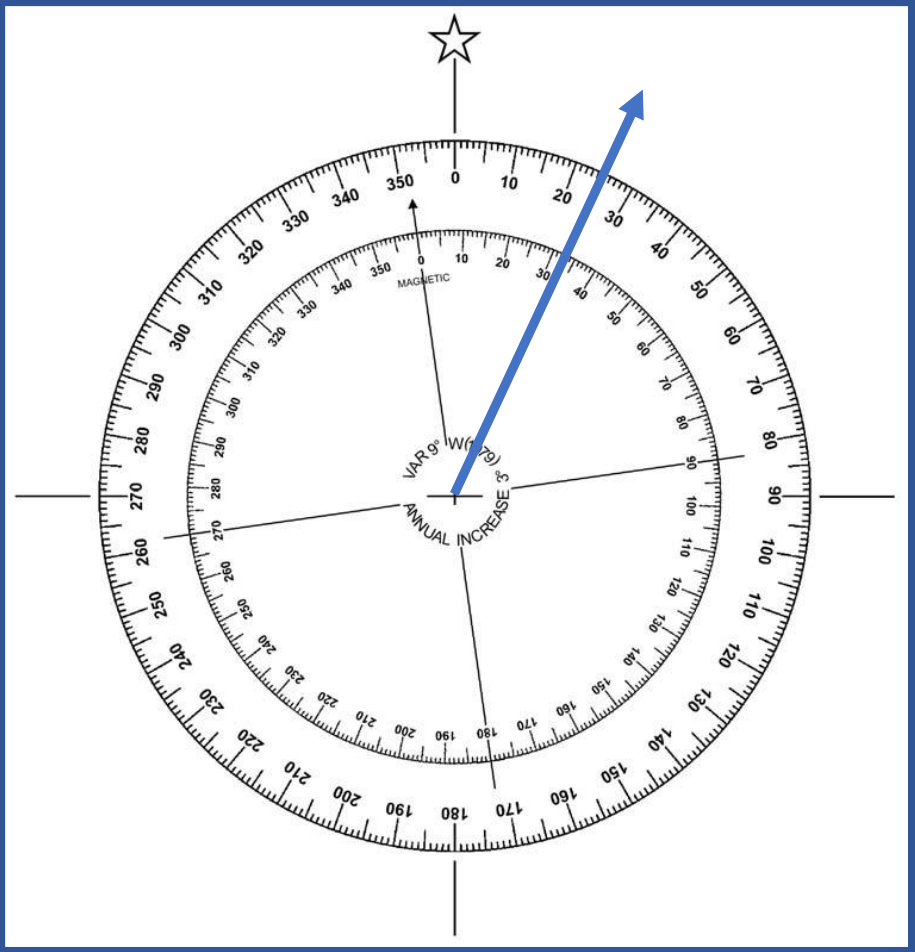
A mark on the vessel compass will indicate the direction of travel of the vessel, That mark is called the Lubers line.

Compass Rose

Nautical charts usually have one or more compass roses printed on them and are oriented with north at the top.

Direction is measured as a straight line from the center point of the circle to a number on the compass rose.

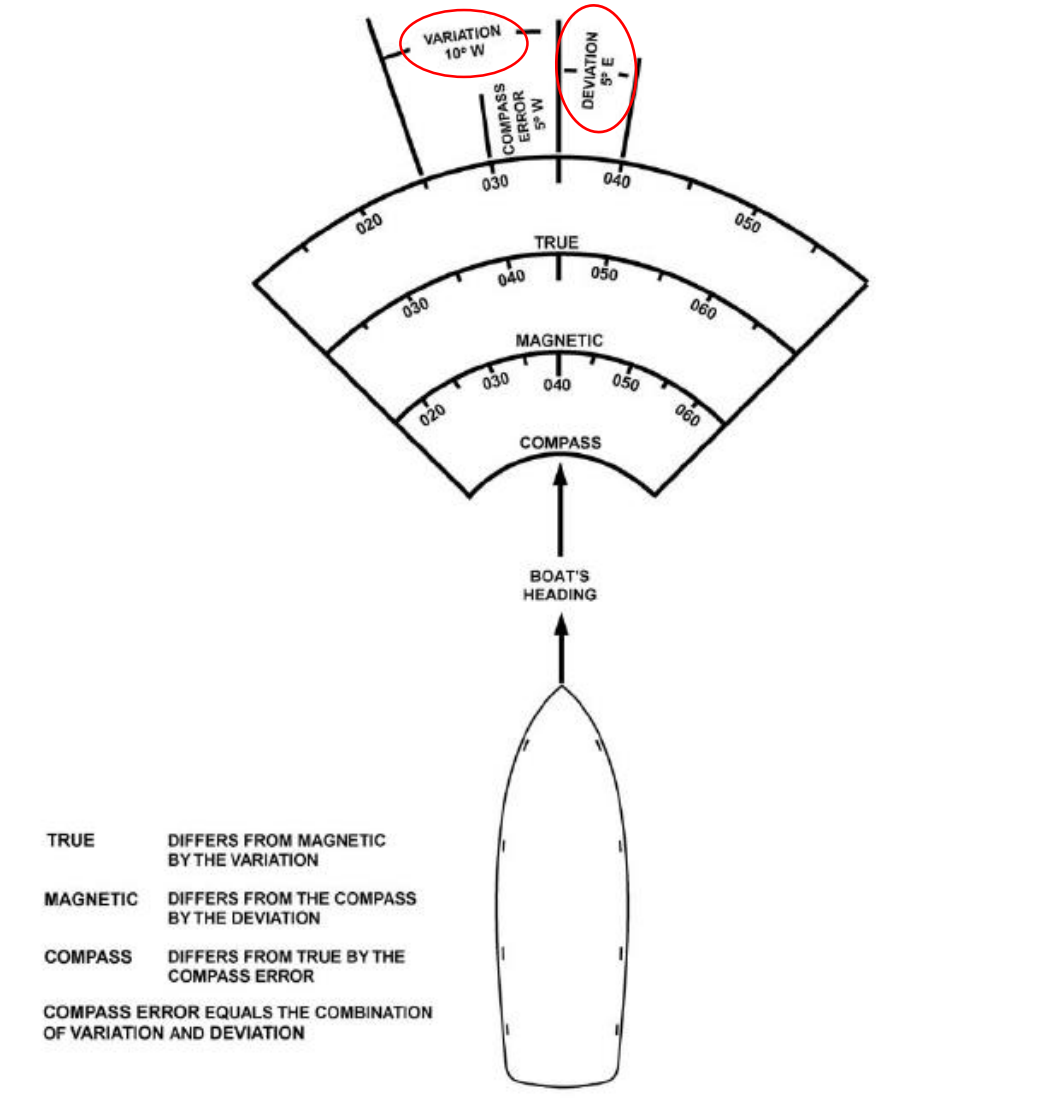
The variation is on the inside ring of the compass rose of the chart. (explained on next slide)



Directions measured on a chart are in true degrees or magnetic degrees

- "True North" uses the North Pole as a reference point.
- "Magnetic North" is what a compass will show. It will differ from True North a few degrees depending on what part of the world you are in, and it changes with time.
- The difference between True North and Magnetic North is called "Variation"
- Deviation is additional interference like metal on the boat that causes some change in the compass.

All of it together is Compass Error
In this case 10° W Variation and 5° E Deviation makes the total Compass Error 5° W .

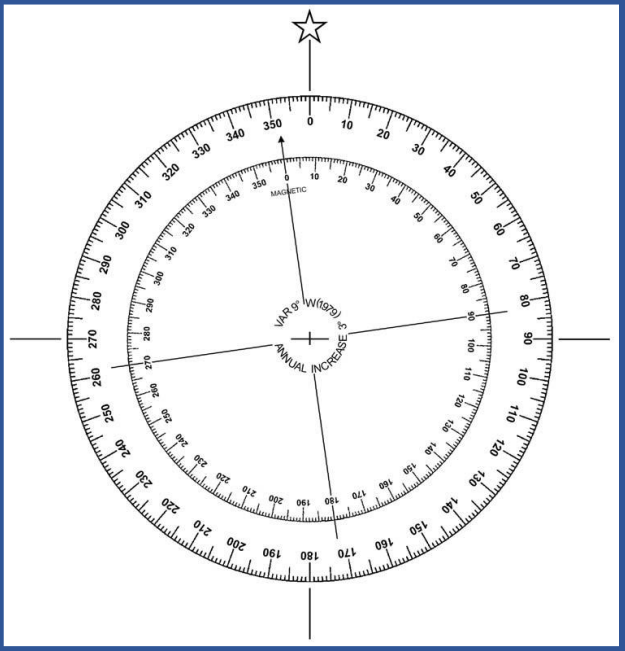


Plot a Magnetic Course

Bear island

Going from West of Bear to East of Deer Island Maine – distance 30 miles apart.

Deer island



Plot a Magnetic Course

Bear island

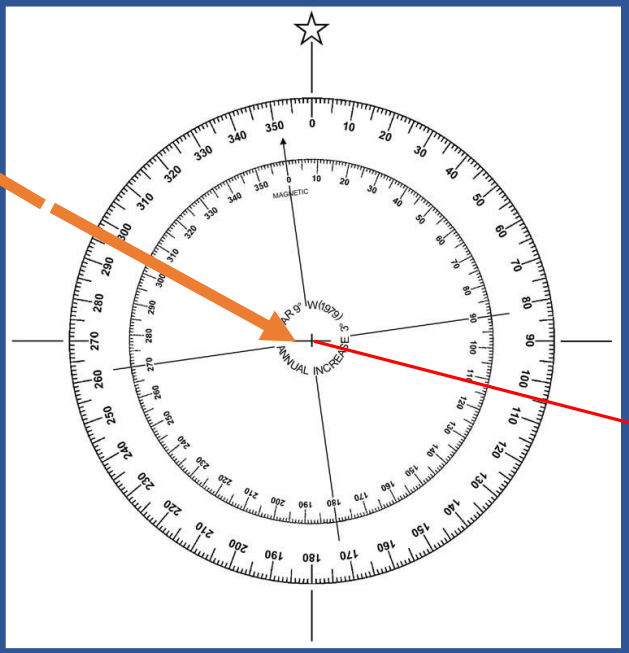
Walk line to nearest Compass Rose using Parallel Rule in same direction as travel with start point at the center.

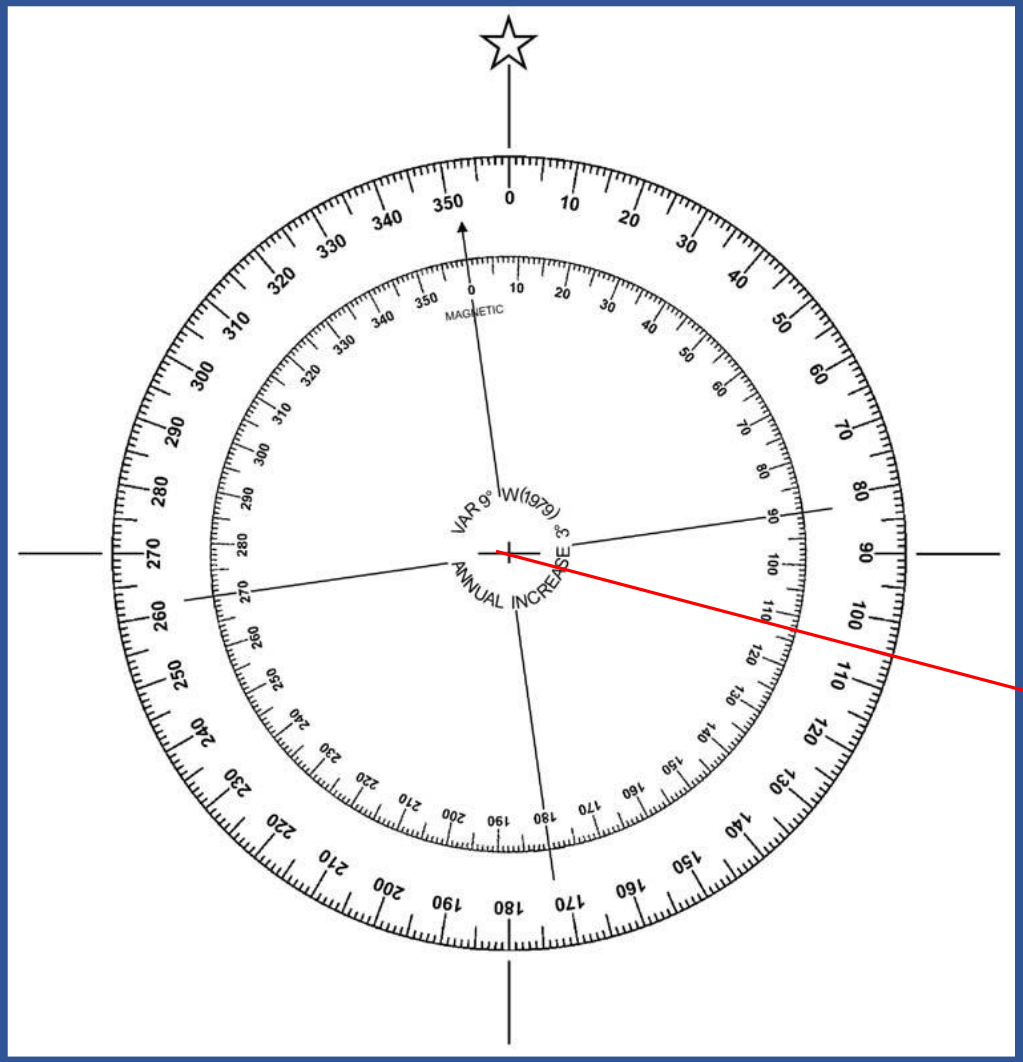
Start

Direction of travel

End

Deer island

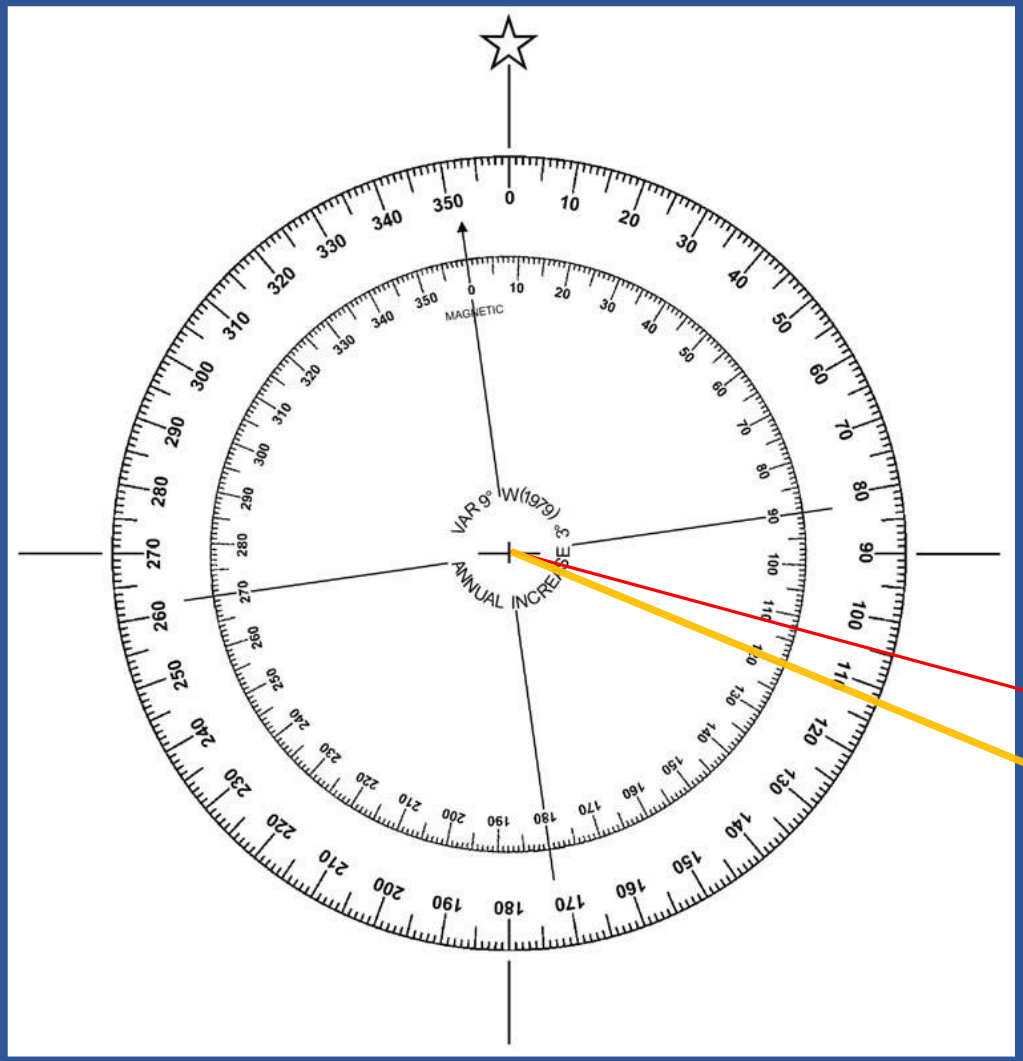



MAGNETIC
VAR 9° W(1979)
ANNUAL INCREASE 3'
105° TRUE

Computing True To Magnetic Course to Steer

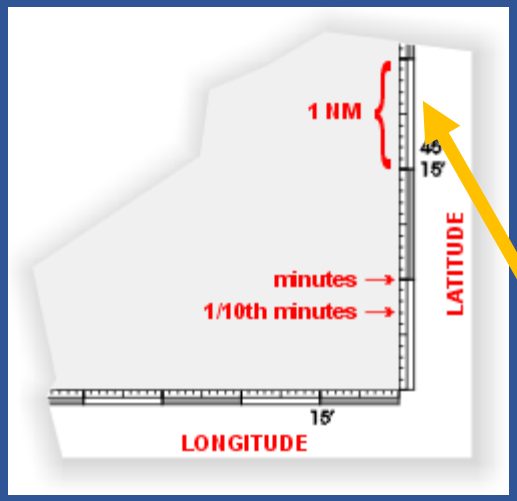
T = TRUE (From Chart) 105°
V = VARIATION (From the Compass Rose) shows 9° West
M = Magnetic + W comes to 114°
D = Deviation (from a deviation table) -E (will make one up) 2° E
C = Compass subtracting 2 comes to 112° per standard compass

+W
- E


MAGNETIC
VAR 9° W(1979)
ANNUAL INCREASE 3'
105° TRUE
112° Magnetic

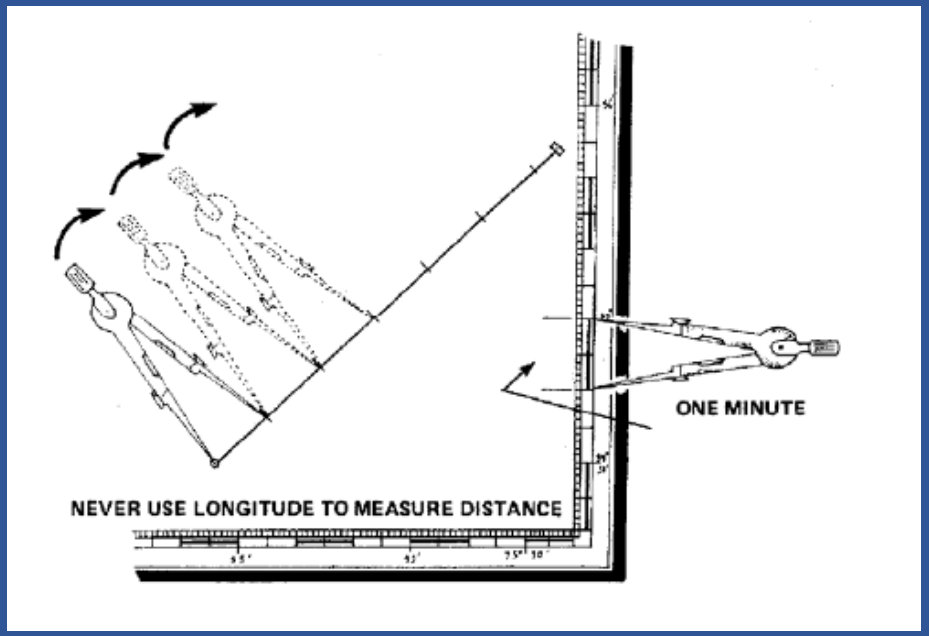
Plot a Magnetic Course

Measuring Distance on a Chart



Use latitude scale only to measure distance due to curvature of the earth.

1 minute = 1 nautical mile



Computing Time, Speed, Distance

There are three basic equations for distance (D), speed (S), and time (T).

If you know 2 parts of the equation you can find the third.

The equations are:

- D = S x T/60
- S = 60D/T
- T = 60D/S

Examples:

What is Distance made of boat going 30 mph X 30 min?

D = S x T/60
D = 30 mph x 30 min/60
D = 30 x ½
D = 15 miles

Examples:

What is speed of boat going 15 miles in 30 minutes?

S = 60D/T
S = 60 x 15 mi./ 30 min
S = 900 /30
S = 30 mph

Examples:

How long does it take for a boat going 15 miles at 30 mph?

T = 60D/S
T = 60 x 15 mi/ 30 mph
T = 900 /30
T = 30 minutes

Suggest you search You Tube videos on Navigation