# GMDSS

By : Anupam Singh Rajput

: SMART MARINER(Please subscribe)

For more notes visit

marineredition.com

Smart Mariner Edition

for smart sailors

# GMDSS

## Q.1) What is GMDSS?

Ans:- Global Maritime Distress and Safety System (GMDSS) is the internationally agreed-upon set of safety procedures, types of equipment and communication protocols used to increase safety and make it easier to rescue all distressed ships, boats and aircrafts.

## Q.2)What are functional requirement of GMDSS?

Ans:- The GMDSS is designed to perform 9 functions:

1. **Transmission of ship to shore distress alerts by two separate and independent means.**
The details for this function are contained on the individual ship's radio safety certificate. For example, a ship in area A1 would use VHF DVS equipment as the primary means and the EPIRB as the secondary. Ships in are A4 would use HF DSC equipment as the primary means and a 406 MHz EPIRB as a secondary means.
2. **Reception of shore to ship distress alerts.**
If a ship sends a distress signal via an EPIRB or INMARSAT C satellite terminal, any ship in the vicinity will not be aware of the distress until the shore authorities relay the distress details by sending a DSC call and/or a satellite call to all ships within a defined area.
3. **Transmission and reception of ship to ship distress alerts.**
A ship in distress can alert other ships in the vicinity by sending a DSC distress alert on VHF and MF and follow it up with a distress voice message on channel 16 or 2182 MHz. HF DSC is reserved for long range work and is intended for alerting shore-based authorities.
4. **Transmission and reception of SAR coordinating communications.**
This is to enable ships to perform SAR coordination functions described in the International Aeronautical and Maritime Search and Rescue (IAMSAR) manual. It includes the use of radio telex (called Barrow Band Direct Printing or NBDP) between ships involved in the SAR.
5. **Transmission and reception of on-scene communications.**
It involves the use of short to medium range communications during the course of the operation.
Ships must be able to communicate with aircraft, other ships and shore authorities using dedicated GMDSS frequencies for voice and NBDP communications,
Frequencies for RT (radio telephony) use are:
   - VHF Channel 16 and channel 6 (inter ship and ship-aircraft communications).
   - VHF 121.5 MHz and 123.1 MHz (ship-aircraft communications) It is compulsory for passenger vessels.
   - MF 2182 KHz (distress and safety voice communications).
   - HF 3023 KHz (ship-aircraft); 4125 KHz (ship-shore; ship-ship); 5680 KHz (ship-aircraft).
6. **Transmission and reception of locating signals.**
Locating and homing signals are provided for in GMDSS by EPIRBs and SARTs.

SARTs are intended for use in survival craft to provide a homing signal for ships and aircraft engaged in SAR operations.
SARTs operate in the navigation radar frequency band (X band).

7. **Transmission and reception of maritime safety information (MSI).**
   GMDSS provides two independent systems for broadcasting MSI namely, NAVTEX and SAFETY NET.
   Navigation and meteorology warnings, meteorology forecasts and other urgent safety related messages for a given area (NAVAREA) are broadcast over NAVTEX and SAFETY NET.
8. **Transmission and reception of general communications to and from shore-based radio systems.**
   GMDSS provides facilities for all types of commercial and personal communications over commercial telecommunications networks.
9. **Transmission of bridge to bridge communications.**
   SOLAS (Safety Of Life At Sea) requires that access to VHF communication equipment must be available at the position the ship is normally navigated and controlled from. This includes the operation of channel 13 which is reserved for inter ship communications relating to the safety of navigation.

## Q.3) Carraige requirement?

Ans:- 1 2 3 formula

1 EPIRB

2 SART

3 two way GMDSS HAND HELD WALKIE TALKIE

Q.4) Availability of the equipment?

Ans:- • Duplication of equipment (DOE)
• At sea maintenance (ASM)
• Shore based maintenance (SBM)

→ Ships plying in sea area A1 & A2, need to use atleast ONE of the above 3 option
→ Ships plying in sea area A3 & A4, need to use atleast TWO of the above 3 option

Q.5) Carriage requirement?

Ans:- • All the cargo ships of 300 GRT and above
• Ocean going passenger vessel
• vessel going to foreign port

→ Additional requirement for passenger ship?
• Remote distress panel
• Automatic updating of position to all relavant radio-communication equipment.
• Two way on-scene communication on 121.5 Mhz or 123.1 MHz for ship & aircraft communication.

Q.6) GMDSS regulation for VHF radio on survival craft?

Ans:- 1,2,3 formula
i.e. 3 two way GMDSS hand held walkie talkie.

Q.7) Type of maintenance of GMDSS equipment?

Ans:- → Daily: • VHF and MF/HF DSC equipment (internal or self test)
• Batteries (On/off load test)
• Printers

→ Weekly: • MF/HF DSC (external test with CRS)
• Emergency generator Test

→ monthly: • EPIRB, SART, GMDSS Portable VHF
• Aerials and Insulators
• Batteries (monthly maintenance)

JUNE 2018

| Su | Mo | Tu | We | Th | Fr | Sa |
|---|---|---|---|---|---|---|
| | | | | | 1 | 2 |
| 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| 24 | 25 | 26 | 27 | 28 | 29 | 30 |

who is designated for maintenance?

Usually the second officer holding a GMDSS General operator Certificate (GOC)

- For vessels plying in coastal water & less than 300 GRT, must have atleast 1 GOC holder.
- For vessel above 300 GRT,
  a) One GMDSS GOC holder, if person is exclusively as radio operator
  b) Two GMDSS GOC holder, if person also carries out other duties

Q.8) What are the documents are to be carried on-board with regard to GMDSS?

Ans :- (i) Ship's radio licence
(ii) Radio operator certificate
(iii) Safety radio certificate
(iv) Shore based maintenance certificate
(v) Antenna rigging plan
(vi) GMDSS radio log book
(vii) ITU List of Call sign and (numerical MMSI identities of stations)
(viii) ITU List of coast station
(ix) ITU List of ship station
(x) ITU List of Radio determination & special service stations.

Q.9) What information contains on Ship's radio license?

Ans :-
- Name of the ship
- Call sign, MMSI
- Name of owner
- Public correspondance category
- Transmitter- output power,
- Frequencies
- Class of emission.
- The condition under which the station is to be operated

Q.10) GMDSS log book sections & what information it contains? Wednesday

Ans:- This log book is drawn in 4 sections

**Section A :-**

- Particulars of ship
- Radio certificates
- Availability of radio equipment
- Details of service company when SBM option is utilized

**Section B**

- Details of GMDSS certified personnel (and crew member) designated with the primary responsibility for distress communication.

**Section-C**

- Summary of the communication related to Distress, Urgency & Safety.
- Record of important incidents like breakdown, malfunction etc.
- Position of ship atleast once a day.
- Details of tests and checks carried out.

Q.11) **Frequencies**

ⓐ VHF

DSC alert : Ch 70 (156.525 Mhz) RT: Ch 16 (156.80 Mhz) SAR: CH 06

ⓑ MF

DSC alert : 2187.5 Khz RT : 2182 Khz

ⓒ HF

| DSC alert | RT |
|---|---|
| 4207.5 Khz | 4125 Khz |
| 6312 Khz | 6215 Khz |
| 8414.5 Khz | 8291 Khz |
| 12577 Khz | 12290 Khz |
| 16804.5 Khz | 16420 Khz |

4 bands

ⓓ MF/HF RT used between ship and aircraft during SAR

MF RT : 3023 Khz

HF RT : 5680 Khz

JUNE 2018

| Su | Mo | Tu | We | Th | Fr | Sa |
|---|---|---|---|---|---|---|
| | | | | | 1 | 2 |
| 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| 24 | 25 | 26 | 27 | 28 | 29 | 30 |

NBDP is telex

Thursday

9 (e) VHF DSC routine

Ch 70 (only internal test)

10

(f) MF DSC routine

11 Ship to ship : Tx: 2177 Khz / Rx: 2177 KHz

Ship to shore : Tx: 2189.5 Khz / Rx: 2177 Khz

12 ite routine on this

(g) Navtex

1 MF NBDP - English - 518 Khz

MF NBDP - Regional language - 490 Khz

2 HF NBDP - Tropical region - 4209.5 Khz

3 (h) EPIRB

Frequency : 406 Mhz

4 Homing signal for locating : 121.5 Mhz

Duration : 48 hrs

5 (i) SART

9.2 - 9.5 GHz

6 (3cm X-band radar)

Duration : Std by for 96 hours

working time for 8 hours

7 (j) LRIT

Uses INMARSAT-C

(K) AIS

161.975 MHz - Channel 87B (Simplex For ship to ship)

162.025 MHz - Channel 88B (Duplex For ship to shore)

(h) Satellite uplink & downlink frequency.

SES to satellite uplink : 1.6 GHz (L-band)

Satellite to CES downlink : 4 GHz (C-band)

CES to satellite uplink : 6 GHz (C-band)

Satellite to SES downlink : 1.5 GHz (L-Band)

Q.(12) VHF, MF, HF Bandwidth?

Ans:- Frequency range are :-

Medium frequency (MF) : 300 KHz to 3000 KHz

High frequency (HF) : 3 MHz to 30 MHz

very High frequency (VHF) : 30 MHz to 300 MHz

Bands are :-

Medium frequency (MF) : 1605 MHz to 2 MHz

High frequency (HF) : (2 MHz) 4 MHz, 6 MHz, 8 Mhz, 10 MHz, 12 MHz, 16 Mhz

very high frequency (VHF) : 156 Mhz to 174 Mhz

Q(13) Your vessel is in area A4, make an urgent call in office.

Ans:-
- Use HF DSC equipment
- Select station from ALRS vol-1 as per your position.
- Send an DSC routine alert on CES frequency & follow up on corrosponding RT channel
- Coast earth station (CES) will connect you to your office via optic cable

Q.(14) Procedure for routine call in sea Area A4?

Saturday

Q.15) What is distress?

Ans:- • The distress signal consist of the word "MAYDAY"
• The distress signal MAYDAY indicates that a mobile unit or person is threatened by a grave and imminent danger and requires immediate assistance.

Type of distress alert: DSC designated alert & DSC undesignated alert.

Q.16) Distress procedure in GMDSS?

Ans:- • Send Distress alert depending on sea area
• Change over to corresponding RT channel
• Give Distress call(RT)
• Send distress message(telex)

Q.17) Distress call + message i.e. Radio Telephony (RT)

Ans:- MAYDAY (X3)
This is NAME OF SHIP (X3), Call sign, MMSI

CALL

message
Mayday
Name of ship, call sign, MMSI
My position 15°28'N 045° 52'E @ 1100 UTC
Nature of distress
Require immediate assistance
20 persons on-board, EPIRB/SART activated.
OVER

01 Sunday

Acknowledgement of distress alert & distress call + message

call
MAYDAY
M.T. SWARNA MALA, call sign AVEY (X3), MMSI 419123456 (distress vessel)
This is M.V. VISHVA VIJAY, call sign AVUY (X3), MMSI 419654321 (coast vessel)

message
RECIEVED MAYDAY
OVER

Q.18) Distress relay call + message (RT)

MAYDAY RELAY (x3)

ALL STATION/NAME OF THE STATION (x3)

This is

Own ship's NAME, CALL SIGN, MMSI (x3)

MAYDAY

Distress ship's NAME, CALL SIGN, MMSI (If known)

STRUCK ROCK and sinking

5 miles north east of nariman point

Require immediate assisstance

05 persons on-board

OVER

If unknown

= Sighted unknown vessel sinking

=

=

Other information

OVER

Acknowledgement of distress relay

MAYDAY

Name of ship station or CRS (x3)

This is

Own ship's name (x3), CALL SIGN, MMSI

Recieved MAYDAY or RECIEVED MAYDAY RELAY

OVER

Q.19) Proceeding message

MAYDAY

DISTRESS vessel's name/ call sign/MMSI

This is, own vessel's name, call sign, MMSI

position ..... @ ____ UTC

Course ___°

JULY 2018

| Su | Mo | Tu | We | Th | Fr | Sa |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| 29 | 30 | 31 | | | | |

9 Speed __ kts
ETA __ Hrs
10 OVER

11 Q·20) SEELONCE FEENEE message (distress traffic has ceased, Normal working may be resumed)
MAYDAY (Given by controlling station)
12 ALL STATIONS (X3)
This is controlling station name, CALL SIGN
1
At POSN _____ @ ____ UTC
2 Distress vessel's Name, CALL SIGN
Situation under control
SEELONCE FEENEE
3 OUT

4 Q·21) SEELONCE MAYDAY or SEELONCE DISTRESS

| (Keep complete radio silence) (given in station in distress or controlling station) | (If particular station is unaware of radio silence, he will told by this (any other station other than controlling station) |
|---|---|
| 6 MAYDAY | MAYDAY |
| ALL STATION (X3) | Name of station unaware (X3), Call sign |
| 7 This is controlling station name, Call sign | This is own vessel's name (X3), Call sign |
| Time, one two zero zero, UTC | Time ____ UTC |
| SEELONCE MAYDAY | SEELONCE DISTRESS |
| OUT | OUT |

Q.22)* Distress message i.e. telex

MAYDAY

Distress vessel's Name, Call sign, SAT-B/SAT-C NO.

Posn _____ @ _____ UTC

NATURE OF DISTRESS

Require immediate assistance

20 persons on-board, SART/EPIRB activated

MASTER DTG

NNNN

* Acknowledgement of distress message (telex)

MAYDAY

Distress vessel's name, call sign, SAT-B/SAT-C NO.

DE own vessel's name, call sign, SAT-B/SAT-C NO

. . . . .

RRR MAYDAY

NNNN

Q.23) Urgency call + message i.e. RT

PAN PAN (x3)

ALL STATION (or) Name of the station (x3)

This is own vessel's name (x3), CALL SIGN, MMSI

PANPAN

Own vessel's name, Call sign, MMSI

Own ship's position

Complete details of urgency situation

MASTER DTG

OVER

JULY 2018

| Su | Mo | Tu | We | Th | Fr | Sa |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| 29 | 30 | 31 | | | | |

Thursday **Urgency medico**

PANPAN (x3) MEDICO
Name of coast station (x3)
This is own vessel's name (x3), call sign, MMSI

PANPAN MEDICO
Own vessel's name, call sign, MMSI
Own ship's position
Next port & ETA / Nearest port
Patient details
Symptoms and advice required
Medical history (if any)
Require immediate medical advice
MASTER DTG
OVER

Q.24) **Safety call by RT**

SECURITE (x3)
ALL STATIONS or Name of coast station (x3)
This is own vessel's name (x3), call sign, MMSI

Listen on Navigational warning on Frequency/ channel

**Safety message by Telex**

SECURITE
Own vessel's name, call sign, MMSI
Navigational warning at 010830 LT
12 15 North 068 25 East Sighted container floating
Drifting slowly NE4. Danger to navigation
All vessel's to navigate with great caution
MASTER DTG
NNNN

Q.25) Actions to be taken by vessel's recieving a DSC distress alert.

- Log down
- Inform master
- Set on corrosponding RT frequency/channel
- Wait for a CRS to acknowledge
- ACKnowledge by RT.
- If RT contact fails and if nothing heard from CRS or RCC
- Relay the alert to MRCC by any means.
- If RCC says to acknowledge, acknowledge on RT

Q.26) Cancellation of false distress alert

- Reset the equipment immediately
- If the DSC equipment is capable of cancellation, cancel the alert
- Set on corrosponding RT frequency/channel
- Transmitt a broadcast message to ALL STATIONS giving the ship's name, call sign, MMSI and cancel the false distress alert

Q.27) Simplex and Duplex

Simplex

- During communication between two stations, where simultaneous transmission and reception cannot be heard.
- Simplex need one frequency for communication.

Duplex

- During communication between two stations, where simultaneous transmission and reception is possible
- Duplex make use of two frequencies, one for transmission and another for reception.

JULY 2018

| Su | Mo | Tu | We | Th | Fr | Sa |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| 29 | 30 | 31 | | | | |

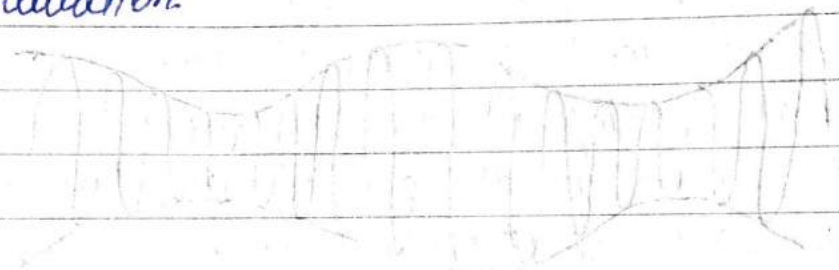
Saturday 28) **MODULATION**

Audio waves cannot travel to long distances. So to send the audio/sound waves to longer distance, we use modulation.

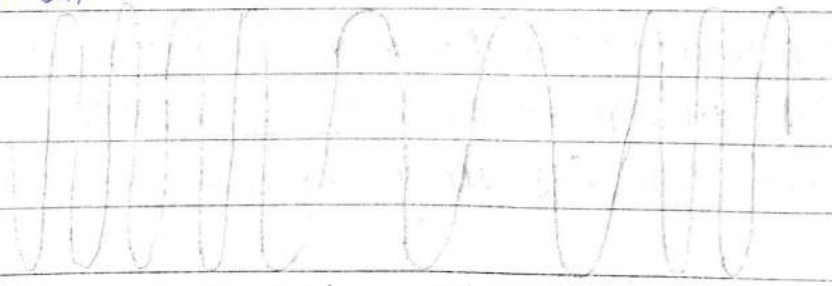
Modulation is superimposing the audio frequencies on radio frequency i.e. also known as carrier frequency to carry over longer distances.

There are three types of modulation :-

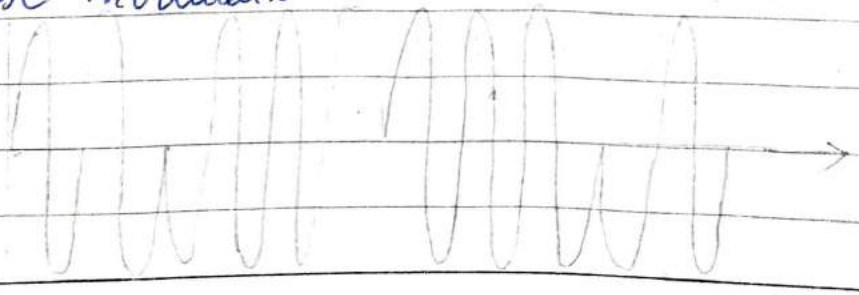
a) Amplitude modulation :- When the amplitude of carrier wave will change & frequency remains the same, it is known as amplitude modulation.



b) Frequency modulation: When the frequency will change & amplitude remains the same, it is known as frequency modulation.



08 Sunday c) Phase modulation: When the phase of the carrier wave will change & amplitude remains the same, it is known as phase modulation.



In modulation, basically we modulate the audio frequency on radio frequency, it is the carried by radio waves & again de-modulated & changes into audio frequency/sound waves. This is done with the help of MODEM

↓ modulator ↳ demodulator.

## Class of emission

A3E - Amplitude modulated DSB RT

(2182Khz) H3E - Amplitude modulated SSB RT full carrier emission

R3E - Amplitude modulated SSB RT reduced carrier emission

J3E - Amplitude modulated SSB RT supressed carrier emission.

F1B - Frequency modulated RT for telex

J2B - SSB supressed carrier for telex - MF/HF DSC

G2B - VHF DSC

G1D - Phase modulated digital data transmission

F3E - Frequency modulated RT - VHF RT

J3E - MF/HF RT

DSB - Double side band

SSB - Single side band

1 1 2 - digital transmitter

3 - analogue transmitter

E - voice (RT)

B - telex or DSC

D - data

λ = lamda

Tuesday 29) **PROPAGATION** :- is the behaviour of radio waves as they travel or propogated from one point to another into various parts of atmosphere.

Here, the radio propogation is radiating (sending) the sound waves into space by a transmitter i.e. antenna

$$\text{wavelength}(\lambda) = \frac{\text{speed of light}(c)}{\text{frequency}(f)}$$

$$\lambda = \frac{c}{f} \quad \text{Hertz}$$

For propogation, we require the height of antenna to be equal to $\lambda$ or $\lambda/2$

Example:- VHF $f$ = 156 mhz

= 156000 Khz

$f$ = 156000000 hertz

1 Mhz = 1000 Khz

= 1000000 hertz

$c = 3 \times 10^8$ m/sec

$$\lambda = \frac{c}{f}$$

$$\lambda = \frac{3 \times 10^8}{156000000}$$

$\lambda$ = 1.92 m, that should be the height of antenna of VHF

Similarly for MF,

$$\lambda = \frac{3 \times 10^8}{2182000} \quad (\text{MF} = 2182 \text{ Khz})$$

$\lambda$ = 137.4 m

So, here in MF, the height of antenna should be 137.4 m which is practically not possible.

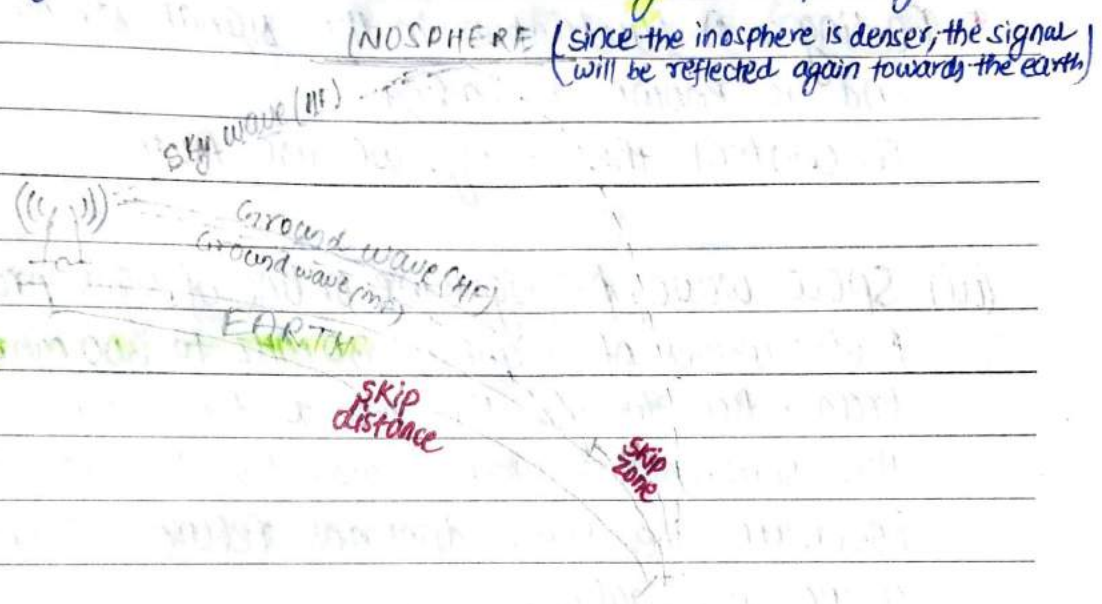
Hence, we use ATU

ATU :- see 14 July

There are 3 types of propogation, those are:-

i) Ground wave propogation: Radio waves of upto 3 MHz i.e. medium frequency (MF) generally travel along the surface of the earth by following the curvature of earth is known as Ground wave propogation. Typical range is about 200-300 NM.

ii) Sky wave propogation: Radio waves of frequency 3 MHz to 30 MHz (HF) travel through the inosphere is known as sky wave propogation.




* Skip distance: The distance between the transmitting station to the nearest point at which the sky wave returns to the earth is known as skip distance

* Skip zone or dead zone: The distance between the point where the ground wave returns and point at which the sky wave returns to the earth is known as skip zone

* Maximum usable frequency (MUF): It is the highest frequency at which inosphere refracted signal returns to earth with usable strength.

JULY 2018

| Su | Mo | Tu | We | Th | Fr | Sa |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| 29 | 30 | 31 | | | | |

Thursday

* Optimum transmitting frequency: The best frequency obtained which is reliable for communication i.e. 85% of MUF.

* Critical frequency: The critical frequency is the magnitude of frequency above which the waves penetrate the inosphere & below which waves are reflected back from inosphere.

* Fading: A fluctuation in the signal strength at reciever end is known as fading.
TO control the fading, we use Automatic Gain control (AGC)

(iii) Space wave, direct wave or line of sight propogation
Radio waves of frequency 30 MHz to 300 Mhz (VHF), when transmitted towards the ground the antenna in sight catches the signal, but when transmitted towards the sky it will penetrate the sky & does not return is known as space wave propogation.

Overall the modes of propogation are:-
MF : ground wave propogation - 300 to 3000 Khz
HF : ground + sky wave propogation - 3 to 30 MHz
VHF : ground + space wave propogation - 30 to 300 Mhz

* Line of sight : Line of sight (LOS) is a type of propogation that can transmitt and recieve data only when transmitting and recieving station are in view of each other.

* To communicate in the skip zone, we can use different bands like 4, 6, 8, 10, 12, 16, 22 and 25 which cause change in angle of refraction. So diff. band will have different skip zone.

Q.30) Type of antenna?

(i) dipole antenna :- Onboard we use half wavelength dipole antenna in VHF equipments. i.e = $\lambda/2$
= 1m should be the height of antenna

- The radiation pattern of this half-wave dipole is omni-directional

(ii) whip antenna :

- It is a flexible vertical wideband antenna used for communication in the MF and HF bands.
- It has physical length of 6 to 8m
- It also posses an omni-directional properties
- it has ATU

(iii) Active whip antenna :

- It is a short conventional antenna which includes pre-amplifier at the base of antenna used for navtex reception
- It has a physical length of 1.5 mtrs.

(iv) Parabolic antenna

- It uses a parabolic reflector to direct the radio waves to the reciever
- The INM-B & Fleet-77 uses parabolic dish antenna
  (90cm dia) (77cm dia)

(v) Omni directional antenna

- It IS an antenna which radiates equal radio power in all direction
- The INMARSAT C uses this omni direction antenna.



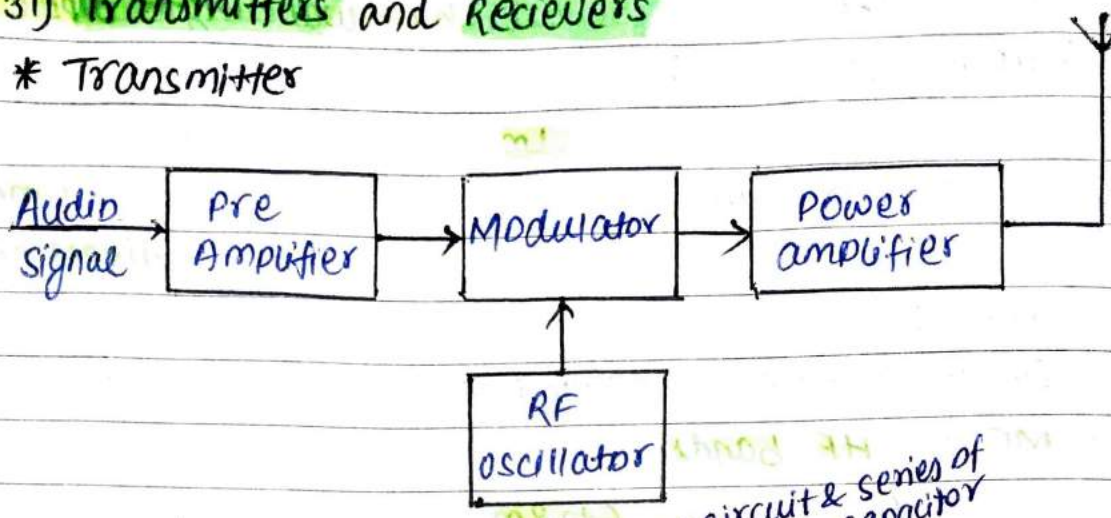
(vi) Yagi uda antenna

It is a directional antenna used for telivision in old days.

NOTE :- VHF antenna is the toppest antenna
MF/HF antenna is the longest antenna.

## Q31) Transmitters and Recievers

* Transmitter



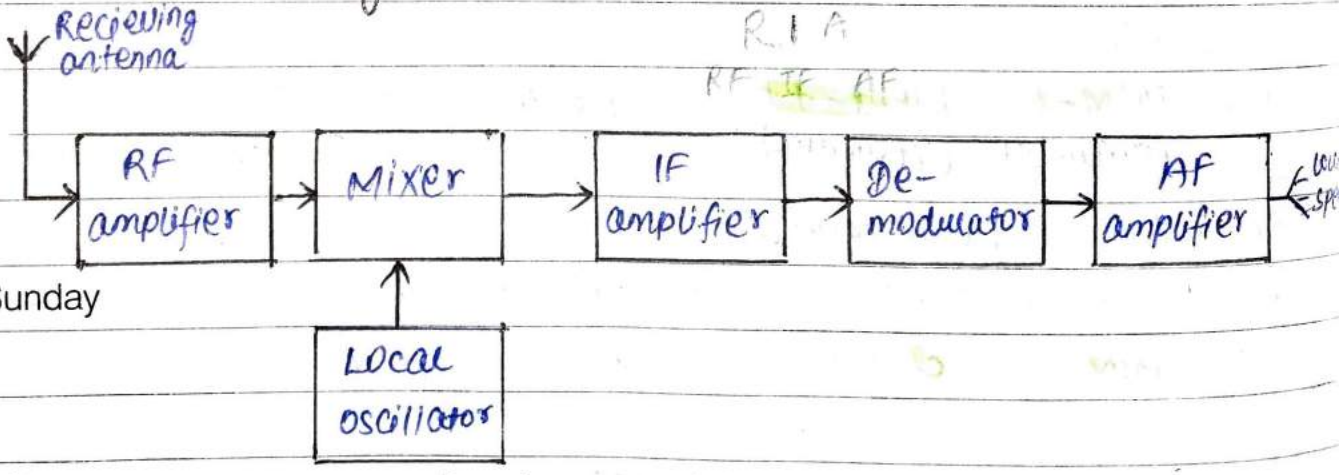

Antenna Tuning Unit (ATU) adjusts the electrical length of the antenna. It is required for MF/HF bands. → circuit & series of capacitor

Dummy load is provided in transmitter to test the efficiency of the transmitter with radiating signal. Dummy load dissipate the energy fed to it in the form of heat.

EIRP (Effective isotropic radiated power) is the power output required for a transmitter to radiate radio waves in all direction.

* Reciever

(i) Superhetrodyne reciever.




15 Sunday

(ii) Double superhetrodyne reciever

RF → 1st mixer → 1st IF → 2nd mixer → 2nd IF → demodulator → AF

1st LO, 2nd LO

* It is used to improve selectivity

## Three quality of a reciever:

a) Sensitivity: is the abity of reciever to pick up the weakest signal.

b) Selectivity: is the ability of reciever to recieve the desired frequency and reject others

c) Fiddility : is the ability of reciever to reproduce the original signal.

## Automatic Gain control (AGC)

To counter the effects of fading, an Automatic Gain control (AGC) is provided.

The AGC will adjust the level of the incoming signal to a constant level.

It is normaly a switch and can be put ON or OFF.

## Clarifier

If getting an interferance from nearby strong station, the fine adjustment of the frequency can be done by this control.

## Squelch

- It eliminate the sound of noise when the radio is not recieving a desired transmission.
- To hear the weak signal, we have to decrease the squelch.

RF gain control :- To increase the sensitivity which peaks up the weak radio signal

AF gain control: The output of the demodulator is fed to an audio amplifier, which provide sufficient gain to operate loudspeaker.

JULY 2018

| Su | Mo | Tu | We | Th | Fr | Sa |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| 29 | 30 | 31 | | | | |

Tuesday Q 32) INMARSAT

International maritime satellite.

→ Space segment

- It comprises of 4 geo-stationary satellite placed at 36000 Km above the earth.
- The 4 satellite are positioned in the regions above AOR-E, AOR-W, POR & IOR.
- The footprint of each satellite overlaps the footprint of adjacent satellite.
- This ensures coverage between 76°N & 76's.

→ Ground segment

- Satellite control centres (SCC): They are responsible for physical management of 4 satellites.

- Network operation centre (NOC): It is situated in LONDON and has overall control of the entire INMARSAT network.

- Network coordination center (NCS): • NCS is located within each Ocean Region to monitor & control communication traffic.
  - NCS allocates working channel
  - To transmit EGC message
  - To monitor Distress priority request.

- Land Earth station (LES) or Coast Earth station (CES)
  - LES provide the link between satellite & terrestrial telecommunication network.
  - LES consist of a parabolic antenna (12-14 m dia)
  - Each LES has direct connection with MRCC for emergency comm.

• Ship Earth station (SES) or Mobile Earth station (MES)

• The SES monitor the appropriate ocean region NCS on the common signaling channel (CSC)

CSC is a time division multiplexing (TDM) channel used by NCS to transmit system info & message announcement to MES.

SES or MES → LES or CES → MRCC

(via satellite)

| Features | SAT-A | SAT-B | SAT-C | SAT-F/Fleet-77 |
|---|---|---|---|---|
| Number | 1XXXXXX (7 digit) | 3MIDXXXXX (9 digit) | 4MIDXXXXX (9 digit) | 6 to 7 digit |
| Communication type | Real time | Real time | Store & forward | Real time |
| Antenna Type | — | Parabolic Highly directional | Omni-directional | Parabolic |
| Distress prioritization | prioritization | prioritization | alert | prioritization + pre-emtization |
| Services | | | | |
| Voice | | Yes | NO | Yes |
| Telex | | Yes | Yes | NO |
| Fax | | Yes | Text-fax | Yes |
| Data | | Yes 9600 bits | Yes 600 bits | Yes 64 Kb/128 Kb |
| ECA | | Yes | Yes | Yes |
| Cost | Rs 500 per min | Rs 200 per min | Rs 70 per min | 25-30 per min |
| Safe dist from antenna | | 6 to 7 m | 1 to 3 m | Email (internet) |
| EIRP :- | | 16 dbw | 33 dbw | 25 to 30 dbw |

* Classes of SAT-C

Class 0 : Only EGC receiver

Class 1 : For routine messages only.

class 2 : You recieve EGC message when not engaged in routine (for m. Ship)

Class 3 : Can recieve EGC as well as routine messages at the same time.

JULY 2018

| Su | Mo | Tu | We | Th | Fr | Sa |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| 29 | 30 | 31 | | | | |

Thursday

9 * Special asscess code

| | |
|---|---|
| 00 | International automatic access code |
| 0 | National automatic access code |
| 32 | Medical advice |
| 38 | Medical assisstance |
| 39 | Maritime assisstance |
| 42 | Navigational hazard |
| 43 | Position report (AMVER etc) |
| 28 | Email |
| 91 | |

* Enhanced Group calling (EGC)

- EGC is the broadcast of maritime safety information (MSI) and SAR related information to a defined geographical area using a satellite servie
- EGC recievers are programmed to recieve only the required type of messages
- It is also used to transmit urgency and safety alert as well as routine call
- It is issued for vessels within a 100 mile radius to assist.
- To recieve, set the SAT-C on EGC mode & select the nav area for which you want. You can also select an additional nav area for further passage.

Type Of EGC servie :-

Safety NET : Organisation such as hydrographic office, search and rescue, meteorological and RCC transmit maritime safety information to vessels at sea.

Fleet NET : allows commercial information to be sent. It is also used for information servie such as news, stock exchange report, sport result etc.

## * Performance verification Test (PVT)

- PVT also known as link test conducted at the time of commisioning of SAT-C SES.
- It test the transmission and reception of message and acknowledgement of distress alert.
- The consent of CES is to obtained prior testing.
- It is discouraged to do the PV test often as it occupies the distress alerting channel.

## * Fleet-77

- INMARSAT Fleet 77 provides fully integrated digital voice, fax and data satellite communication service.
- It the only satellite product which meet the latest distress and safety specification of GMDSS as per the IMO.
- It has build is pre-emption & prioritization, that means
  - If distress come, urgency will disconnect
  - If urgency come, safety will disconnect
  - If safety come, routine will disconnect
- It also provide voice communication around the world by help of SIM card (Subscriber Identity Module) at 4.8 Kbps

Fleet 77 provice two type of Communication method:

**Mobile ISDN (high speed):** Mobile integrated switch data network provide high speed data at 128 Kbps which is generaly used for large file & image transfer, high quality audio etc. It is charges on per minute basis.

**MPDS (low speed):** Mobile packet data service provide low speed data of 64 Kbps which is used where user have to remain "always connected" like web browsing, interactive email etc. It is charged as per the amount of data transmitted rather than time spent online.

JULY 2018

| Su | Mo | Tu | We | Th | Fr | Sa |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| 29 | 30 | 31 | | | | |

Saturday

9 Q-33) Call sign

- For ships: 4 to 5 alphanumerical character

10 AUVY

AVEY9

11 The first two indicate the country code.

- For coast station: 3 character.

12

MMSI

1 - 9 numerical characters

→ For ships : MID,1234,00 → National MID123,00 International

2 → For coast station: 004123456

→ Group of station : 044123456

3

Q.34) AAIC & SBMC :- full form & its function

4 AAIC : Accounting authority identification code.

- ITU requires each ship station to have an internationaly recognized accounting authority.

5

- Company will not pay the bill directly to the service provider. They will pay through the agency called accounting authority. They have a code AAIC.

6

- You can prepare the bill of charges for the calls and messages and add accounting authority code in the bill.

7

22 Sunday

SBMC

Shore Based maintenance certificate

Annual test of EPIRB should be done at SBM.

## Q.35) FULL FORM/ ABBREVIATION

| | |
|---|---|
| GMDSS | GlObal Maritime distress and safety system |
| DSC | Digital selective calling |
| EPIRB | Emergency position indicating Radio Beacon |
| SART | Search and Rescue Transponder |
| Navtex | Navigational Telex |
| EGC | Enhanced group calling |
| INMARSAT | International maritime satellite |
| MSI | Maritime safety information. |
| MMSI | Maritime mobile service identity. |
| RT | Radio telephony |
| SES | Ship earth station |
| LES | Land earth station |
| CES | Coast earth station |
| MES | Mobile earth station |
| DOE | Duplication of equipment |
| ASM | At sea maintenance |
| SBM | Shore based maintenance. |
| LRIT | Long Range Identification tracking |
| SSAS | Ship security Alert system. |
| MRCC | Maritime rescue coordination center |
| MCC | mission control center |
| LUT | Local user terminal. |
| ATU | Antenna Tuning Unit |
| AGC | Automatic gain control. |
| FEC | Forward error correction |
| NBDP | Narrow band direct printing |
| FSK | Frequent shift Keying |
| CSC | Common signaling channel |
| WPC | Wireless planning & coordination |
| EIRP | Effective isotrophic radiated power |

JULY 2018

| Su | Mo | Tu | We | Th | Fr | Sa |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| 29 | 30 | 31 | | | | |

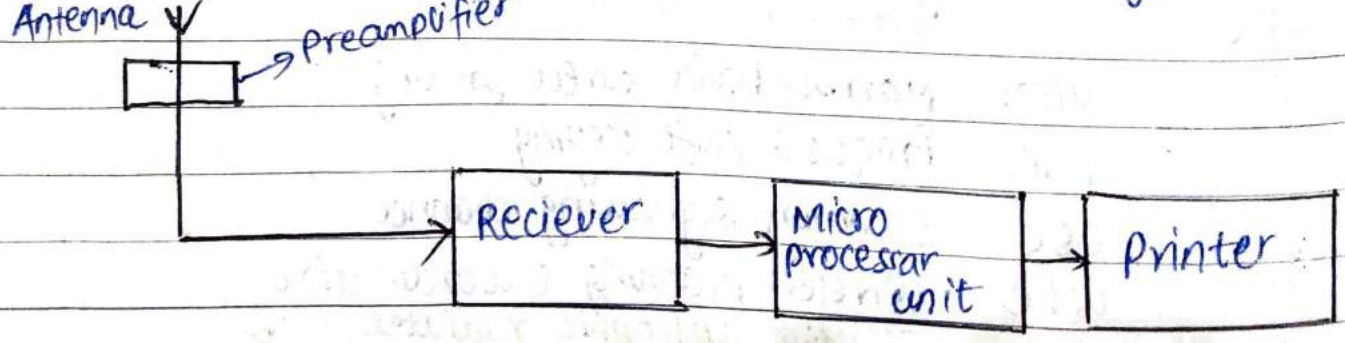
NAVTEX
EPIRB
SART
Two way radio
Telex over radio

Batteries
Electrical

Tuesday Q.36) **NAVTEX**

Navigational Telex

- Frequency : 518 Khz - English
  490 Khz - Regional Language
  4209.5 Khz - Tropical region.
- Emission : F1B
  Frequency modulated RT for telex
- Functional requirement : NO.7
  i.e. Transmission/Reception of MSI
- Cost : It is free service.
- Reciever : Tuned radio frequency (TRF) reciever.
- Modulation : Frequency shift keying (FSK)
- Antenna : Active antenna fitted with pre-amplifier
  Height : 1.5 mtr.
- ZCZC : Phasing signal to 10 sec for tuning just before reception starts.
- Message code : A B 1 2 → serial no. of message.
  ↓ transmitter identity
  → message category.
- Transmission :
  - For transmission, all stations have got a specified allocated transmission time i.e. 10 minutes every 4 hours
  - This is done so that no information should overlap when ship is in range of two station
  - One station get chance of transmission only 6 times a day.



| | 1 EPIRB | 2 SART | 3 two-way GMDSS |
|---|---|---|---|
| Frequency | 406 MHz (RCC) | 9.2 to 9.5 GHz | 156-174 MHz |
| | 121.5 Mhz (Homing frequency) | | |
| Working time | 48 hours | Standby - 96 hrs | 6 hours. |
| | | Transmission time - 8 hrs | |
| Power output | 5 watt (406 Mhz) | 40mW | min : 0.75W |
| | 100 mw (121.5 Mhz) | | max : 1 W |
| Carriage requirement | 1 Nos | 2 Nos | 3 Nos |
| Battery type | Lithium | Lithium | Lithium |
| | Other features | | |
| | It has a RR tape | It should be placed at min^m height of 1m | It should be operated by layman |
| | Flashes light of 0.75cd | It consist of lanyard to tie it at a height | Spacing b/w keys to operate with immersion suit |
| | Can be activated manualy & automaticaly | It has a telescopic rod of 1 mtr. | Sealed primary cell: Battery |
| | It should be of bright colour | It should be of bright colour. | It should be of bright colour |
| | It has a lanyard | Range increases as height of antenna increases | No sharp edges |
| | | | Water resistant |
| | | | It should get operated by one hand. |
| Shelf line | 5 years | 5 years | 2 years |
| Emission | G1D (Phase modulated digital data transmission) | | F3E (Frequency modulated RT |

Tema = 006270000

ANUPAM KUMAR SINGH
16NL2240



| | MF | HF | VHF |
|---|---|---|---|
| DSC distress alert | 2187.5 Khz | 8414.5 Khz | CH-70 |
| RT distress call | 2182 Khz | 8291 Khz | CH-16 |
| Range | 200 to 300 NM | worldwide (depend on band) | approx 25-30 NM, upto 50 NM with DSC; depends on antenna height |
| Power output | Max$^m$: 400 watts | Max$^m$ : 1500 watts | Max$^m$ : 25 watts |
| | Min$^m$ : 1/16th of 400 | Min$^m$ : 1/16th of 1500 | Min$^m$ : 1 watts |
| Frequency range | 300 to 3000 Khz | 3 to 30 Mhz | 30 to 300 Mhz |
| Bands | 1605 to 3800 Khz | 4000 to 27,500 Khz | 156 to 172 Mhz |
| Sea Areas | A2 | A3 & A4 | A1 |
| Modulation | Amplitude modulated (DSC is | Amplitude modulated phase modulated) | Frequency modulated |
| Class of emission | 2182: J3E (AM SSB RT full carrier emi) 2187.5: ~~F1B~~/J2B | RT : J3E DSC : ~~F1B~~/J2B | F3E (Frequency modulated RT) DSC :- G2B |
| Propogation | Ground wave | ground + SKY | Space wave propogation |
| Scanning fascilities | Scanning | scanning | no scanning, only dual watch |
| Duration of DSC call | 6.2 to 7.2 sec :- It & to stop the scanning it will first send the dot pattern. | takes time bcz it is scanning | 0.45 to 0.63 sec (within this time, it repeat for 5 times) |
| Transmission speed of DSC | 100 bauds | 100 bauds | 1200 bauds |
| Antenna | whip antenna | whip antenna | Half wavelength dipole antenna |
| Antenna height | 6 to 8m with ATU | 6 to 8m with ATU | 1 to 2m |
| Call repetition | | | 3.5 to 4.5 second |
| Duration of DSC call | 6.2 to 7.2 seconds. | | 0.45 to 0.63 second |