

Raman Chauhan

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Date: 5/4/14

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FUN :- 1 ORAL 2nd MATE

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BEST OF LUCK TO ALL MY
FRIEND

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12/04/2014

Meteorology

① Barometric tendency :- Barometric tendency is the difference b/w the atmospheric pressure at the time of observation and the atmospheric pressure THREE HOURS EARLIER. It is expressed in millibars and up to one decimal of a millibar.

② Humidity :- humidity is the quantity of water vapour present in the atmosphere. **Ram... Simran**

③ Relative humidity :- Rel. hum. is the percentage ratio of the actual water vapour contained in a given sample of air to the max. quantity of water vapour that the sample can hold at that temperature.

① Ventilation freely when hold temperature is greater than dew point of outside air.

② Ventilation restrict when hold temperature is less than dew point of outside air.

④ CLOUDS :- AS PER Meteorology book

⑤ DEW - When water vapour condenses into droplets of water and gets deposited on exposed surfaces on or near the ground it is called dew.

⑥ ISOBARS - is a line drawn on a weather map and joining all places having the same atmospheric pressure at the time for which that weather map was drawn.

⑦ BUYS BALLOT'S LAW - Face the true wind and the low pressure area will be on your right in N.H and left in the S.H.

⑧ Tropical revolving storm -

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India call - Cyclone
Atlantic call - Hurricane
Pacific call - Typhoon
but they all TRS

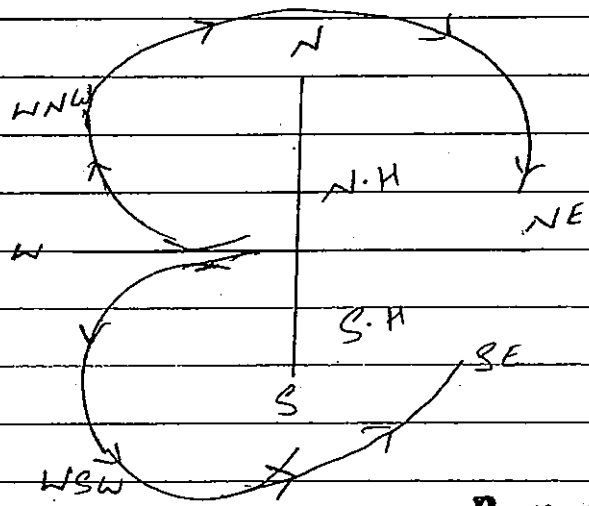
Condition of TRS and Indication

In TRS is a small area of very low pressure around high pressure area and wind blow spirally inwards anticlockwise in N.H and clockwise in S.H. Wind can blow more than 130 knots visibility will reduce due to spray and rain. It is can occur in season area also. Swell will be travel thousand of mile. many sea horse will be see. Barometer pressure will fall steady rate at 3 mb or below

TRS Warning send by Coast Radio Station or Regional Meteorological

office and onboard get by Navtex, Set C, EGC, by VHF
 The all type of TRS warning.

⑨ TRS originate in latitudes between 5° and 20° and travel
 blw W and WNW in NH in SH will travel W and WSW
 and S



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● TRS diameter ~~300~~ 500 miles average
 TRS eye or vortex diameter 6W 4 miles and 30 miles the
 average about 10 miles.

⑩ Action when approach of a TRS

- ① obtain the bearing of storm centre
- ② Take avoiding action

To find out the position of TRS use Buoy Ballot's LAW in point no (7) if pressure fallen 5mb below normal allow 12 points from ship and TRS is well developed
if the pressure has fallen 20 mb or more below to allow 8 points from VSL near the eye of a well developed TRS.

⑪

AVOIDING ACTION

⑪ ① VSL in port and receiving TRS warning ASAP proceeding to plenty sea room a sufficient depth.

⑪ ② if VSL proceeding out side to sea is not possible it would be advisable for the VSL to anchor outside the port and whatever shelter can find drop both anchor with several shackle and engine should be ready for prevention to dragging anchor.

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⑪ ③ if VSL is in the dangerous quadrant proceed as fast as practicable with the wind 1 to 4 point on the stbd bow in NH and port bow in SH and action should be kept until the pressure rises back to normal.

⑪ ④ if VSL is in the path of storm or if in the navigable semi circle. proceed as fast as practicable. with the wind abeam 4 point on stbd quarter on NH. in SH port quarter
This action should be kept up until the pressure rises back to normal.

(12) PRESSURE MEASURING INSTRUMENTS

- (1) The mercury barometer
- (2) The aneroid barometer
- (3) The precision aneroid barometer
- (4) The barograph.

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(2) Aneroid barometer:- Aneroid barometer measures without liquid. A sealed chamber made of thin metal having a partial vacuum inside and connected by a system of levers and springs to pointer fitted over a circular scale and have elastic effect. When atmospheric pressure increase the chamber gets compressed and when the atmospheric pressure decreases chamber gets expand.

Location and Advantages of aneroid barometer:

- (1) Away from draught Air.
- (2) Away from undue vibration or sudden jerks.
- (3) At eye level for ease of observation.
- (4) At close to the centre line of the ship.
- (5) Mostly kept on chart room.
- (6) Advantage is robust compact instrument. a fixed pointer is provided attached to the glass face the instrument. tapping the instrument the fixed pointer is aligned with the dial pointer. After some time. tapped again. If the dial pointer now lies to the right of fixed pointer the pressure has risen and vice versa. The amount of rise or fall note in log book.

ERRORS of aneroid barometer:

① Index error:- This error by the imperfect elasticity of vacuum chamber. and this could be done by comparison with another aneroid barometer at least once in three months. on post on request meteorological officer bring another instrument if error found the can eliminated by small adjustment on the back of the instrument use screwdriver.

② Height correction:- Since atmospheric pressure falls near sea level at the rate of one millibar for every 10 meter increase of height.

Formula use for correction:- $\frac{\text{height above sea level in metres}}{10}$

Example :- $\frac{20}{10}$:- this is height above sea level = 2 metres

Suppose our pressure show 1008

than actually pressure enter in log book =

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$1008 + 2 = 1010 \text{ mb.}$

The barograph:- is an aneroid barometer that gives a continuous record of pressure on a paper chart. Such a chart with a continuous barograph trace on it, called a barogram. this instrument is so adjusted as to allow for index error and also error due to height above sea level. Comparison should be done once a week.

⑬ INSTRUMENTS MEASURING TEMPERATURE

- ① Thermometer
- ② hygrometer (also psychrometer)
- ③ The Whistling psychrometer.

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② Hygrometer is an instrument obtaining the relative humidity or dew point temperature of air in this instrument use ~~two~~ wet and dry bulb ~~thermometers~~ thermometers. Wet bulb therm. has a thin single layer of muslin or cotton tied around the bulb by a few strands of cotton wick. The extra length of the strands of wick is immersed in a bottle of distilled water. Both the thermometers are enclosed in a special ventilated wooden box called the Stevenson Screen.

③ Whistling psychrometer it consist of light wooden frame pivoted to revolve smoothly around a handle. The frame has two identical Celsius.

When required the frame is held horizontal and using a dropper one drop of distilled water is made to fall on the muslin to make it damp. The frame is then whistled in open air at least two minutes before reading ~~of the wet and dry bulb temp.~~ off the wet and dry bulb temperatures. By entering meteorological table.

Calculation of and Reading to the bulb

Example -

(1) Read dry or Wet bulb temp.

$$32^{\circ} \quad 28^{\circ}$$

(2) Make differ in between

$$32 - 28 = 4^{\circ}$$

(3) Then after go through table see in 4° in 32° Dry temp then we get our dew temp. in Air.

Precautions (1) It should be about 1.5m above the deck

(2) The Stevenson's screen should be on the windward side.

(3) Away from sunlight falling directly.

(4) Away from metal bulkheads.










(5) The Muslin should be clean.

(6) The water bottle should be washed and the distilled water in it renewed once a week.

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(14)

VISUAL STORM WARNING SIGNALS

	NO	DAY	NIGHT
Distant CAUTIONARY	I		OW OW
Distant WARNING	II		•R •R
LOCAL CAUTIONARY	III		OW •R
LOCAL WARNING	IV		•R OW
DANGER	V		OW OW •R
DANGER	VI		•R OW OW
DANGER	VII		OW •R OW
GREAT DANGER	VIII		OW •R •R
GREAT DANGER	IX		•R •R OW

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QUS OF METEOROLOGY

- ① How do you receive weather info onboard.
- ② What is QSO Bar - Ans in point No- 6
- ③ What is TRS - Ans in point No- 8
- ④ Qualification of TRS - " " " "
- ⑤ What precaution will you take when UR in TRS - See point ⑪
- ⑥ Pressure measuring instrument / See point No 12
- ⑦ How many error in Aneroid barometer. See point No-13
- ⑧ How many way get to TRS Warning
- ⑨ Height correction in aneroid barometer.
- ⑩ Instrument measuring temperature See Note No-13
- ⑪ Name of High clouds and Medium clouds.
- ⑫ How to get true wind.
- ⑬ How many type of fog.
- ⑭ When you carried out ventilation or not. ^{See} point No ③

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B.W.E

- ① G.P.S | ECHO Sounder | Doppler log | ECDIS | AIS
LRIT | VDR | ROT | AUTO PILOT

The All Refer from BWE book

ABOVE

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GYRO COMPASS

- ①
 - ① It has an electrically driven Gyro scope.
 - ② Which has a heavy well balanced wheel spinning at a high rate above 22000 RPM
 - ③ Gyro does not depend upon the Earth Magnetism
 - ④ It is free from variation and Deviation of Magnetic effect
 - ⑤ It has freedom of movement in 3 AXIS.
I Spin AXIS II Horizontal AXIS III Vertical AXIS
 - ⑥ G.C is consist of ~~Radar~~ Rotax which one running by movement or Inertia.

② Gyro Control by two step. **Raman Chauhan**

- ① Gravity: Where the G.C spin axis are North seeking
- ② DAMPING: Where the G.C spin axis are settling the Nox

③ Gyro Error.

- ① SPEED ERROR: When ship is moving, Speed and Course of ship affect Gyro
 - Error is Max in N-S direction.
 - Error is Min. in E-W direction.
 - in N'ly Course Error is West.
 - in S'ly Course error is east.
 - When ship is moving in 'N' Direction the Gyro will
 - Lat. Since higher the lat. Smaller the earth rotational speed and there hence greater effect on ship speed.

Settle 90° Away from the Resultant of Ship speed and Earth Movement:

(2) Latitude Error or Damping error

- The error is proportional to tangent of latitude so it increase with latitude.
- It also depend on the design and construction of individual compass.
- The error is calculated and applied as latitude correction.

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Gyroscopic Inertia

(4)

- once a free gyroscope is set spinning it will maintain a fixed Direction in space as long as there are no disturbing force. However due to the rotation of earth on its Axis the Axis of the gyroscope will seem to drift (Horizontal) and tilt (Vertically)

Tilt :- The angle of elevation or depression of the spin axis above or below the horizontal is said to as tilt.

Drift :- The movement of the spin axis in direction of azimuth is called as drift.

⑤ Starting of Gyro Compass.

- Make preparation 4 hrs before the gyro put in service.
- Check all supply switches are open.
- Check the oil is sufficient.
- Switch on alternator
- Adjust latitude and speed setting.
- Switch on compass & Azimuth switch.
- Test After heading is steady switch on Repeater.
- Test the alarm switch on the alarm gong.

⑥ Advantage and Disadvantage of Gyro.

- It always show True North
- The gyro will have a number of Repeater
- Gyro input can feed to Radar / ARPA / Autopilot / Echo Sounder
- Do not use Earth magnetic field as reference.

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Disadvantage -

- It is run with electricity. So when the electricity fails the gyro also fails.
- When gyro compass stop for any reason, it will take time to settled down 5 to 6 hrs.

⑦ Case 8 Maintenance of Gyro Compass

- 1 Check repeater with master compass to ensure repeaters are functioning properly. If power fails repeater may have to be reset.
- 2 Check compass error by azimuth.
- 3 Speed and latitude correctors should be reset as necessary.
- 4 Inspect compass to guard against any abnormal condition of operation monthly.
 - 1 check alarm buzzer
 - 2 clean and oil any part as indicated by manufacturer's instruction
 - 3 General cleanliness should be checked.

⑧ Various Methods are available at sea to find Compass Error.

- ① By taking Azimuth (Sun, moon, star, planet)
- ② By taking Transit BRG.
- ③ By taking Amplitude (Sun)
- ④ By taking H.S.A
- ⑤ By taking V.S.A
- ⑥ By taking Leading light
- ⑦ By taking at Jetty

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★ Note - We can't take of moon Amplitude becoz moon is very near to earth and reflection is very less.

MAGNETIC COMPASS

- ① Magnetic Compass is a primary means of direction indicator of ship, It is the ship standard compass, it is fitted above the bridge on the monkey island at the center line of the ship. Where reading output needed to other bridge equipment then transmitting magnetic compass is fitted.

TWO Type of Magnetic Compass.

① Dry Card Compass

② Wet Card Compass

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① Dry Card Compass

- Made of size paper

- Dia - 254 mm (10 inches) Aluminium ring

- Silk thread used to attached

② Wet Card Compass

- Liquid - Distilled water and pure Ethyl Alcohol so mixture has following properties -

- Low freezing point about -30°C

- Small coefficient of expansion

- Does not discolour the card

- Low relative density - about 0.93

- Made of mica and is only about 15 cm in dia.

⑩

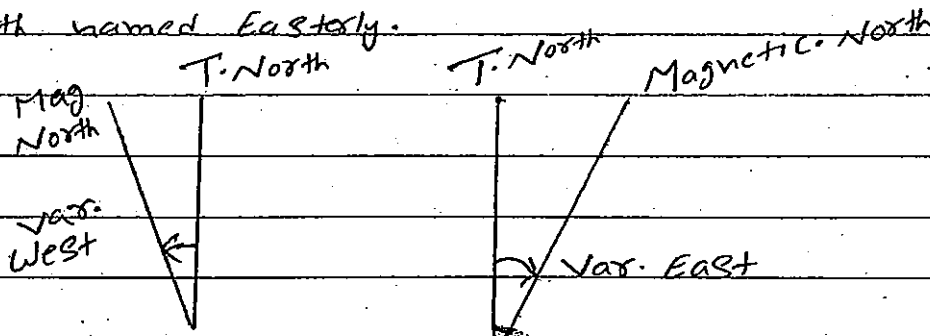
ERROR IN MAGNETIC COMPASS.

① Variation ② Deviation

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① Variation is due to the Magnetism of the earth.

- Variation is the angle b/w the True North & Magnetic North
- It is either east or west
- Var. East, Mag. Least
- Var. West, Mag. Best
- If the magnetic needle lies to the left of true north variation named westerly, if lie to the right of true north named Easterly.

Variation subjected to 3 types of changes

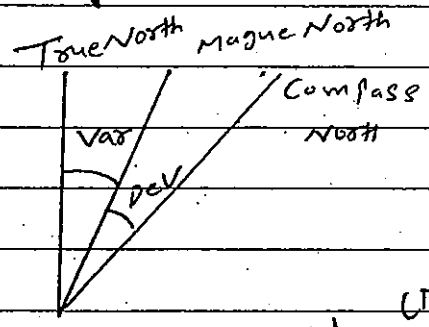
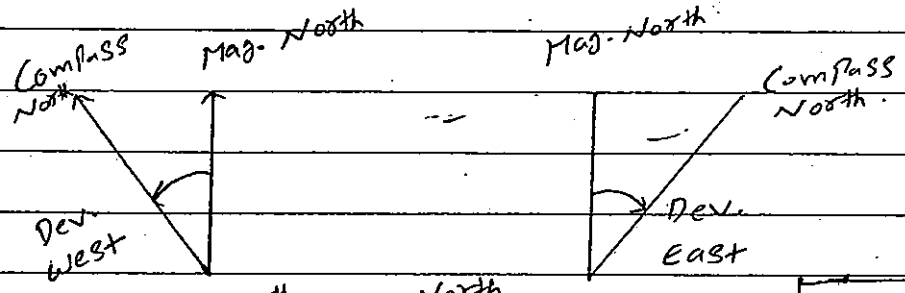
- A daily fluctuation called Diurnal change.
- A continuous change called Secular change.
- A seasonal fluctuations called Annual change.

Variation for any area can found from

- Compass Rose of the Nav. Chart.
- Adm. variation chart or Isogonic chart.

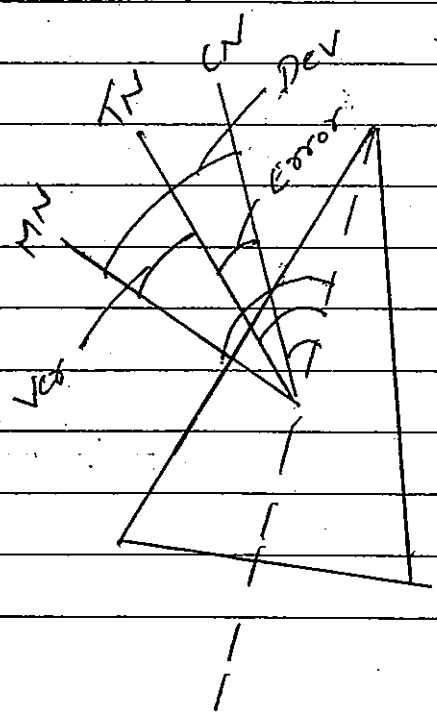
⑤ Deviation = it is due to the Magnetism present on ship due to steel structure.

- Deviation of the Compass varies as the ship's heading changes
- It is the angle b/w the Magnetic North and Compass North
- If the Compass needle lies right to the magnetic north is the devi. named easterly. If it's lies left to the magnetic compass the deviation named westerly.



T (E) - V (W) +	C (E) + (W) - D
M	M
D	V
C	T

Dev can found
by Amplituded
Azimuth or Dev.
Card.



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★ AS the ship head changes the dev. also changes the compass error is given by the algebraic sum of Deviation and Variation since the deviation has altered the error will also change.

⑪ Corrector the Compass adjuster by two Method.

① Permanent Corrector adjuster

- It is caused below ship is made up of steel
- The ship's permanent magnetism may be defined that part of the ship magnetism which would remain unaltered if we imagine the ship is to be entirely removed from any external field.
- It has got three component namely fore and aft athwartship and vertical component

② Induced Magnetism - It is caused due to induction by the earth field in soft iron

- This is caused due to the induction by earth field in soft iron and the direction of the induction in material will vary with every change in the direction of the material.
- It has got eliminate by Ellender bar, or by two quadrantal sphere.

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⑫ HOW TO Removal bubble from Compass

- Tilt the bowl until the filler hole comes uppermost. (This hole is provided on the side of the bowl.)
- Unscrew the screw provided.
- Top up with 'ethyl alcohol'. If this is not available distilled water would do.
- Screw the screw back into place.
- Let the bowl return to upright.

⑬ CARE AND MAINTENANCE

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- The wooden part of the Binnacle should not painted as paint may cause door to jam
- The soft iron sphere & their brackets should be painted this for prevent rust.
- The Brass part of the Binnacle should be polished
- All magnetic materials such as electric machinery electronic wire etc should be keep well away from the compass
- The Binnacle light should be switch off during day time.

(14)

SEXTANT

Principle:- When a ray light is twice reflected by two mirrors in the same plane, the angle b/w the first and last rays is twice the angle b/w the two mirrors (As the sextant arc is 60° following that sextant can measure angles of twice the amount 120°)

USE OF SEXTANT:- To measure Altitude of Celestial bodies.
To measure vertical angle of high terrestrial object to obtain distance off.

- Horizontal angles b/w prominent terrestrial object to fix positions.

Part of Sextant

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- ① Arc - is constructed of a thin strip of metal which has a low coefficient of expansion. It is graduated from 0° to 125° on the arc and 0° to -5° off the arc.
- ② Index Arm - The index arm is free to rotate on a central axis beneath the index mirror. The arrow of zero of the index arm is known as the index mark.
- ③ Micrometer Vernier - This is used for reading seconds or decimal place of minutes of arc.

(4) Micrometer drum - Minutes of the arc are read off from the micrometer drum this permits adjustment of an observed angle.

(5) Index Mirror - This reflect the observed object into the Horizon Mirror. It is a rectangular shape and set in a frame attached to the movable Index Arm. Index mirror should be perpendicular to the plane of the equipment.

(6) Horizon Mirror - This receives the reflected image from the index mirror and reflects it back to the observer through the telescope. This should be perpendicular to the frame and parallel to the index mirror when index arm is set at zero.

ERROR OF SEXTANT

- (1) Adjustable Sextant error
- (2) Non Adjustable Sextant error.

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(1) ADJUSTABLE ERROR

(1) Perpendicularity error - This is due to the index mirror is not being perpendicular to the plane of the instrument.

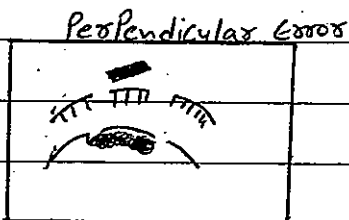
Checking this error.

- Place index arc about the middle of the arm
- Hold the sextant horizontally
- Look obliquely into the Index Mirror, if direct and reflected image of the arc appear to be in a straight line error is not present otherwise error present.

Removing Perpendicularity Error

- gently turn the 1st adjustment screw on the back of the Index mirror until the true and reflected arcs appear in a straight line.

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- (2) Side ERROR - This is due to the Horizon mirror not being perpendicular to the plan of this instrument.

Checking side error by the Horizon observation

- Set the Index Arm and micrometer exactly 0°
- Hold the sextant horizontally and look thru the Horizon Mirror at the horizon
- if true and reflected image appear in a straight line there is no error.

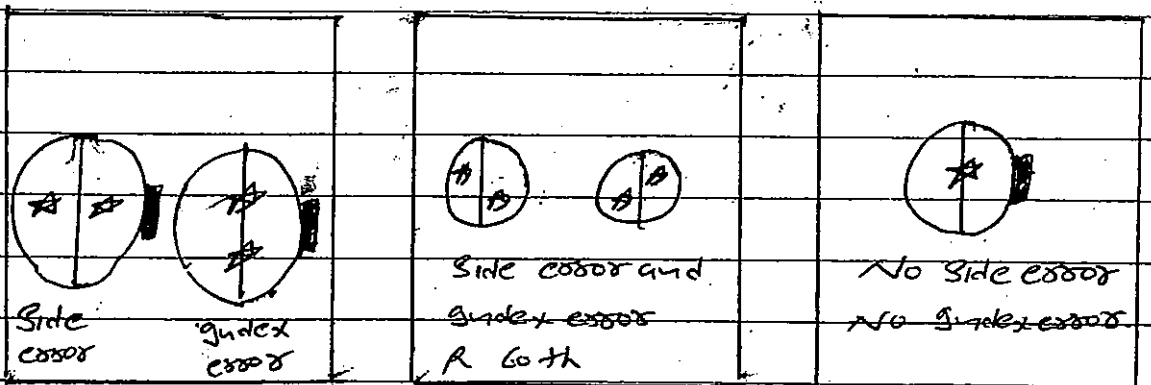
Removing Side error by turn the 2nd Adjustment screw on the reverse side of the horizon glass which is away from the frame until the true and reflected horizon appear in a straight line.

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Checking the Side Error by star obs.

- Set the Index Arm and Micrometer to zero
- Hold the Sextant vertically and look directly at the star thru the telescope
- Adj. the Micrometer drum the reflector image should pass up and down directly over the direct view of the star if no side error is present.

Removing side error by star obs. by the turn screw adjustment until the true and reflected image pass up and down directly over the direct view of the star.



③ Index ERROR - This due to the Index mirror and horizon mirror or glass not being parallel when the index arm is set exactly to zero.

Checking Index error by Star obs.

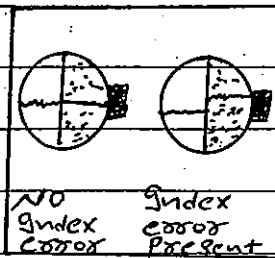
- Set the Index arm exactly to zero
- Hold the Sextant vertically and look directly at a star.
- If both reflected and true image coincide there is no index error. If they are one above the other index error is present.

Removing Index error ^{remove} by the screw adjustment until both reflected and true image coincide.

Checking Index error by horizon obs.

- Set Sextant exactly to zero
- Hold the sextant vertically and look at the horizon
- If true and reflected image of the horizon are in one straight line index error is not present!

Removing Index error by horizon obs. by the screw adjustment until true and reflected image of the horizon are in one straight line



Finding The value of Index error by Sun Obs.

- Set the Index arm exactly to zero
- Hold the Sexton vertically and look through the telescope at the Sun
- Adjust the micrometer drum until the upper limb of reflected image just touches the lower limb of true image and read the error 'ON THE ARC'
- Adjust the micrometer drum until the lower limb of the reflected image just touches the upper limb of the true image and read the error 'OFF THE ARC'
- Take the difference of the errors and divide it by 2 to get the index error and it should name by the sign which is having the highest value.

Example - Read on the arc = $32.9'$

Read off the arc = $32.5'$

$$\text{Index error} = \frac{32.9' + 32.5'}{2}$$

$$\text{Index error} = \boxed{0.15'} \text{ on the arc below}$$

he is greater than off the

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Checking the accuracy of the index error which was found by Sun obs.

- Obs S.D of the Sun = $\frac{\text{Sum of two reading}}{4} = \frac{(32.9 + 32.5)}{4} = 16.35'$
- True S.D of the Sun = to be obtained by Almanac
- if Obs S.D of the Sun = True S.D of the Sun
(then the reading perfect)

④ Collimation error: error adjustable by maker.

NON ADJUSTABLE ERROR

- ① Centring error
- ② Graduation error
- ③ Micrometer error
- ④ Shade error
- ⑤ Parallax error
- ⑥ Vertical sext Angle.

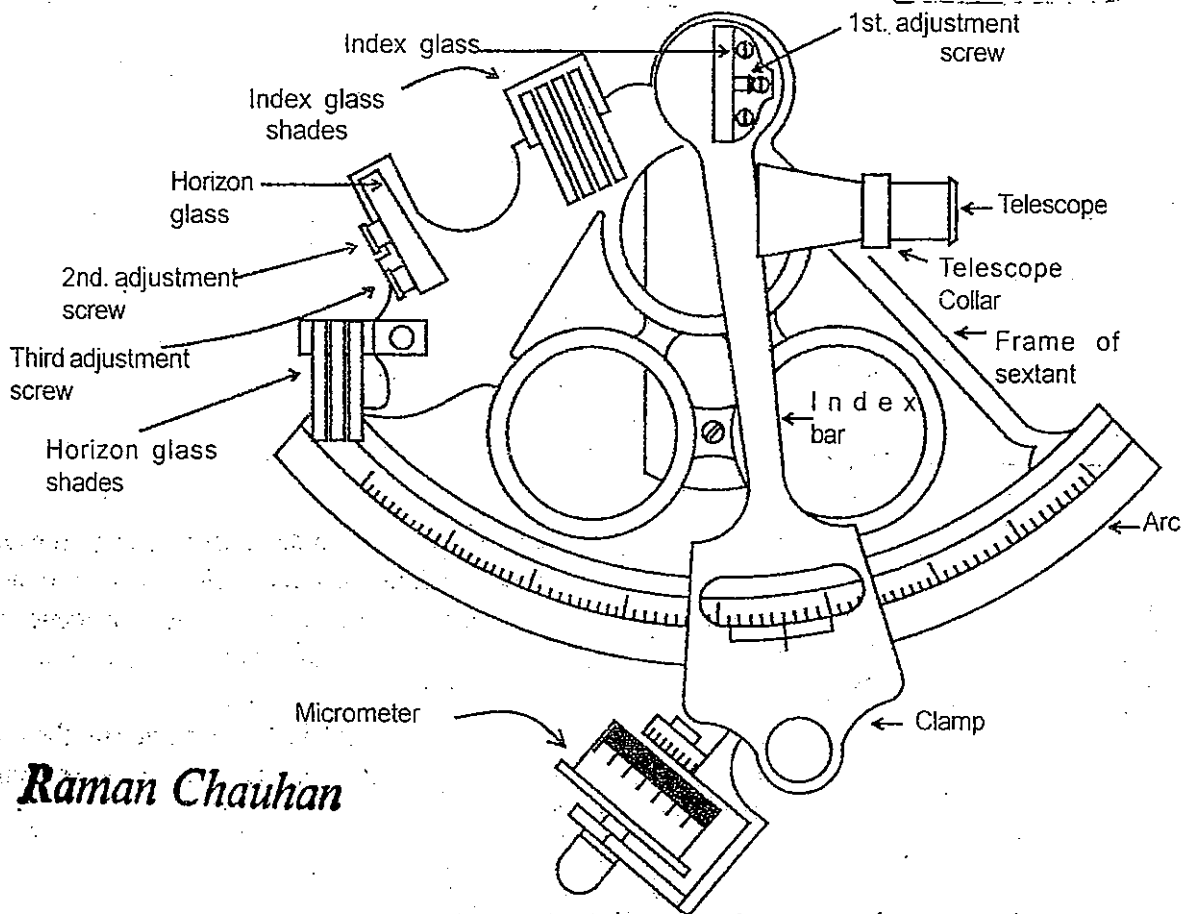
⑤ Take the Altitude of celestial bodies

- Sext Alt
- Index error
- observer Alt
- DIP
- APPARENT Altitude
- TOTAL Correction
- True Altitude.

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⑥ Take the horizontal distance of light house

$$V.S.A = \frac{\text{Height of the object in meters}}{\text{Sext Alt in minutes}} \times 1.854$$



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(15)

What do you understand by 'Squat' Explain the shallow water effect on manoeuvring

Squat :- Is the reduction in Under Keel Clearance

Resulting from bodily sinkage and change of trim which occurs when ship moves through water and this is hydro dynamic phenomena where drop in pressure and drop in buoyancy. Pressure and Under Keel will increase displacement it's called to Squat. A moored vessel also experiences the Squat, in strong tide alongside the Jetty.

Cause of Squat :- When a ship gets underway from rest it first overcome and then start to push water ahead of displacing water and causing wave action. This creates void in the water which is filled by surrounding

Water Under the hull moves of faster speed reduction in pressure. Under the hull this ship experiences bodily sinkage in water.

effect
Reduce the squat in shallow water if proceed in shallow water use formula then we get draft how much increases for ~~it~~ due to draft increases ship can sinkage for reduction we should reduce our speed

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Formula in shallow water = $\frac{2 \times C_b \times V^2}{10}$

" " " open " = $\frac{C_b \times V^2}{100}$

C_b is block coefficient and every ship has own C_b

V is the ship speed at present

① Example - if $C_b = 0.8$ Speed $V = 12$ Knot

then ship draft will be ^{increas} $= \frac{2 \times 0.8 \times 12 \times 12}{100}$

No Safe

$= 2.304$ mtr.

In shallow water 2.304 draft can increase due to shallow water effect

② Example - if $C_b = 0.8$ Speed $V = 6$ Knot

Then ship draft will be increase = $\frac{2 \times 0.8 \times 6 \times 6}{100}$

$$= 0.576 \text{ mtr}$$

in shallow water draft can increase by 0.576 mtr due to shallow water and it can be safe more the 12 knot speed if we want more safe then reduce speed according maneuvering.

Effect of Squat:

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- Increase the stopping distance
- " " " turning circle radius
- " " " rate of turning
- " " " the influence of current
- Decrease the effectiveness of the tug
- " " " " rudder

(16)

Shallow Water effect on Maneuvering

- (1) Interaction between ship: When two identical ship are proceeding on an identical course and speed each ship has her streamline and water flow from fwd to aft. When these ship come close to each other with their streamlines overlapping it causes reduction in pressure on their quarters. This imbalance of pressure will cause bow to repel each other and midship area tend to draw close to each other. The stern gets sucked close to each other.

② Smalling the ground :- At a normal speed. When a vessel is nearing an extremely shallow depth of water such as a shoal she is likely to take a sudden sheer first towards it and then violently away. This is called Smalling of ground.

③ Bank Suction :- Due to the ship coming closer to the bank it causes reduction in pressure between ship side and will result in ship being sucked by the bank. This is termed as Bank Suction and bow away from bank.

⑦

BANWAS

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Bridge Navigational Watch Alarm System.

1. The BanWas is a small equipment can prevent big accident.
2. BanWas IMO Resolution MSC 128(75) specific the need for a series of indication and alarms.
3. BanWas was made mandatory in an amendment to Chapter V of SOLAS Reg-19 which adopted June 2009.
4. BanWas is monitor bridge activity and detect operator disability which could lead to maritime accidents.
this enhance
5. Purpose of the BanWas is to increase navigational safety.
6. The OOW is required to press a button at regular intervals.

7. Not doing so would sound off an alarm and summon the officer and then the Captain
8. The system monitors the awareness of the officer of the Watch and automatically alert the master or another OOW if for any reason the OOW became incapable of performing the OOW
9. Additionally, the BanWAS may provide the OOW with a means of calling for immediate assistance, if required.
10. BanWAS should be operational whenever the ship underway at sea.
11. System will be connected to S-VDR or VDR

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Working of BanWAS

1. once operational the alarm system should remain dormant or period of 6h 3 and 12 min (Td)
2. At the end of this dormant alarm system should initiate a visual indication on the bridge
3. if not reset BanWAS should sound a first stage audible alarm on the bridge 15s after the visual indication
4. if not reset the banwas should sound second stage audible alarm the backup officer location 15s after the first stage audible alarm
5. if not reset the banwas should sound third stage audible alarm for a further crew member capable to taking corrective action 90 sec after the second stage remote audible alarm is initiated.

6. In larger VSL the delay (1W 2nd and 3rd stage alarm may be set to a longer value up to maximum of 3 min. to allow sufficient time for the officer and Master to reach the bridge.

(18)

TAMBAR

International Aeronautical Maritime Search and Rescue.

- It is published by IMO & ICAO and it is a Combined Search and Rescue System by Civil aviation and maritime to provide assistance to people in distress while travelling by sea or air.
- It has 3 Vol **Raman Chauhan**
- Vol 1 - Organisation and Management
- Vol 2 - Mission Co-ordination
- Vol-3 - Mobile facilities.

ON Board Carry only Vol-3 and it has four section

Section - 1 Overview

" " 2 Rendering Assistance

" " 3 On-Scene Co-ordination

" " 4 on Board Emergencies.

PSWU

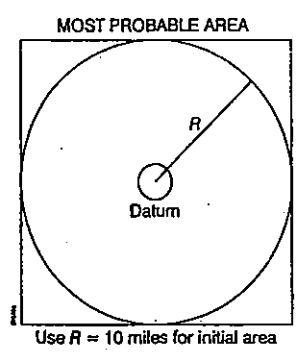
Page No. 36

Q No - 22

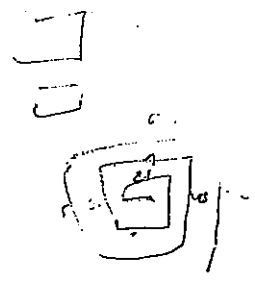
Search Patterns

Section 3 - On-Scene Co-ordination

- Plot the search area:
 - draw a circle centred on datum with radius R .
 - using tangents to the circle, form a square as shown below
 - if several facilities will be searching at the same time, divide the square into sub-areas of the appropriate size and assign search facilities accordingly.



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■ Search Patterns

✓ Expanding Square Search (SS)

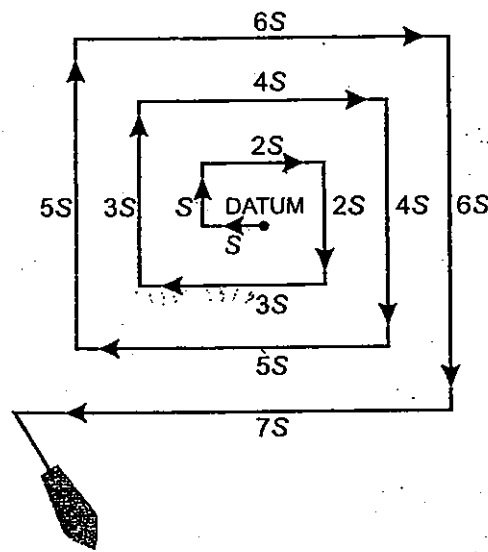
- Most effective when the location of the search object is known within relatively close limits.
- The commence search point is always the datum position.
- Often appropriate for vessels or small boats to use when searching for persons in the water or other search objects with little or no leeway.
- Due to the small area involved, this procedure must not be used simultaneously by multiple aircraft at similar altitudes or by multiple vessels.
- Accurate navigation is required; the first leg is usually oriented directly into the wind to minimize navigational errors.
- It is difficult for fixed-wing aircraft to fly legs close to datum if S is less than 2 NM.

- ③ the cross section area of sea are, through which ship is transiting
- ④ the ratio of ships underwater cross section to the cross section of the sea area, is called the blockage factor.

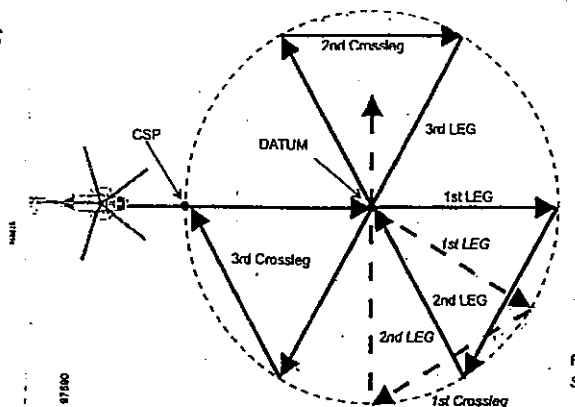
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Section 3 - On-Scene Co-ordination

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Expanding square search (SS)



Sector pattern: single-unit (VS)

Sector Search (VS)

- Most effective when the position of the search object is accurately known and the search area is small.
- Used to search a circular area centred on a datum point.
 - Due to the small area involved; this procedure must not be used simultaneously by multiple aircraft at similar altitudes or by multiple vessels.
- An aircraft and a vessel may be used together to perform independent sector searches of the same area.
- A suitable marker (for example, a smoke float or a radio beacon) may be dropped at the datum position and used as a reference or navigational aid marking the centre of the pattern.
- For aircraft, the search pattern radius is usually between 5 NM and 20 NM.
- For vessels, the search pattern radius is usually between 2 NM and 5 NM, and each turn is 120°, normally turned to starboard.

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Section 3 - On-Scene Co-ordination

Sweep widths for visual land search (km (NM))

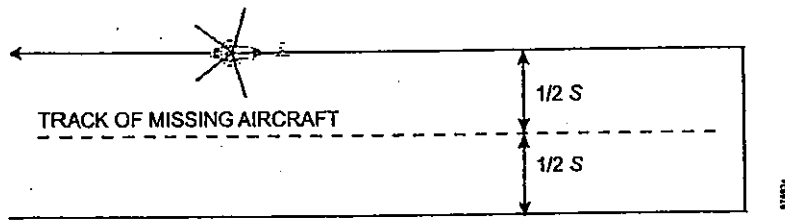
Search object	Height (m (ft))	Visibility (km (NM))				
		6 (3)	9 (5)	19 (10)	28 (15)	37 (20)
Person	150 (500)	0.7 (0.4)	0.7 (0.4)	0.9 (0.5)	0.9 (0.5)	0.9 (0.5)
	300 (1000)	0.7 (0.4)	0.7 (0.4)	0.9 (0.5)	0.9 (0.5)	0.9 (0.5)
	450 (1500)	—	—	—	—	—
	600 (2000)	—	—	—	—	—
Vehicle	150 (500)	1.7 (0.9)	2.4 (1.3)	2.4 (1.3)	2.4 (1.3)	2.4 (1.3)
	300 (1000)	1.9 (1.0)	2.6 (1.4)	2.6 (1.4)	2.8 (1.5)	2.8 (1.5)
	450 (1500)	1.9 (1.0)	2.6 (1.4)	3.1 (1.7)	3.1 (1.7)	3.1 (1.7)
	600 (2000)	1.9 (1.0)	2.8 (1.5)	3.7 (2.0)	3.7 (2.0)	3.7 (2.0)
Aircraft less than 5700 kg	150 (500)	1.9 (1.0)	2.6 (1.4)	2.6 (1.4)	2.6 (1.4)	2.6 (1.4)
	300 (1000)	1.9 (1.0)	2.8 (1.5)	2.8 (1.5)	3.0 (1.6)	3.0 (1.6)
	450 (1500)	1.9 (1.0)	2.8 (1.5)	3.3 (1.8)	3.3 (1.8)	3.3 (1.8)
	600 (2000)	1.9 (1.0)	3.0 (1.6)	3.7 (2.0)	3.7 (2.0)	3.7 (2.0)
Aircraft over 5700 kg	150 (500)	2.2 (1.2)	3.7 (2.0)	4.1 (2.2)	4.1 (2.2)	4.1 (2.2)
	300 (1000)	3.3 (1.8)	5.0 (2.7)	5.6 (3.0)	5.6 (3.0)	5.6 (3.0)
	450 (1500)	3.7 (2.0)	5.2 (2.8)	5.9 (3.2)	5.9 (3.2)	5.9 (3.2)
	600 (2000)	4.1 (2.2)	5.2 (2.9)	6.5 (3.5)	6.5 (3.5)	6.5 (3.5)

Track Line Search (TS)

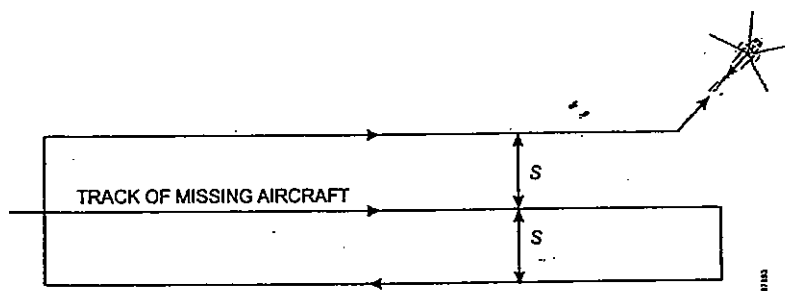
- Normally used when an aircraft or vessel has disappeared without a trace along a known route.
- Often used as initial search effort due to ease of planning and implementation.
- Consists of a rapid and reasonably thorough search along intended route of the distressed craft.
- Search may be along one side of the track line and return in the opposite direction on the other side (TSR).
- Search may be along the intended track and once on each side, then search facility continues on its way and does not return (TSN).
- Aircraft are frequently used for TS due to their high speed.

(4)

Section 3 - On-Scene Co-ordination

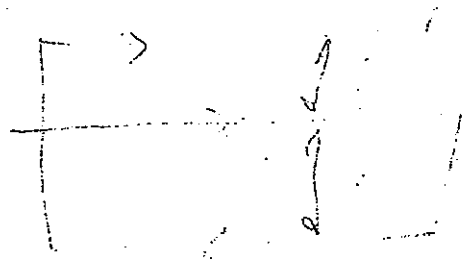


Track line search, return (TSR)



Track line search, non-return (TSN)

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- Aircraft search height usually 300 m to 600 m (1000 ft to 3000 ft) during daylight or 600 m to 900 m (2000 ft to 3000 ft) at night.

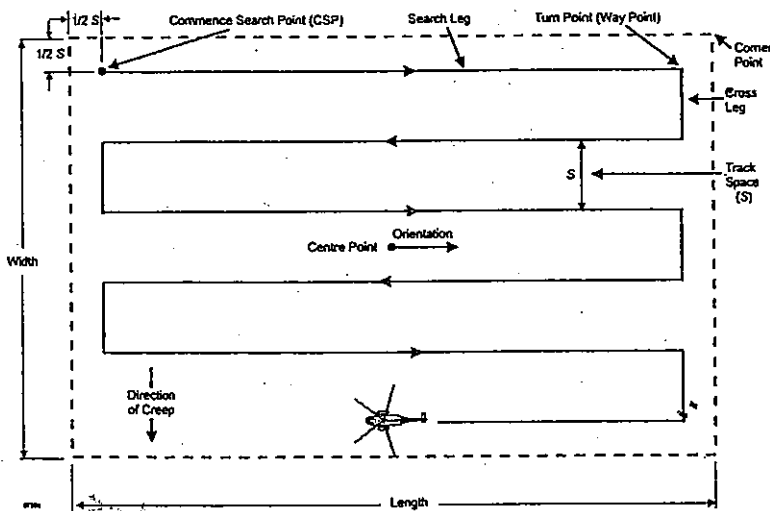
Parallel Sweep Search (PS)

- Used to search a large area when survivor location is uncertain.
- Most effective over water or flat terrain.
- Usually used when a large search area must be divided into sub-areas for assignment to individual search facilities on-scene at the same time.
- The commence search point is in one corner of the sub-area, one-half track space inside the rectangle from each of the two sides forming the corner.
- Search legs are parallel to each other and to the long sides of the sub-area.

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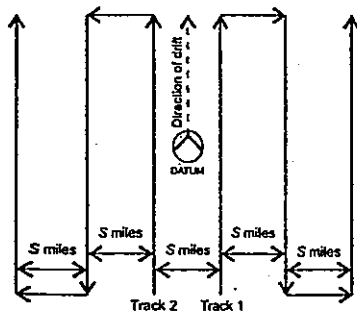
Section 3 - On-Scene Co-ordination



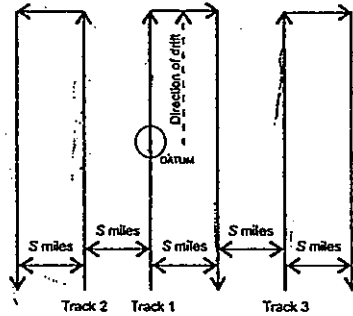
Parallel sweep search (PS)

- Multiple vessels may be used as shown on page 3-28:
 - Parallel sweep: for use by two ships.
 - Parallel sweep: for use by three ships.
 - Parallel sweep: for use by four ships.
 - Parallel sweep: for use by five or more ships.

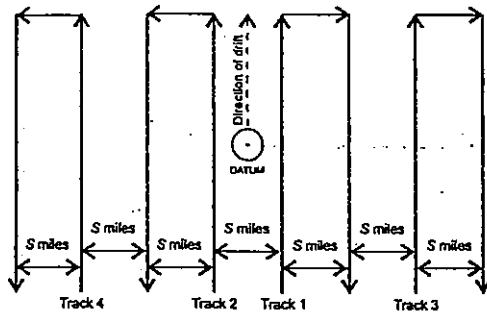
Section 3 - On-Scene Co-ordination



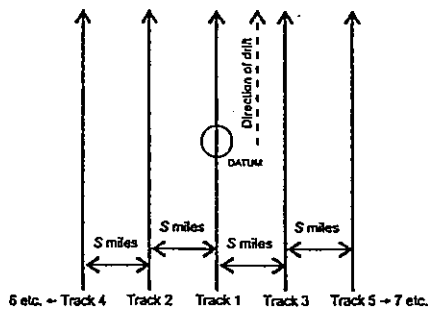
PATTERN 2
Parallel track search - 2 ships



PATTERN 3
Parallel track search - 3 ships



PATTERN 4
Parallel track search - 4 ships



PATTERN 5
Parallel track search - 5 or more ships

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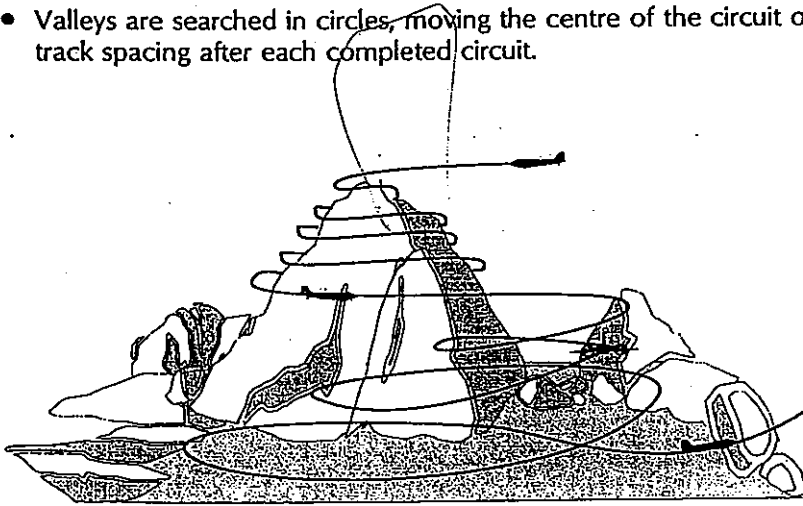
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Section 3 - On-Scene Co-ordination

Contour Search (OS)

- Used around mountains and in valleys when sharp changes in elevation make other patterns not practical.
- Search is started from highest peak and goes from top to bottom with new search altitude for each circuit.
- Search altitude intervals may be 150 m to 300 m (500 ft to 1000 ft).
- The aircraft may make a descending orbit away from the mountain before resuming the contour search at the lower altitude.
- The aircraft may spiral downwards around the mountain at a low but approximately constant rate of descent when there is not enough room to make a circuit opposite to the direction of search.
- If the mountain cannot be circled, successive sweeps at the same altitude intervals as listed above should be flown along its side.
- Valleys are searched in circles, moving the centre of the circuit one track spacing after each completed circuit.



Contour search (OS)

Co-ordinated Vessel-Aircraft Search Pattern

- Normally used only if there is an OSC present to give direction to and provide communications with the participating craft.
- Creeping line search, co-ordinated (CSC) is often used.



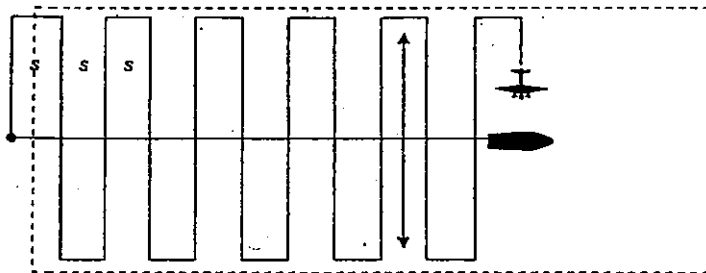
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Section 3 - On-Scene Co-ordination

- The aircraft does most of the searching, while the ship steams along a course at a speed as directed by the OSC so that the aircraft can use it as a navigational checkpoint.
- The aircraft, as it passes over the ship, can easily make corrections to stay on the track of its search pattern.
- Gives a higher probability of detection than can normally be attained by an aircraft searching alone.
- Ship speed varies according to the speed of the aircraft and the size of the pattern. The relationship among the speed of the surface facility, the aircraft's speed, the track spacing and the length of the search legs is defined by the following equation:

$$V_s = (S \times V_a) / (L + S),$$

where V_s is the speed of the surface facility in knots, S is the track spacing in nautical miles, V_a is the aircraft's true air speed (TAS) in knots, and L is the length of the aircraft's search leg in nautical miles.



Creeping line search, co-ordinated (CSC)

■ Initiation of Search

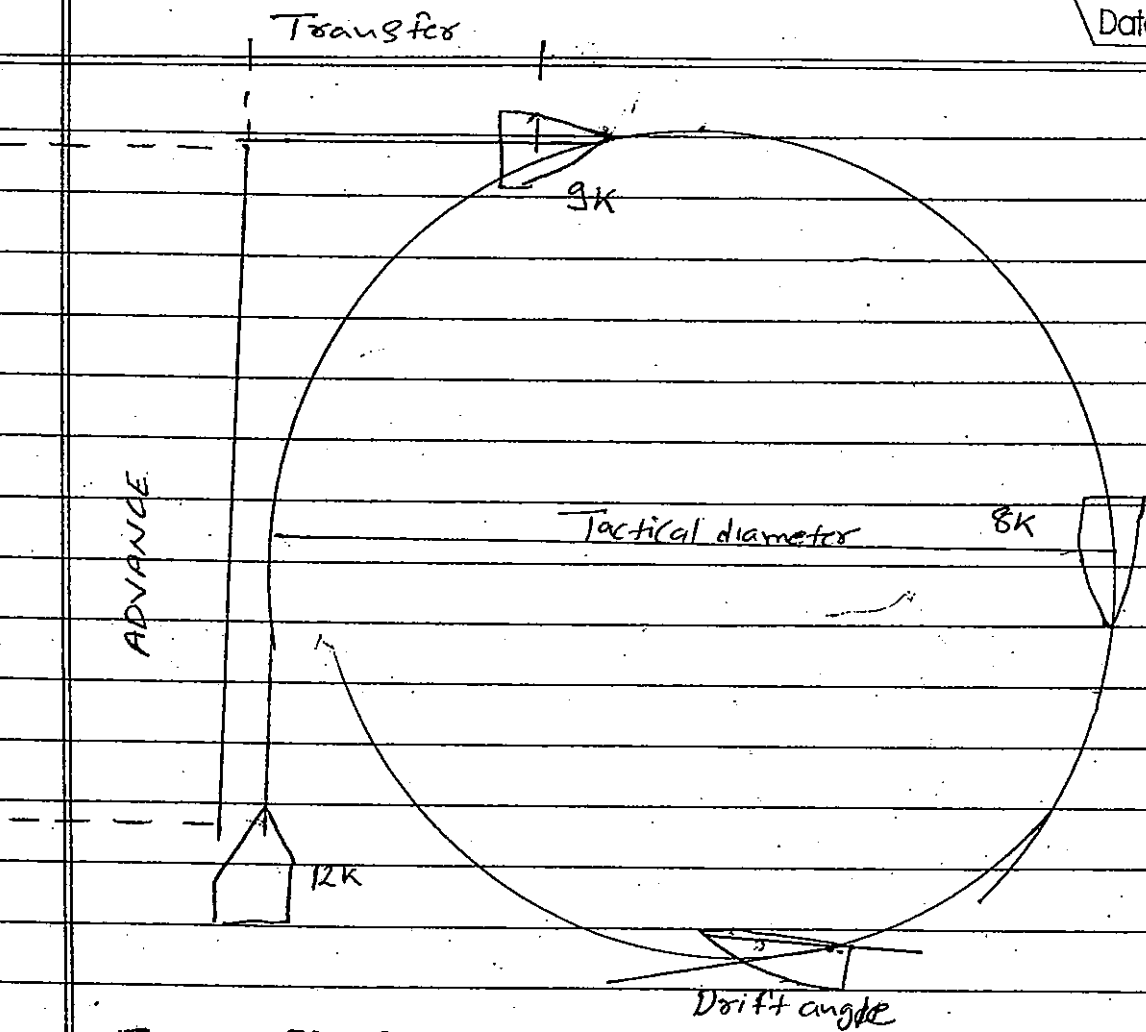
- When a search facility arrives on-scene in advance of the others, it should proceed directly to datum and commence an expanding square search.
- If possible, datum may be marked by putting over a liferaft or other floating marker with a leeway similar to that of the search object, as a check on the drift.

Turning Circle

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Date:

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1. Turning Circle = When a vessel alters her course under helm through 360° she moves on roughly circular path called turning circle.
2. Advance = The advance is the distance travelled by the ship along the original course when she alters the course under helm through 360° .
3. Transfer = The transfer is the distance travelled by the ship, measured from the original track to the po

Where the vessel has altered her course by 90° when is alter her course through Under helm through 360°

(4) Tactical Diameter - The distance travelled by the ship measured from the track to the point where the vessel has altered her course by 180° when altering her course Under helm through 360°

(5) Drift Angle - is the angle b/w the ship fore-aft line and the tangent to the turning circle.

(6) HEAD REACH - It is distance of traveled by a ship in forward direction when the main engine has been stopped.

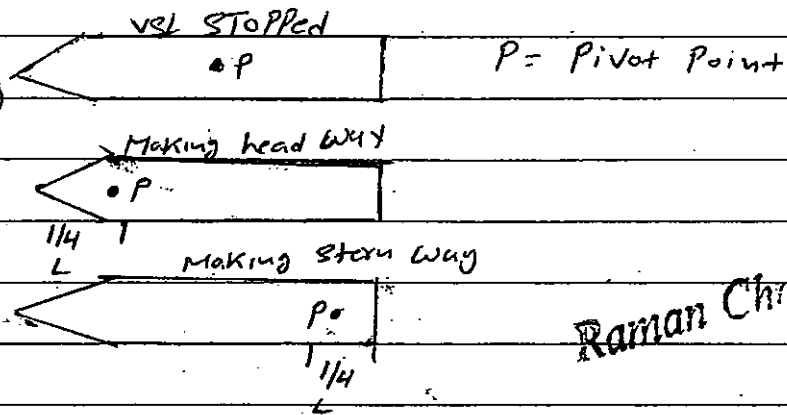
(7) Side Reach - It is the distance V/L will continue travel in the direction perpendicular to the initial heading after the M/E have been reversed.

(23) Pivot Point

It is an imaginary point situated somewhere in the vertical plane through stem and stern, around which a VSL turn when forced into a directional change. Pivot point effect by U/L Vol. Rudder size & type turn ~~to~~ UKC and Direction of movement.

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Show the position
of Pivot Point during
the VSL Condition



(24)

Swinging Circle When VSL At Anchor.

When VSL at Anchor and we want to know VSL How much
will swing at 360° So that

- Mark the ship position where the anchor let go
- Note down the How much cable in water
- Then add with length ~~with~~ stem to break of Accommodation

Example:- Anchor in water = $7 \times 27.5 \text{ mtrs} = 192.5 \text{ mtrs}$

Length stem to break of ACCO = 120 mtrs

$$S_0 = 192.5 + 120$$

$$= 312.5 \text{ mtrs} / 1852$$

So that ship will swing = 0.17 miles or

$$= 312.5 \text{ mtrs}$$

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(25)

Transverse Thrust

This is caused the difference of load on the propeller blades. The lower blades has comparatively more load than the upper blade because the upper blades are working less water. This effect is more when the V/L is in light condition.

Propeller:- There are two type of propeller.

① Right handed

② Left handed

① Right handed :- V/L going ahead & viewing from the stern if the propeller rotates in clock wise direction.

② Left handed :- V/L going ahead and viewing from the stern if the propeller rotates in anticlock wise direction.

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Standard Methods of Recovery.

Williamson turn

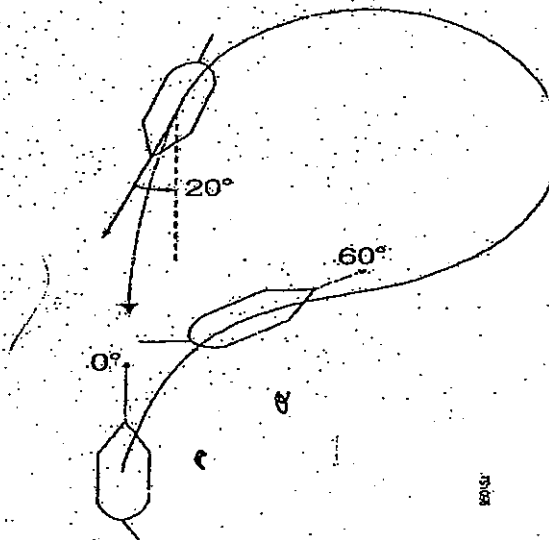
- makes good original track line
- good in reduced visibility
- simple
- takes the ship farther away from the scene of the incident
- slow procedure

Williamson turn

Rudder hard over (in an "immediate action" situation, only to the side of the casualty).

After deviation from the original course by 60°, rudder hard over to the opposite side.

When heading 20° short of opposite course, rudder to midship position and ship to be turned to opposite course.



MAN
 OVERBOARD
 RESCUE
 MANOEUVRE

One turn ("Single turn, Anderson turn")

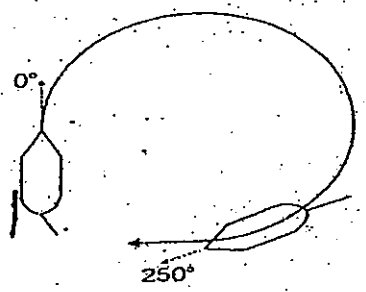
- fastest recovery method
- good for ships with tight turning characteristics
- used most by ships with considerable power
- very difficult for a single-screw vessel
- difficult because approach to person is not straight

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Single turn (270° manoeuvre)

Rudder hard over (in an "immediate action" situation, only to the side of the casualty).

After deviation from the original course by 250°, rudder to midship position and stopping manoeuvre to be initiated.



Scharnov turn

- will take vessel back into her wake
- less distance is covered, saving time
- cannot be carried out effectively unless the time elapsed between occurrence of the incident and the commencement of the manoeuvre is known

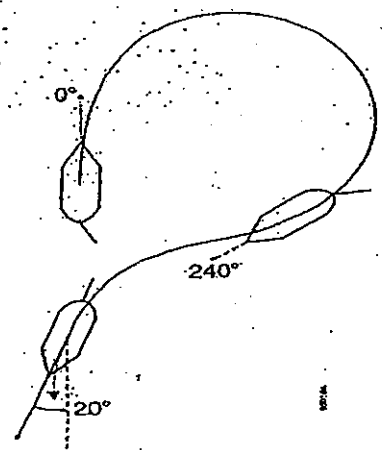
Scharnov turn

(Not to be used in an "immediate action" situation.)

Rudder hard over.

After deviation from the original course by 240°, rudder hard over to the opposite side.

When heading 20° short of opposite course, rudder to midship position so that ship will turn to opposite course.



(27)

Wheel House Poster

- ① Ship Particulars (Name, C.S., GRT, NRT, Max Displ, Load Line)
- ② Steering Particulars
- ③ Population Particulars
- ④ Anchor Chain
- ⑤ Turning Circles
- ⑥ Deviation Card
- ⑦ Muster List
- ⑧ Man overboard rescue maneuver
- ⑨ Load Line Zone
- ⑩ Time Zone chart
- ⑪ Thruster effect at trail condition
- ⑫ ME Correction

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(28)

OFF-Course alarm

- As part of the steering control system there should be an off-course alarm facility to warn the oow when the ship deviates from its course.
- A magnetic off-course alarm independent from other bridge equipment and input.
- A second gyro compass with a heading comparison unit connect to both compasses.
- The alarm should be use at all time when the autopilot is open.
- Non-activation of the off course alarm will not always mean that the ship is maintaining its planned track. The ship may be moved off its track by wind and current even though the heading remain unchanged.

①

ENGINE STEERING GEAR FAILURE

- ① Inform Master.
- ② Inform Engine room.
- ③ Prepare for anchoring if in shallow water.
- ④ Exhibit "Not Under Command" shapes and lights.
- ⑤ Commence Sound Signalling.
- ⑥ Keep VHF watch.
- ⑦ Monitor V/L position Rate of drift.
- ⑧ Check for any Navigational Hazards approaching traffic ^{at} ~~at~~
- ⑨ Change over Auto to Hand Steering.
- ⑩ Check for immediate weather conditions.
- ⑪ Broadcast "URGENCY" message.

In case of only steering failure :-

- ① Inform engine room
- ② Engage emergency steering
- ③ Take way off the ship
- ④ Prepare engine for maneuvering.

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②

APPROACHING FOR OR IN RESTRICTED VISIBILITY

- ① Inform Master & Engine room.
- ② Observe visually and make note of the all traffic in sight.
- ③ Switch on ARPA/RADAR and commence plotting.
- ④ Switch on Navigational light.
- ⑤ Change over to hand steering.
- ⑥ Switch on Echo Sounder in shallow water.
- ⑦ Switch on other steering motor.

- ⑧ Post double look out.
- ⑨ Try out the fog signaling apparatus.
- ⑩ Keep the wheel house door open and stop all noise of the deck so that you can hear the fog signal of other VC.
- ⑪ Commence sounding fog signal before entering fog.
- ⑫ Close all weather light door.
- ⑬ Keep record of all happening.
- ⑭ Switch on VHP.

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3. PREPARATION FOR HEAVY WEATER :-

- 1 Inform master, engine room, Galley staff, Chief officer.
- 2 Secure all moveable equipment on bridge and on deck.
- 3 Switch on ARPA, Radar and commence plotting.
- 4 Tight the cargo lashing.
- 5 Anchor lashing should be checked.
- 6 Mooring ropes are secured.
- 7 Additional lashing on accommodation ladder.
- 8 Inform crew to secure all loose items in cabin.
- 9 Life line are rigged on both sides of the deck.
- 10 Switch on Navigational lights.
- 11 Try out fog signaling apparatus.
- 12 Keep a record of all events.

5

STRANDING OR GROUNDING

1. Stop Engine
2. Sound General Emergency alarm.
3. Inform master & Engine room.
4. Announce on the public Address system (PAS) our ship's name around. (Close water tight door's if fitted)
5. Mark the position quickly by pressing MOB button on GPS
6. Three ball in day time signal.
7. Two all round red light's and anchor light in night.
8. Switch on the deck light's at night.
9. Check hull for damage.
10. Take sounding of bilge & Tanks.
11. Take sounding around the ship.
12. Determine which side is deeper water & Nature of seabed.
13. Check next highest Rise fall of tide.
14. Reduce the draft of ship
15. Broadcast 'URGENCY' message.
16. Keep record of all went

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4

MAN OVER BOARD :-

- ① Immediately wheel hand over to casualty side.
- ② Raise General Emergency Alarm
- ③ Release MOB buoy
- ④ Press MOB on GPS
- ⑤ Inform Master & Engine room.
- ⑥ Change Auto to Hand Steering (if in auto earlier)
- ⑦ Follow the Williamson pattern.
- ⑧ Sound occur (- - -)
- ⑨ Hoist flag 'O'
- ⑩ Post extra look out with 'binocular'
- ⑪ Note ship position, wind speed, direction & time
- ⑫ Muster Rescue boat crew.
- ⑬ Prepare rescue boat launching.
- ⑭ Send 'URGENCY' Message.
- ⑮ Rig pilot ladder / Net to assist the recovery.
- ⑯ Recovery of casualty from windward side.
- ⑰ Give first aid to the person.
- ⑱ Pick up the life buoy.
- ⑲ Once rescue is successful cancel urgency message
- ⑳ Maintain a record of all events.
- ㉑ Inform owner etc.

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6

CALLING MASTER

- ① if R.V encountered or suspected
- ② if traffic condition or the movements of other ship are causing concern.
- ③ if difficulty is experienced in maintaining course
- ④ on failure to sight cloud, a navigation mark or to obtain sounding by the expected time
- ⑤ if radio equipment malfunction
- ⑥ in heavy wx if any doubt about the possibility of wx damage
- ⑦ if the ship meets any hazard to navigation such as ice derelict.
- ⑧ if any other emergency or if any doubt.

FIRE

7

Have the following action being carried out?

- ① Emergency alarm (internal and external) sounded
- ② All concerned notified of seat of fire.
- ③ ventilation automatic fire doors, watertight door closed.
- ④ deck lighting switched on.
- ⑤ vessel's position available in radio room, satelite terminal and other automatic distress transmitters up date as necessary.

⑧

Gyro Failure / COMPASS FAILURE

- Are the following actions being carried out?
1. Magnetic compass or any alternative means used as heading
 2. Master informed.
 3. Person responsible for gyro maintenance informed.
 4. Engine room informed
 5. Effect of failure on other navigational aids considered.

⑨

Bridge Control / Telegraph Failure.

- Are the following actions being carried out?
1. Switched to engine room control.
 2. Duty engineer / engine room informed
 3. Emergency communication established with engine room.
 4. Master informed

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(a) Navigating in restricted visibility (b) Navigating in rough weather.

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Ans: In restricted visibility: —

1. ✓ Comply with COLREG 1972 with particular regard to the sounding of fog signal, proceeding at safe speed and having main engine ready for immediate manoeuvre.
2. ✓ Inform master.
3. ✓ Post a proper lookout & maintain a proper lookout by sight, hearing & all available means.
4. ✓ Exhibit navigation lights.
5. ✓ Operate ~~and~~ the Radar & ARPA.
6. Observe visually, and make a note of, the movement of all traffic in sight.
7. Change over to hand steering if on auto pilot.
8. ✓ Switch check both the steering motors are on.
9. stop all the noise on deck so that fog signal from other v/L will be clearly audible.
10. ✓ keep open the ~~or~~ bridge wings door so that the fog signals of the other vessel may be heard, even if they are very faint.
11. Restrict hold ventilation if in progress.
12. ✓ keep a good watch on VHF CH 16.
13. ✓ Record all happenings in the Bridge Notebook.

In rough weather: —

1. ✓ Inform the master.
2. ✓ Inform the chief officer, catering staff & engine room.
3. ✓ Secure all moveable equipment on bridge.
4. ✓ Switch on ~~alg~~ commence plotting.
5. ✓ Switch on navigational lights if required.

58. Enumerate the SOLAS requirement of routine steering gear test.
How often should emergency steering drill be conducted?

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Ans. Requirement of routine steering gear test as per SOLAS :-

- (a) Within 12 hr before departure, the ship steering gear shall be checked and tested by ship's crew. The test procedure shall include where applicable, the operation of the following :-
- (i) The main steering gear. **Raman Chauhan**
- (ii) the auxiliary steering gear
- (iii) the remote steering gear control systems
- (iv) the steering positions located on the navigational bridge
- (v) the emergency power supply relation
- (vi) the rudder angle indicator in addition to the actual position of the rudder
- (vii) the remote steering gear control system power failure alarm.
- (viii) the steering gear power unit failure alarms.
- (ix) automatic isolating arrangements and other automatic equipment.
- (b) The check & test shall include :-
- (i) full movement of rudder according to the required capability of steering gear.
- (ii) A visual inspection of steering gear and its connecting linkage.
- (iii) the operation of means of communication between navigational bridge and the steering gear compartment.
- (c) The ships which are regularly engaged on short duration voyage shall carry out these checks and test at least once a week.
- (d) Emergency steering drill shall be conducted at least once every three months.
- (e) The date and details of all checks, test & emergency drill shall be recorded in the log book.

(1)

QUS OF B.W.E ; SHIP HANDLING
OR EMERGENCY

- ① Rudder stuck 20° to starboard open sea ACTION
- ② Rudder stuck 30° to port in TSS / narrow channel ACTION
- ③ What action will you take when other VIL not take action
- ④ What do you know about TRS
- ⑤ How are ECDIS Chart corrected
- ⑥ Requirement for magnetic compass
- ⑦ If no gyro onboard ship can sail
- ⑧ What is manoeuvring characteristics, turning circle
- ⑨ What is squat, shallow water effect why
- ⑩ Bridge Procedure Guide Content
- ⑪ GPS error
- ⑫ Echo sounder error
- ⑬ YAW control in Auto pilot How work
- ⑭ How does a gyro work
- ⑮ In open sea if gyro fails how would u know?
- ⑯ If^m river passage RPM suddenly start reducing ACTION
- ⑰ How to carry out performance test of Radar
- ⑱ How will you know GPS giving wrong position
- ⑲ What is Rot and How does work
- ⑳ off course alarm
- ㉑ What is wheel over point
- ㉒ Steering gear failure ACTION
- ㉓ Explain all recovery method as per IAMSAR
- ㉔ Taking over Navigational Watch
- ㉕ M.O.B procedures in R.V

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- (26) GPS Correction VVVE
- (27) Does VDR have ECDIS input
- (28) Why Do you take compass error and Gyro error
- (29) Explain the Sextant error
- (30) Principle of Sextant
- (31) Use of Sextant
- (32) AIS Limitation
- (33) What is BanWag
- (34) Where is pivot point when ship underway.
- (35) Error of Magnetic
- (36) Error of Gyro
- (37) Gyro Fail action
- (38)

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RULE OF THE ROAD Page No- 59

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RULE 2	RESPONSIBILITY
RULE 3	GENERAL DEFINITIONS
PART B : STEERING AND SAILING RULES	
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RULE 4	APPLICATION
RULE 5	LOOK-OUT
RULE 6	SAFE SPEED
RULE 7	RISK OF COLLISION
RULE 8	ACTION TO AVOID COLLISION
RULE 9	NARROW CHANNELS
RULE 10	TRAFFIC SEPARATION SCHEMES
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RULE 23	POWER-DRIVEN VESSEL UNDERWAY
RULE 24	TOWING AND PUSHING

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RULE 25	SAILING VESSEL UNDERWAY AND VESSELS UNDER OARS
RULE 26	FISHING VESSELS
RULE 27	VESSEL NOT UNDER COMMAND OR RESTRICTED IN THEIR ABILITY TO MANOEUVRE
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RULE 33	EQUIPMENT FOR SOUND SIGNALS
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RULE 36	SIGNALS TO ATTRACT ATTENTION
RULE 37	DISTRESS SIGNALS
PART E : EXEMPTIONS	
RULE 38	EXEMPTIONS

DEFINITIONS:

VESSEL NOT UNDER COMMAND: Means a vessel which through some exceptional circumstance is unable to manoeuvre as required by these Rules and is therefore unable to keep out of the way of another vessel.

VESSEL RESTRICTED IN HER ABILITY TO MANOEUVRE: Means a vessel which from the nature of her work is restricted in her ability to manoeuvre as required by these Rules and is therefore unable to keep out of the way of another vessel.

VESSEL CONSTRAINED BY HER DRAUGHT: Means a power driven vessel which, because of her draught in relation to the available depth and width of navigable water, is severely restricted in her ability to deviate from the course she is following.

UNDERWAY: means that a vessel is not at anchor or made fast to the shore or aground.

EVERY VESSEL SHALL MAINTAIN A PROPER LOOKOUT ALL THE TIME THE VESSEL IS AT SEA EVERY VESSEL SHALL PROCEED AT A SAFE SPEED ALL THE TIME THE VESSEL IS AT SEA

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IN NARROW CHANNELS 4(FOUR) TYPES OF VESSELS ARE NOT TO IMPEDE THE SAFE PASSAGE OF A VESSEL

- 1 VESSEL < 20 METRES IN LENGTH
- 2 FISHING VESSEL
- 3 SAILING VESSEL
- 4 CROSSING VESSEL

IN A TRAFFIC SEPARATION SCHEME 3(THREE) TYPE OF VESSELS ARE NOT TO IMPEDE THE PASSAGE OF ANY VESSEL

- 1 FISHING VESSEL
- 2 SAILING VESSEL
- 3 VESSEL < 20 METERS IN LENGTH

TYPE OF VESSEL YOU KNOW FOR SURE ARE MAKING WAY OR NOT

- 1 VESSEL ENGAGED IN FISHING
- 2 VESSEL NOT UNDER COMMAND
- 3 DEDICATED VESSELS RESTRICTED IN HER ABILITY TO MANOEUVRE

EXPLANATION OF RULE 8 (f)

(i) A VESSEL REQUIRED NOT TO IMPEDE THE PASSAGE OR SAFE PASSAGE OF ANOTHER VESSEL UNDER ANY OF THESE RULES SHALL TAKE EARLY ACTION TO ALLOW SUFFICIENT SEA ROOM FOR THE SAFE PASSAGE OF THE OTHER VESSEL.

(ii) A VESSEL REQUIRED NOT TO IMPEDE THE PASSAGE OR SAFE PASSAGE OF ANOTHER VESSEL WHEN APPROACHING THE OTHER VESSEL SO AS TO INVOLVE RISK OF COLLISION SHALL WHEN TAKING ANY ACTION HAVE DUE REGARDS TO THE ACTION REQUIRED BY THESE RULES.

(iii) A VESSEL WHOSE PASSAGE IS REQUIRED NOT TO BE IMPEDED (i.e THE OTHER VESSEL) REMAINS FULLY OBLIGED WITH THESE RULES AND DOES NOT HAVE AN AUTOMATIC RIGHT OF WAY.

WHEN REQUIRED TO STAND ON OTHER VESSEL NOT TAKING ANY ACTION

- 1 5 OR MORE SHORT AND RAPID BLAST ON THE WHISTLE
- 2 SUPPLEMENTED BY 5 OR MORE SHORT AND RAPID LIGHT SIGNAL
- 3 INFORM THE MASTER
- 4 ENGAGE MANUAL STEERING
- 5 ENGINES ON STAND-BY
- 6 CHECK OWN NAVIGATIONAL LIGHTS

(NB: WHEN IN A TSS POINTS 4 AND 5 ARE ALREADY ENGAGED)

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ANNEX - I : POSITIONING & TECHNICAL DETAILS OF LIGHT & SHAPES

Vertical Spacing Of Lights

- ✓ $v/l > 20m$ Masthead Lt not $< 6m$ above hull
- ✓ $v/l > 20m$ Masthead Lt not $> 12m$ above hull
- ✓ v/l breadth $> 6m$ Masthead Lt not $<$ the breadth
- ✓ $v/l < 20m$ but $> 12m$ Masthead Lt not $< 2.5m$ above gunwale
- ✓ $v/l < 12m$ highest Lt $< 2.5m$ above gunwale but not $< 1m$ above Side Lts.
- ✓ $v/l > 50m$ Aft Masthead Lt not $< 4.5m$ above for'd Masthead Lt
- ✓ $v/l > 20m$ Side Lts not $> \frac{1}{4}$ of the height of the for'd Masthead Lt
- ✓ $v/l > 20m$ Other Lights except Towing Lt. not $< 4m$ above hull
- ✓ $v/l > 20m$ Spacing between Lts not $< 2m$
- ✓ $v/l < 20m$ Spacing between Lts not $< 1m$ ✓ $v/l < 20m$
- ✓ For'd anchor lt when 2 are carried, not $< 6m$ above hull

Horizontal Spacing Of Lights

- ✓ Dist. Between for'd & aft Masthead Lt not $> 100m$ & not $< \frac{1}{2}$ the L.O.A. of v/l
- ✓ For'd Masthead Lt not $> \frac{1}{4}$ the length of v/l from stem
- Other Lts not $> 2m$ from fore & aft centreline in athwartship direction
- Fishing v/l outlying gear indicating lt not $< 2m$ but not $> 6m$ from all round R/W.lt.

Shapes

- ✓ Ball dia not $< 0.6m$
- ✓ Cone dia of base not $< 0.6m$
- ✓ Cylinder dia not $< 0.6m$ Height not $<$ dia.
- ✓ Diamond \rightarrow Assume 2 cones with common base
- Distance between shapes not $< 1.5m$

Vertical Sectors Of Lights

- All v/l 100% intensity 5 deg. above & below horizontal
- v/l except sailing v/l 60% intensity 7.5 deg. above & below horizontal
- Sailing v/l 50% intensity 25 deg. above & below horizontal

Horizontal Sectors Of Lights

- Side Lts from for'd 1 - 3 deg. outside prescribed limit
- Side Lts; Stern Lt; Masthead Lt 22.5 deg. abaft beam 5 deg. outside prescribed limit
- Side Lts; Stern Lt; Masthead Lt 100% intensity 5deg within prescribed limit
- Side Lts; Stern Lt; Masthead Lt 50% intensity upto prescribed limit & 5deg beyond prescribed limit
- 1) round Lts sector of obstruction not > 6 deg.

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SOUND SIGNALS - RULE 34 / 35 & ANNEX III

Page No - 63

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Sound Signalling Apparatus:

- V/I > 12m but < 100m 1 whistle + 1 bell
- V/I > 100m 1 gong + 1 whistle + 1 bell

[Short blast / - prolonged blast]

- Manoeuvring Sound Signals (can be used only by power driven vessels)

- Altering to Starboard
- Altering to Port
- Going Astern

Vessels in sight of one another in a Narrow Channel:

- Intend to Overtake from Starboard side
- Intend to Overtake from Port side
- Vessel agrees to be Overtaken
- Vessel nearing a bend

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Vessels in sight of one another in any situation if in doubt of the other vessel's intention or more

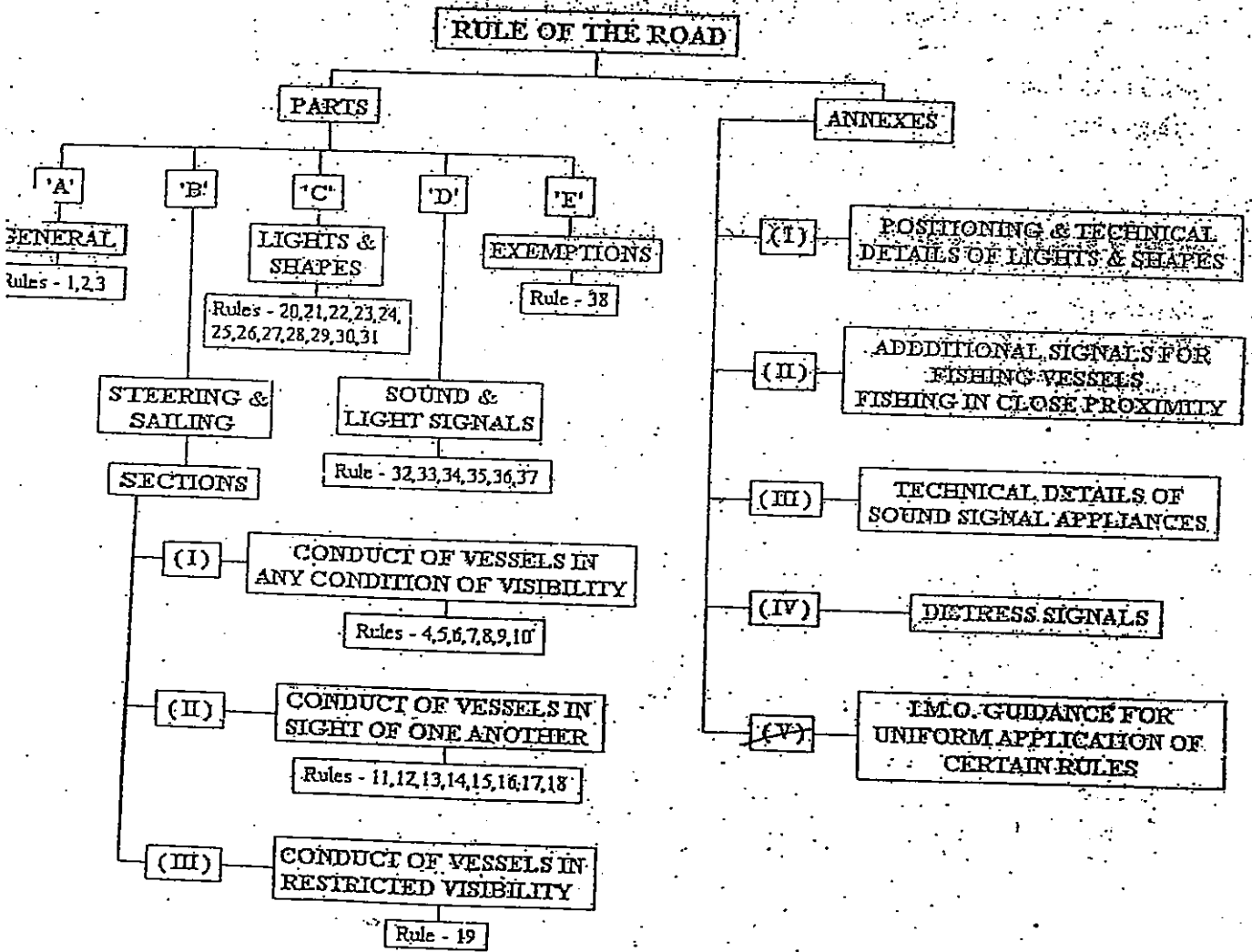
Sound Signals in Restricted Visibility:

- Power Driven v/I making way - (every 2 min.)
- Power Driven v/I stopped
- WINUC ; RAM ; CBD ; Towing ; Fishing ; under Sails
- V/I > 100m @ anchor Rapid ring of the bell for 5sec followed by Rapid ringing of the gong Aft for 5sec
- V/I > 100m @ anchor Rapid ring of the bell for 5sec
- Additional warning signal by v/I @ anchor
- V/I Aground 3 distinctive strokes on the bell followed by rapid ringing of the bell for 5sec & 3 distinctive strokes again. Succeeded by rapid ringing of the gong Aft for 5sec
- Additionally . . .
- Pilot v/I normal sound signals as a power driven v/I +

Characteristics of Sound Signalling Appliances:

Nature of v/I	Fundamental Freq (Hz)	Audible Range (m)
> 200m	70 - 200	2
< 200m / > 75	130 - 350	1.5
< 75m / > 20m	250 - 700	1
< 20m	250 - 700	0.5

N

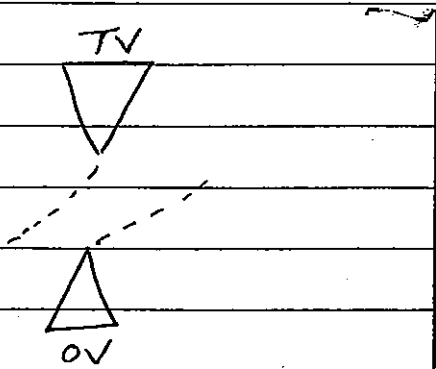


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TV - target VSL
 OV - own VSL
 R.V : Rest VISIBIL
 P.D : Power driven VSL

ROR - SITUATIONS

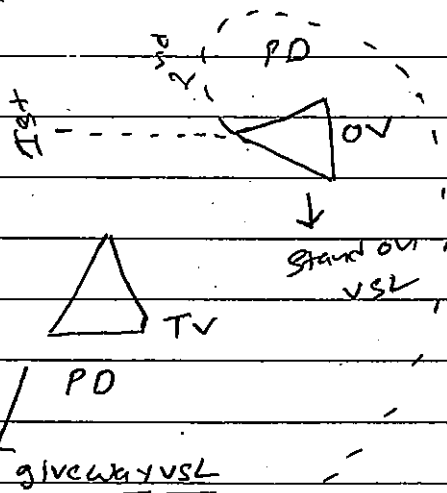
①



Head on Situation as per Rule 14
 Action :- Take Series of C/R/GS to Determine if ROC exist

② if Risk of collision exist as per Rule 34 one short blast A/C STD

②



Crossing situation as per Rule No 15
 Action :- Take Series of C/R/G
 - Maintain my course and speed
 - if the ROC exist, and target VSL not take any action
 - Then as per Rule no 34 D give her five short rapid blast / flashes for intention
 - again she will not take any action then as per Rule NO 17-C ~~At~~ and 34 A one short blast A/C STD passing to her stream

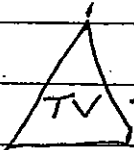
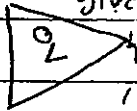
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3

Both x PD

give way



stand on

Crossing situation as per R/N 15

Action - Take series of C/Brg determine

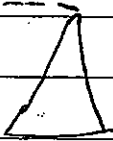
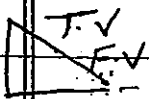
if Roc exist

- if Roc exist then as per Rule No 34-

one short blast A/C STD PASS

Stem of that

4



O.V
P.D

Crossing situation as per R/N-15

Action - Take series of C/Brg for deter

Roc

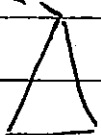
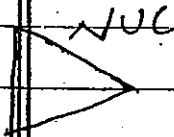
- if Roc exist as per R/N 18-A my vsL

give way vsL

- if Roc exist two short blast A/C

port pass from her stem

5



O.V

P.D

- Take series of C/Brg for deter
mine Roc

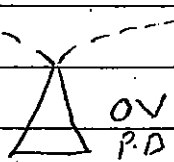
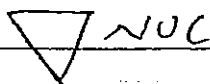
- As per R/N 18-A my vsL give way vsL

- if Roc exist as per Rule No 34-A
two short blast

A/C port if sufficient room

otherwise STD

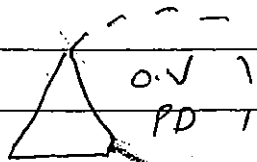
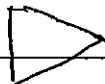
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- AS per Rule 18-A it is our responsibility to keep out of the way of NU
- Assess the situation and clear from any side either port or starboard.

7

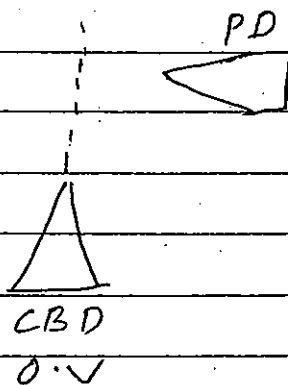
CBD



- AS per R/N 18 D my vessel give way
- VSL to keep out clear her
- one short blast A/C starboard pass from her stern of CBD

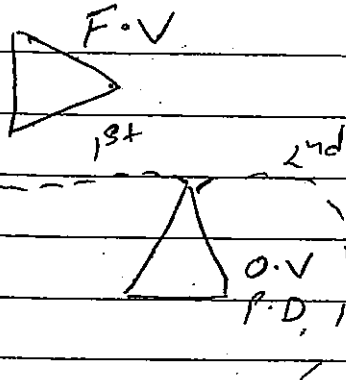
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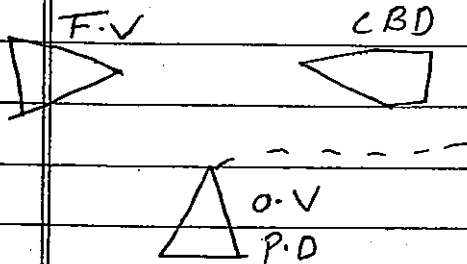
- AS per R/N 18 D our vessel stand on
- Maintain my course and speed
- Take sound signal if ROC exist
- ~~Check~~ Check my CBD light is exhibit or not
- Then give her to five short blast AS per R/N 34 D
- IF again no any action Reduce my speed or take all way off as per R/N 8 e

9



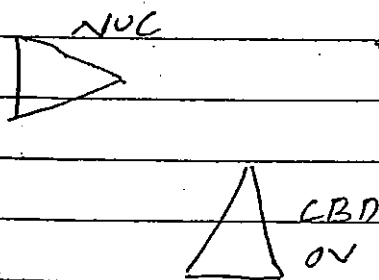
- AS per RIN 18-A our VSL is give way VSL
- ASSESS the situation if ROC exit
- Then two short blast as per Rule No 34-1 AIC port if there sufficient searoom otherwise ~~one~~ one short blast AIC starboard

10



- CROSSING situation AS per RIN 15
- AS per RIN 18-D our VSL is give way VSL
- ASSESS the situation by the C/Bog if ROC exit
- one short blast AS per (RIN 34-A) AIC starboard pass to ~~the~~ starboard CBD

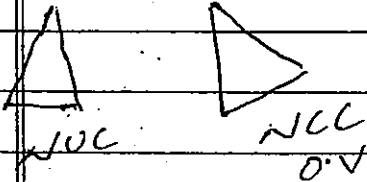
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- AS per RIN 18-D my VSL give way
- So AVOID collision take all way of reverse propulsion / stop / Reduce speed as per Rule 8 e

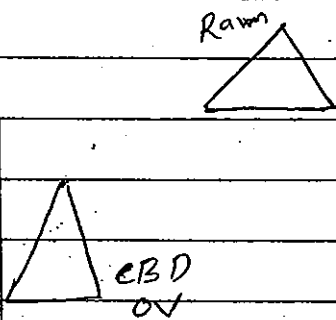
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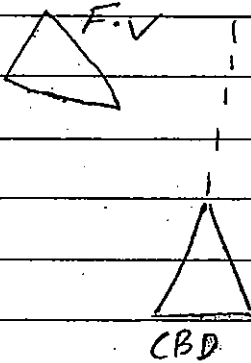
- Form Master
- Check Depth
- Sufficient Depth Deep Anchor
- If not ~~keep~~ able keep clear use fender

(13)



- AS per Rule no 18-D / 8-d
- Own VSL give way VSL
- Take Service by C/Brg Roc exist
- Take all way off by stopping / Reduce speed reversing propulsion as per Rule no 8e

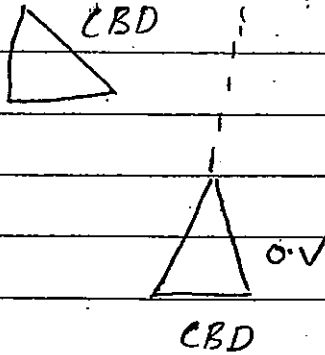
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- AS per R/W 18 D
- Own VSL stand on
- Maintain Course and speed
- Take Service C/Brg Roc exist
- ~~give~~ check my CBD light and shape exist or n
- Then give to her 5 short Rapid blast AS per R/W 34(d)
- Then if no action Take all way off as per R/W 8e

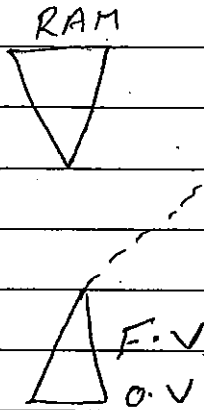
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(15)



- AS per R/W 15 Crossing VSL
- Own VSL stand VSL
- Maintain Course and Speed
- No action give her 5 short blast AS per R/W 34 D
- again No action take all way off AS per R/W 8 e

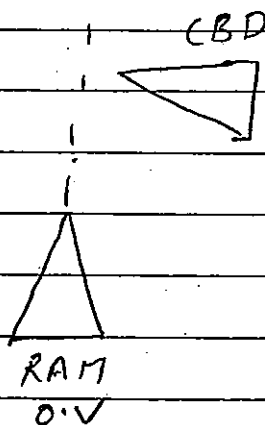
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- AS per Rule No 18 (C)
- EV clear from Ram
- one short blast AIC STD or AIC to Port as per situation AS per 34 A

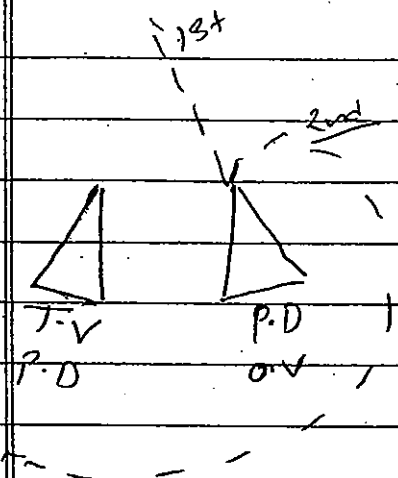
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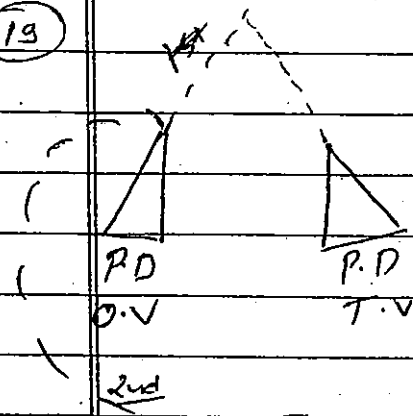
- AS per Rule No (18 d)
- Own VSL stand on
- maintain course and speed
- CBD will keep clear from RAM
- No action give to her 5 short blast AS per R/W 34 d
- again No any action take all way off AS per R/W 8 e

18



- Maintain course and speed (my VSL stands)
- No action attract by S short blast as per R/W 34d
- again no action one short blast AIC BtAG as per R/W 24-A or 17C

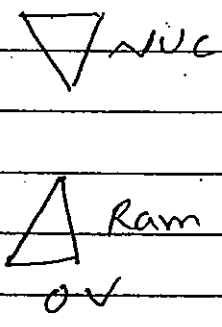
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- ~~Maintain~~
- My VSL give VSL
- take series C/BtAG ROC exist
- Two short blast AIC port pass from her stern P

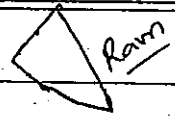
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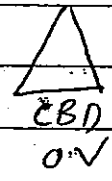


- Inform Master
- own VSL keep clear from NVC

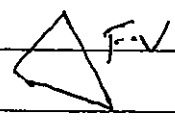
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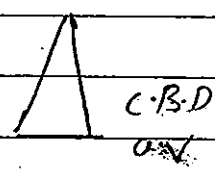
- Assess the situation by C/Brg
- If Rac exist
- Take all way off by Reduce speed
Stop / R. Propulsion AS per Rule
No 18 d



22



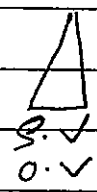
- Maintain course and speed
- If other VIL take no action attract
by 5 short blast as per Rule No- 34 a
- again no action take all way off
AS per Rule No 8 e



23

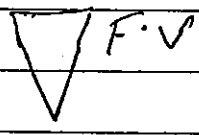


- AS per Rule No 18 B
- own VIL give way so take all way
off and clear from Ram

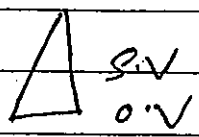


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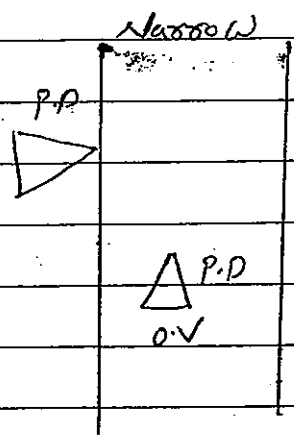


- AS per Rule No 18. B
- S will keep clear from fishing
VSL.



overtaking VSL AS per 15

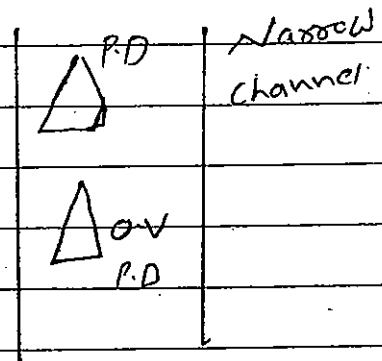
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- ASSES situation by C/Btg Roc exist
- Attract by five short blast as per 34d
- No action take all way of as per Rule no 8e

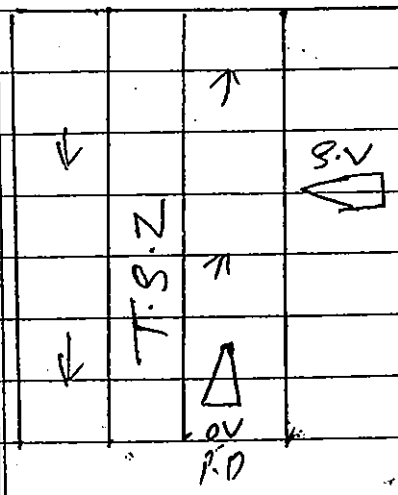
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26



- OVERTAKING SITUATION AS per RIN - 13
- AS per Rule No (9e) OWN VSL responsible
- CHECK the depth
- Give the signal if we want overtake stbd side (---) or for port (---) as per Rule No 34 C I
- If Agreement another VIL Give signal (---) as per Rule No (34 C II)
- Then Pass from that side

27



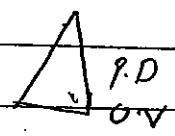
- Maintain Course and Speed
- ASSES the situation Roc exist
- give her 5 short blast as per 34d
- If Roc exist no action take all way off as per RIN 8e

[in all TSS. same action]

(28)

R.V

☞ Fog Signal



Radar not operational

- Reduce speed and take all way off as per R/N 19-e
- navigate with caution

Raman Chauhan

(29)

R.V

P.D

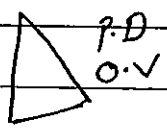
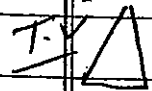
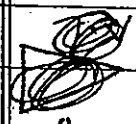


L.B.D
O.V

- give the fog signal as per R/N 35
- ~~plot~~ plot target
- Maintain course and speed.
- Assess situation if the Roc exist
- Take all way off as per Rule No 19-e

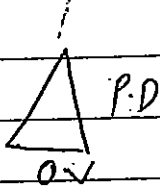
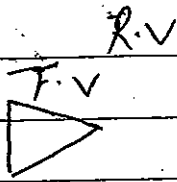
(30)

R.V



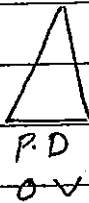
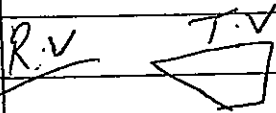
- give the fog signal as per R/N 35
- plot target
- Assess the situation if Roc exist
- A/C 8+6D as per R/N 19(d)(1)

31



- give fog signal as per R/W 35
- ASSES situation
- Plot target
- Maintain My Course and Speed
- No action A/C STD as per 19(d)(1)

32

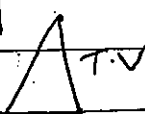
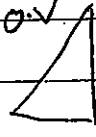


- give fog signal as per R/W 35
- Plot target
- A/C STD as per Rule No 19(d)(1)

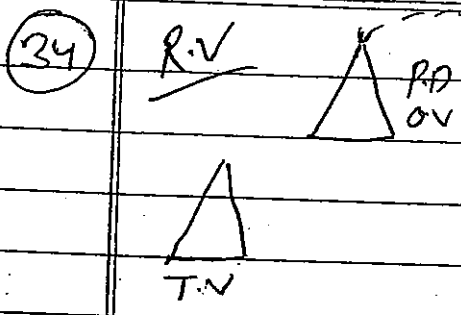
Raman Chauhan

33

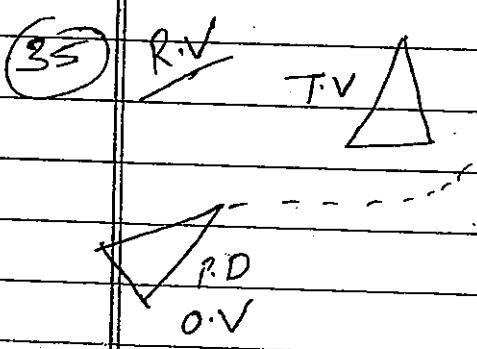
R.V



- give fog signal as per R/W 35
- ASSES situation
- Plot target
- Maintain Course and Speed
- if Roc exit I will not A/C STD as per Rule no 19(d)(2) if sufficient Sea Room A/C Port

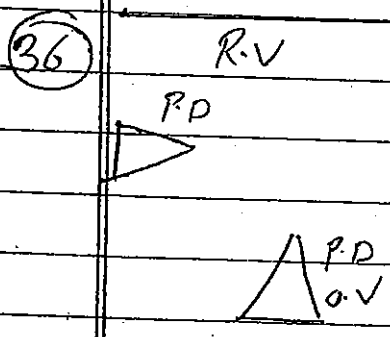


- give fog signal as per R/W 35
- plot the target
- Maintain course and speed
- If Roc exist
- AIC stbd to keep clear as per R/W 19(H)(R)

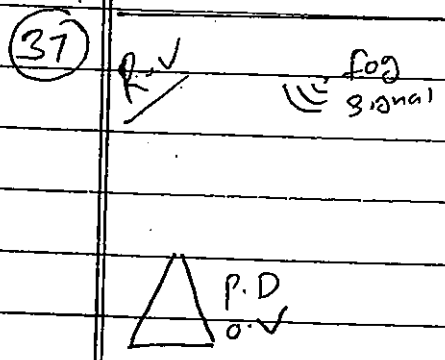


- give fog signal as per R/W 35
- plot target
- AIC stbd and keep clear to another VSL

~~Remain vigilant~~

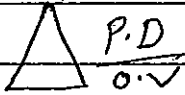
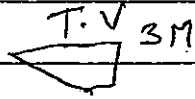


- give fog signal as per R/W 35
- plot the target / assess situation
- Roc exist AIC stbd as per R/W 19(D)



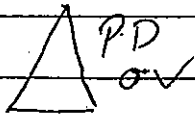
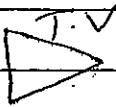
- Radar not operational
- As per Rule no 19 (e)
- Reduce speed if necessary keep all way off
- Navigate with caution.

(38)

R.V

- Assess the situation
- Plot the target if Roc exist
AIC stand as per Rule 19 (d) (1)

39

R.V

- Assess the situation
- Plot the target if Roc exist
AIC stand as per R/W 19 (d)

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(40)

NOTE: (1) In R.V condition if we want alteration any side (Port/Starboard) No any short blast give just fog signal

- (2) in R.V condition Rule apply 7 to 10 or 19 and
- (3) In R.V No any VSL stand on or give way both VSL are responsible.

Q) G.P.S Connection

Ans PLS find out ?

C.N.O

① SHIP POSITION FINDING METHODS

	Terrestrial	Celestial
①	Bearing and distance	Long by Chrono
②	Running fix	Intercept
③	H. S. A	EX-meridian
④	V. S. A	Meridian altitude
⑤	Cross bearing	
⑥	Racon	
⑦	Parallel Index	
⑧	Three bearing	Raman Chauhan

② How will you take noon position

- ① I will check the all error in sextant (Page No -
- ② I will ~~take~~ synchronise the clock with GMT
- ③ Will take morning sight 0800 hr. around before taking noon sight by the long by Chrono method
- ④ The I will get DR Lat and obs Long and position line which is near by north-south
- ⑤ After that calculate the merpass time and table sight at that time and calculate by meridian altitude
- ⑥ I will get obs lat and DR long and position line E-W

⑦ Transfer 1st position line to 2nd PL which will cut another at point.

⑧ This will be fix at merpass time

① if any case ϕ could not take merpass sight due to could not see sun or sun horizon that time ϕ have take Ex-meridian sight

② Ex-meridian method use only for limited period and the limit we get from ~~the~~ Noons table table No (1) and table No (4) then we get Ex-meridian limit but [if we delay than we can use intercept method] or this PL will transfer and get position

③ USE Long by Chron at morning time and advantage - USE L.B.C at morning time becoz that time sun is near the prime vertical, calculation is less / less error and accuracy to get noon fix position

④

Raman Chandra

① Long by Chron → We get the obs long from L.C.C. when the sun E or near to E and obs long near to the ship chron and we take at morning by the sextant PL will be N-S

② Lat by Max Pass → When the sun is North or near to North then we get PL from the sextant E-W

Raman Chauhan

③ Ex meridian → When we not able to see sun or his horizon that time we use Ex meridian method but 1st we take Ed meridian limit from Noories table

④ Lat by Polaris → it use in twilight for a any star or Polaris

⑤ Intercept → When the sun at any position but mostly use for stars.

- ③ International Date line ÷ approx 180° passage on the 180° meridian
Around a Group of Island so that all countries in that Group follow the same time date
- in east ward direction ship have to advanced her clock by one hour for every 15°
 - but ship easterly course retard the date by one day
 - in westward direction ship have to Retard her clock by one hour for every 15°
 - ship on westward course advance the date by one day.

④ CHROMOMETER

Now days use Quartz Crystal Chronometer and its storage in wooden box in chart room purpose of absorb the shocks and vibrations and insulates the chronometer from temperature variation humidity and dust / Chronometer error difference b/w the GMT and Chronometer time if chro. show high it called fast and vice versa. this error due to vibrations and error can be eliminate by a small setting and comparison with correct time and correct time we get from "time signal BBC" or ALRS Vol-2

Setting of Chrono

- ① open the back plate of the Chrono
- ② Press stop button
- ③ Pull the hand set knob and turn it gently to set the time
- ④ Wait for the time signal of transmission release the stop button
- ⑤ Re assemble the back back plate.
- ⑥ Check the error ASAP.

RHUMB LINE :-

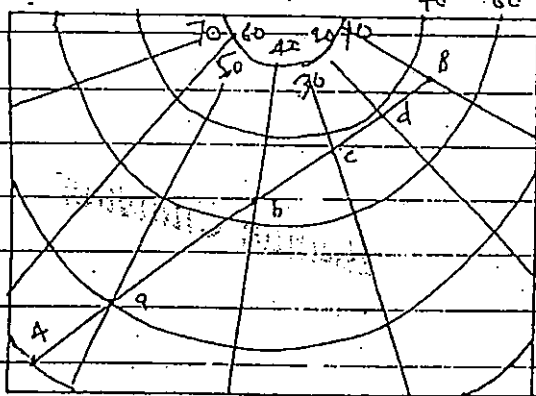
A Rhumb line is one that cuts all meridians at the same angle. It would appear as a straight line on a Mercator chart but on the surface of the earth, a rhumb line would be curved.

GNOMONIC CHART :-

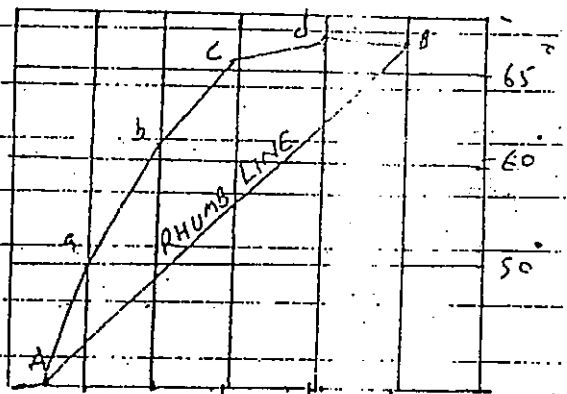
In Gnomonic chart all points on the surface of a sphere are projected from the centre of the sphere to a plane which is tangential to the sphere.

It is used to plot great circle course between the departure and arrival position as straight lines.

Compass roses are not shown on gnomonic charts.



GNOMONIC CHART



MERCATOR CHART

Raman Chauhan

Mercator sailing :-

It is used when the distance is more than 600 miles

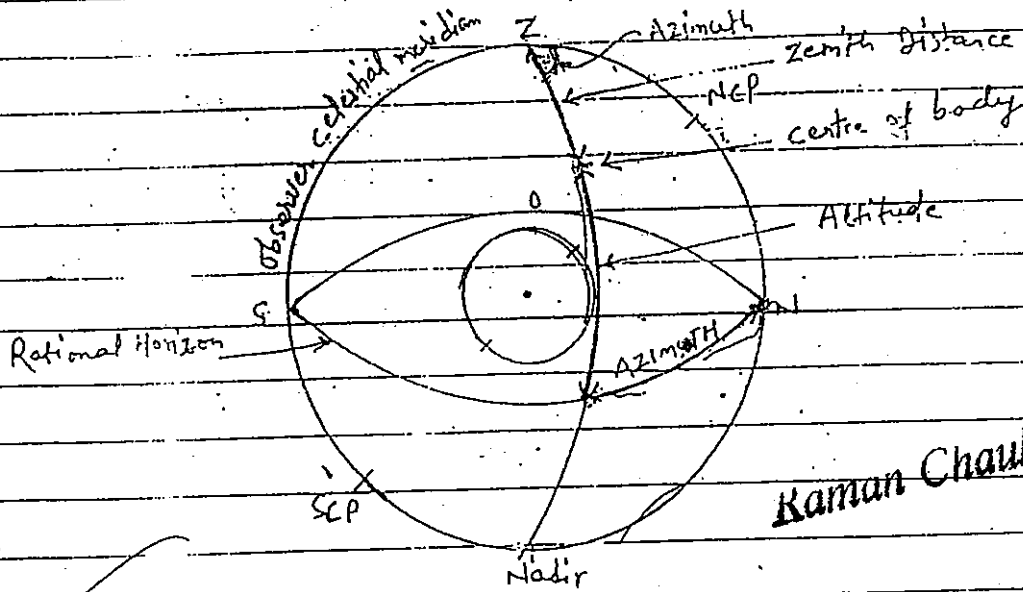
formula:- $\frac{D'long}{DMP} = \tan \alpha$ (It is from point to point)

DMP

Great circle \rightarrow Great circle track is shortest distance measured along the earth surface. Great circle track is effective and convergently.

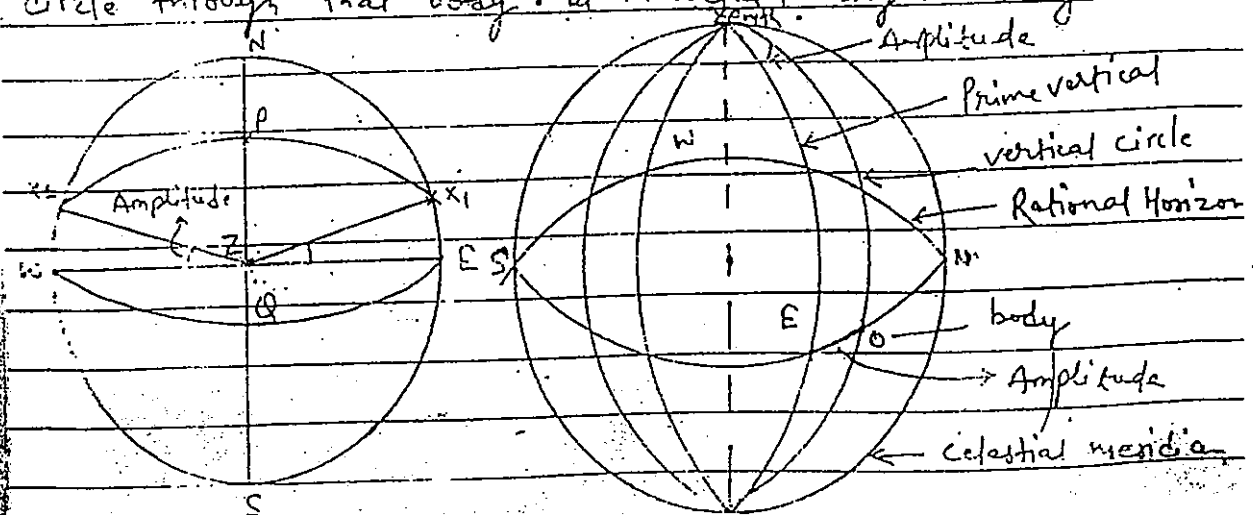
AZIMUTH:-

The Azimuth of a celestial body is the arc of the observer's rational horizon or the angle at his zenith contained between the observer's celestial meridian and the vertical circle through that body.



AMPLITUDE:-

Amplitude of a celestial body is the arc of the observer's Rational horizon or the angle at his zenith contained between the observer's prime vertical and the vertical circle through that body at theoretical rising or setting.



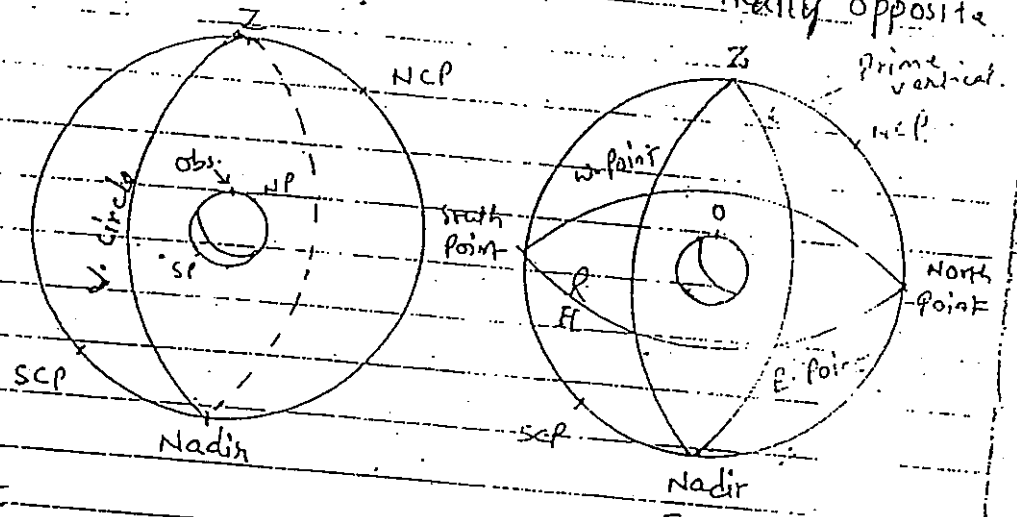
Observer's Zenith:-

It is the point on the celestial sphere vertically above the observer.

Observer's Nadir:-

It is the point on the celestial sphere vertically opposite his Zenith.

Ruman Chauhan



Vertical Circles:-

It is a great circles on the celestial sphere passing through the observer's Zenith and Nadir.

Celestial or Rational Horizon:-

It is a great circle on the celestial sphere, every point on which is 90 away from his zenith.

True altitude:-

True altitude of a body is the arc of the vertical circle through that body contained between the rational horizon and the centre of the body.

Zenith Distance:-

Zenith Distance of a body is the arc of the vertical circle through the body contained between the observer's Zenith and the centre of the body.

Prime Vertical:- It is the vertical circle passing through the East and West points of his rational horizon. (figure II)

(C)

PAGE NO - 86

→ * Mercator chart :-

It has a following characteristics :-

- (a) The equator appears as a straight line.
- (b) All meridians appear as straight lines parallel to, and equidistant from, each other and cross the equator at right angles.
- (c) Parallels of latitude would appear as straight lines parallel to each other but the distance between consecutive parallels would increase as latitude increases.
- (d) Polar regions do not appear.
- (e) One minute of $d'long$ is the same size in all parts of the chart.
- (f) One minute of $d'lat$ increases in size steadily as we go away from the equator.

→ * MERIDIONAL PARTS :-

Latitude

It is the arc of the meridian, or the angle at the centre of the earth, contained between the equator and that parallel of latitude. Expressed in minutes of LONGITUDE.

→ * DMP (Difference of Meridional Parts) :-

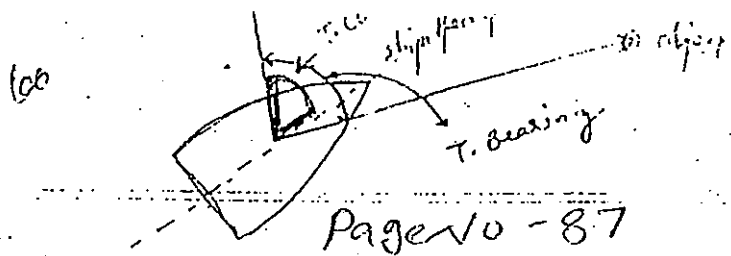
$D'lat$

DMP between any two parallels of latitude is the arc of the meridian or the angle at the centre of the earth, contained between those two parallels of latitude. Expressed in minutes of LONGITUDE.

→ * SEAFORD

Visible Horizon :- It is the parallel to the Rational Horizon.

→ * VH (Visible Horizon) :- Horizon clearly visible by naked eye when sea meet the sea.



* TRUE COURSE :-

It is the angle at the ship between True North and the ship's head. i.e. (the angle between the true meridian and the ship's fore and aft centre line)

* TRUE BEARING :-

True bearing of an object is the angle at the observer between True North indicated by the meridian and the line joining the observer and the object.

* Magnetic meridian :-

It is the line joining the magnetic poles of the earth.

* PLANE SAILING :-

Distance between two places is less than 600 miles, plane sailing used to :-

- (a) Compute the course & the distance between two positions.
- (b) Calculate the position arrived given the starting position, course and distance steamed.

* Parallel sailing formula :-

$$\frac{D'_{\text{long}}}{D'_{\text{lat}}} = \cos m'_{\text{lat}}$$

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$$d'_{\text{lat}} = \text{dist.} \cdot \cos co$$

$$Dep = \text{dist.} \cdot \sin co$$

$$d'_{\text{long}} = \frac{Dep \cdot \sec m'_{\text{lat}} \text{ or } dep}{\cos m'_{\text{lat}}}$$

$$\tan co = \frac{dep}{d'_{\text{lat}}}$$

GMT :-

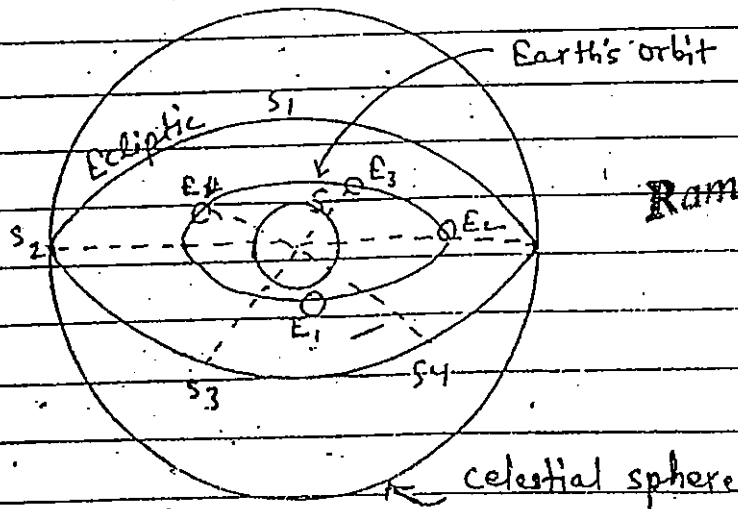
When the sun is on the Greenwich meridian, $GHA = 0^\circ$ but the time is said to be 1200 hrs GMT. So GMT is ahead of GHA by 12 hours. GMT is the number of hours, minutes and seconds since the sun crossed the inferior meridian of Greenwich. (The inferior meridian is one which is 180° away, i.e. on the opposite side of the earth/celestial sphere)

LMT :-

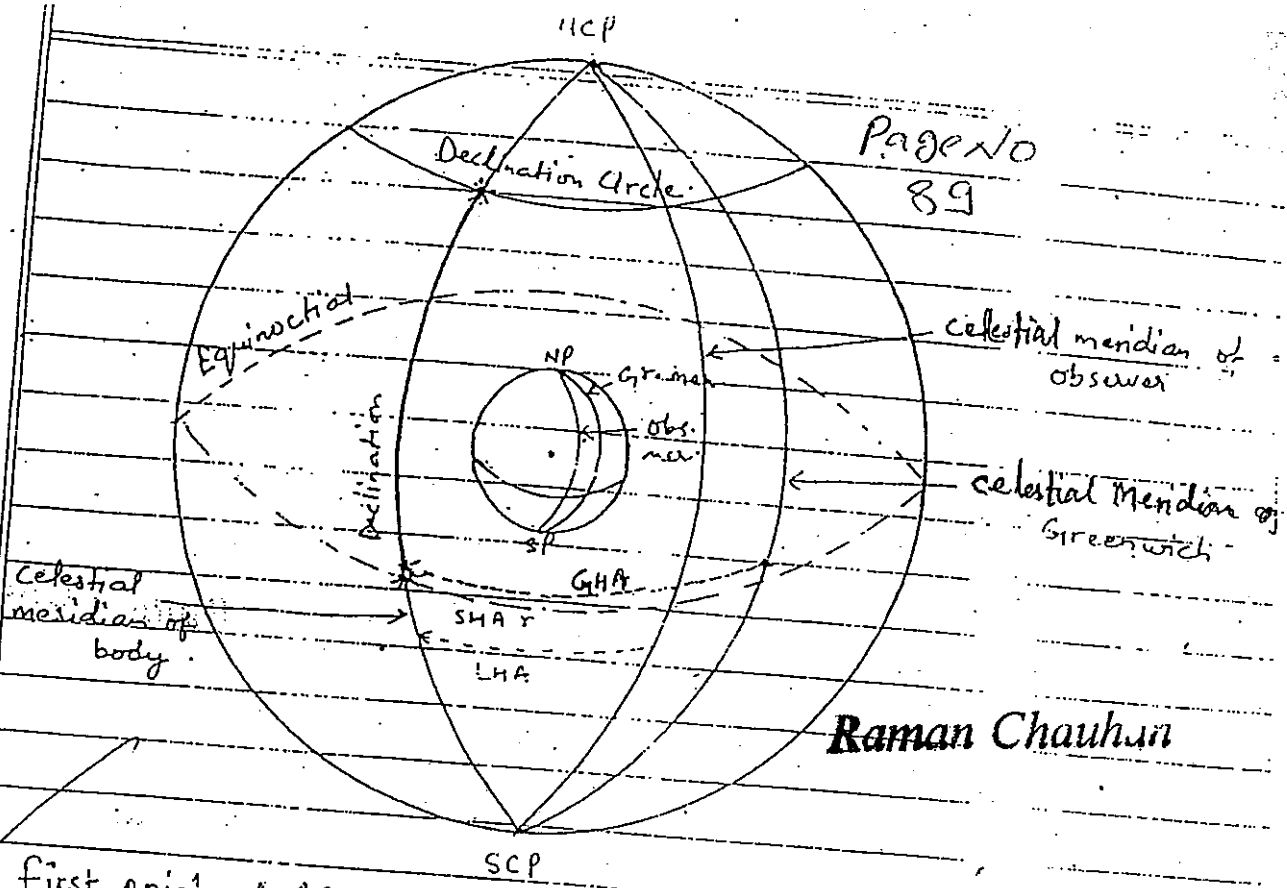
When the sun is on the observer's meridian, $LHA = 0^\circ$ but the time is said to be 1200 hours LMT. So LMT is ahead of LHA by 12 hours. LMT is the number of hours, minutes and seconds since the sun crossed the inferior meridian of the observer (The inferior meridian is one which is 180° away, i.e. on the opposite side of the earth/celestial sphere)

ECLIPTIC :-

The sun's apparent annual path on the celestial sphere is the Ecliptic. It is inclined $23\frac{1}{2}^\circ$ to that of the Equinoctial.



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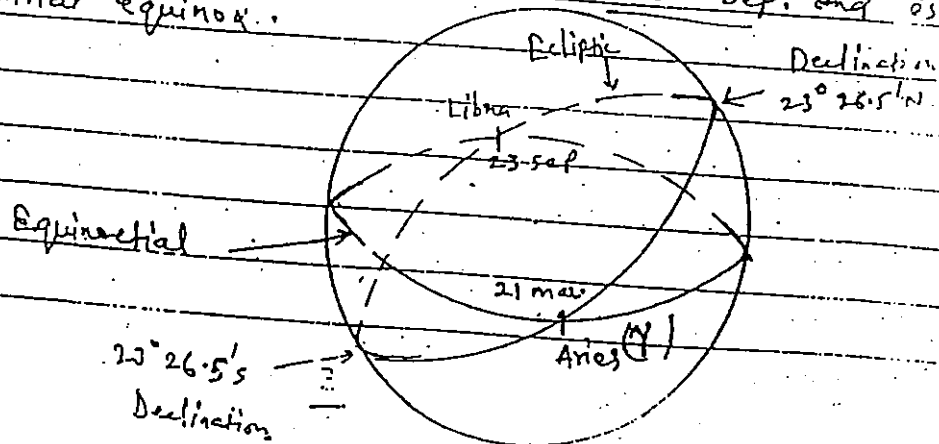
Raman Chauhan

First point of ARIES :-

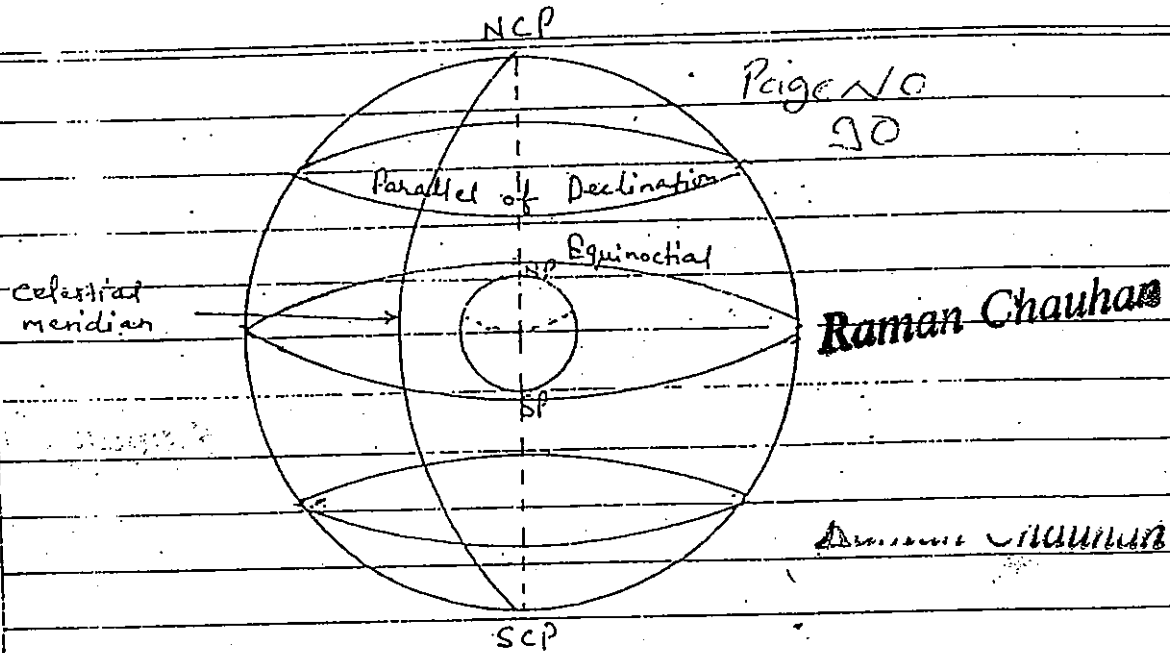
The first point of Aries is that point on the surface of the celestial sphere (where the sun's path crosses the equinoctial from SOUTH to NORTH. This occurs around 21st March and is called vernal Equinox.

First point of LIBRA :-

The first point of LIBRA is that point on the surface of the celestial sphere (where the sun's path crosses the equinoctial from NORTH to SOUTH. This occurs around 23rd sep. and is called Autumnal equinox.



ORD



→ * GHA (Greenwich Hour Angle) :-

GHA of a celestial body is the arc of the equinoctial, or the angle at the celestial pole, measured westerly from the celestial meridian of Greenwich to the celestial meridian passing through that body.

* : Position of the celestial body is indicated by the Declination and GHA at that instant.

→ * LHA (Local Hour Angle) :-

LHA of a celestial body is the arc of the equinoctial, or the angle at the celestial pole, measured westerly from the observer's celestial meridian to the celestial meridian passing through that body.

→ * SHA (Sidereal Hour Angle) :-

SHA of a celestial body is the arc of the equinoctial or the angle at the celestial pole, measured westerly from the first point of Aries to the celestial meridian passing through the star.

Lat

Declination

EARTH	CELESTIAL SPHERE	Page NO
Geographical pole	Celestial poles	91
Equator	Equinoctial	
Meridians	celestial meridians	
Parallels of lat	Declination circle	
Position of observer	Zenith of observer	

Raman Chaudhary

CELESTIAL

→* The celestial sphere:-

It is a sphere of infinite radius with the centre of the Earth as its centre.

→* Celestial poles:-

The two points where the axis of rotation of the earth cuts the surface of the celestial sphere are called the celestial poles.

→* EQUINOCTIAL:- or (Celestial Equator)

The equinoctial is a great circle which is equidistant from and therefore 90° away from the celestial poles.

→* DECLINATION CIRCLES:-

Declination circles are small circles, on the celestial sphere parallel to the equinoctial.

→* CELESTIAL MERIDIANS:-

Celestial meridians are great circles that pass through the celestial poles. Celestial meridians cross the equinoctial and all declination circles at right angles.

→* Declination:- Declination of a celestial body is the arc of a celestial meridian, or the angle at the centre of the celestial sphere, measured between the equinoctial and the declination circle passing through that body.

PRACTICAL NAVIGATION

Page No. 92

→ * Prime Meridian:-

The meridian which passes through the Greenwich is called the prime meridian and has the value of 0° of longitude.

→ * LONGITUDE:-

It is the arc of the Equator, or the angle at the Geographic pole, contained between the prime meridian and the meridian passing through that place.

→ * D'LAT (Difference of latitude):-

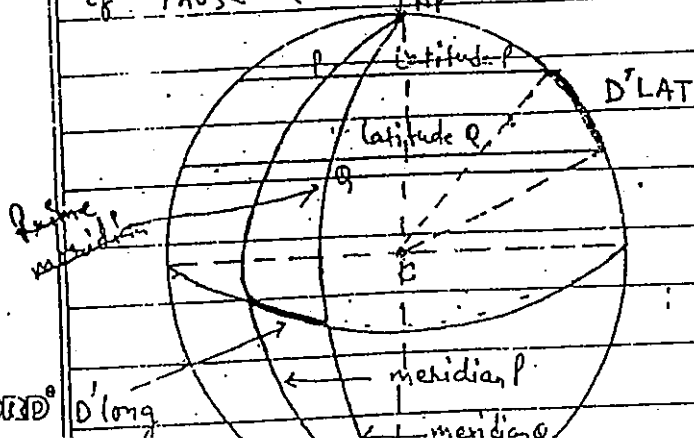
D'lat between two places is the arc of a meridian or the angle at the centre of the earth, contained between the parallels of latitude passing through those two places.

→ * D'LONG (Difference of longitude):-

D'long between two places is the arc of the equator, or the angle at the geographic pole, contained between the meridians passing through those two places.

→ * M'LAT (Mean latitude):-

M'lat between two places is that parallel of latitude which lies midway between the parallels of latitude of those two places.



→ *

Axis :-

The axis of the earth is the diameter about which it rotates

→ *

Geographic Poles :-

The two points where the axis of rotation cuts the earth's surface. The upper one is called North pole & lower South pole

→ *

EQUATOR :-

The Equator is a great circle on the surface of the earth the plane of which is perpendicular to the Earth's axis. The Equator divides the Earth into North & South Hemispheres.

→ *

Parallels of Latitude :-

Parallels of latitude are small circles parallel to the Equator

→ *

Meridians of longitude :-

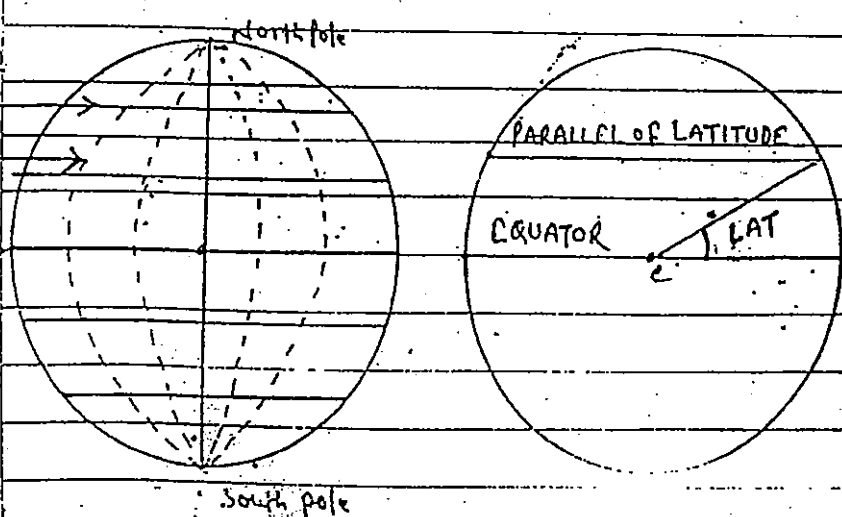
Meridians are great circles that pass through the geographic poles. Meridians cross the equator and all parallels of latitude at right angles.

→ *

LATITUDE :-

It is the arc of a meridian, or the angle at the centre of the earth, measured between the equator and the parallel of latitude passing through that place.

parallel of latitude
Meridian
Equator



OXFORD

→ *

Geographic poles The Geographical pole of the earth is two points where axis meet with earth surface.

G.M.D.S.S

GMDSS came in Under ALRS Vol-5 NP-285

①

Terrestrial GMDSS	Satellite GMDSS
Short Range Manual	70° N to 70° S of structure
Using MF/HF/VHF	Using Sat B, Sat C, F77
Range MF - 250 Mile	
HF - Long range but variable	
VHF - 40 mile	

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GMDSS Piratex button is Red colour

DSC: Digital selective calling this equipment using tx/Rx have 4 particular Distress/Urgency/Safety/Route

DSC is integral part of gmdss

May Day / Distress

PAN PAN / Urgency

Security / Safety

Distress Reply

MF - 400 W power 250 mile range

HF - 1500 W " Global "

VHF - 25 W " 15 to 40 mile.

(3)

Carriage Requirement

Sea Area I = VHF DSC / VHF RT / Navtex / Walkie talkie
EPIRB / EIRB - C

Sea Area II = All equipment of AI and + MF DSC / MF RT

Sea Area III = All equipment of AI and AII + HF DSC + HF RT
(70°N to 70°S) Inmarsat / EGC Receiver

Sea Area IV = All equipment of A1, A2, A3 + HF DSC
Above (70°N/15) HF RT COSPAS SeaSat EPIRB
must be carry.

(4)

GMDSS Battery Check

Battery check every day vol of battery is 24 Vol
and each cell vol is 2.1 and use 12 cell in
battery so that vol will be $2.1 \times 12 = 25.2$ but
show only 24 Vol but battery show less than
22.7 Vol means battery discharge

Second method check ~~by~~ specific gravity by
Hydrometer in monthly if S.G less than 1.250 vol
means battery discharge.

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⑤ Document Carry

- ① Check Ship Station Licence
- ② Service report
- ③ GMDSS log book (have 4 section)
- ④ ITC publication (have 4 publication)
- ⑤ Test report (EPIRB / EART)
- ⑥ Battery check
- ⑦ Self performance
- ⑧ Safety Radio Certificate
- ⑨ Antenna rigging plan
- ⑩ Two operator certificate

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⑥ GMDSS TEST

- ① DAILY testing of GMDSS - DSC test / Batteries on/off
Load vol check / Check the
Printer for adequate paper supply.
- ② Weekly testing - LIVE test by MF/HF DSC with a
CRS / test of emergency Generated
Survival Craft band held VHF CH-16
- ③ Monthly testing - EPIRB / EART / Batteries by SP-Group
social and Insulators

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⑥ EPIRB - emergency position indicating Radio Beacons and purpose to determine the position of the survivors.

type of EPIRB

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VHF EPIRB - Area - A1

LBand EPIRB or Inmarsat EPIRB - Area A1, A2, A3

COSPAS Sarsat EPIRB 406 MHz - All areas

COSPAS Sarsat EPIRB frequency is 121.5 MHz and transmit Homing signal for Aircraft

EPIRB is connect with HRU and it will operate when ship sinks depth about 1.5 - 4m.

⑦

NAVTEX

Navigation telex Receiver

in World Wide have 21 Navarea and each Navarea have MAX 24 station Navtex use freq 518 KHZ for english and Range of Navtex is 400 mile.

Power of Navtex is 1KW, Navtex antenna about 1 to 1.5 mtr long 8 Vol DC Navtex use Thermal Paper and Thermal Printer, Navtex have Tuned Radio Frequency receiver.

It give alarm when paper finish or receipt MSG ABDL and this type of MSG can't be ignore or Deleted

- ⑧ Navtex Message Categories
- ① Navigational Warning
 - ② Gale Warning
 - C Ice Report
 - ⑤ Distress alerting + SAR / Piracy info
 - E Weather forecasts
 - F Pilot service info
 - G Decca MSG
 - H Loran "
 - T Omega "
 - J SATNAV "
 - K Other NAV "
 - ⑦ Rig Move

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Note: ABDL these MSG cannot be rejected by the receiver.

⑨ During these MSG Navtex Show

<u>Show</u>	<u>means</u>
① 7LZC	Starting signal
② Navtex MSG GA06	anything (A to L) (G, Navtex station identity) (A category of MSG) (06 MSG serial No)
③ NNNN	Ending signal

- (10) Inmarsat B - it is a satellite base use for telex, telephone, fax and data
- (11) Inmarsat C - it is a satellite base use for only telex (store and forward)
- (12) F-77 - voice and data (high speed fax (broad band) E-mail.
- (13) Radio Medical Advise - use on board ship captain Medical guide and appropriate Ground SS equipment like F-77, some important digit for special service

32 # Medical Advise

38 # " Assistance Raman Chauhan

39 # Maritime - "

41 # Meteorological Report

42 # Navigation Hazards

43 # Ship Position Report

MSG Format

- Distress call = May day³
This is ship name / call sign³

① Distress Message

Mayday
Ship Name / call sign
Position
Sinking
Require immediate assistance
26 person on board
Master
UTC
over

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② Distress Acknowledgement

Mayday
MT Raman Chauhan³ / ABCD³
This is
MT Raman Singh³ / ABCD³
over

③ Safety Call

Securite³
All station³
This is^{MT} Raman Chauhan³ / ABCD³
Listen for Nav Warning on CH / Freq

④ Urgency call

Pan Pan³ All station³
This is^{MT} Raman Chauhan³ / ABCD³

Safety MSG

Securite
Nav Warning at 1000 UTC

⑤ Urgency MSG

Pan Pan
MT Raman Chauhan / ABCD
Post
Lost Propeller
Require tug assistance
Master
MT Raman Chauhan
UTC over

Raman Chauhan / ABCD
Position

Towing an oil rig to Mumbai for
Speed 12K Course 300°
All VSL to give wide berth

Master
Raman Chauhan

UTC

over

EPIRB (Emergency Position Indicating Radio Beacons)

Page No
102

1. What is the use & purpose of EPIRB and what does EPIRB signal indicate?

- * To radiate secondary means of distress alert and position indicating signal
- * Purpose – to determine the position of the survivors
- * EPIRB signal indicates that one or more persons are in distress and may no longer be on board and that receiving facilities may no longer be available.

2. What are the types of EPIRB?

- * VIII EPIRB – Only in Area: A1
- * I. – Band EPIRB or Inmarsat GEO stationary EPIRB -- Areas: A1, A2, and A3
- * 406 MHz COSPAS-SARSAT EPIRB – All areas (Global coverage)

3. What is the optional frequency of COSPAS - SARSAT EPIRB besides 406 MHz? What is the Purpose?

- * 121.5 MHz. It will transmit the Homing signal for aircraft.

4. How do you distinguish the stowed and operating position of EPIRB?

- * Stowed position: Arrow mark points upwards (Battery is disconnected from Transmitter).
- * Operating position: Arrow mark points downwards (Battery is connected with Transmitter).

5. If the seawater sprayed on EPIRB in stowed position what will happen?

- * Nothing will happen. In stowed position, Battery is disconnected from Transmitter with the help of Gravity switch or Mercury switch. So it will not activate.

6. What do you mean by Dual activation mode in EPIRB?

- * 1) Manual Activation mode: We can activate the EPIRB by manually. Take out the EPIRB from the pedestal. Turn it to operating posn (Arrow mark should point down).

Remove the safety pin on the switch and move the switch to Emergency position. EPIRB will send the alert.

- * 2) Automatic Activation mode: When the ship is sinking, and when the EPIRB/HRU is at the depth of 1.5 to 4 m, HRU will release the EPIRB from the pedestal. EPIRB will float in the water in transmitting position. Now the two screws, which are in the battery compartment, will be in contact with the seawater which will make the EPIRB to activate.

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7. What is HRU and it's user?

- * **HRU:** Hydrostatic Release Unit. It is pressure-sensing device.
- * When ship sinks and when HRU is at the depth of about 1.5 – 4 m, it releases the EPIRB from the pedestal.

8. What does the EPIRB transmit?

- * The EPIRB transmits EPIRB ID in a coded format.
- * The EPIRB ID can be a MMSI number or Radio call sign.

Page No

103

9. Explain the controls?

- * Only one switch which moves to three position
- * **OFF:** EPIRB is off (for manual operation)
- * **TEST:** To carry out self test (Monthly Test without radiation)
- * **EMERGENCY:** To activate EPIRB manually.

10. What is the routine maintenance of EPIRB?

* **Monthly maintenance:**

1) Self-Test:

Take out the EPIRB from the pedestal. Turn it to operating posn. Hold the switch in Test position for about 15–20 secs. The test lamp flashes. Once the test is passed the lamp will glow continuously. Release the switch to Off mode. (If test fails, send the EPIRB for shore service)

2) Check the expiry date of the Battery

3) Security Check:

Check for corrosion / damage / fitting etc.

* **Annual maintenance:**

Send the EPIRB for Shore service.

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11. How many hours EPIRB should work continuously?

- * 48 Hrs.

12. What will you do, if EPIRB is activated accidentally?

- * Switch off the EPIRB
- * Transmit alert cancellation message to RCC.

(If SATCOM is used to send the message then the Distress priority should be selected to connect RCC.)

13. Who is receiving the COSPAS-SARSAT EPIRB signal?

- * If the EPIRB is activated, COSPAS-SARSAT satellites pick up the signal and down load to LUT (Local User Terminal) in two modes:
1) Live Mode (Real time mode) 2) Store and forward (Global coverage mode)

LUT will calculate the Posn of the EPIRB by Doppler Shift Effect. Then it will pass the information to MCC (Mission Control Center) Finally MCC will pass all the information to RCC.

14. What are the functions of LUT and MCC?

Page No
104

* **LUT:** Local User Terminal.

It is the ground station in COSPAS – SARSA'T system to receive the EPIRB signal from the satellite. LUT will receive only EPIRB ID. It will calculate the posn of the Survivors by Doppler Shift Effect. LUT passes the information to MCC.

* **MCC:** Mission Control Centre.

It is the Registering authority of EPIRB. It has all the details about EPIRB in Data entry. So after receiving the information from LUT, it will take out all the information and pass them to RCC for effective Search And Rescue operation.

15. Is there any LUT and MCC in India?

* Yes. LUT: Ban galore, Luck now

MCC: Ban galore

16. What are the common factors of Safety Equipments?

* Safety equipments (EPIRB, SART, VHF Portables) are highly visible in colours (Orange or Yellow)

* All are using Primary cell (18 V Lithium Battery)

17. What are the equipments will you carry before abandoning the vessel?

* All Safety equipments (EPIRB, SART, VHF Portables)

18. Where will you keep the Safety Equipments?

* We have to mount the Float free EPIRB at the Bridge Wings or Monkey Island so that if ship sinks it can freely come out of the water and transmit.

* Hand held EPIRB, SART and Portable VHF should be kept in such places from where we can easily takeout at that time of abandoning the vessel (Navigational Bridge).

19. What are the carriage requirements of Indian vessel above 500 GRT?

* EPIRB – 2 Numbers. (Out of these two EPIRB, one should be a Float Free EPIRB)

* SART – 2 Numbers.

* VHF Portables – 3 Numbers.

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SART (Search and Rescue)

20. What is the purpose of SART and what does its signal indicate?

- * To determine the position of the survival craft
- * It indicates that the survivors are on a survival craft and require immediate assistance

Page No
105

21. What is the frequency band of SART?

- * 9.2 – 9.5 GHz (Radar: X-Band, 3cm)

22. What is the Range of SART? What is the minimum height recommended?

- * 5-6 miles from a ship
- * 40-45 miles from an aircraft
- * 1m height above the sea level is recommended.

23. How many hours SART should work continuously?

- * 96 Hrs in Standby mode (In On mode)
- * 8 Hrs in transmitting mode.

24. Explain routine maintenance of SART?

* Monthly maintenance:

1) **Self-Test:** Take the SART to wings or forward and keep the switch to Test position and put on the X-Band Radar at 12 miles range. The radar produces 12 concentric circles and SART produces audible & visual indications if SART is working OK. Then release to Off mode,

(If Radar is not producing 12 concentric circles, check the range in Radar. Still if you are not getting, send to shore service.)

2) **Check the Expiry date of Battery**

3) **Security Check:** Check corrosion/damage.

* Annual maintenance: By shore service

25. How the survivors in the life raft know that the rescue vessel is on the way?

- * The SART will produce audible and visual indications when it intercepts the RADAR signal from the approaching vessel

26. You are in the ship. How will you come to know if there is a life raft?

- * The X- Band Radar will produce 12 Blip codes at the range of 5 – 6 miles.
- * When it approaches at about 1 mile, it will change to 12 wide arcs.
- * When it comes close (within 1 mile), wide arcs will change to 12 concentric circles.

27. In radar screen what is the position of the SART?

- * The first blip from the center point.

28. What is the use and purpose of the VHF Portable?

- * Used in the survival craft
- * For the purpose of On-scene communication

29. What is the range of the VHF Portable?

- * 5 miles (if operated from 1M height above the sea level)

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106

30. What are the special features of GMDSS VHF Portables over normal Walkie-Talkies?

- * Single hand operation
- * Attractive color (Orange or Yellow)
- * Water proof up to 1 metre depth for 5 minutes
- * Shock proof from 1 metre height on hard surface
- * Minimum 2 channels (Ch - 16 & Ch - 06)
- * Minimum out put power: 250 mW.

31. What is the carriage requirement of survival craft VHF portables and its battery?

- * 3 sets
- * Each set should have 2 batteries. Total 6 Batteries.
- * One should be attached to the set and the other one is sealed battery which is to be opened and used during emergency only.
- * The Battery which is attached to the set can be Primary cell (18 V Lithium cell) or Secondary cell (18 V Nickel Cadmium cell)
- * The battery which is sealed should be a Primary cell (18 V Lithium cell)

32. How many hours GMDSS VHF Portables should work continuously?

- * 48 Hrs in Standby mode (In Receiving mode)
- * 8 Hrs in transmitting mode.

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Q. HOW TO CANCEL a false Distress Alert
DSC (VHF/MF/HF)

Ans

- ① Switch off transmitter immediately
- ② Switch set to 'ON' set to voice frequency
- ③ Make broadcast to 'All Station' give the ship name call sign, DSC No, and say cancel the false alert

Q. Inmarsat - C

Ans ① Notify the appropriate RCC to cancel the alert

- ② Use distress priority
- ③ Use the same CES through which the false Distress Alert was sent.

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Signature

CHART WORK① NAUTICAL PUBLICATION

- ① Bridge Procedure guide
- ② Mariner hand book (NP100)
- ③ NAUTICAL ALMANAC
- ④ Noons table
- ⑤ ADMIRALTY LIST OF RADIO SIGNAL
- ⑥ Adm. List of Light
- ⑦ Adm. Sailing Direction
- ⑧ Adm. Tide table & tidal stream Atlas.
- ⑨ Chart Catalogue
- ⑩ Ocean Passage of the World
- ⑪ Guide to port entry
- ⑫ Adm. distance of table
- ⑬ Chart Abrogation
- ⑭ Notice to Mariners (MS/M Notice)
- ⑮ Medical Guide.

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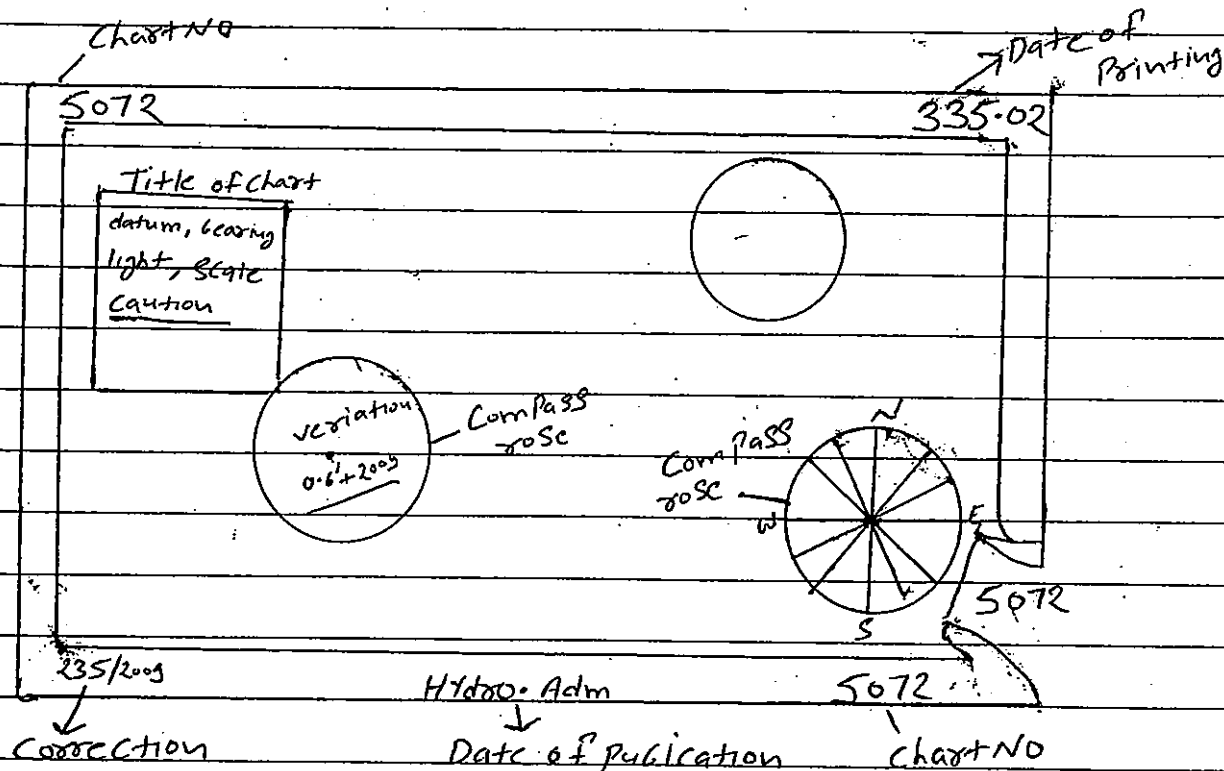
2

CATEGORIES of Charts USE on board:

- ① Mercator chart — See page No - 83/86
- ② Gnomonic Chart — See page No - 83/
- ③ Routing chart — See page No - 124
- ④ Variation chart — These are special chart showing
 Isogonic lines. The variation show
 on these chart is usually more accurate than shown
 on compass rose of many chart. This is becoz
 Variation chart are updated every few years whilst
 other chart are printed after decades at times.

3

Description of the Charts



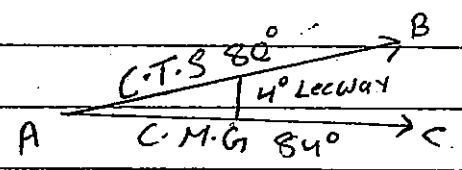
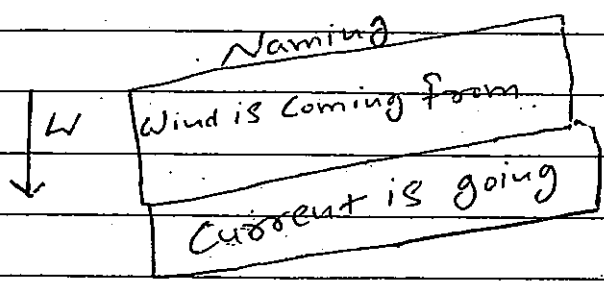
- ① Title of the Chart :- The title of each chart is printed in some convenient place on chart where it does not hinder the navigational use of it. It is also shown on the reverse side of the chart at the thumb level. Under the title the information about datum, bearing light Natural Scale. Shown below the cautions.
- ② Caution :- Normally caution appears under or near the title of the chart. It may also be found around a particular portion on a chart. It is required to attract attention of navigators toward warning. and show limitation of chart.
- ③ Number of Chart :- Each chart has a serial number and this is shown at the bottom right hand corner and top left hand corner outside the margin and also reverse side of chart.
- ④ Date of Publication The date of publication along with the name of the Hydro to the Adm. or government authority is printed at the bottom in the middle just outside the margin.

⑤ Date of printing - This is shown as the number of the day in the year printed at the top right hand corner outside the margin e.g. 335.02 means chart was printed on the 335th day 2002

⑥ Compass Rose - C.R. For laying off bearing and courses are engraved on chart and they are referred to as C.R. to avoid confusion with ship compass. The C.R. are printed on the chart at two or three places. C.R. is on the true north and the inner card is on the magnetic meridian and variation shown on the compass rose.

④ DETAILS

(1) LeeWay - LeeWay is the angle b/w the ship fore and aft line of the wake left behind her. in other word angle b/w the course steered and the course made good

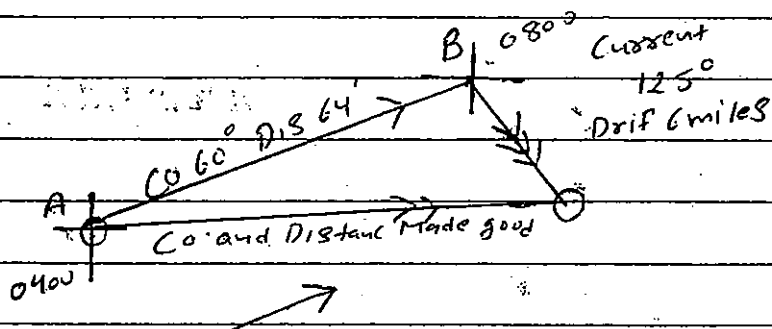


(i) Dead Reckoning position - is a position of the ship found by allowing for the course steered and distance steamed through the water from a fixed position or any starting position. It is only an approximate position. When ship steers a certain course she does not necessarily arrive at her D.R. position this is due to the effect wind and current etc.

(ii) Estimated position - This calculated position which ship is expected to reach after allowing for her course and speed and estimated leeway and the current (set and drift) is called the estimated position.

(iii) Observed position (FIX) - O.P. on the other hand is the actual true position of the ship which ~~may be~~ The O.P. is the most accurate one, because it is based on the actual observation whereas the accuracy of the estimated position will depend entirely on the estimate of the wind and current made by the navigator.

(iv)



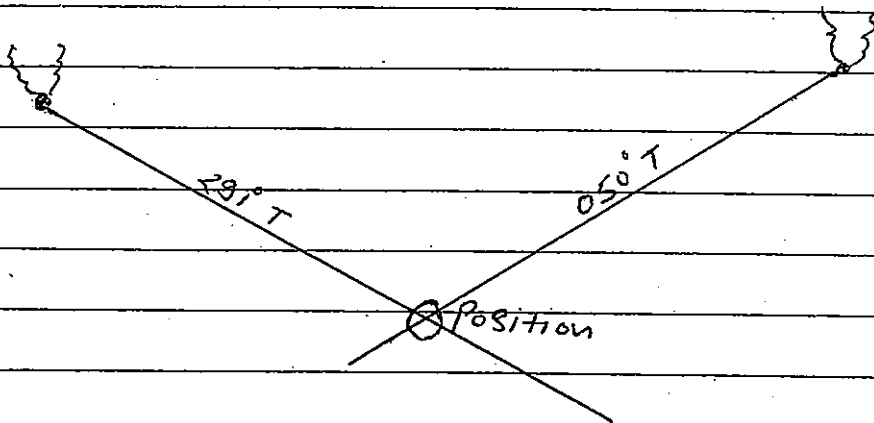
(v)

Set and drift of the current - The course and distance 6/64

The Dis position and the obs. position is the set and the drift of the current during the period:

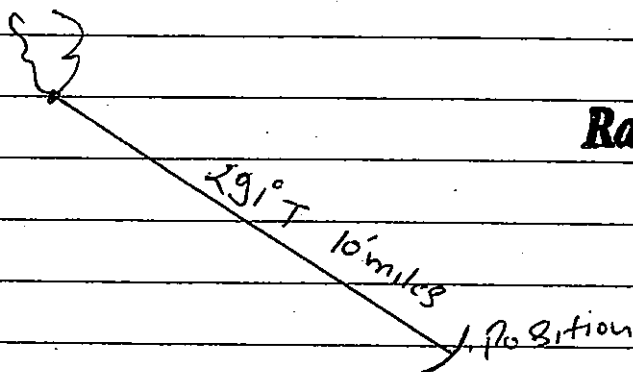
⑤ Various Methods of obtaining position line by terrestrial

① A visual bearing of a terrestrial object.



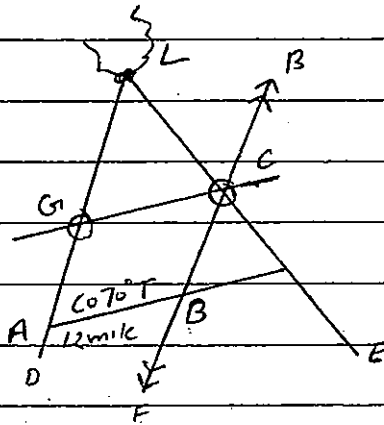
② A transit bearing

③ Bearing or ranges obtained by Radar



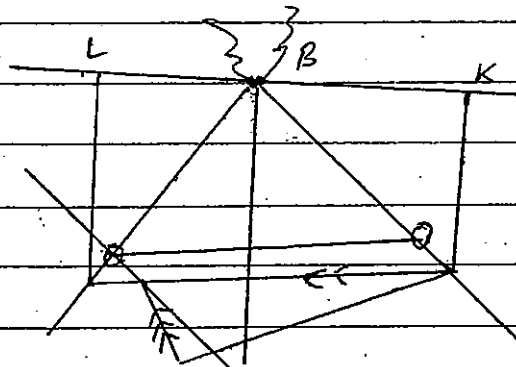
Raman Chauhan

(4) Running fix



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(5) Three bearing



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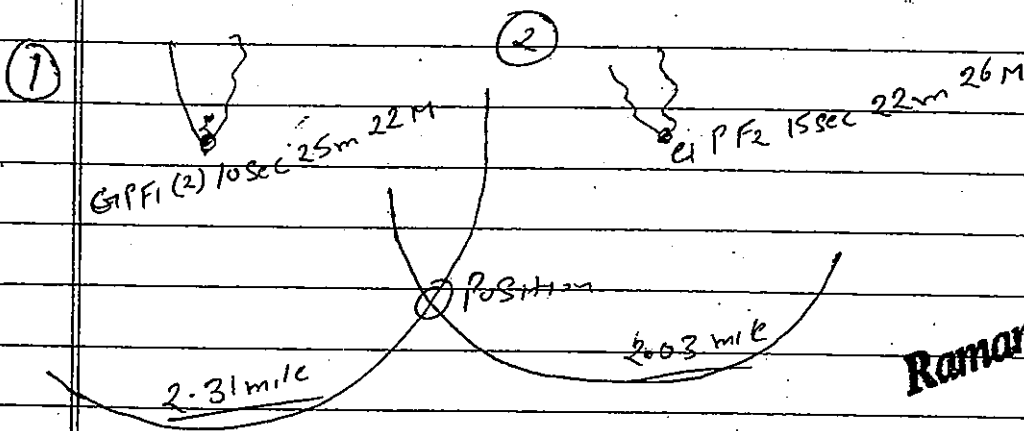
(6) By the Vertical Sextant Angel.

Another method of finding the ship position is by means of taking a bearing of lighthouse or any terrestrial object and obtaining the distance off that object by V.S.A and ship position can also be found by taking V.S.A of two or more

Suitable object and give distance off from that object and give position circle and the two pos. circles cut each other will be pos. of the ship

Example -

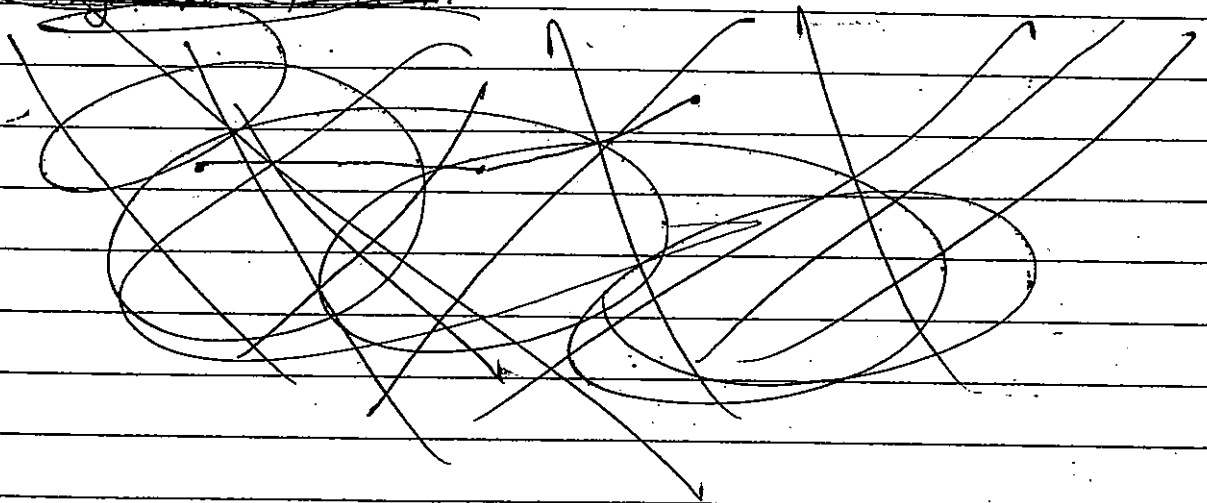
$$\frac{\text{Height of object}}{\text{Sextant altitude}} \times 1.854$$



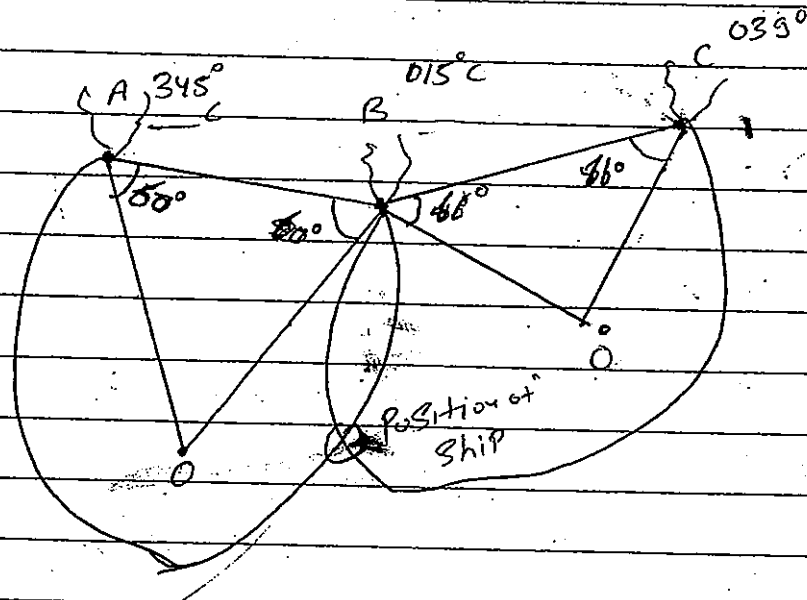
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$$\begin{aligned} \textcircled{1} \quad \frac{25}{20} \times 1.854 &= \textcircled{2} \quad \frac{22}{20} \times 1.854 \\ = 2.31 \text{ mile} &= 2.03 \text{ mile} \end{aligned}$$

~~By the H.R.A~~



⑦ By the H.S.A



① Join A to B and B to C light house

② from A to - B light house bearing

$$345 - 15 = 30^\circ$$

$$\text{then } 90 - 30 = 60^\circ$$

③ from B to - C light house bearing

$$015 - 039^\circ = 24^\circ$$

$$\text{then } 90 - 24^\circ = 66^\circ$$

④ Make angle at A B C 60° or 66°

⑤ Then make a circle from point O where the circle cut = ship position.

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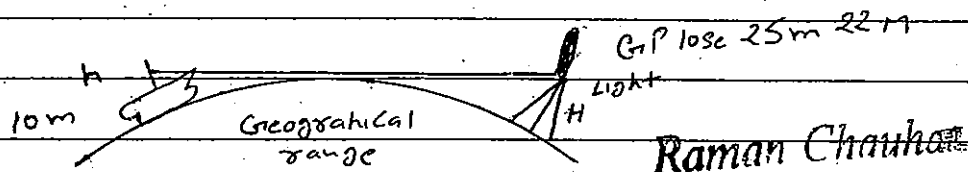
⑧ Geographical Range :- for find out use this formula

$$2.095 \sqrt{H} + 2.095 \sqrt{h}$$

H = Height of lighthouse

h = Height of eye

Gr. R. It is the max distance at which light can reach an observer as determine by the height of eye of the observer and the height of the structure and the curvature of the earth AS we can see the raising dipping basically on H and h only. the meteorological visibility did not play any role.



$$2.095 \sqrt{25} + 2.095 \sqrt{10} = 17.1 \text{ nm}$$

⑨ Nominal Range :- is a actually Luminous Range of the light when meteorological visibility is 10 N.M (N.R. Picked up from the chart)

⑩ Luminous Range :- It is the Maximum distance in horizontal direction which light can be see in present Meteorological Condition. (and the light is first sighted the radar range is taken which actually is the L.R.)

(11) Small Scale Chart - S.C.S. Cover large part of the earth surface. These charts are mainly used for planning and executing

(12) Large Scale Charts - L.S.C. Cover small area such as port harbour and it contains all the information required when navigating a ship in harbour.

(13) CHART CATALOGUE NP 131

- ① Chart Catalogue has 39 sections and 10 parts
- ② It is revised and republished on 1st Dec of each year.
- ③ It gives the date of publication, date of current edition, coverage area of publication, BA chart number, title of chart, Natural Scale for all the charts are shown in the geographical region, It also gives the details of agent from when to produce them with price of each item.
- ④ Any correction is corrected by WNM Sec II

Roman Chauhan

14. ADM. Sailing Direction (Pilot book)

- ① It is very useful book for passage planning
- ② Various Navigable areas of all over the world are covered by different volume [~~74~~ Volume] 74 Volume
- ③ General information about any area
 - ① Local regulation, port facilities, harbour approaches
 - Climate Condition, Weather Condition, Type of coast line, Hazards and dangers of navigation, Buoys system (A or B) based on meteorological history etc.
- ④ New vol published every 12 year
- ⑤ kept upto date by Supplement every 18 month
- ⑥ Correction are given in WNM SECTION IV

India = vol-21 East Coast
vol-38 West Coast

Raman Chauhan

15. ADM. List of Light & Fog Signal.

- ① It has total 12 Volume (A to L) for India
- ② It cover all world, divided geographically which is shown on the last page of the volume.
- ③ It is published on every 18 month.
- ④ Correction is done by WNM Section IV
- ⑤ give to information about
 - ① Geographical Range table
 - ② Luminous Range diagram
 - ③ Abbreviation of ALLFS
 - ④ Abbreviation of ALL
 - ⑤ Prefex
 - ⑥ Content's
 - ⑦ Light character
 - ⑧ Explanation
 - ⑨ special mark applicable in this vol
 - ⑩

(16)

Adm. List of Radio Signal

It has 8 Volume

- ① Vol ① - Coast Radio Station It has 2 part (NP 281) published annually
- ② Vol ② - Radio Navigational Aids (NP 282) published annually
- ③ Vol ③ - Maritime Safety Information Services (NP 283) It has two part published annually
- ④ Vol 4 - Meteorological observation station (NP 284) published ~~18m~~ every 18 month
- ⑤ Vol ⑤ - GMDSS (NP 285) published annually
- ⑥ Vol ⑥ - Pilot Services & Port operation (NP 286) published annually
- ⑦ Vol-7 - T.S.S & Reporting Station published annually
- ⑧ Vol-8 - Satellite navigation system (NP 288) " " "
- ⑨ ALRS corrected by WNM Sec - VI

(17)

Adm. Tide table

It has 4 Volume each Vol is divided 2 part

- | | |
|-------|---|
| Vol 1 | U.K and Ireland |
| Vol 2 | Europe & Mediterranean Sea & Atlantic Ocean |
| Vol 3 | Indian Ocean & South China Sea |
| Vol 4 | Pacific ocean. |

Ranjit Chaurhan

Part 1 :- give daily prediction of the Time & Height of high and Low Water for a selection of standard port.

Part 2 :- give data for prediction of the rest of the port known as 'secondary ports'

Adm. distance table.

- (18) The table give shortest navigable distance in international nautical miles (1852) b/w important position and chief port of the world without considering the advantage of current and weather.

It has 3 Volume.

Raman Chauhan

(19) CHART SYMBOL - 5011

It is a nautical publication published by British Admiralty it cover entire range of symbol & abbreviation that are used in Admiralty chart.

(5020 for Indian)

(20) Mariner hand book (NP-100)

- It's a ready reference book / guide for mariner
- give to date

(1) Meteorological information

(2) Navigational Hazard

(3) Use of chart and navigational aids

(4) Ice condition hazards

(5) Chart and publication

(6) IALA buoy system

(7) Current tide

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(8) Infor. about sea states

(9) And more information provided by this book and corrected by LHM Sec - IV

(21)

OCEAN Passages of the World (136)

The B. a also issue OPW which help the mariner to plan his passage across the oceans and give recommended routes distances b/w various port of the world with details of wind, current data and ice hazards.

(22)

Guide to Port Entry

(1) It published in two volume (A to K) (L to Z)

(2) It cover the port of entire world give information regarding various port and approaches to master charter, owner and various parties

(3) each vol divided in two parts

(1) Description of port is given in very systematic way

(2) Yellow page giving plan and mooring diagram of various port

Vol-1 Information about port and approaches

Vol-2 List plan of important ports.

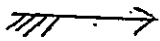
23

Tidal Stream Atlas

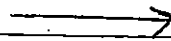
T.S.A gives the tidal prediction for every hour including Rate and direction of the Spring and Neap of each 6 hrs before and after high water for the particular place

- In tidal Stream Atlas no compass rose on the chart
- Measures by parallel ruler.
- direction of the tidal stream is indicated by arrow
- \diamond tidal diamond indicate the geographical position

Flood tide



Ebb tide



The rate of tidal stream is indicated in 2 way

(1) Numerically - Neap and spring rate is given in length of the knot eg- 1.1, 2.2 indicate 1.1 knot neap or 2.2 knot spring.

(2) Pictorial presentation - Rate is indicated by length and thickness of arrow

Short thick arrow represent a weak tidal stream.

Ramun Civanhan

(24)

Routing Charts (Pilot Chart)

Routing Chart useful for the planning of ocean voyages

- It is published for every month for five Regions
- So Annually it has 5x12 = 60 Charts
- It's give to data

- ① Prevailing currents
- ② Atmospheric pressure & isobars
- 3 Air temperature
- 4 Sea level temperature
- 5 Load line Zone and ice limit
- 6 Probability of fog or gale
- 7 Storm track

Raman Chauhan

(25)

Adm. Notices to Mariners

- ① Weekly Notices to Mariners
- ② Annual Notices to Mariners (Temporary and Preliminary)
- ③ Cumulative Notices to Mariners

① W.N.M

- 52 W.N.M are published each year.
- W.N.M is a complete compilation of all adm. chart or publication update issued in any one week

It divided into six section

Sec I Index

Sec II Correction to chart

Sec III Reprint of Radio Navigational Warning.

Sec IV Correction to Adm. Sailing direction

Sec V " " Adm. list of light and fog signal

Sec VI " " Adm. list of Radio Signal.

(2) Annual Notices to Mariners.
It published annually, it contains all the correction for that year also Temporary and Preliminary correction.

(3) Cumulative Notices to Mariners.

- Published every six month (Jan & July)
- An Jan publication contains past 2 year information
- An July publication contains past 2 1/2 year information.

Ram Kumar

(26)

Passage Planning

- (1) Appraisal
- (2) Planning
- (3) Execution
- (4) Monitoring

Raman Chauhan

(1) Appraisal

(1) Refer all Adm. Publication

ALRS / ALLFS / Chart Catalogue / Routine Chart / Navigation Chart
 tide table / Notices to Marine / Mariners handbook / Distance table
 Guide to Port entry / OPW / Navigation Warning etc.

(2) Check the charts have been corrected up to date

(3) Advise about the collected information to the master and get his instruction such as the required distance to the coast

(2) Planning

(1) Plan the passage from berth to berth.

(2) Plot the route on suitable chart

(3) Decide the ways of fixing position

(4) Mark all no go zone, like a dangerous, wreck etc.

(5) Mark all the various transit marks

(6) Number and Mark the way point and mark the Co and dist

(7) from way point to way point

(8) Contingency plan should be there for emergency.

- ⑧ Prepare the course card
- ⑨ Calculate the tide and direction as per tide table
- ⑩ Get the approval from the master.

3. Executing -

- ① Check reliability of the vessel's navigational equipment.
- ② Check ETA to critical points
- ③ Check Met conditions and Navigational Warning
- ④ Check day time and night time passing dangerous
- ⑤ Check traffic condition.
- ⑥ Check Maneuverability of the ship.

4) Monitoring - **Raman Chauhan**

- ① Close and Continuous monitoring should be done
- ② if oow in doubt call the Master
- ③ Take all actions what he thinks correct for the safety of the vessel.

Note - (in oral ask passage planning give ~~also~~ above data)

27) Plan the Passage for Voyage Port to Port

- ① Refer the chart Catalogue.
- ② Note down Small Scale and large Scale Chart No.
- ③ Arrange chart in Serial number
- ④ Check all the chart is up to date or not
if not corrected first
- ⑤ First draw the Co. on Small Scale Chart.
- ⑥ Keep in mind danger of navigation
- ⑦ Refer all Adm publication
- ⑧ transfer the Co. from Small Scale to large Scale
- ⑨ Write down the Co. Distance to go, Wheel over Point (if any turning) Distance off from Coast line one hour before E/R notice, Calling Master, Pilot Calling,
- ⑩ Take approval from Master. **Raman Chauhan**

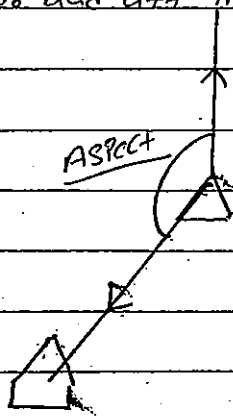
Correct the Chart

- ① Refer the latest NTM
- ② Go through index see the chart effected list
- ③ Note down the Chart No. and Notice No.
- ④ See that it is permanent or temporary correction
- ⑤ If temporary correction corrected by pencil.
- ⑥ If permanent correction corrected by water proof pen (Pilot)

- ⑦ Record on chart bottom left hand corner as Notice No and year
- ⑧ Also mention in the chart correction log books

- ②⑨ Aspect :- is my ship bearing from other ship with respect of her fore and aft line

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- ③⑩ Radar - Characteristics

Vertical beam width ③ Horizontal beam width
pulse length ④ PRF and wave length

Radar Limitation

- ① Range discrimination ② Bearing discrimination
③ Minimum Range ④ Max Range ⑤ Range accuracy
⑥ Bearing accuracy

(31)

Compass Point

Cardinal Point = 4

Inter Cardinal Point = 4

Three letter Point = 8

By Point = 16

Total Point = 32

Raman Charan

and each degree difference is = $\frac{360}{32} = 11.25^\circ$







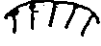

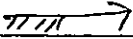
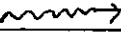


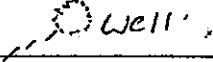
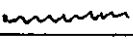
N	E	S	W
NBE	ELS	SGW	WLN
NNE	ESE	SSW	WNW
NEBN	SESE	SWBS	NWLN
NE	SE	SW	NW
NEBE	SELS	SWLN	NWLN
ENE	SSE	WSW	NWN
EN	SE	WS	NWN

★ Equipment tools for chart

Pen / Ink / Pencils / Eraser / Parallel rule / Divider

Compass / Hacksaw blade

Chart - SYMBOLS

(32)		Benchmark
		Fixed Point
		temple / Pagoda
		Windmill
		Wind turbine
		Radio tower
		Quarry
		Ebb tide stream
		Flood tide stream
		Current
		Eddies
		Wreck
		Well
		Submarine cable

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- c. Date of publication
- d. Date of printing
- e. Date of new edition
- f. Number of the last small correction.

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NATURAL SCALE OF A CHART: Found under the title of a chart, it is for a specific latitude. It is expressed as a ratio or a fraction for example 1:200,000 or $\frac{1}{200,000}$

The meaning is that if the distance between two points on a chart is, say, 1 cm, the actual distance between the two points on the surface of Earth is 200,000 cm. In coastal areas it is normally given for the middle Latitude of the chart. Thus the scale or natural scale of a chart is the ratio between a unit of length measured on the chart and a corresponding unit measured on the Earth's surface.

THE NAUTICAL MILE: It is also called sea mile and is used to measure distances at sea. It is defined as the length of a minute of latitude or the length of an arc of a meridian which subtends an angle of 1' at the centre of curvature. Though it changes from pole to the Equator, by international agreement the chosen length of international Nautical Mile is 1852 meters or 6076.1 feet has superseded the earlier British or U.K. Nautical Mile of 1843 meters or 6080 feet. The nautical mile is divided into 10 cables, a cable being usually accepted as 600 feet.


CHART DATUM: It is usually a level so low that the tide will not frequently fall below it. Modern Admiralty surveys are planned for a datum approximately equal to the Lowest Astronomical Tide (LAT) under average meteorological conditions. All the soundings (depth of water) at sea are given with respect to chart datum. Drying height is also given with respect to Chart datum.

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DRYING HEIGHT: It is the extent to which a patch is exposed in the air at the level of chart datum i.e. when there is lowest Astronomical Tide. Normally soundings are shown in meters (above 20 meters) and decimeters (under 20 meters). The drying heights are also shown in meters and decimeters but they are underlined i.e. 0.4. It means that the pint (rock) dries by an amount of 4 decimeters above the datum of soundings.

ROUTING CHARTS: These charts cover specific areas and for specific months. These are intended to provide ship masters with a graphic summary of factors which may affect the loading of a vessel and may affect the choice of route when making an ocean passage. Features include: Main shipping tracks, distances, load lines in force, winds, current, temperatures, dew point, iceberg limits, etc.

AERO RADIO BEACON: These are basically used for aircrafts but if they are situated in coastal waters, can be used for ships also for taking bearings. The mariners have to take following precautions while using Aero radio beacons:

- 1) The charted position of an Aero radio beacon not so listed may be in error.
- 2) There may not be guarantee of the accuracy of bearings observed at sea level. It is marked as  Aero RC.

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REMARK: It is a Radar Beacon which operates continuously. When it targets the radar of a ship, the radial lines are shown on the PPI. So only the bearing can be taken by a remark but no range. It is mostly found in Japanese and Far East waters. It is marked as

Remark
⊙

RACON: It is a Radar Responder Beacon. When targeted by the radar waves of the ship, it activates the Racon and a characteristic echo on the PPI is painted. The bearing and range both can be obtained by a Racon. There is a morse identification signal which comes on the PPI and is clearly identified on the radar picture. In crowded waters it is very conspicuous. Since it takes some time for the Racon to activate, the range obtained is slightly more than actual. It is marked as

Racon
⊙

FOG DETECTOR LIGHTS: These may be fitted on the light houses or on a structure close to it. On the onset of fog, the fog detector light senses it, activates the operation of main light and starts the fog signal. The detector exhibits a powerful light which may be continuous or may be in the form of a powerful flash of about one second duration. The light will probably be concentrated into a narrow beam and the beam may sweep back and forth horizontally over a stated arc or it may remain fixed on one stated bearing. It is marked as Fog Det. Lt.

RELIABILITY OF A CHART: The reliability of a chart can be checked by :

- 1) The date of survey
- 2) The source of surveys
- 3) Frequency of soundings given on the chart
- 4) Scale of the chart
- 5) The distortion in the chart
- 6) The projection

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TRANSIT BEARINGS: When two objects i.e. light house or towers are in transit, the vessel sees both objects in same line. If a bearing is taken when the two objects are in line, it is called a transit bearing. The transit bearing plotted on a chart is a position line. Compass error can be obtained by comparing transit compass bearing and true bearing from the chart when both objects are in line. Transit bearings are marked as

CLEARING LINE: A clearing line is a line drawn through two conspicuous objects on the charts such as two light houses or towers. A vessel has to be kept outside of this line in order to clear some danger. The two conspicuous objects as stated above will be called as clearing marks.

CLEARING BEARING: When clearing lines are not shown on the chart, a conspicuous object is selected and a bearing leading clear of the danger laid off from it. A vessel kept on this bearing will then pass clear off the danger.

COCKED HAT: If three or more bearings are taken of shore objects, they may either cut at one point or make a cocked hat. A doubt thus arises on the fix. For example, if the light

houses A, B and C give three bearings and when plotted as in the figure A2, a cocked hat is formed. Let the vessel be steering a course of $100^\circ T$.

The cocked hat may be formed because of:

Incorrect compass error, compass error being wrongly applied, manual error in taking the bearings, incorrectly plotted positions of light houses etc.

If the cocked hat is small, as in the figure A1, the ship's position generally is taken as the centre. If the cocked hat is large, the reason for the cocked hat is to be analyzed. If repeated bearings still give a large cocked hat, or if there is no time to check the bearings, assume the vessel to be in that part of the cocked hat which puts the vessel in greatest danger. As in the figure A2, when the vessel steers a course of $100^\circ T$, position P is to be taken as it puts the vessel in greatest danger. In chart work, unlike Practical Navigation, the cocked hat is not resolved.

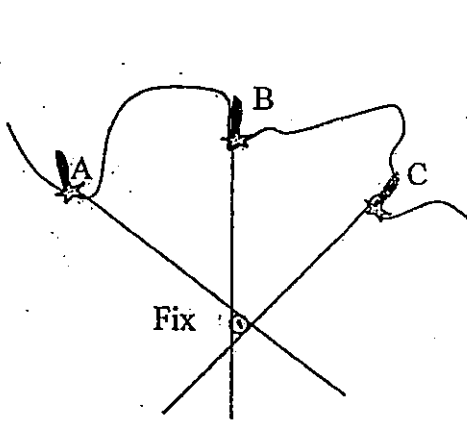


Fig. A1

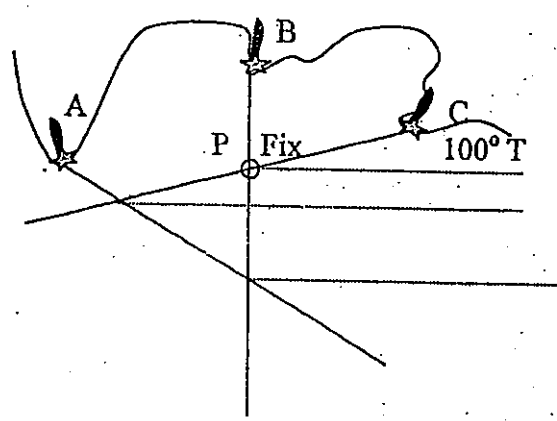


Fig. A2

ISOGONIC LINES: The admiralty publishes a chart entitled 'Magnetic variation and annual rates of change'. In this chart, the lines or curves joining places of equal variation are drawn which are called isogonic lines. Rate of change of variation is also shown. The correct variation for any position can be obtained from this chart. If the variation obtained from the navigational chart does not match with the variation obtained from Magnetic variation chart, we accept the one obtained from the latter.

LOCAL MAGNETIC ANOMALY: At some positions at sea, there is sudden change in the variation of the compass due to the abnormal magnetism present below the surface of the Earth. The difference in Gyro and Magnetic course increases when passing on these positions. There is warning to this effect on the chart i.e. Local Magnetic Anomaly + 5°. It is also given in the sailing directions.

LATTICE CHARTS: These are normal navigational charts on which the pattern of lines is superimposed. The pattern is called a grid or a lattice. Admiralty lattice charts bear the prefix L. These charts bear the same number as the basic chart from which they are prepared. The charts are issued as fully navigational and are corrected from Weekly Admiralty Notices to Mariners. The chart number is prefixed by L meaning latticed, followed by a bracket containing a reference to the appropriate hyperbolic system. In case

of Decca, the bracket contains D. in case of Loran the bracket contains L and in case of Omega the bracket contains OMEGA.

L (D6) 2575

L (L-C) 245

L (OMEGA) 245

Raman Chauhan

CHART CORRECTION: Without correction, a chart is as good as not having it on board. It is therefore necessary to keep all charts on board, fully corrected and up-to-date with the help of weekly notices to Mariners. After the corrections are done, same is to be recorded in the Chart Correction Log maintained by the navigating officer.

The following is an example of a Notice to Mariners:

*150 AFRICA, West Coast – Ivory Coast – Yobua Rocks – Stranded wreck.

A stranded wreck, P.A., is to be inserted in position $4^{\circ} 21.0' N, 7^{\circ} 28.7' W$.

Note: This is the wreck of the M.V. Med Explorer (9826 GRT)

Charts [Last Correction] – 1980 [2845/81] 1365 { New edition, 2/12/83 }

Lloyds List (H.3332/76).

The star (*) means that the notice is based on original information.

TRIANGULATION: It is marked as \triangle . It is the survey process in which the distances on the far side can be established by solving the constructed triangle (triangulation). The ideal triangle (strongest) is one having angles close to 60° (equilateral) although angles as small as 20° may be acceptable.

The base line and a minimum of two angles are measured so that the missing distance can be calculated. The third angle on the far side should also be measured to check the mistakes and reduce the errors. Each angle is measured precisely by using a Theodolite. Triangulation allows the quick check of simply summing the triangle angles to 180° .

BENCH MARK: It is marked as $BM \uparrow$. It is a permanent point of known elevation. Bench marks are established using precise levelling techniques and instrumentation. Bench marks are Bronze discs or plugs set in to vertical wall faces. It is important that the bench mark be placed in a structure that has substantial footings. Benchmark elevations and locations are published by state, port or municipal agencies and are available to surveyors.

Temporary Bench Mark ($TBM \uparrow$) is a semi-permanent point of known elevation. TBM can be a nail in the root of a tree or top corners of concrete head walls. The elevations of TBMs are not normally published.

Bench Marks located on Jetty walls can be used to take water levels regularly to decide on Lowest Astronomical Tide, Mean High Water Springs etc. by looking at the records of many years.

CHART INSET: Sometimes it is not possible to show a part of the chart in detail. A square or rectangular border is made covering that area and same is magnified at some other location on the chart which is not being used for navigation. It is called Chart Inset. For example, on chart no. 5072, FALSTERBO TO OLAND, there is a chart inset for the port of YSTAD.

SOURCE DATA: On all modern charts, Source Data inset is placed in a convenient location indicating source of hydrographic information used in the construction of the chart. Source data includes year, name of the agency and scale of hydrographic survey of each section of the chart.

NEW CHART : A chart which is published for the first time is called a new chart. It is shown in the notices to mariners. The date of publication of the chart is shown in the middle out side the bottom margin of the chart.

GNOMONIC CHART : It is a great circle chart and has following uses:

- ✓ 1. It can be used for great circle sailing.
- 2. It can be used for polar navigation in high latitudes.
- 3. It can be used to show large scale plans of approach to harbors.

NEW DANGERS : It is used to describe the newly discovered hazards which are not yet shown an any of the nautical publications. The examples of New Dangers can be : sand banks, rocks, wrecks etc. The markings of new dangers is done as per IALA buoyage system and has at least one of the marks duplicated. The duplicate mark can be identical to its partner and may carry a RACON giving morse D. The signal length is one nautical mile on radar display. The duplicate mark may be removed when the relevant authority is satisfied that the information has been sufficiently promulgated.

ADMIRALTY NOTICES TO MARINERS : Published by British Admiralty or Indian Hydrographic department or some other Government who has published the relevant charts. Before commencing the voyage, it is Master's responsibility to ensure that all charts to be used are corrected to the latest admiralty notices.

Raman Chauhan

A. Weekly notices to mariner :

There are 52 issues of it and numbered consecutively. Each weekly notice comprises of 6 sections.

- (i) Index to notices to mariners and explanation.
- (ii) Notices to mariners for correction of charts. This section covers navigational charts, notices including temporary (T) and preliminary (P) notices for that week. The last weekly notice of each month will also list T and P notices which are in force. Any new editions of charts, new publications like sailing direction or list of lights etc. are also mentioned.
- (iii) Navigational warnings are re-printed in this part. All warnings which are in force find a place in the first weekly notice of each year. Lists of NAVAREA, HYPROLANT, HYDRPAC messages are also covered.
- (iv) Here all the corrections affecting Admiralty sailing directions are given. A cumulative list of correction which are in fore are published on a monthly basis.
- (v) This section covers all corrections for list of lights and fog signals.
- (vi) This section contains correction to admiralty list of radio signals.

CUMULATIVE LIST OF ADMIRALTY NOTICES TO MARINERS

It is published every 6 months in December and June. It contains Serial Nos. of all permanent notices published in last 2 years. This helps in checking your chart whether it is corrected to all notices or not. The chart numbers affected by these notices are also mentioned.

ANNUAL SUMMARY OF ADMIRALTY NOTICE TO MARINERS.

It is published at the beginning of each year.

The following are its contents.

1. All T & P notices affecting sailing direction which are in force at the end of the previous year.
2. Information on tidal surges.
3. Distress procedure and marine operation with aircraft.
4. Master's Actions in case of collision.
5. Submarine indicator buoys.
6. The works of coast guard.
7. The royal nautical life boat institution.
8. Off shore installations – positions and safety zones.

Raman Cnauhan

CHART CORRECTION : The weekly notices to mariners is the main source of chart correction. The chart folio, chart correction log, scissors, chart correction pens, parallel ruler, divider etc. are other accessories. The T and P notices are corrected in pencil. The cumulative notices to mariners is also to be consulted. The chart correction log is published by the hydrographic department. It contains summary of correction sheets for the corrections which affect each chart folio. The charts are listed in numerical order and relevant notices are also listed.

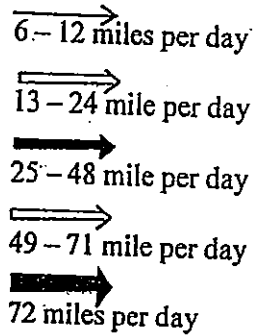
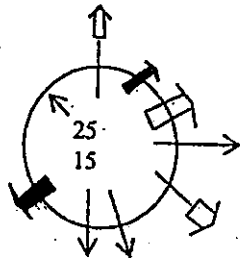
BLOCK CORRECTION : Sometimes an area on a chart may have many contents. It may be easier to cut and paste a part of the chart than to correct it. Some distortion may be expected when pasting the block on the chart.

TRACING PAPER CORRECTION : It is a modern method of chart correction which is being used extensively. In this method precise correction can be transferred from a tracing directly onto the chart. The latitudes, longitudes, buoys and beacons, light houses etc are all plotted on the tracing paper. The tracing paper is put on the chart, the corrections are pressed with a pen / pencil, which leaves a mark on the chart and correction, is done on the spot on the chart. It is easier to do the chart correction this way.

ICE BLINK : It is observed in areas when sea ice is present and visibility is clear in day time. There will be a yellowish haze just before the ice is detected. If sky is overcast, a white glaze may be seen instead. The ice blinks are pre indication of ice and thus distortion of course may be considered to avoid the ice.

CURRENT ROSE : It indicates how variable the ocean current is in the area covered by the chart.

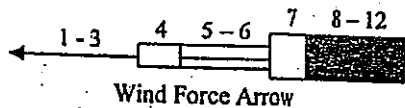
Figure :



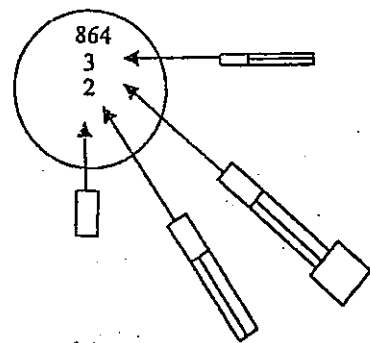
The figure in the rose represents the total number of observation. The lower figure represents the % frequency of currents, having a rate of less than 1/2 knots.

All the current observations are noted and a graphical presentation is made in the form of current rose charts. To plot the observed data, the compass is divided into 16 equal sectors. The number of observed current sets within the limits of each sector are noted. This number is then expressed as a % frequency of total number of observations. The obtained current value is used to determine the length and thickness of arrow which is constructed in the middle of the sector.

WIND ROSES : These are shown on the routing charts in pale red color. Arrows fly with the wind and their length indicates % frequency on a given scale (5% to 50%) from the arrow head to circle is 5 % and provides a ready means of estimating the % frequency. The upper figure inside the circle gives the number of observations; the middle figure gives % frequency of various winds while the lower figure gives the number of observed columns.



(Wind force indicated by arrow thickness)



Wind Rose with arrow representation

Raman Chauhan



TIDES

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Vertical oscillation of the sea surface is known as tide. Although we loosely talk about the tide coming in or going out, the tide is not a horizontal movement. It is a vertical motion of sea level.

At most places it occurs twice daily. The tide rises until it reaches a maximum height, called high tide or high water, and then falls to a minimum level called low tide or low water.

If a graph is plotted between height of sea level about a given reference level called chart datum and time, we have a tidal curve as shown below. As we can see it is approximately a sine curve. It is illustrated in figure 1.

The rate of rise and fall is not uniform. From low water the tide begins to rise slowly at first but at an increasing rate until it is about halfway to high water. The rate of rise then decreases until high water is reached and the rise ceases. The falling tide behaves in a similar manner. The period at high or low water during which there is no sensible change of level is called stand, or slack water.

The interval between high water and low water times is called duration of tide and the difference in respective heights is called range of tide.

Tides at a particular place are classified as one of the three types: semidiurnal, diurnal or mixed-according to the characteristics of the tidal pattern occurring at the place.

At most places, the sea level rises and falls twice a day (24 hours). These are called Semidiurnal tides. The duration of tide is about 6 hours and the period of tide is about 12 hours i.e. another high water (or low water) will happen about 12 hours later. These tides occur in most part of the world specially European and North American ports. The semidiurnal tide for a particular port is illustrated in figure 2.

In the diurnal type of tide, only one single high or single low water occurs each tidal day. Tides of the diurnal type occur along northern shores of gulf of Mexico, in the Java sea. The diurnal tide for particular port is illustrated in figure 3.

In the mixed tide, the diurnal and semidiurnal oscillations are both important factors and the tide is characterised by a large inequality in the high water heights, low water heights, or in both. There are usually two high and two low waters each day, but occasionally tide may become diurnal. Such tides are prevalent along coast of the U.S.A. For illustration see figure 4.

SPRING AND NEAP TIDES:

When Earth, Moon and Sun come in line as shown in the figure given below, they are said to be in conjunction. We then have a new Moon. Since the gravitational pull of the Moon and the Sun on the water mass of the Earth is along the same axis, we have a Spring tide. After about 7 days,

Raman Chankin

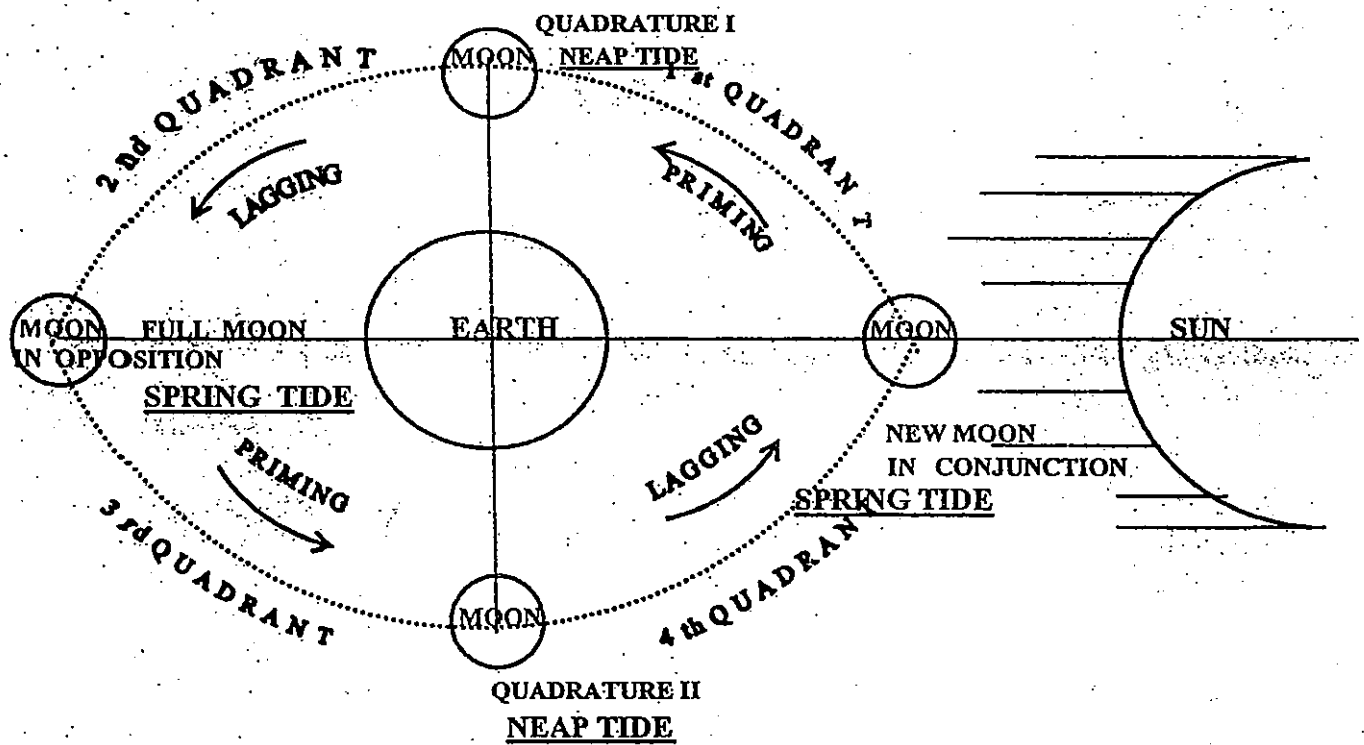
the Moon has moved to quadrature position with respect to the Sun. In this position, the gravitational pull of the Moon and Sun are along different axes and it is getting divided. Therefore we have the least effect of gravitational pull on the water mass of the Earth and there is a Neap tide.

Again after about 7 days, the moon comes on the other side of the Sun with respect to the Earth. This is the opposition position and the gravitational pulls of Moon and Sun are again along the same axis. We therefore have Spring tide again. After another 7 days there is the quadrature position and there is Neap tide again. After one Lunar month of about 29.5 days there is again a Spring tide.

PRIMING AND LAGGING OF TIDE:

In first and third quadrant the tide is said to be priming. The high water time is before the meridian passage of the Moon.

In second and fourth quadrant the tide is said to be lagging and the time of high water is after the meridian passage of the Moon.



THEORY OF TIDES

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The tides are caused due to the forces which act between the Earth, Sun, Moon and the water mass of the Earth. It is also affected by the motion of the Moon and Sun relative to the Earth. The Earth Motion on its own axis is also to be considered. As per Newton's law of gravitation :

$$F = \frac{m_1 m_2}{d^2}$$

Where F is the force between say Earth & Moon, d is the distance between their centres & m1 & m2 are their masses.

As there is gravitational pull between Earth & Moon there is also a gravitational pull between Earth & Sun.

High tides take place on the part of the Earth facing the Moon as it circles round the Earth. The Moon's gravity pulls the water slightly away from the Earth. Thus there is piling up of water just below the Moon i.e. high tide. At the same time, it is also high tide on the opposite side of the world. There the tug of the Moon's gravity is weaker and it is the force of the Earth's spin which pushes the water outward. As the Earth turns, the part of the sea that was high moves away from Moon's gravity. The water sinks back down. After about six hours, this part of the sea is all the way down to what is called low tide.

Each part of the sea has two high tides each day - one when it is beneath the moon & one when the Moon is on the opposite side of the Earth. And of course, there are two low tides.

Laplace was first to point out that tidal oscillations are composed of harmonic motions originated by various periodic forces. A tide at any place is the sum of a large number of harmonic constants, some of which are diurnal and some are semi-diurnal in nature. Tidal predictions for a port are made by using mechanical aids or electronic computers which use 10 to 62 harmonic constants.

SOLAR TIDE:

The natural period of oscillation of a body of water may accentuate either the solar or the lunar tidal oscillations. Though it is a general rule that the tides follow the Moon, the relative importance of the solar effect varies in different areas. There are a few places, primarily in the South Pacific and the Indonesian areas, where solar oscillation is the more important. At those places the high and, low waters occur at about the same time each day. At Port Adelaide, Australia the solar and lunar semidiurnal oscillations are equal and nullify one another at neaps.

Raman Chauhan

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BORE TIDE:

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As a progressive wave enters shallow water its speed is decreased. Since the trough is shallower than the crest, its retardation is greater, resulting in a steepening of the wave front. Therefore in many rivers, the duration of rise is considerably less than the duration of fall. In few estuaries, the advance of the low water trough is so much retarded that the crest of the rising tide overtakes the low, and advances up stream as a churning, foaming wall of water called a Bore tide. The Bore tides can be dangerous as the ship along side berth may suddenly surge and break the mooring lines. The tide tables indicate where bores occur.

DOUBLE HIGH AND LOW WATER:

As in the case of Southampton, England, there is often a slight fall in the middle of the high water period. This is called double high water. In the case of Hoek Van Holland there is often a slight rise in the middle of the low water period. The practical effect is to create a longer period of slack water at high or low tide. The tide tables direct attention to these.

EQUINOCTIAL AND SOLSTIAL TIDES:

When the declinations of the Moon and the Sun are the same, tide-raising force of each will be acting more in concert. At the Equinoxes in March and September when the declinations of both the Moon and the Sun are zero, the semi-diurnal luni-solar tide raising force will be at its maximum. It causes the Equinoctial tide. At these times, where semi-diurnal tides are concerned spring tides higher than the normal are expected.

At the solstices in June and December, when the declinations of Moon and Sun are both at Maximum, the diurnal luni-solar tide-raising force will be at its maximum, thus causing the solstial tides. At these times, the diurnal tides are at a maximum.

SEISMIC SEA WAVES (TSUNAMIS):

Tsunamis are ocean waves produced by sudden, large-scale motion of a portion of the ocean floor or the shore, as by volcanic eruption, earthquake (sometimes called seaquake if it occurs at sea) or landslide. If they are caused by a seaquake, they are called seismic sea waves. The point directly above the disturbance, at which the waves originate, is called the epicenter.

These submarine earthquakes set up long waves, which travel across the ocean at very high speeds, often reaching a speed of 400 knots in the Pacific. On entering shallow waters, these waves increase in height and often reach destructive proportions. It is then termed as 'tidal wave' or Tsunamis though it does not bear any relationship with tide.

STORM SURGES:

Imp Under exceptional circumstances, either severe extra-tropical storms or tropical cyclones can produce changes in sea level that exceed the normal range of tide. Low sea level is of little concern except to shipping, but a rise above the ordinary high water mark can result in to a catastrophe. Like tsunamis these storm surges are also called tidal waves.

Raman Chauhan

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~~Raman Chandra~~

A storm surge may be generated either in the Northern part of the North Sea or in the Atlantic. In the later case, the wave may travel round the north of Scotland and on entering the North Sea it may be deflected southward by the rotation of the Earth. The most dangerous surges occur when a deep depression moving in from the Atlantic, travels slowly across the north of Scotland from west to east. It causes strong NW'ly or N'ly winds. Surges which occur at or near neaps seldom cause abnormally high level but relatively small surges occurring at high water of springs can be very dangerous.

A very severe storm surge occurred on 31st January, 1953. Predicted high waters exceeded by more than 3 meters on the Netherlands coast resulting in disastrous flooding with considerable loss of life and property.

NEGATIVE SURGES:

In a manner somewhat similar to storm surges the level of the sea can also be lower than the predicted level. Again the cause is meteorological. It makes a lot of difference to very large vessels which may be navigating with very small under keel clearance. Negative surges of over 0.6 m occur about 15 times a year in the southern North sea, 3 or 4 times exceeding 1 m.

Warning of onset of negative surges in the southern North Sea is given by a warning service to the mariners.

SEICHES:

Seiches sometimes occur in a confined body of water. It is a long wave, usually having its crest at one end of the confined space, and its trough at the other. Abrupt changes in meteorological conditions such as the passage of an intense depression or line squall may cause oscillations in sea level. The period between successive waves may be any thing between a few minutes and about two hours and the height of the waves may be anything from a few centimeters to a meter or even more. The shape and the size of certain harbours make them very susceptible to seiches. Fishguard and Wicah are the example of harbours where seiches regularly occur.

FREQUENCY OF SPRINGS AND NEAPS:

Two spring tides occur each lunar month interspersed with two neap tides. Interval between successive spring and neap tides is about 7.5 days.

It is usual for springs and neaps to follow the relevant phase of the Moon by two or three days. This is because there is always a time-lag between the action of the Force and reaction to it, caused by the time taken to overcome the inertia of the water surface and friction.

Springs and neaps will occur approximately the same time of the day at any particular place, since the Moon at that time is in similar position relative to the Sun.

DEFINITIONS

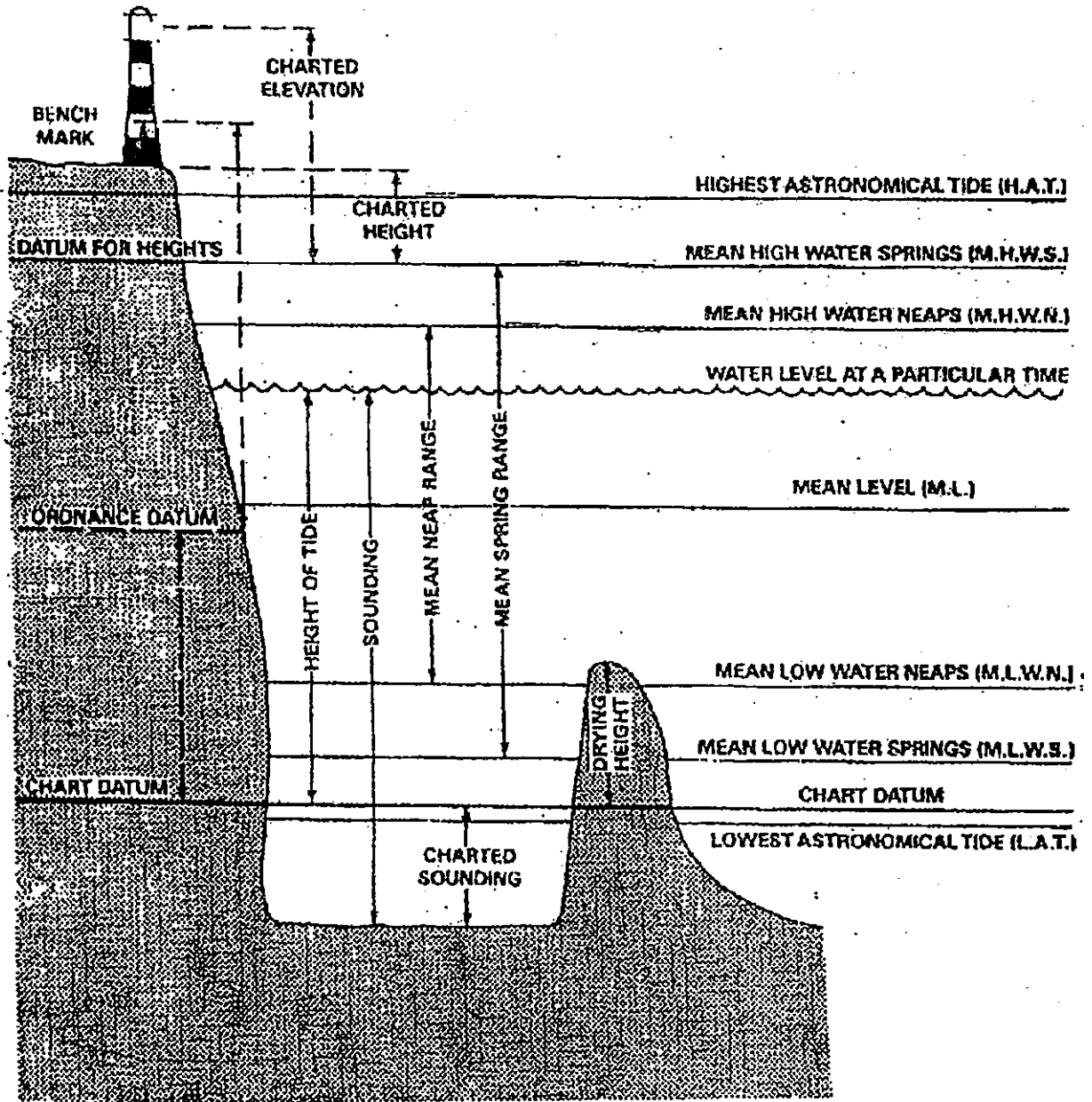
Raman Chauhan

- (a) **SPRING TIDE** is a tide occurring twice a month, of maximum range, when the sun and moon are in conjunction or opposition.
- (b) **NEAP TIDE** is a tide occurring twice a month, of minimum range, when the moon is in quadrature
- (c) **HEIGHT OF TIDE** is the height of the water level, at any particular time, measured above chart datum, by taking the height of low water, and adding the rise of the tide.
- (d) **M.H.W.S.** is the height of Mean High Water Spring Tides, taken as an average, throughout a year when the average maximum declination of the moon is $23\frac{1}{2}^{\circ}$, of two successive high waters in 24 hours when the range of tide is greatest.
- (e) **M. L. W. S.** is the average height obtained from two successive low waters during the same period.
- (f) **M.H.W.N.** The height of Mean High Water Neap Tides, is the average of any of two successive high waters when the range of tide is least – same conditions as in (d).
- (g) **M.L.W.N.** is the average height obtained from two successive low waters during the same period.
- (h) **RANGES OF TIDES** are the differences in height between successive high waters and low waters or low waters and high waters.
NB: In most cases, the range of a tide will be slightly different to the tidal range before and to the one after, as the time of spring or neap tides approaches.
- (i) **SPRING RANGE** is the difference in height between M.H.W.S. and M.L.W.S. It is normally the greatest range experienced, occasionally exceeded when astronomical conditions cause L.A.T., and /or when meteorological conditions (wind) build up or reduce the water level.
- (j) **NEAP RANGE** is the difference in height between M.H.W.N. and M.L.W.N. It is normally the smallest range experienced, under normal conditions.
- (k) **CHART DATUM** is the standard depth usually at the level of M.L.W.S. (or L.A.T. in some ports) from which to measure depths of shoals, or heights of rocks, etc., which show above the water at low tide.
- (l) **HEIGHT OF SHORE OBJECTS**, is charted above M.H.W.S. and to find correct height, add fall of tide below M.H.W.S.

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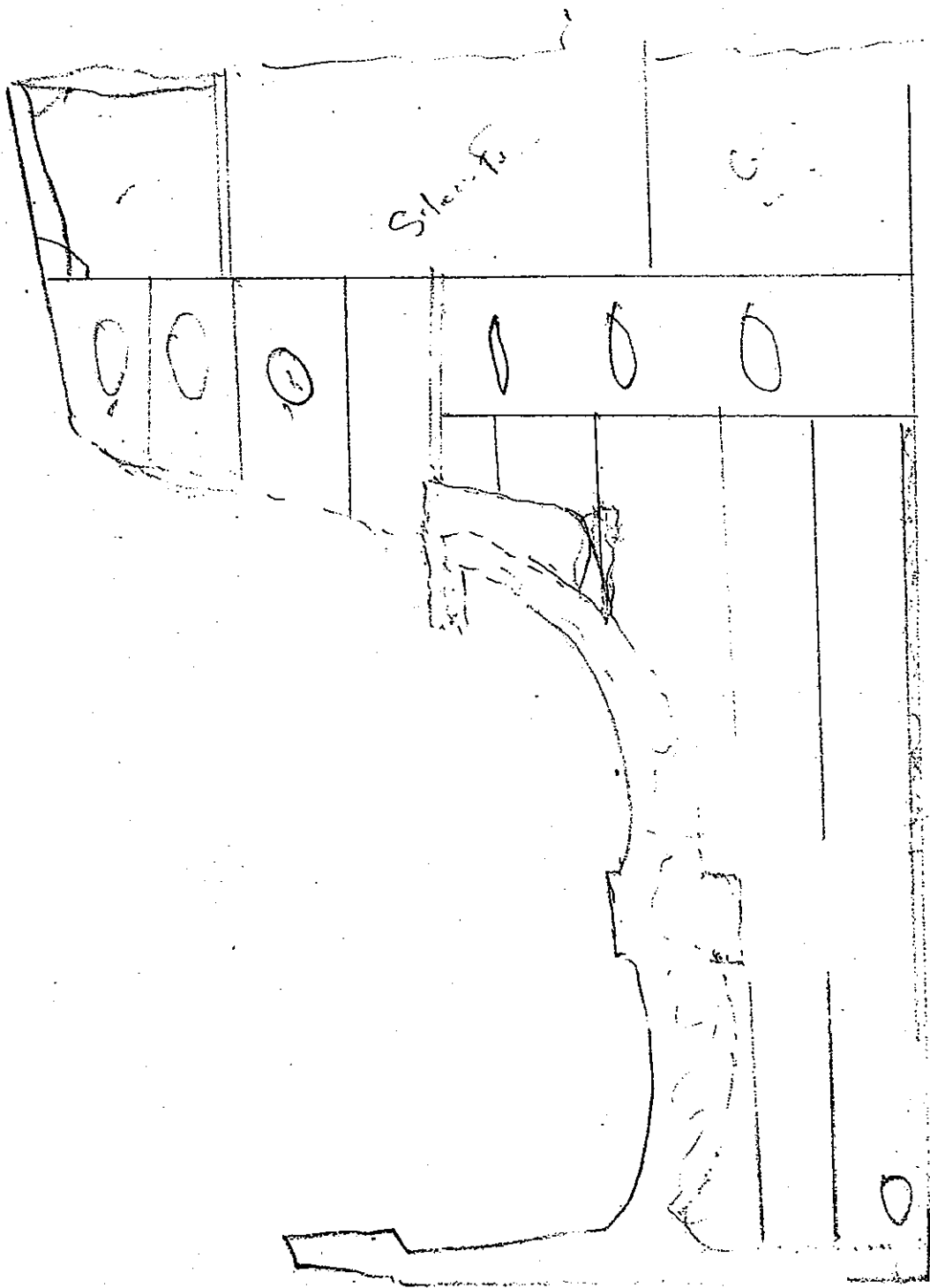
Raman Chauhan



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Raman Chauhan

12/4/2014



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CARGO WATCH PORT WATCH

First of all i have fit enough. I had take proper rest as per STCW 95. Carry out my watch.

At first i will wear my personal protective equipment and before 15 min to start my watch. I will go to the bridge and their i will check.

1. Any standing order night order from master.
2. Check any important Message or information about weather forecast.
3. Check barometer pressure
4. Note down the tidal information.

Then after i will close the bridge door and go to the cargo control room. And there i will check

1. Any standing order from chief officer.
2. Check the cargo plan stowage plan. And taking the instructions. Where cargo is going to load and has and had already been loaded.

Then i will come to the gangway and ensure that

1. Gangway watch are maintain as per ISPS level.
2. Gangway attended by reliable crew member or shore watchman.
3. Ensure that gangway ladder is properly secured and steps are free from grease, oil its provide a safe access.
4. Check weather fire patrol are being carried out at a regular interval.

Then i will go to the aft station and check the mooring condition and come to the deck the other side of the cargo operation.

1. Ensure how many cargo are working and their breaking time and also before going to the deck i will ensure that all activities are carried out as per COSWP Code.
2. Check the cargo handling equipment operation by trained and experienced personal.
3. Check the area of cargo work is properly illuminated.
4. Check the cargo handling gear.
5. Maintain the SWL.
6. Check the visually cargo hold and cargo condition.

Then i will go to the FWD station and check the mooring condition

1. Check the emergency fire wire is rigged.
2. Check the all FWD store are closed.
3. Check the ballast operation.

Then come to the deck office and tack over duty from the duty officer and ask him any important information about cargo. Vessel draught , Trim, List.

HEAVY WEATHER

1. Inform master, inform E/room, inform crew and other departments such as galley.
2. When master on bridge ask him if required to plot alternate course. Show him the recent weather reports.
3. Then first i will secure up the bridge.
4. Wear PPE and organize crew with their PPE on.
5. Check weather all moveable object been secured above and below decks particularly in E/Room Galley and store rooms, paint room, locker.
6. Check weather ship accommodation been secured and all ports and deadlights closed.
7. Ensure lifeboat is well secured check the gripes.
8. Check whether deck openings being secured hatch cover, hatch access, hatch ventilation has been secured, bilge pipe and sounding pipe cap to be closed. Deep tray plug to be open. All deck scupper to be open
9. Check the whether AFT and FWD mooring station has been secured all mooring rope has been secured. Anchor chine and sperling pipe covered and secured. FWD store has been locked.

TAKING OVER WATCH

First of all i have fit enough. I had take proper rest as per STCW 95. Carry out my watch.

I will go 15 min before to the start my watch.

Check the night order read it and sign it or any standing order from master.

Then i will check the vessel present position and also check that chart is corrected.

Then i will plot the new position vessel on ^{chart} position and also check the present speed of vessel by GPS or present course from gyro compass.

Check the any A/C during my watch.

Check the no go areas or danger areas well marked on the chart.

Ensure the location of next chart and all other respective publication.

Check all meteorological instruments like barometer, barograph, hygrometer, navtex and get the information GMDSS.

Check the present depth of water by echo sounder and match the chart.

Check the sea status.

Adjust the eyes at night vision. (if night watch)

Visually check the traffic density.

Also see the target on the radar screen and compare with actual target.

I will not touch the radar or will not taking over the watch if collision avoidance is going.

Check the difference between gyro and magnetic compass.

Check the engine status.

Check the navigation light status

Emergency signal light, sound signal apparatus.

VHF set the appropriate channel and set the low volume

FIRE IN EMERGENCY

Raise the alarm.

Inform master and engine room.

Follow ship emergency plan or contingency plan.

All person should wear personal protective equipment.

Muster at the assign station.

Head count as per muster list.

As per muster list establish the fire parties.

In my last ship chief officer head of emergency party or master and chief engineer head of command party.

Establish communication with emergency parties.

Prepare the all fire fighting equipment.

Everyone familiar with all fire fighting equipment.

Engine room party operate the fire pump and emergency fire pump.

First of all back up party close the watertight door.

Cut off all electrical circuits in the vicinity of fire areas.

Shut off all ventilation fire flaps in the vicinity of fire areas.

In the galley (cut off galley ventilation fans.) (Potential hazards oil and fat in pans.) additional fire appliances (which may be available in the galley) fire blanket CO₂ extinguisher and fix fire fighting appliances)

In the engine (cut off foul oil supply) (release the fix fire fighting system)

(as per new regulation after release fix fire fighting system no body going inside until port surveyor is onboard)

In the cargo hold (all hatch cover beten down and also hatch access, hatch ventilation proper close) (release the fix fire fighting system)

(as per new regulation after release fix fire fighting system no body going inside until port server is onboard)

And also back up party cooling the boundary.

Send two person with fire suit and BA tackle the fire.

Make ship position available to radio room/GMDSS Station satellite terminal .

Broadcast distress alert and message to all ships in the vicinity.(if the ship at sea)

If the ship in port call port authority.

Stop the cargo

One man stand by on the gangway with fire wallet and fire plan.

RECEIVED PILOT

First i will take my personal protective equipment.

Then i will follow the master order while side is pilot ladder how much meter above the water level.

Then i will take the sufficient crew and they are also wear personal protective equipment.

Then i will conduct tool meting do the risk assessment and all work activates as per COSWP.

Establish communication with bridge.

Take the right tool.

Then proceed at pilot point. If night time proper illuminate pilot area.

Then check the pilot access are no any oil or greasy or no any obstruction.

Check the pilot ladder stapes and ropes is good condition or check the no any oil or greasy or paint.

Before rig the pilot ladder i will check the make fast point or stencil is strong.

Then i will make fast the pilot ladder to the strong point and check the pilot ladder resting on the ship side which recurred above the water level and also make fast the safety line

Then i will staying 2nd or 3rd steps ensure that pilot is properly rig.

Stand by life buoy with line and light ready for emergency used and also heaving line and one clean bucket using for paper giving and taking.

Every thing ready inform the bridge and waiting the pilot.

When pilot onboard i will master. Taking the pilot short way on the bridge.

I will Brief the life saving appliances.

WORKING ALOFT

At first i will do the risk assessment and all work activates as per COSWP.

Inform master and (if working near the ship fennel any engine ventilation) inform engine room.
(if working mast AFT and FWD) must inform bridge.

A work permit should be completed (as per ISM check list)

Responsible officer should be able to communication with the bridge.

Responsible officer should be display card on radar or sound signal control panel posted.

A experience person should send for the work.

Ensure that he is wearing PPE and safety belt, safety harness, safety line.

If necessary rig the safety.

Check the condition of the boson chair and it should be load test (4 time of weight proof load).

Check the ropes and grant line is good condition.

The responsible officer should be standby until the a work is done.

When complete the work inform the duty officer.

DUTY OF SAFETY OFFICER

Ensure code of safe working practice and company health and safety policies complied with.

Conduct the safety committee meeting.

Records should be kept of all safety committee meeting.

Seek to improve the safety awareness among the crew.

Investigate accidents. Dangerous occurrences and potential hazards.

Investigate health and safety crew complaints.

Conduct health and safety inspections at least once every 3 month.

Keep record book of accident and Dangerous occurrences.

Stop any work. Which may be dangerous.

Maintains, caring, testing of all LAS/FFA equipment.

Supervise boat and fire drills./ Update muster list.

Familiarise new crew with LSA/FFA.

Restricted Visibility

Inform master./ Inform engine room.

Engine ready for immediate manoeuvre

commence on sound signal. / Switch on navigation light.

Switch on Echo sounder.if in shallow water

Post extra lookout./ Engage hand steering.

Proceed at a safe speed.

Keep good radar watch and both radar should be on.

Maintain VHF channel 16.

Follow the COLREGS rule 19.

Stop deck work if noisy./ Bridge door keep open

It is important to know the handling characteristics of the ship including its stopping distance.

MAN OVERBOARD

Wheel hard over casualty side.

Release life buoy with light and smoke signal(MOB apparatus)

Sound three prolonged blasts on ship whistle and repeat as necessary.

Press MOB button on GPS.

Inform master./ Inform engine room.

Post extra lookout.

Engage wheel on hand steering.

Hoist signal flag "Oscar"

Engine ready for manoeuvre condition.

Note down the vessel position UTC time

Commence recovery manoeuvre such as Williamson turn.

Muster rescue boat crew.

Prepare rescue boat for launching.

Broadcast urgency message.

Update GMDSS information.

Williamson turn

Rudder hard over casualty side.

Deviate 60* from original course. Put rudder hard over to the opposite side.

When 20* from reciprocal course rudder amidships and steady up on reciprocal course.

Global Positioning System (GPS)

It gives the position of the receiver antenna.

** Works on line of sight * WGS 84.
radio communication*

It works on two frequencies 1575.42 MHz for civilian user and 1227.6 MHz for us coast guard.

GPS required three satellites to fix two dimension which we used on ship. (lat and long)

It gives course over ground , speed over ground and XTE (cross track error).

- * 3 segments*
- ① SPACE (SATELLITE)
- ② GROUND (CONTROL)
- ③ USER

Can be used for passage planning by feeding all the way point in it.

Around the earth in 6 orbits and about 24 satellites worked on orbiting.

GPS error

Ionosphere and atmosphere

** CODES (P, E, A)*

Satellites error

GPS receiver calculate its position by precisely timing the signal sent by GPS satellite.

Multipath error

Dilation of precision

Selective availability *INTERNATIONAL DEGRADATION OF SATELLITE SIGNAL.*

NAVTEX

Its provides maritime safety information

MSI NBDP.

Navigation warnings.

Metrological forecasts and warnings.

Search and rescue information.

Pilot messages.

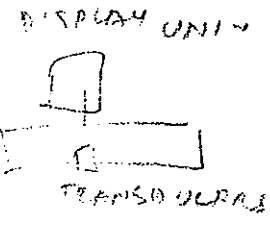
It used frequency 518 Khz and 490 khz

There divide NAV areas find in ALRS volume 5 and posted on bridge.

Set the NAV area which we are your vessel.

Check the printer paper every watch

ECHO SOUNDER



② Its use to determine the depth of water.

Its frequency are 30 to 55 KHz (ULTRA SOUND WAVES)

① VELOCITY : 1500 M/SEC

It gives depth of water in meters or fathoms.

upto 200m

ERRORS

REFLECTOR
REFLECTION

Multiple error.

acoustic sound.

False echoes or 2nd trace echoes.

$$D = (1500 \times T) \times 2.$$

INTERFERENCE

Mechanical and electrical noise.

Aeration..... caused due to presence of air bubbles in water.

Reverberation.....caused in rough seas due to water noise.

AUTOMATED IDENTIFICATION SYSTEM

- All ships over the 300 GRT engaged in international voyages must be fitted AIS.
- To help identify vessels.
- Assist the target tracking.
- Automatically exchange mandatory ship reporting information.
- AIS continuously transmits the ship's own data to other vessels and VTS stations.
- It also continuously receives data from other vessels and VTS stations.
- AIS linked between radar and ECDIS, can display this data.
- As per master other AIS switched off and as per security purpose on ship.
- AIS range 20-30 miles same as VHF range.
- Once a month check the static information if change the static data as per master order.
- Check the dynamic information every voyage if no accurate .
- Change the voyage data every voyage.

Static data.

MMSI number

Call sign and name

IMO number

Length and beam

Type of ship

Location of position

Dynamic data.

Ship position

Position time in UTC

Course over ground

Speed over ground

Heading

Navigation status

Voyage data.

Ship draught

Hazardous cargo (type of cargo)

Destination and ETA *4*

Route plan (waypoint)

S-52 → gives us graphical display
S-63 IMO recommended standard for protection of ENC information

hydrographic data.

ECDIS

(Electronic Chart Display Information System)

It is approval of IMO and it is requirement of SOLAS.

It has a capacity of showing simple charts information.

ECDIS has two modes.

ENC → IHO 379

- Raster navigation chart:** it is a digital scan of paper chart.
- Vector chart:** it is a database of digital information chart.
- Raster navigation chart:** can not be zoom.
- Vector chart:** can be zoom.
- Raster navigation chart:** these chart can not be seamless
- Vector chart:** it is seamless chart.
- Raster navigation chart:** in raster chart information is stored up to single layer and therefore information can not be display.
- Vector chart:** information is stored in a layer and can be displayed at any time when you required by user.
- Raster navigation chart:** GPS, radar, ARPA, information and chart correction can be obtained.
- Vector chart:** GPS, radar, ARPA, information and chart correction can be obtained.
- Raster navigation chart:** alarms are not automatically triggered.
- Vector chart:** alarms will automatically triggered.
- Raster navigation chart:** raster chart show error in position of ship.
- Vector chart:** all electronic navigational chart are referred to WGS84.
- Raster navigation chart:** vessel must carry the backup folio chart.
- Vector chart:** vessel must carry out a risk assessment and paper chart if system is not working.

*System must use ENC data to IHO 379 standard, which must be supplied by national hydrographic office. Such ENC data must be correct weekly

- adequate backup system
- #1 Backup folio chart

RADAR SETUP

- First of all i will make sure the nobody working or no obstruction near the scanner.
- There are no any notices near the radar.
- Set the gain control, brilliance and anti clutter controls to minimize.
- Then i will switch on the radar and radar show the digital clock in countdown mode.
- Then radar will be come in standby mode.
- I will adjust the brilliance control. Brilliance must be set with gain and anti clutter control to minimum.
- I will check the just visibly and i will read everything on radar screen and match the all information on radar screen for other equipment.

RADAR

X BAND 3CM 9GHz short wave length.	S BAND 10CM 3GHz long wave lenth.
Scanner 6 feet	Scanner 12 feet
Short range	Long range
Small echo size	Bigger echo size
Use to find sort range target. Use in coastal water, pilotage and narrow channels	Find out long range target. Use in open sea to avoid collision.
Give clear picture.	Better look through cloud and rain.
Good for bearing discrimination	Poor for bearing discrimination
In fair weather a target will show up better on 9 GHz radar	Better at detecting target in rain.

Can detect a search and rescue transponder (SART). At range approx 8 to 12 miles	Radar horizon greater then 9GHz radar.
	Sea cutter response better then 9GHz their targets are less likely to be heeder.

RADAR ERROR

False echo

Multiple echo

Indirect echo

Ghost echo

Second echo

Radar to radar interference

LIMITATION OF RADAR

Small vessel, ice and other floating object may not be detected at an adequate range.

Use of sea or rain clutter may obscure some targets.

Minimum range.

Blind and shadow sectors.

False echo.

RADAR PERFORMANCE

Check radar performance every 4 hours.

When using the radar for position fixing. Positively identify all object and using range and bearing, Range are more accurate then bearing. Do not rely on single bearing and range for position fixing.

Check the gyro error and compares radar heading marker with compass heading of ship.

Check the accuracy of the variable range marker.

Be aware of blind and shadow sectors

When radar is used for collision avoidance, the speed input should be from a water-stabilised source,

The speed given by GPS is ground stabilised.

Relative motion

In open sea relative motion north up sea stabilised. I will get CPA and TCPA of target vessel in this situation my vessel is stationary and other vessel is moving.

True motion

In coastal water I will set up my radar north up and head up true ground stabilised. I will get course and speed of target vessel in this situation both vessels are moving.

Sea stabilised

Good for anti collision with ship. Land move opposite to tide and current.

Tracks are water track.

Not for anti collision with ground.

Ground stabilised

Ground stays still track one ground track.

Not for anti collision with ship.

Good for anti collision with land/ground.

Voyage Data Recorder (VDR)

Mandatory for all ships above 3000 GRT constructed after 1st July 2002.

To assist in casualty investigation on ship when engaged on international voyage.

Data record at last 12 hrs of operation this information can be downloaded

Inside bridge area microphone and interface with other instrument. It records the events of voice; GPS; DGPS; engine orders weather and any events this records can bring to analysis

Battery backup power supply.

Inside protective capsule.

Data recorded in the VDR.

7

HOW TO CORRECT THE CHART

Sir, first i will check the last correction on chart the last correction is (2005). So we can't use for navigation.

For correction the chart i will take the edition no and go to cumulative notice to mariner. Cumulative notice to mariner comes every January and July. And it keeps recoded for last tow year. I will correct the chart. And also i will see the weekly notes to mariner. If there any new correction and i will correct the chart then we can used the chart for navigation.

Info

ORAL (OOW)

International safety management code (ISM)

Provide international standard for the safe management and operation of ship and for the pollution prevention.

OBJECTIVES

- To ensure safety at sea.
- Prevention of human injury or loss of life .
- Avoidance of damage to the environment . In particular to the marine environment and to the property.

PURPOSE

- Safe working practise.
- Safety of personals.
- Safety of ship.
- Safety of environment.
- Training of onboard personals far emergencies.
- Complies with mandatory rules and regulation.
- Guidance and standard recommended by organisation.

Designated Person Ashore (DPA)

He has the link between the company and ship crew. And direct asses between the company's highest management level and ship's if there is any emergency. We must report to DPA.

Document of compliance (DOC)

Issued by flag state it is an evidence that the company complies with ISM Code. Valid for 5 year and internal audit every year.

Safety Management Certificate (SMC)

Issued to each individual ship after a onboard audit of SMS. It is valid for 5 year. Audit done in between 2nd and 3rd year.

Safety Management System (SMS)

Structured and documented system enabling personal to implement policies.

International Maritime Organisation (IMO)

Purpose

To improve the safety of navigation in areas. When the density of traffic is more and in restricted sea room. Also preventing or reducing the risk of pollution or other damage to the environment.

IMO Conventions

1. International convention for safety of life at sea. (1984) SOLAS
2. International convention for load line.(1966) LOAD LINE
3. Convention of the international regulation for the prevention of collision at sea.(1972) IRPCS
4. Convection of international standard of training and certification and watch keeping for seafarers. (1978) STCW.
5. MARPOL (73/78)

IMO Ship Routing Guide (GOTADAMA)

PART:A	General provisions
PART:B	Traffic Separation Scheme (TSS)
PART:C	Deep Water Routes
PART:D	Areas to be avoided
PART:E	Other Routeing Measures
PART:F	Associated Rules And Recommendation
PART:G	Mandatory Reporting System
PART:H	Adoption designation and substitution

IMO SHIP ROUTINE CHARTS

Routine chart divided in five ocean.

1. Indian Ocean
2. North Pacific Ocean
3. South Pacific Ocean
4. North Atlantic Ocean
5. South Atlantic Ocean

Every month 1 chart each ocean or every year 12 charts each ocean and total 60 routine charts

Information in routine chart .

- Barometric pressure
- Monthly weather information
- Wind rose
- Gale warning
- Ice information

- Recommended route (not used for navigation)
- Load line zone information
- Sea currents

Contents of SOLAS

1. General Provision .
2. PART : 1 Construction (subdivision and Stability, Machinery and Electrical installations).
PART: 2 Construction (Fire protection, Fire detection, and fire extinction). *date*
3. Life-saving Appliances and Arrangements.
4. Radio Communications.
5. Safety of Navigation.
6. Carriage of Cargoes.
7. Carriages of Dangerous Goods.
8. Nuclear Ships.
9. Management for the safe operation of ships.
10. Safety measures for High-speed Craft.
11. Safety measures to enhance maritime safety.
12. Additional safety measures for bulk carriers. *MAN-60*

Appendix : Certificates

SOLAS TRAINING MANUAL:

Shall be provided in each crewmess room ,recreation room and bridge
the following shall be explained in details

- ✓1. Donning of lifejacket, immersion suit and anti exposure suit.
- ✓2. Muster at the assigned station.
- ✓3. Boarding, launching and clearing the survival craft.
- 4. Method of launching from within the survival craft.
- ✓5. Release from launching appliances.
6. Method and use of devise for protection in launching areas.
- ✓7. Illumination in launching areas.
- ✓8. Use of all survival equipment.
9. Use of all detection equipment.
- ✓10. Use of radio LSA.
11. Use of engine and accessories.
12. Recovery of survival craft and rescue boat. (including storage and securing).
13. Hazards of exposure and need for warm clothing.
14. Best use of the craft facilities to survive.
15. Methods helicopter rescue and ships LTA.
16. Contents of muster list and emergency instructions.
17. Instructions for emergency repair of LSA.

D
M
B-3
U.S
R-3
E

Content of Cargo Securing Manual?

Content of Cargo Securing Manual are as follows:

- I) General
- II) Principal of safe storage and securing of cargo
- III) Standardize storage & securing
- IV) semi. Standardize storage & securing
- V) Non Standardize storage & securing
- VI) Action may be taken in heavy whether.
- VII) Action may be taken once cargo has been shifted.

(SOLAS requires ships of 500 tons over are required to carry cargo securing manual & to have a "ship specific cargo securing manual" approved by FLAG state.)

Entries made in Oil record book Part 1 and Part 2?

Ans: **ENTRIES IN OIL RECORD BOOK PART 1(ONE) MACHINERY SPACE OPERATION ALL SHIP:**

- i) Ballasting or cleaning of fuel oil tanks.
- ii) Discharging of dirty ballast or cleaning water from fuel oil tanks.
- iii) Collection and disposal of oil sludge.
- iv) Discharging overboard bilge water.
- v) Condition of oil discharge monitoring and control system.
- vi) Bunkering fuel or lubricating oil in bulk.
- vii) Accidental or other exceptional discharge
- viii) Procedure ad remarks

OIL RECORD BOOK PART II(two) cargo/ ballast operation tankers:

- i) Loading of oil cargo.
- ii) Internal transfer of oil cargo
- iii) Ballasting of cargo tanks.
- iv) Ballasting of dedicated clean ballast tank.(CBT tankers only)
- v) Cleaning of cargo tanks including crude oil washing.
- vi) Disposal of residues
- vii) Discharge of ballast from cargo tanks.
- viii) Discharge of ballast from clean ballast tank(CBT tankers only)
- ix) Accidental or other exceptional discharge of oil.

Content of chain register?

Ans: CHAIN REGISTER: provides details of only Anchor Chain Certificates.

- i) Length of cable no of shackles
- ii) Diameter of link
- iii) Length of a shackle
- iv) Certificates.

Ans: CHAIN REGISTER: provides details in chain register.

1. Test and thoroughly examination of lifting gear
2. Test and thoroughly examination of derricks used and union purchase
3. Test and thoroughly examination of wire rope
4. Test and thoroughly examination of lose lifting gear

WHAT ARE THE CONTENTS OF S.O.P.E.P MANUAL?

Ans: SOPEP (ship board oil pollution emergency plan):

- i) Ship (tanker 150 GRT or other cargo 400 GRT) must have SPOEP.
- ii) Ship carry marpol annex II (noxious liquid sunstone) combines in one document (SMPEP) *Ship Board marine pollution Emergency plan*.

Plan should be simple consisting of a series of checklists and flowcharts.

The plan should guide the master through the decisions and action required in responding to an incident.

The plan should assist the crew in taking steps to minimize any discharge of oil.

Mandatory content :

- The procedure to be followed by the master in the event of an oil pollution incident.
- A list of authorities and persons to contact in the event of an oil pollution incident.
- Detailed procedure of action to be taken by the ship crew in order to reduce and stop the flow of oil from an incident.
- The procedures and contact details of the command centre on the bridge for co-ordinating national and local pollution control centres.

Non- Mandatory content.

- Plan and diagrams of the ship.
- Oil spill response equipment carried on the vessel.
- Procedure for dealing with the media.
- Procedure for record keeping.
- Details of drills.
-

SOPEP EQUIPMENT?

Ans: PLASTIC DRUM, SHAVEL, SAW DUST, FIRE EXTINGUISHER, RUBBER BOOT, ABSORBING PAD, HELMET, BOOM, WINDLASS PUMP,

International Maritime Danger Goods (IMDG)

It is mandatory 1st of July 2004.

Purpose of IMDG for storage or transportation environmental protection.

Principal of IMDG

The IMDG code lays down basic principles for the stowage, segregation and caring of dangerous substances by sea. It also lays down recommendation for emergency response during incidents involving dangerous goods.

IMDG code consist of two volumes and with a supplementary volume

VOLUME 1

- General provision
- Classification
- Packing and tank provision
- Consignment procedure
- Construction and testing of packing
- Transfer operation

VOLUME 2

- ❖ Dangerous goods list in tabular form
- ❖ Limit quantities exception
- ❖ The index
- ❖ Appendices

SUPPLEMENTARY VOLUME

- ✦ EMS Guide
- ✦ MFAG (Medical first aid guide)
- ✦ Reporting procedure
- ✦ Safe use of pesticide
- ✦ INF Code

The proper shipping name of the material carried.

- The UN number
- Hazard class
- Packing group
- Subsidiy risk
- Marine pollutant
- Number of packages
- Flash point
- IMDG Code or other local regulations.

Classes of dangerous cargo:

Class 1 : explosives

Class 2 : gases compressed, liquefied or dissolved under pressure.

Class 3 : inflammable liquids.

Class 4.1 : inflammable solids.

Class 4.2 : inflammable solids or substances liable to spontaneous combustion.

Class 4.3 : inflammable solids or substances which when in contact with water emit flammable gases.

Class 5.1 : oxidising substances.

Class 5.2 : organic peroxides.

Class 6.1 : poisonous toxic substances.

Class 6.2 : infectious substances.

Class 7 : radio active substances.

Class 8 : corrosives.

Class 9 : miscellaneous dangerous cargo which presto a danger not covered by other classes

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CONTENT AND USE OF IAMSAR MANUAL

IAMSAR (International Aeronautical and Maritime Search and Rescue Manual)

It is published jointly by IMO (International Maritime Origination) and International Civil Aviation Organization (ICAO)

There are three volumes of the IAMSAR Manual and they provide guidelines for the co-ordination and organization of marine and air facilities in a search and rescue scenario.

VOLUME-1: Organization and Management

VOLUME-2: Mission Co-ordination

VOLUME-3: Mobile Facilities

Mobile Facilities

- ✚ Carried onboard aircraft and ship.
- ✚ Mandatory for carriage onboard ship.
- ✚ Provides assistance in helping perform a search and rescue.
- ✚ Provides information on the role of on-scene co-ordinator.

In mobile facilities there are 4 section and additional appendices.

SECTION-1: Overview

- Responsibilities and obligations
- SAR System Organization
- SAR Co-ordination
- SAR Mission Co-ordinator
- On-scene Co-ordinator
- Ship Reporting System
- AMVER Automated Mutual Assistance Vessel Rescue System

SECTION-2: Rendering assistance

- ✓ Initial action by assisting craft
- ✓ Action proceeding to a distress.
- ✓ On-board preparations
- ✓ Action by Aircraft assisting
- ✓ Search patterns
- ✓ On-scene communication
- ✓ Helicopter operation
- ✓ Care of survivors

SECTION -3: On-board co- ordination

- ☒ Co- ordination of search and rescue operation
- ☒ Communication
- ☒ Planning and conducting the search
- ☒ Conclusion of search

SECTION-4: On - board emergencies

- ⊖ Distress signal
- ⊖ Medical Evacuation
- ⊖ Person overboard
- ⊖ Ship emergencies at sea
- ⊖ Aircraft emergencies
- ⊖ Vessel - aircraft communications

APPENDICES- A: Regulation v/33 of the international convention for the safety of life at 1974, as amended.

APPENDICES-B: search action message

APPENDICES-C: factors affection as serves effectiveness

APPENDICES-D: standard format for search and rescue situation report (SITREP)

APPENDICES-E: SAR briefing and debriefing from.

WHAT ARE THE DIFFERENT SEARCH PATTERNS

Ans: There are many searches including

- (i) An Expanding Square Search
- (ii) A sector Search
- (iii) A creeping line search
- (iv) A Parallel search with one or more vessels
- (v) A 90° parallel search with one vessel (Used by oilrig's and is very effective)

CARGO RECORD BOOK

ANS: Every to which annex ii (regulation for the control of pollution by noxious liquid substance in bulk) applies shall be provided by with cargo record book.

In which following shall be recorded:

- ❖ Loading of cargo
- ❖ Internal transfer of the cargo.
- ❖ Unloading of the cargo.
- ❖ Cleaning of cargo tank
- ❖ Discharging into the sea of tank cleaning
- ❖ Ballasting of cargo tank.
- ❖ Discharge of ballast from cargo tanks
- ❖ Accidental or other exceptional discharge
- ❖ Control by authorised surveyors
- ❖ Additional operational procedure and remarks

GRAIN REGULATIONS

ANS: GRAIN REGULATIONS (IMO 240 E) (MSN-1253)

GRAINS: Wheat, corn, rice, pulses, seeds, oats etc.

Minimum stability requirement:

1. No more than 12 degree list after assumed shift of grain. Full compartment-grain shift-15 degree, partly filled compartment-25 degree grain shift.
2. Initial GM of 0.3 m.
3. Upright before sailing.
4. A minimum residual stability as specified
Angle of flooding 40 degree, 0.075 m radius.

Every ship intended to load grain should have:

1. Document of authorization.
2. Grain loading manual.
3. International code for the safe carriage of grain-IMO 240 E

WHAT INFORMATION YOU GET IN MARINERS HANDBOOK -NP100

The information found in the Mariner's Handbook are as follows :-

- World map of areas / list of volumes which are covered by the Sailing Directions.
- Preface, list of diagrams and abbreviations.
- Chapter 1 : Charts, books, system of names, IHO and IMO (navigational information, charts & diagrams, supply of charts, navigational warnings, Admiralty Notices to Mariners, Upkeep of chart outfit, books, system of names, IHO and IMO)
- Chapter 2 : The use of charts and other navigational aids (position fixing, lights, fog signals, buoyage, echo soundings, squat and underkeel clearance)
- Chapter 3 : Operational information and regulations (Obligatory reports, Distress & rescue, Tonnage & loadlines, National limits, Vessels requiring special consideration, Ship's routing, Vessel traffic management, Exercise areas, Minefields, Helicopter operations, Pilot ladders, International port traffic signals, Offshore oil & gas operations, Submarine pipelines & cables, Overhead power cables, Pollution of the sea, Conservation and Historic & dangerous wrecks)
- Chapter 4 : The sea (Tides, Tidal streams, Ocean currents, Waves, Underwater volcanoes & earthquakes, Density/salinity/colour of the sea, Submarine springs, Coral, Sand waves and Local magnetic anomalies)
- Chapter 5 : Meteorology (General maritime meteorology, Weather routing of ships, Abnormal refraction, Aurora, Magnetic and ionospheric storms)
- Chapter 6 : Ice (Sea ice, Icebergs and Ice glossary)

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- Chapter 7 : ~~Operation in polar regions and where ice is prevalent~~ (Polar regions, Approaching ice, The Master's duty regarding ice, Ice reports, Ice accumulation on ships, Operating in ice, Icebreaker assistance and Exposure to cold)
- Chapter 8 ~~Observing and reporting~~ (Hydrographic information and Rendering of information)
- Chapter 9 : ~~IALA Maritime Buoyage System~~ • Annexes, Glossary and Index.

List the titles of the main sections of the Weekly Notices to Mariners.

- Section I : Explanatory notes,
- Section II : Updates to standard navigational chart
- Section III : Reprints of Radio Navigational Warnings.
- Section IV : Corrections to Admiralty Sailing Directions.
- Section V : Corrections to Admiralty List of Lights and Fog Signals.
- Section VI : Corrections to Admiralty List of Radio Signals.

amendment Miscellaneous Nautical Publication.
amendment Digital product and services:

Admiralty List of Radio Signals

- VOLUME: 1** Cost Radio Stations
- VOLUME: 2** Radio Aids to Navigation
- VOLUME: 3** Maritime Safety information Services
- VOLUME: 4** Meteorological Observation stations
- VOLUME: 5** Global Maritime Safety and Distress System (GMDSS)
- VOLUME: 6** Pilot Services

Cumulative Notice to Mariner

Cumulative notice to mariner comes every January and July. And it keeps recorded for last tow year chart corrections.

Annual Summary Notice to Mariner

Annual Summary Notice to Mariner in force as of January 1st.
Published in the beginning of each year contains all admiralty temporarily & preliminary notices & corrections to admiralty to sailing direction & also contains permanent information on radio message navigational warning & distress & rescue at sea & exercise area fire practice, ukc national claims to maritime, TSS, US navigation safety regulation, information of carriage of publications & charts

SAILING DIRECTIONS

1. Coast to details
2. Off lying features
3. Tidal streams and currents
4. Information about channel and harbours
5. Buoyage systems
6. Navigation hazards
7. Pilotage
8. Port facilities
9. Seasonal currents
10. Local weather information

NAUTICAL ALMANAC

1. Altitude correction tables for Sun Stars and planets
2. Altitude correction tables additional corrections
3. Planet notes and diagram
4. Daily pages, Ephemerides of Sun, Moon, Aries, and planets, sunrise, sunset, twilight, moonrise, moonset,
5. Standard times
6. Star chart
7. Star: H.S.A and Dec., S.H.A
8. Polaris (pole star) table
9. Conversion of arc to time
10. Increments (sun, planets, moon, aries)

Code of Safe Working Practice (COSWP)

(These regulation shall apply to all UK ship)

Purpose

The main purpose of this code is to improve the health and safety onboard and provides guidance on safe working practice. And designed to reduce the number of accidents.

This code is on 5 sections.

SECTION: 1 Safety Responsibility and shipboard management

SS

SECTION: 2 Personal health and safety

PS

WA

SS

SECTION: 3 Working Activities.

SECTION: 4 Specialist Ship

SECTION: 5 Appendix

(I) Standard Specification rule in the sea.

(ii) Bibliography.

Coppice of the current edition must be carried on all UK ships other then F. V/L and pleasure craft coppice made available to any seaman in ship.

In accordance with merchant shipping (COSWP) regulations 1998, there should be always be an adequate number of copies, for master, safety officer and any number of safety committee to have this own,

33, chapters

5, sections

2, appendix

INTERNATIONAL SHIP AND PORT FACILITY SECURITY CODE (ISPS)

1. Adopted to SOLAS chapter 11 Special Measures to Enhance Maritime Security.
2. Objective is to clearly define roles and responsibilities of port facilities, ships, shipping companies and governments in order to enhance security on ship`s and port facilities.
3. Ship security is essential in reducing the risk of terrorism, stowaways, piracy of drug smuggling,
4. It prevent un-authorized entry to the port and ship`s.
5. Ship must carry on international ship security certificate, valid 5 years.
6. Every ship must have a ship security assessment, which identifies any potential weaknesses in the vessel, structure and procedures regarding security.
7. All ship`s must carry a ship security plan,
8. Levels of security introduced. It is divided into there level

LEVEL: 1 (All ship maintain normally)which is included 20% of search

In my last ship I was follow the ship security plan. Visitor and gangway log to be maintained. All visitor ID card to be checked or all restricted areas and unattended space are locked on ship. Make a security round every hrs and maintained a petrol watch as per security plan.

LEVEL: 2 (Enhanced Security level) which is included 50% of search

In my last ship I was follow the ship security plan. Visitor and gangway log to be maintained. All visitor ID card to be checked or all restricted areas and unattended space are locked in port. Pay attention to the offshore side of the vessel. Where potential stowaways may attempt to onboard. Gangway attended by a reliable crew member. Increased the security onboard and maintained a petrol watch as per security plan. Stores or spaces excess should be carefully checked.

LEVEL: 3 (There is a specify threat to the ship or port facility) which is included 100% of search

In this level stop all operation nobody can enter the ship or port heave up the vessel gangway and follow the SSO or master instructions. Establish contact between the port and ship. Detailing the specific security duties and expectation of each port for the duration of the port call.

A security drill must be carried out at least every 3 month. If following a crew change more then 25% of the crew.

Ship Security Officer (SSO)

- Must have completed an approved ship security officer course (SSO).
- Undertakes regular inspection of the vessel.
- Responsible for implementing the ship security plan and proposing any modifications.
- Reports to the company security officer (CSO).
- Responsible for ensuring that all crews with specific security duties and security awareness.

MARPOL

International convention for prevention of pollution from ship

The international conference on marine pollution convened by IMO in 1973 adopted the international convention for the prevention of pollution from ships 1973. It was modified by the protocol of 1978. And further modified by the protocol of 1997. Which added Annex 6 regulation for the prevention of Air pollution from ship.

There are 6 Annexes in MARPOL.

- ANNEX: 1 Regulation for the control of pollution by oil.
- ANNEX: 2 Regulation for the control of pollution by Noxious Liquid substances.
- ANNEX: 3 Regulation for the prevention of pollution by Harmful substances carried by sea in packaged form.
- ANNEX: 4 Regulation for the prevention of pollution by Sewage from ship.
- ANNEX: 5 Regulation for the prevention of pollution by Garbage from ship.
- ANNEX: 6 Regulation for the prevention of Air pollution from ship.

For vessel other than tanker.

- Proceeding on voyage.
- Ship outside a special area.
- Oil content not to exceed 15ppm
- Oil discharge filtering and monitoring system fitted.

For tanker.

- Tanker proceeding on voyage.
- Tanker outside special area.
- More than 50 miles from nearest land.
- Oil content less than 30 litres per mile.
- Total quantity discharged is less than 1/30000 of previous cargo.

Oil special areas

- ❖ Antarctic Area
- ❖ North Sea
- ❖ Wider Caribbean
- ❖ Baltic Sea
- ❖ Black Sea
- ❖ Mediterranean Sea
- ❖ Red Sea
- ❖ Gulf Area
- ❖ Gulf of Aden Area
- ❖ Gulf of Oman
- ❖ Southern South Africa Area

Garbage special areas

- ❖ Antarctic Area
- ❖ North Sea
- ❖ Wider Caribbean
- ❖ Baltic Sea
- ❖ Black Sea
- ❖ Mediterranean Sea
- ❖ Red Sea
- ❖ Gulf of Aden Area

Noxious liquid special areas

- ✓ Black Sea
- ✓ Baltic Sea
- ✓ Antarctic Sea

Air pollution special areas

- English Channel
- North Sea
- Baltic Sea

GERABAGE MANAGEMENT PLAN

- Every ship of 400 GRT and above and every ship certified to carry 15 person and above shall have a garbage management plan.
- Plan shall provide procedures for collection, storage, processing and disposing of garbage, including the use of equipment on board.
- It also designate the person in charge of carrying out the plan.
- Shall be written in working language of crew.
- Shall be prepared in accordance with requirement of merchant shipping regulation and IMO (MARPOL, Annex 5).

GARBAGE

Garbage include all kind of food domestic and operational waste.

- Plastic (No discharge anywhere)
- Food wastes (Ground to 25mm) not less then 3 miles from land 12 miles from land in special area.
- Food wastes (ungrounded) not less then 12 miles from land.
- All other garbage not less then 3 miles from land 12 miles from land in special area. No discharge permitted.
- Dunnage and packing materials that float. Not less than 25 mile from land in special areas. No discharge permitted.

GARBAGE RECORD BOOK

Entries in Garbage Record Book, shall be made on each of the following occasion.

1. **When Garbage discharged into the sea.**

- Date and Time of discharge
- Position of ship, lat and long
- Category of Garbage discharged
- Estimated amount discharged for each category in m³
- Signature of officer of the operation

2. **When Garbage is discharged to shore or other ship.**

- Date and Time of discharge
- Port facility or name of receiving ship
- Category of Garbage discharged
- Estimated amount discharged for each category in m³
- Signature of officer of the operation

3. **When Garbage is incinerated:**

- Date and Time of discharge
- Position of ship, lat and long

- Estimated amount discharged for each category in m³
- Signature of officer of the operation

4. **Accidental or exceptional discharge of Garbage:**

- Date and Time of occurrences
- Port or position of the ship at time of occurrence
- Estimated amount discharged for each category in m³

STCW-95

(Standard of Training Certification and Watch Keeping for Seafarers)

It is IMO Convention also published by the MCA and implement in Training and certification regulation.

Person who has a STCW-95 Course certification he has to proof of compliance of IMO that means I am a white list.

Five main area where STCW-95 affects the ship.

1. Shipboard familiarization
2. Hours of work
3. Training
4. Medical
5. Certificates

HOURS OF WORK

Watchkeepers must have a minimum of 10 hours rest in a 24 hour period and 77 hours in any 7 day period.

Rest hours divided into 2 period one at lest 6 hours long between two period and other should not exceed not more then 14 hours. At time of emergency hours can be extended and all the worked hours should be recorded on log book and keep inspection for port stat control.

CODING AND DECODING

Coding and decoding as per International of Signals

1. Distress Emergency
 - Assistarice
 - Disabled
 - Distress
 - Search and rescue
2. Casualties Damage
 - Collision
 - Damages
 - Fire
 - Towing
3. Aids to Navigation
 - Bearing
 - Dangers to Navigation
4. Maneuvers
 - Ahead – astern
 - Alongside
 - Anchoring
5. Miscellaneous
 - Cargo – Ballast
 - Crew
6. Meteorology – weather
 - Clouds
 - Gale – Storm – tropical storm
 - Wind
7. Routeing of ship
8. Communications
 - Acknowledge
 - Calling
9. International sanitary regulations
 - Practical messages

RISK ASSESSMENT

The aim of risk assessment is to reduce accidents.

Assessment should be carried out for all work activities onboard the ship.

Assessment should cover activities where there is foreseeable element of risk attached.

The company is responsible to ensure that risk assessment has taken place.

A responsible person with suitable experience should carry out the assessment.

Risk assessment there are 4 processes to go through.

- ④ 1. Classify work activities
- I 2. Identify the hazards
- D 3. Determine the risk
- D 4. Decide if the risk is tolerable

1. Classify work activities

Gather the information of the work. Department responsible for the work. Where the job will be carried out is the work plan maintained.

2. Identify the hazards

Gather the source of harm how could the harm happen

3. Determine the risk

How severe of harm how could the harm happen.

4. Decide if the risk is tolerable

Risk are estimated on the damage and like hood of risk occurring.

Where you find risk assessment?

Sir find the risk assessment in Code of safe work procedure (COSWP) SECTION: 1 Safety Responsibility and shipboard management (chapter 1) and MGN 20

What is Port State Control & Flag State Control?

PORT STATE CONTROL:

It is a authority which has right foreign vessel visiting their port, anchorage, offshore installations regarding upkeep of certificates & documents LSA/FFA, general condition of ship & has power to detain the ship if requirement is not meet and they can hold the V/L until requirement is not meet.

A vessel needs to belong to a certain country .this is known as nationality of the vessel .the vessel is generally registered to a certain port of that country . this is known as port of registry.

FLAG STATE CONTROL:

Is a authority to which the general requirements relating to the ship has to be maintained as per flag state control. If she detained due to any reason by port state control flag state control has to be informed of that

WHAT ARE THE DAILY, WEEKLY, MONTHLY TEST OF GMDSS

DAILY CHECKS:

- i) Internal DSC test
- ii) Battery on/off load voltage check.
- iii) Printers & adequate supply of paper available.

WEEKLY CHECKS:

- i) External MF DSC test call.
- ii) Check of reserve power supply.

MONTHLY TEST:

- i) EPIRB/ SART internal test. Inspect mounting and for any signs of damage.
- ii) Check condition antennae systems.
- iii) Survival craft portable VHF test.

SQUAT & INTERACTION

- Bodily sinkage of a vessel when underway and making way
- Most noticeable in shallow water, ion
- Its value will vary proportionally to the square of the speed of the vessel.
- Forward draft increases and trim changes when m/w through water
- Steering becomes critical.
- Speed of the vessel has the strongest influence on the amount of squat.

INTERACTION

Interaction is the reaction of the ship's hull to pressure exerted on its under water volume.

Interaction occurs in following cases:

1. Overtaking.
2. Between two vessels on reciprocal courses.
3. Between a bank and the vessel.
4. Between vessel's hull and sea bed in shallow waters.
5. In narrow channel- between a moored vessel and passing vessel.

WHAT IS IG AND WHY IS IT NECESSARY TO INERT TANKS?

Inert gas systems are a key component of the cargo handling process on tankers. Inert gas defined as a gas or a mixture of gases, such as fule gas, that contain insufficient oxygen to support the gases, such as flue gas that purpose of inert gas, in items of cargo operations on tankers, is to prevent the formation of flammable atmosphere in the cargo tanks. As can be seen in the chapter on hazard of petroleum cargoes. The three components required for ignition are fuel heat and oxygen.

WHAT ARE THE ALARMS ON AN IG PANEL?

SAFETY FEATURES AND ALARMS FOR INERT GAS SYSTEMS:

- 1) low water pressure / flow to the scrubber.
 - 2) High water level in scrubber
 - 3) High I.G temperature
- Other alarms required by SOLAS are:

- 1) failure of I.G bowers
- 2) O₂ content >5% by volume
- 3) low water level in the deck water seal
- 4) low I.G pressure <100mmW.G.
- 5) High I.G pressure.

STIFF AND TENDER VESSEL?

STIFF V/L:

- Large positive GM.
- Large positive **Righting** levers
- Large righting moments.
- Short rolling period with a very abrupt return.

TENDER V/L:

when a v/l has a small GM she is said to be tender

- Small positive GM
- Small positive righting levers(GZ)
- Small positive righting moments
- Long rolling period with a smooth return.
- Will roll even in calm water.

HOW WILL YOU GET MEDICAL ASSISTANCE ON BOARD?

- GMDSS,
- CAP. FAST AID GUIDE,
- MEDICAL FIRST AID GUIDE.

EMERGENCY DRILL UNDER ISM

Emergency drill under ISM and as per MGN 71

1. Abandoning ship drill
2. man overboard drill
3. stranding or grounding drill
4. Fire drill
5. flooding drill
6. Main engine or emergency steering failure drill
7. collision drill
8. search and rescue drill
9. Rescue boat drill
10. Anti pollution drill
11. Security drill

WHERE YOU GET WEATHER INFORMATION?

Weather chart

Low pressure area

high pressure area

isobars

Warm fronts

cold fronts

RIGGING PLAN

position and size of deck eye plates

- ii) position of inboard and out board booms
- iii) maximum head booms
- iv) maximum angle between runners
- v) side and SWL of all blocks and their position
- vi) length size and SWL of all runners topping lifts, gys and provender's
- vii) SWL of all shackles
- viii) Position of the all derricks producing maximum forces
- ix) Guidance and maintenance of the derricks
- x) Combined load diagram's showing force of load
SWL(safe working load)

ACTION ON DISTRESS MESSAGE RECEIVED

- (i) Take a Compass Bearing of the flare and not it down (Convert this to a True Bearing)
- (ii) Take the Lat/Long of the ships position
- (iii) Sound the General alarm of 7 short blasts followed 1 prolonged blast on the ships whistle
- (iv) Alter course Towards the flare
- (v) Inform the Skipper/Captain and relate all the information to him
- (vi) Make sure all your radios are on the distress frequencies (they should always be left on distress frequencies)
- (vii) If no Mayday then it's up to you to Relay a Mayday (Mayday Relay - Mayday Relay - Mayday relay)
- (viii) Inform the crew at the muster station to get all lifesaving/fire-fighting and portable pumps made ready
- (ix) Post look-outs around the vessel
- (x) The mate should now observe the radar looking for a target

CONTENT OF MUSTER LIST

MUSTER LIST CONTENTS

1. Name and rank of crew member.
 2. Duties assigned: (state separately for different emergencies)
 3. Muster points (for respective emergencies)
 4. Alternative muster points.
 5. Boat station (no.1 / no.2)
 6. Person responsible (for maintenance of equipments)
- Name/Rank of responsible person or incharge of respective parties

MSN, MIN, MGN WHAT IS IT, AND WHAT INFORMATION THEY CONVEY

MGN

- will provide
 1. Advice
 2. Guidance
- in order to improve
 1. safety of shipping
 2. safety of life at sea
 3. prevent or minimize pollution
- numbered in sequence from MGN 1

MIN

- info for a more limited audience
e.g. info on training establishments
- Or equipment manufacturers
- Or which will be of use for a short period of time
- numbered in sequence from MIN 1
- cancellation date typically 12 months

MSN

- mandatory info which must be complied with under UK legislation
 - these will relate to SI's and contain technical detail of such regulations
 - numbered in sequence continuing the present numbers but using the initial letters MSN
- Three complimentary series
- Safety
 - Pollution prevention
 - Other info of relevance to shipping and fish industries

PILOT CARD

SHIP PARTICULARS

Name, call sign, displacement, deadweight, year built, length overall, breadth, bulbous bow, draught fwd, draught aft, draught amidships, port anchor stbd anchor,

ENGINE

Type of engine, maximum power, rpm/pitch, loaded speed ballast speed, engine critical rpm, maximum number of consecutive starts, time full ahead to full astern, time limit astern,

STEERING

Rudders, time head-over to head-over, direction of turn, controllable pitch, thrusters, bow power, stern power, steering idiosyncrasies.

EQUIPMENT CHECKED AND READY FOR USE

Anchors, whistle, flags, X-band radar, S-band radar, speed log, echo sounder, electronic positioning, compass system, steering gear, rudder, VHF, mooring winches and line,

EQUIPMENT OPERATION DEFECTS

OTHER IMPORTANT DETAILS

MASTER NAME

DATE

WHEEL HOUSE POTER

1. Ship particulars: Name, C.S., GRT, NRT, Max Displ. DWT, Cw, at summer, full load Draft,
2. Draft: at which the manoeuvring data were observed, loaded, ballast,
3. Steering particulars.
4. Population particulars.
5. Anchor chain.
6. Thrusters effect at trail conditions.
7. Draft increase
8. Turning circles
9. Man overboard rescue manoeuvre
10. Deviation card
11. Muster list
12. Time zone chart
13. Load line zone
14. ME correction

SHIP POSTERS

1. Ship particulars
2. Wheel house poster
3. DF calibration card
4. Deviation card
5. SOLAS card
6. Muster list
7. GA plan
8. Fire plan
9. Emergency steering failure procedure
10. LSA, FFA, placard
11. ISM checklist
12. Garbage poster
13. Emergency contact no
14. Master standing order
15. Pilot ladder rigging arrangement
16. Load line zone chart
17. Sea state cord
18. VHF dsc alert sending procedure
19. MF/HF dsc alert sending procedure

When engaged in coastal navigation, would you use the Admiralty List of Lights and Fog Signals? And if so, how would you use it?

Answer: Yes, I would use the light list in conjunction with the navigation chart. The lights are listed 'geographically' and it would act as an additional checking operation to match the coastal light order as presented by the chart.

The light list also contains more information about individual lights, than is normally contained on the chart, and this fact would further enhance the safe navigation practice of the vessel.

AIR POLLUTION

AS PER MORPOL ANNEX 6

It is set limits for emission of NO_2 and SO_2 from the ship exhaust. It's set a maximum level of 3.5% of SO_2 content in the fuel oil used on ship and it set 1% of SO_2 content in the full oil of the ship in special emission control areas Baltic sea and North sea.

Content of fire wallet

- Up to date stability information.
- Up to date crew list.
- Plans of the vessel, general arrangement, life saving appliances, ventilation,
- Copy of ship contingency plans.
- Copy of emergency contact details.
- Copy of ventilation fire flap shut off points.
- Cargo plan and dangerous goods plan.

Information to hand over to fire crew

- ❖ Location of fire and how to get access it.
- ❖ Briefing of spaces in the vicinity of fire, contents and risks involved.
- ❖ Any action that has already been taken ventilation shut down. Machinery isolated. Boundary cooling in operation.
- ❖ Any persons unaccounted for.
- ❖ Establish communications system.
- ❖ Current stability information and status of fuel. Ballast and fresh water tanks.

LIFE BOAT

Weekly maintains,

1. Visually check the condition of life boat or fixed and loose equipment.
2. Engine and check the propulsion system. (engine running for 3 minutes)
3. Power supply system.
4. Check the life boat falls condition.
5. Check the life boat davit condition.
6. Check the embarkation deck and embarkation ladder condition.
7. Release the life boat in stowage position after reset the life boat in stowage position ready for use in emergency.

Monthly maintains,

1. Visually check the condition of life boat or fixed and loose equipment.
2. Engine and check the propulsion system. (engine running for 3 minutes)
3. Power supply system.
4. Life boat lower above the water level and check the life boat falls wire
(lowering the life boat 1meter above the water)
5. Check the store inventory, water and check the provision expire date and all equipment should be dry.

Three monthly,

1. Visually check the condition of life boat or fixed and looks equipment.
2. Engine and check the propulsion system. (engine running for 3 minutes)
3. Power supply system.
4. Check the life boat falls condition.
5. Check the store inventory, water and check the provision expire date and all equipment should be dry.
6. Life boats fully lower the water level and make a round turn in water.

Release gear test,

1. Operation of devices for activation of release gear.
2. Excessive free play.
3. Hydrostatic interlock system
4. Cables for control and release.
5. Hook fastening or including check plates.

ON Load release gear,

1. Position the life boat partially into the water. The mass of life boat is substantially supported by the falls and hydrostatic interlock system.
2. Operate the on load release gear.
3. Reset the on load release gear.
4. Examine the release gear and hook fastening to ensure that the hook is completely reset and no damage has occurred.

OFF Load release gear,

1. Position the life boat fully waterborne.
2. Operate the off load release gear.
3. Reset the on load release gear.
4. Recover the life boat to the stowed position and verified the life boat ready for launching to the emergency.

Annual life boat test,

1. Visually check the condition of life boat or fixed and looks equipment.
2. Engine and check the propulsion system. (engine running for 3 minutes)
3. Power supply system.
4. Check the life boat falls condition.
5. Check the store inventory, water and check the provision expire date and all equipment should be dry.
6. Life boat lower above the water level and check the life boat falls wire
7. (lowering the life boat 1meter above the water)

Davit test,

1. Check the davit structure with particular regard to corrosion and davit track is clear no paint
2. Wires and sheaves possible such as kinks and corrosion
3. Lubrication of wires and sheaves
4. Check the stored power system and hydraulic system
5. Inspection for correct termination of fall wire ends
6. Condition of reaving of remote control wires

Winch test,

1. Open and inspect brake mechanism
2. Replace brake pads; if necessary
3. Check Remote control system
4. Check Power supply system
5. Check winch foundation
6. Check the winch handle interlocks
7. The angle / clearances of dead mans brake lever to be checked

Dynamic winch brake test,(YEARLY OPERATIONAL TEST)

1. Officer of the watch
2. Accredited person
3. Lowering the empty life boat when the boat has reached its maximum lowering speed and before the boat enter the water the brake should be abruptly applied.

Dynamic winch brake test,(5 YEARLY OPERATIONAL TEST)

1. Officer of the watch
2. Accredited person
3. MCA on classification surveyor
4. Times of the total complement of the life boat
(life boat weight + equipment weight + person complement weight (1.1 times)

5. MCA surveyor eye witness he will check previous maintenance as per maintenance schedule
6. OOW will be make sure every crew member involved in this work should have check the proper PPE and all worked look after
7. Bring the boat embarkation level and lowering the boat loaded to a proof load equal to 1.1 time the weight of the life boat equal to complement of person and equipment or equivalent load when the boat has reached its maximum lowering speed and before the boat enter the water the brake should be abruptly applied

MAINTENANCE OF LIFEBOAT FALLS

Maintenance and inspection

Lifeboat falls:

- Turned end for end at intervals not more than 30 months (2 ½ years)
- Renewed not more than 5 years unless required earlier.

Weekly inspections :

- All survival craft, rescue boats and launching appliances inspected visually
- Engines of life boats and rescue boats run ahead and astern for not less than 3 minutes
- General emergency alarm (if not done daily)

Monthly inspections:

- All LSA, lifeboats and rescue boat equipment using checklist provided.
- Report logged

Servicing of life rafts and HRU (life jackets inflatable, rescue boats inflatable)

- Every 12 months can be extended for additional 5 months but not more.
- Disposable HRU's (HAMAR) 2 years life cycle

Life boat falls wire

As per SOLAS regulation every 5 year full change life boat falls wire and end to end changed 2^{1/2} year or if falls wire strength 10% damaged change full.

CARE AND MAINTENANCE ON WIRES AND ROPES, BREAKING STRESS, AND HOW WOULD YOU KNOW WHEN TO RENEW THE SAME?

Care Of Ropes

- 1) Examine The Ropes For Chafing, Cutting And Internal Wear.
- 2) Keep Away From Direct Sunlight, They Should Be Stored Underdeck For Long Voyages But If Kept Outside They Should Be Kept Covered With Tarpolines Or On Gratings.
- 3) Ropes Should Never Be Stowed Away Wet To Prevent Rotting.
- 4) They Should Be Free From Grease Oilstains And Paint Marks Etc.
- 5) They Should Never Be Surged To Prevent Wear And Tare Due To Friction, Some Ropes Have A Low Melting Point And Can Permanently Fuse And Get Damaged.
- 6) Wire Ropes Should Be Regularly Lubricated With Patent Lubricants Such As Surret Fluid Or Wire Grease.
- 7) For A Wire Rope Care Should Be Taken While Breaking A New Coil As The Rope May Get Kinked Or A Person May Get Injured Due To Faulty Handling. Break The Coil As Per Instructions Given In The Seamanship Manuals Eg. The Vertical Swivel Or The Reel. Always Use Gloves Whenever The Handling Of Ropes Is Concerned.
- 8) Sharp Angles (Nips) To The Wire Rope Need To Be Avoided.
- 9) Rollers Need To Be Used When Wires Are Being Used As Unnecessary Chafing Occurs.
- 10) When Turned On Bits The Top Turns Should Be Secured Against Springing Off By A Light Lashing.

Handling, Maintenance And Inspection:

- Synthetic Lines Can Pose A Great Danger To Personnel If Not Properly Used Or Handled. Handling Of Mooring Lines Has A Higher Potential Accident Risk Than Most Other Shipboard Activities.
- The Most Serious Danger Is Snap-Back, The Suddern Release Of Static Energy Stored In The Stretched Synthetic Rope When It Breaks.
- Snap-Back Is Common To All Lines And Even Long Wire Lines Under Tension Can Stretch Enough To Snap-Back With Considerable Energy.
- Synthetic Lines Break Without Warning And There Are No Visible External Signs Regarding This Danger.
- As A General Rule Any Point Within About A 10 Degree Cone Around The Line From Any Point At Which The Line May Break Is In Danger. A Broken Line Will Snap Back Beyond The Point At Which It Is Secured, Possibly To A Distance As Far As Its Own Length.

The Breaking Strengths Of Ropes:

Ropes:

- 1) Manila: $2d^2 / 300$
- 2) Polypropylene: $3d^2 / 300$
- 3) Terylene: $4d^2 / 300$
- 4) Nylon: $5d^2 / 300$

Wire Ropes:

- 1) 6 Strand, 12 Wires Per Strand $15d^2 / 500$
- 2) 6 Strand, 24 Wires Per Strand $20d^2 / 500$
- 3) 6 Strand, 37 Wires Per Strand $21d^2 / 500$

Marking on Life Boat

LIFE BOAT:

1. Dimensions
2. Capacity
3. Makers serial no.
4. Name or trade mark of manufactures. (tag) inside.
5. Date of manufacture.
6. Name and POR of vessel marked on each bow of the craft.
7. Callsign on the thwarts, (for seeing from top).

NOTES: about life boats:

- Cargo vessel after 1986 – fully enclosed lifeboat.
- Passenger ships 1986 – totally or partly enclosed lifeboat.
- Oil tankers carrying cargo flashpoint <60 deg. : Fire protected totally enclosed is fitted with self-contained deluge or sprinkler system & 8 mins resistance in oil fire.
- Chemical / gas / toxic tankers. : Life boat with air support system & 10 min positive pressure inside.
- Launching time not to be more than
 1. cargo ships 10 min,
 2. passenger ships 30 min.

MASTER TELLS YOU TO PREPARE LIFEBOAT FOR LAUNCHING (PRECAUTION AND PREPARATION)?

Launching of Life Boat

Sound signal, I will wear my PPE with Life Jacket

Proceed to designated station

Establish communication

Collect my crew with PPE and Life Jacket (check whistle, lights etc)

Head count

Brief them their duties once again

Railing removed, see for obstruction remove, proper illumination, boat falls checked

See over board side clear

Since they are removed as a P.O.B or sailing

Gripes to be removed from the deck

Will check overboard side and lower embarkation ladder

First will send two persons in one will start eng another put plugs in life line to be released in boat itself for free most while lowering

Fwd painter to be passed and made fast to strong point, when at embarkation level

Release tracing pendent and make fast bows in tackle.

All sit in boat except winch man

Lower the boat slowly, checking the over side

Release fall hooks together and make water borne

Once water borne the final person to be in boat

Make 45 deg angle less then by boat hook and 90 deg towards wind water side

LSA (SOLAS CHAPTER 3 Life saving appliances arrangement)

L.S.A OF YOUR LAST SHIP?

L.S.A (life saving appliances):

- i) EPIRB
- ii) SART
- iii) Lifebuoy
- v) Life raft
- vi) Life boat
- vii) Rocket parachute
- viii) Hand flare
- ix) Smoke signal
- x) Pilot ladder
- xi) Embarkation ladder
- xii) Life jacket
- xiii) Life bouy
- xiv) T.P.A (100% crew)
- xv) Immersion suit
- xvi) L.T.A
- xvii) Emergency lighting
- xviii) H. R.U

LSA REQUIREMENTS:

Passenger ship : 500 t or greater or 200 passenger more.

Lifeboats – 50% each side (partially enclosed)

Liferafts – 12.5% each side with davit even on each side

Or

Lifeboats – 37.5% each side.

Life rafts – 25% each side

Rescue boats – 2 nos.

In any case it is 125 % of the total persons onboard.

Passenger ships 500T or 200 persons.

Life rafts each side – 100% davit launched.

Life rafts 150% each side if these are not transferable.

One rescue boat.

Emergency lighting should be from a separate emergency power source.

Illumination required area:

- Muster points.

1. TPA -100% +(10% spare or 2 which ever is greater)

2. L/buoy-DEPEND ON SHIP,S LENGTH

3. UNDER 100 m 8 NO.

4. 100 -UNDER 150m 10 NO.

5. 150-UNDER 200 m 12 NO.

6. 200- ABOVE 200 m 14 NO.

7. Immersion Suit- 6 nos in rescue boat

LIFE RAFTS

Weight : weight of throw over the launch raft not >185 kgs.

Inflate : within 1 min fully inflate. Gas non toxic.

Lifer raft external light as per lifeboat.

Painter : twice the height (length) of its stowed position to water line at light ship condition or 15 mts whichever is greater.

MRU : Service annually, Rafts : service annually.

HRU : throw away type – validity two years,

Hook : automatic release hook of raft if fitted must

MANUAL LAUNCHING OF AN INFLATABLE LIFE RAFT

MANUAL LAUNCHING OF AN INFLATABLE LIFERAFT

1. Look overside clear for launching the raft.
2. Ensure painter is secured to a strong point.
3. Remove any side railings, obstructions, chains etc.
4. Remove any securing arrangements from the raft itself.
5. If safe to launch then throw the raft to overable checking obstruction.
6. Pull painter to full length to inflate the raft.
7. Once raft is inflated (should normally take 1 to 3 min) dependent on climatic conditions then board as soon as possible by means of rope or ladder provided.
Never jump directly into a raft from any height.

DAVIT LAUNCHED INFLATABLE LIFERAFT

1. See for adequate illumination.
2. Remove guardrails. Obstruction.
3. Raise raft from deck by davit, hold bowsing lines at each end of raft, hold painter line and short red fireline.
4. Slew the davit arm to overside, make fast bowsing lines and painter.
5. Check overside obstn, inflate by pulling sharply the red firing line.
6. Once inflated make sure raft is well secured to deck by bowsing lines.
7. Ensure all personnel's are correctly wearing their life jackets.
8. Board the raft make sure it doesn't tilt since supported by one wire.
9. Once boarding is complete, release bowsing lines and painter and check all clean around and below the raft then lower away.
10. Once in water, release raft and allow to drift clear of immediate danger, before streaming sea anchor.

Instructions for the launching in close proximity to the launching station. Emergency lighting, means of access, drills of above every 4 months by special liferaft.

i) Have two men undo the SENHOUSE SLIP

- xi) Life the life raft to the ships rail (do not undo the painter line from the hydrostatic release)
- xii) Drop the life raft in to the water
- i) Pull the painter line till it can come no more and then give it a sharp pull
- ii) The liferaft should now inflate.
- iii) Pull the life raft close to the pilot ladder
- iv) Put the strongest man in to the liferaft fast
- v) pass him the tail of the painter line leading back to the hydrostatic release, he will be pulling the liferaft closer too.
- vi) Ever person that enters the liferaft helps him to keep the life raft close to the ship.
- vii) The second last person boards the liferaft, the painter line gets cut at the hydrostatic release side
- viii) It is important to try and not loose your liferaft's. this has been done before, the reson for launching liferaft's is there is no hope for the v/l loose these lifraft's and there is no hope for you.

MAGNETIC COMPASS

Purpose

It is very imported instrument for us and for safe navigation. In my last ship it was fitted on monkey island fore and aft centreline of the ship. It is all the time cover with canvas.

Used

It is used onboard ship for steer the ship also taking the celestial and terrestrial object bearing and Also for collision avoidance and transit bearing and also we can see on bridge by periscope.

Precaution

Before taking bearing first of all i will make sure that no any metal with my body and also i will consult with chart that i am not in a magnetic area. after i will check the azimuth ring is freely rotating and prism of magnified glass is clean. while taking celestial object bearing i will put the arrow upward side. when taking terrestrial object bearing i will put the arrow downward side. check the gimbals ring is freely moving. compass card is freely floating. Before taking a reading i will make sure the bobble is at centreline. Inside there is a mixture of Ethel alcohol and distil water. I will make sure inside no any bobble if there is any bobble the i will remove by filling distil water. I will make sure there is no any leakage.

After taking compass bearing . i will not directly plot on chart so there are tow type of error variation and deviation

Variation

It is due to earth magnetism difference between true north and magnetic north

Deviation

It is due to ship magnetism difference between magnetic north and compass north

After applying :i will find the true then apply on chart.

C	= 245°(C)	T	= 127°(T)
D	=04° (E)	V	=04° (E)
M	=249°(M)	M	=123°(M)
V	=02°(W)	D	=02°(W)
T	=247°(T)	C	=125°(C)

How often do you take compass error ?

1. The difference between the compass north and the true north is the compass error. Like compass name is east or west .
2. Azimuth: true bearing of the heavenly body calculated at a given time in GMT.
3. Amplitude: true bearing of the heavenly body calculated at a given time in GMT made when body is on the above half of the horizon. Rising or Setting
4. Transit : take the bearing is one in which tow conspicuous terrestrial object are in a line one in front of the other.
5. Leading light: first of all i will take the bearing of leading light after i will move the ship head in a line of leading light than take bearing and compare both bearing if there any difference or not

When find the compass error ?

1. Large alteration
2. Every watch
3. Arrival and departure of port
4. After dry-dock
5. When loaded the metal cargo
6. Near the compass electrical installation
7. Constructional changes

GYRO REPETOR

Purpose

It is very important instrument for us and for safe navigation. In my last ship it was fitted on bridge wings port and stbd side

Used

It is used onboard ship for steer the ship also taking the celestial and terrestrial object bearing and Also for collision avoidance and transit bearing .

Precaution

Before taking bearing first of all i will check the power supply system. By night i will check the dimmer light. after i will check the azimuth ring is freely rotating and prism of magnified glass is clean. while taking celestial object bearing i will put the arrow upward side. when taking terrestrial object bearing i will put the arrow downward side. check the gimbals ring is freely moving. compass card is freely floating. Before taking a reading i will make sure the bobble is at centreline.

Marine Hydrometer

Purpose

Sir, this is marine hydrometer. Its gives the density of liquids.

Used

In my last ship chef officer give me order. He was told me collect a full bucket of clean dock water away from engine room discharges and from a depth about half the draught.

After he was put hydrometer in the bucket of dock water and push down lightly and spin slowly.

- Make sure the hydrometer is not resting on the bottom of the bucket.
- Break the surface tension of the water.

When the stopped spinning read the density of the dock water.

Q Why we required density?

A Because ship move from dock water to salt water or salt water to dock water. The density of water is changing and so the draft of the vessel also change.

(Is less the SW density so we have load more cargo in DW when we will go open sea it will come to the appropriate load line)

Q if you move from dock water to salt water when will happen with draft?

A Vessel move to dock water to salt water draft will be decreasing.

Like dock water draft 7.5m vessel will be going to salt water draft will be decreased 5.3m means vessel will be rising 2.2m.

Q if you move from salt water to dock water when will happen with draft?

A Vessel move to salt water to dock water draft will be increasing.

Like salt water draft 5.3m vessel will be going to dock water draft will be increased 7.5m means vessel will be sinking 2.2m.

Q if your vessel FWA = 200mm, and density of water is same. What will be the DWA?

Sir, I will calculate the DWA by formula.

$DWA = 1025 - \text{density of dock water} / 25 \times FWA$

$DWA = 1025 - 1005 / 25 \times 200$

Dock water Allowance = 160mm

Q What is FWA?

A The amount by which the appropriate load line can be submerged. When loading in freshwater of relative density 1.000.

Formula of $FWA = \frac{\text{SUMMER DISPLACEMENT}}{4 \times TPC}$

Q What is DWA?

A The amount by which the appropriate load line can be submerged. When loading in water of density between 1000 and 1025 kg m³.

Where you find FW allowance.

1. Load line zone
2. Stability booklet
3. Ship particular
4. Hydrostatic table
5. By formula

ANEROID BAROMETER

Purpose

This is Aneroid Barometer. it gives us atmospheric pressure at mean time. In my last ship it was fitted on the bridge fore and aft centre line of the ship. It should be kept away from the direct sunlight.

Used

Inside the instrument there is one aneroid capsule. When the pressure is increase the capsule compress and when the pressure is decreases the capsule is expands,

ORIFACE

When i am coming on the watch i will set the dummy needle on the present reading and note down present reading. cause if there is any changes in between three (3) hrs. Then i will come to know whether the pressure is increasing or decreasing. If the pressure is increasing that means we are going to the high pressure area and we will get the good weather. If the pressure is decreasing that means we are going to the low pressure area and we will get the depression or bad weather.

Precaution

- Aneroid barometer should be sited at a height that is easy to read preferably on the bridge fore and aft centre line of the ship.
- It should be kept away from the direct sunlight.
- Before take the reading i will tap the instruments gently because if the pointer is liable to stick.
- Apply the index error correction stated on the card.
- Apply the height of eye correction form the card. (always added)
- Note the reading as accurately as possible.
- Log the reading.

→ appreciable change

INDEX ERROR

Large index error can be removed from the instrument by adjustment of a screw located at the back of the instrument. And note of this adjustment should be made in the log book.

Small error should be noted on a card.

If there is defected or very large error i will be send the instrument port meteorological officers or marine offices. (atmospheric pressure unit = 1 MB (Millibar) universal unit = 1 hPa (hectopascal) 1 MB (Millibar) = 1 hPa (hectopascal))

→ Barograph → atmospheric tendency
3 hours, change in atmospheric pressure

7 days paper →

→ Silicon & oil & aneroid capsules →

Dr. Prasad

THE MASONS HYGROMETER

Sir, this is masons hygrometer. It is purpose to measuring the humidity of the air. This is Stevenson's screen and this is louvered side. It is protect the inside instrument from direct sunlight and allow the free flow of air over the instrument. Inside there is a tow thermometers one is called dry bulb and other one called wet bulb and this is muslin or wick and reservoir (inside the reservoir refill the distilled water). Dry bulb gives us temperature of the air and wet bulb gives us humidity of the air.

Precaution

Before take the reading,

1. I will make sure that thermometers are clean.
2. Check that the thread of mercury is not broken in the thermometer.
3. Ensure that marine screen is hung to the windward side.
4. Ensure that the muslin is wet and not dry.

Taking a Reading

After taking the both reading (dry and wet bulb reading) and note down the both reading and subtract the two reading. I will get the depression of wet bulb from metrological table.

Metrological Table,

Dry bulb	Depression of Wet bulb									
	0.0	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	
5.0	5.0	4.5	4.0	3.5	3.0	2.5	2.0	1.5	1.0	
4.5	4.5	4.0	3.5	3.0	2.5	2.0	1.5	1.0	0.5	
4.0	4.0	3.5	3.0	2.5	2.0	1.5	1.0	0.5	0.0	
3.5	3.5	3.0	2.5	2.0	1.5	1.0	0.5	0.0	-0.5	
3.0	3.0	2.5	2.0	1.5	1.0	0.5	0.0	-0.5	-1.0	
2.5										
2.0										
1.5										
1.0										
0.5										
0.0										
-0.5										

Enter the table with dry bulb temperature down left hand column and depression of wet bulb along the top.

Maintenance

1. Each week the muslin and wick should be change for a clean one.
2. Refill the reservoir with distilled water.
3. Clean the thermometers and screen.
4. Ensure the thermometer are not broken .
5. Enter the log book...

WET BULB READING DURING FROST

The hygrometer can still be used during freeing conditions .

Sir, I will give the wet cloth and clean the wet bulb and dry bulb surface and wet the muslin after few minutes i will drying the both bulb before taking the reading wait few minutes when the wet bulb has fallen below the dry bulb and remain steady take the reading.

Q: WHAT IS DEW POINT.

A: (is the temperature at which the air become saturated and they can hold no more vapours in the air.)

Q: WHAT IS HUMIDITY .

A: the temperature at which the relative humidity of air become 100%, and they can hold the more vapours in the air

Q: WHAT IT IS AND WHAT IT GIVES AND HOW TO FIND IT?

A: relative humidity and dew point also to check temp and know to ventilate the cargo spaces when moving from warm ports to colder ports.

Q: IF BOTH ARE EQUAL LEVEL?

A: 100% humidity and fog can be expected or rain or TRS or muslin cloth may be dry.