

# Modern Navigational Instruments

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# Gyro Compass



- ▶ a type of non-magnetic compass which is based on a fast-spinning disc and rotation of the earth (or another planetary body if used elsewhere in the universe) to automatically find geographical direction.
- ▶ invented in 1906 in Germany by **Herman Anschutz Kaempfe**
- ▶ they find true north as determined by earth's rotation, which is different from, and navigationally more useful than, *magnetic north*
- ▶ they are unaffected by ferromagnetic materials, such as ship's steel hull which change the magnetic field

# Magnetic Compass



- ▶ *an instrument containing a magnetized pointer that shows the direction of magnetic north and bearings from it.*
- ▶ Affected by the ship's magnetism

# Azimuth Circle



- ▶ *Used to determine the bearing of an object*

# Telescopic Alidade



- ▶ *Used to determine the bearing of an object*

# Stadimeter



- ▶ *is an optical rangefinder developed by Bradley Allen Fiske (1854-1942), an officer in the United States Navy.*
- ▶ It was designed for gunnery purposes, but its first sea tests, conducted in 1895, showed that it was equally useful for fleet sailing and for navigation

# Radar



- ▶ **Radar** is an object-detection system which uses radio waves to determine the range, altitude, direction, or speed of objects.
- ▶ The radar dish or antenna transmits pulses of radio waves or microwaves which bounce off any object in their path.
- ▶ Radar was secretly developed by several nations before and during World War II
- ▶ The term *RADAR* was coined in 1941 by the United States Navy as an acronym for *radio detection and ranging*.

# Sonar



- ▶ **Sonar** (originally an acronym for **SOund Navigation And Ranging**) *is a technique that uses sound propagation (usually underwater, as in submarine navigation) to navigate, communicate with or detect objects on or under the surface of the water, such as other vessels.*
- ▶ Patented by English meteorologist Lewis Richardson in 1912

# Echo Sounder



- ▶ a type of SONAR used to determine the **depth** of water by transmitting sound pulses into water.
- ▶ The time interval between emission and return of a pulse is recorded, which is used to determine the **depth** of water along with the speed of sound in water at the time.

# Fish Finder



- ▶ *is an instrument used to locate fish underwater by detecting reflected pulses of sound energy, as in sonar.*
- ▶ A modern fish finder displays measurements of reflected sound on a graphical display, allowing an operator to interpret information to locate schools of fish, underwater debris, and the bottom of body of water

# ARPA



- ▶ **Automatic Radar Plotting Aid** *displays the position of a ship and other vessels nearby.*
- ▶ The radar displays the position of the ships in the vicinity and selects the course for the vessel by avoiding any kind of collision.

# ECDIS



- ▶ **The Electronic Chart Display and Information System (ECDIS)** *is a development in the navigational chart system used in naval vessels and ships.*
- ▶ The ECDIS utilises the feature of the GPS to successfully pinpoint the navigational points. Because the GPS is a highly reliable system, the utility and the reliability of the ECDIS as an electronic chart system can never be doubted.

# AIS



- ▶ **Automatic Identification System**, more popularly known as *AIS* is a system which helps to pinpoint the location and other navigational statistics of ships.
- ▶ AIS uses VHF radio channels as transmitters and receivers to send and receive messages between ships which endeavors to fulfill a lot of responsibilities.

# Marine Auto Pilot



- ▶ Marine Autopilots *form the third and final support system of Consumers Marine.*
- ▶ solved the problem of physically maneuvering the ship or the boat, thus allowing the captain far more flexibility in his operations

# Rudder Angle Indicator



- ▶ *provide the angle of the rudder.*
- ▶ The display is provided on bridge to control the rate of turn and rudder angle of the ship.

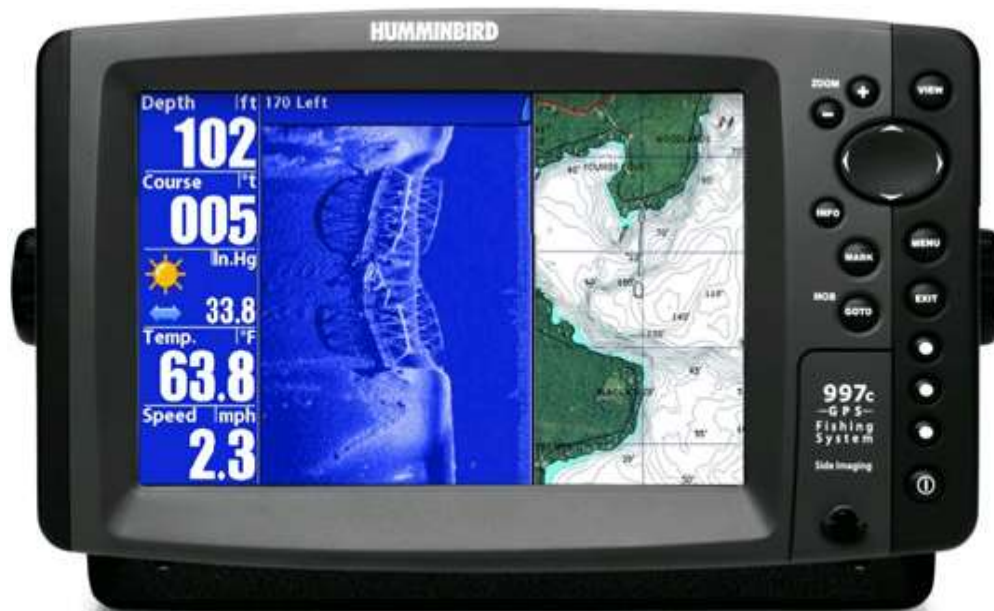
# Voyage Data Recorder



- ▶ Just like in Airplanes, a ship is also provided with a *black box* known as *Voyage data recorder*.
- ▶ It is said that the accident rate of ship is higher than that of an air plane, as the former is bigger in size and carries several machineries in a harsh environment, which makes it extremely important to have a voyage data recorder on board.



# GPS



- ▶ Global Positioning System
- ▶ *is a space-based navigation system that provides location and time information in all weather conditions, anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites.*

# GPS Receiver

- ▶ *is a display system used to show the ship's location with the help of Global positioning satellite in the earth's orbit*



# Marine VHF Radio



- ▶ Marine VHF Radios *are two-way communicators which are used to transfer and receive messages.*
- ▶ The most important function of a Marine VHF Radio is that it is very helpful when it comes to sending distress signals across the channels to coast guards and other ships and boats in the periphery

# Loud Hailer

- ▶ *An electronic device used to amplify the sound of a person's voice so that it can be heard at a distance*



# Sound Reception System



- ▶ *A device used in communication.*
- ▶ It enables the navigating officer inside the cabin to listen to the sound signals and fog horn from other ships.
- ▶ This system is required for a ship with fully enclosed type bridge.

# Rate of Turn Indicator



- ▶ *A device used to indicate how fast the ship is turning at steady rate, normally shown as number of degree turned.*

# Automatic Tracking Aid



- ▶ *A device which displays the information on tracked targets in graphic and numeric to generate a planned layout for a safer and collision free course.*

# Speed and Distance Log



- ▶ *The device is used to measure the speed and the distance traveled by a ship from a set point.*
- ▶ By calculating the same, ETA of the ship is adjusted or given to the port authority and agent.

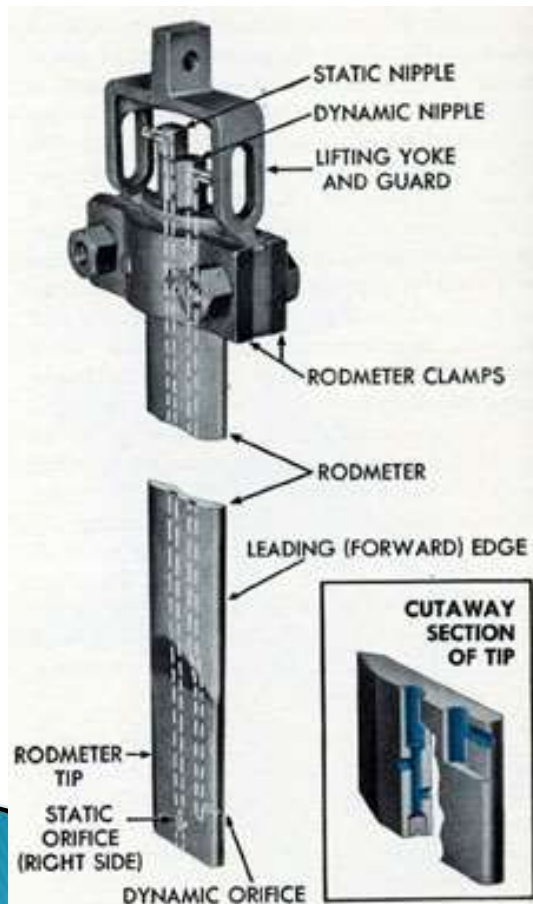
# Impeller log



- ▶ *Used to determine the speed of a boat.*

# Pitometer log

- ▶ *Used to determine the speed of a boat*



# Doppler Speed



- ▶ *Used to determine the speed of a boat*

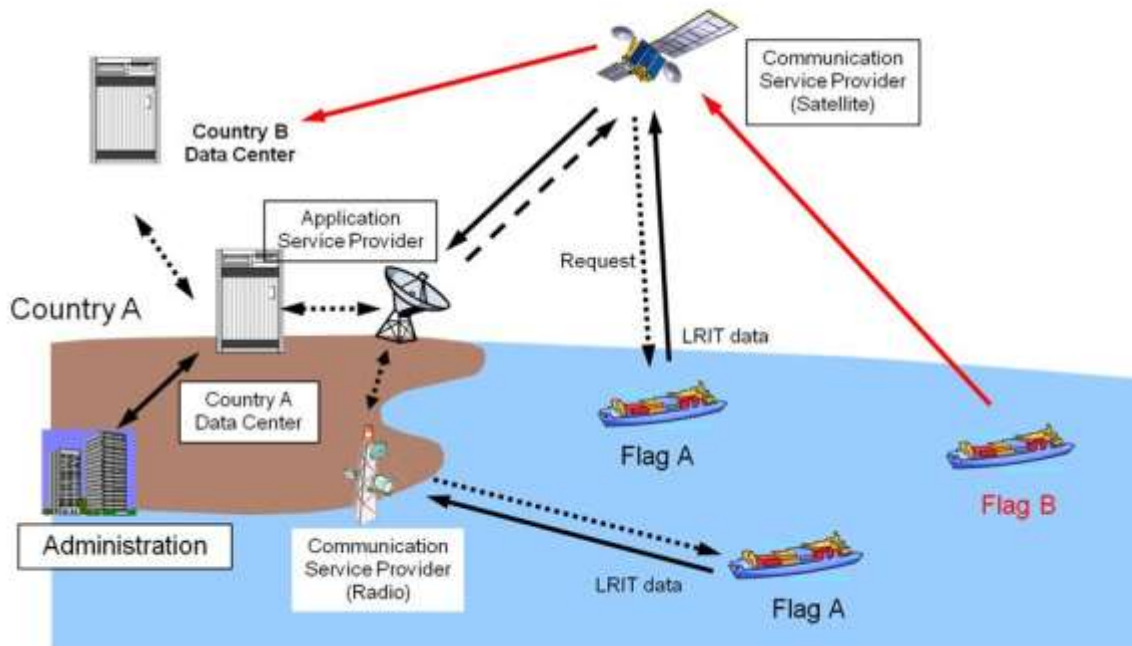
# Radar Altimeter



- ▶ otherwise known as electronic altimeter, reflection altimeter, radio altimeter (RADALT), low range radio altimeter (LRRA) or simply RA which *measures altitude above the terrain presently beneath an aircraft.*

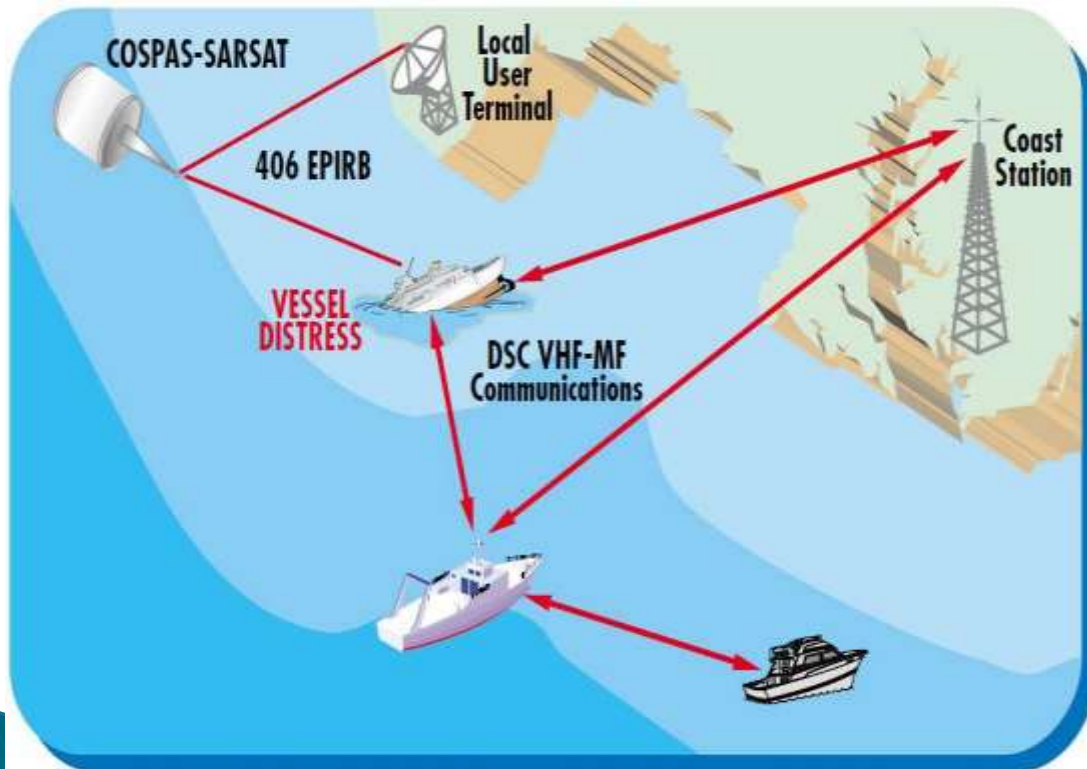
# LRIT

## *LRIT Configuration*



- ▶ The Long Range Tracking and Identification (LRIT) is an international tracking and identification system incorporated by the IMO under its SOLAS convention to ensure a thorough tracking system for ships across the world

# Global Maritime Distress Safety System (GMDSS)



- ▶ The Global Maritime Distress and Safety System (**GMDSS**) is an international system which uses improved terrestrial and satellite technology and ship-board radio systems.
- ▶ It ensures rapid alerting of shore-based rescue and communications authorities in the event of an emergency.

# Anemometer



- ▶ *is a device for measuring wind speed, and is a common weather station instrument.*
- ▶ The first known description of an anemometer was given by **Leon Battista Alberti** around 1450

# Barometer



- ▶ *instrument used in meteorology to measure atmospheric pressure.*

# Navtex/weather fax machine

- ▶ *A device used to provide latest weather information updates*

