RADAR

Radar is a navigation tool which has greatly advanced in the last few years and has also become affordable for most boaters.

What is Radar?

Radar is an acronym which stands for Radio Detecting and Ranging. It is a device which sends a pulsed signal and measures the time for it to be reflected off an object. This information builds an image of surrounding objects. It will provide information about the whereabouts of neighboring vessels, coastal outlines and navigation aids and any object that will reflect the signal. The objects detected are shown relative to your position. No other device can provide this much information about objects around your boat

What Radar Can Do

Its main function is and anti-collision aid.

- Collision avoidance A guard alarm feature allows you to set up and alarm area in front of your ship or a 360 degree circle around the boat. An audible alarm with sound if a radar target is detected with in this zone. Therefore necessary action can be taken to avoid a collision.
- Navigate in darkness and fog When poor or no visibility causes a loss of situational awareness around your boat the radar acts as your eyes and you have the ability to monitor other ships' movement under these conditions
- Assess target movement An Echo Trail feature simulates target movement in afterglow. This is useful to assess the movement of all targets relative to your own ship.
- Determine own ships position By observing the echoes from land masses and islands it can be used to determine your position.
- Targeting birds Fishermen and target birds when looking for schools of fish

Radar Range

When purchasing radar you will see that a 2KW has a range of 24 miles and the 4 KW is 48 miles. This is maximum distance if the radar in the right conditions. The range that radar can detect is relative to the height of the radar scanner above water surface and the height of the target. The radar will show targets at a distance 6% greater than the optical horizon. This is because radio waves bend or refract slightly by atmospheric change.

You can calculate radar range with the following formula

D(nautical miles) = 1.22(sq.root h1 + sq.root h2)

H1 = Antenna height (feet)

H2= Target height (feet)

EX. If a scanner is 12 ft above sea surface and the target is 40 ft then you should be able to see the targets echo on the display when the target is 11.93 miles from the radar

Basic Radar System

The basic system consists of two units. The scanner unit which may be an enclosed dome or an open array. A display unit which allows you to control the radar functions and observe the images created.

- Scanner The selection of the scanner is important to the expected performance. The scanner transmits the radio pulses and receives the reflected echoes. The array in the scanner produces a vertical and horizontal beamwidth.

- Horizontal Beamwidth The length of the array determines the horizontal beamwdith. This can range from 5 degrees to .75 degrees. An 18" array on a 2 KW radar may have a 5 degree beamwidth and a 6 KW open array may have a .75 degree beamwidth. The narrower the horizontal beamwidth the sharper image.
- Vertical Beamwidth The vertical beamwith should be wide and normally 20 to 25 Degrees. The wide beamwidth ensures the ability to display a target on a pitching and rolling boat.
- Resolution The bearing resolution is a measure of the capability of the radar to display two targets located close to each other as individual targets. Radar with a narrow horizontal beamwidth of .75 degrees will show two targets and radar with a wider horizontal beamwidth of 5 degrees will show one target.

Advancements of Radar Technology

Although radar has been around for over 60 years there have been many enhancements and refinements in the last few years. Units today are much lighter, user friendly and affordable. The units today are much smaller, use less power and feature automated controls. The displays today are much sharper and the images easier to interpret.

Digital Signal Processing

The emergence of digital technology in marine radar signal processing qualifies as a major advancement. Digital signals are easier to transmit, mostly immune to noise interference and the data transfer from scanner to display is more effectively analyzed.

Raymarine have a range of open array radars which are called "Super HD" that uses advanced signal processing to get much better angular resolution than the antenna would otherwise deliver. This provides much clearer screen shots.

Navico now have Broadband radar on their Northstar and Simrad units which uses low power solid state technology instead of high powered magnetrons. This eliminates the magnetron which reduces the power usage by 30 to 50%. This is significant for sailboats and small powerboats. They also feature and instant on with no warm up time. They also have great short range resolution.

Latest Radar Features

- Ability to display on multifunction screens with radar overlay or dedicated radar with multicolor features.
- Dual radar ranges that can be displayed simultaneously to give clear data on long and short ranges
- Adaptive digital receiver to automatically adjust to changing environmental and sea conditions.
- Bird modes to detect sea birds above schools of fish.
- Thin interconnect cables and remotely mounted voltage converter modules
- Incorporated NMEA 2000 network port in some units such as Furuno to facilitate connection of NMEA 2000 GPS, weather and other devices without installing more cables.
- Raymarine Advanced Super HD signal processing reduces the effective antenna beam width, enabling increased resolution and performance.

Make sure you check out the radars at the upcoming boat shows and I'm sure you will be impressed.