RADAR CERTIFICATION STANDARDS

Outcome: To demonstrate an understanding of the principles and operation of radar for recreational boating.

Recommended Equipment: This course may be taught in a classroom, or on a boat (or both), and tested in a classroom utilizing a radar simulator, or on a boat equipped with radar.

Knowledge

1.0 Introduction to Radar and How It Works

1.1 Understand the basics of radar.
   1.1.1 Understand that the radar is aligned with the ship’s head and how a radar works.

1.2 Understand how radar can be used for navigation, collision avoidance, and weather monitoring.

2.0 Radar Equipment and Operation

2.1 Understand the differences between broadband and pulse radar systems, including the power requirements of various radar units, broadband and pulse systems, the need for warm-up time (pulse system), and how resolution is affected when zooming in.

2.2 Understand the function of the radar components, including the antenna and display.

2.3 Understand how the following affect radar: antennas (closed radome and open array), antenna length (horizontal beam width), installation height, vertical beam width (gimbaled vs. fixed mount), WIFI vs. cable connections.

2.4 Understand the relative accuracy of target range vs. bearing returns on a small boat vs. a ship.

3.0 Radar Controls

3.1 Understand controls of a radar system, including range (zoom), gain, sea and rain clutter, VRM, EBL, range rings, cursor, day and night mode and interference rejection.
   3.1.1 Recognize the importance of adjusting the range to capture poor or distant targets.

3.2 Understand the various display modes such as true motion, relative motion, heads up, north up, course up.

3.3 Understand the pros and cons of overlaying radar on a MFD.

3.4 Understand the setup and use of guard zones.

4.0 Weather

4.1 Understand how range and bearing on a radar can be used to track the relative motion of localized weather phenomena such as squalls, rain showers, and thunderstorms.

4.2 Understand how a radar display can be used to determine the intensity of localized weather phenomena such as squalls, rain showers, and thunderstorms.
5.0 Radar Limitations and Capabilities

5.1 Understand the limitations of radar, including blind spots, shadow sectors, and false echoes.

5.2 Understand how the size, shape and composition of targets (i.e., small vessels, geographic features) influence the quality of returns.

5.3 Understand your vessel’s quality of radar image and how to enhance it (i.e., radar reflector).

5.4 Understand a radar’s potential to interfere with other electronic devices and the importance of proper shielding and installation.

5.5 Know when to rely on radar and when to use alternative methods for navigation and collision avoidance.

5.6 Describe the importance of using safe speed in restricted visibility as radar may not capture all targets.

6.0 Collision Avoidance

6.1 Understand the actions to be taken to avoid collision utilizing radar based on the relative positions of the vessels.

6.2 Understand the use of bridge-to-bridge communications to clarify collision avoidance actions.

Practical Skills

1.0 Radar Controls

1.1 Demonstrate the use of controls of a radar system, including range (zoom), gain, sea and rain clutter, VRM, EBL, range rings, cursor, day and night mode and interference rejection.

1.1.1 Demonstrate the ability to adjust the range to capture poor or distant targets.

2.0 Navigation

2.1 Interpret radar returns such as land, buoys, and other vessels.

2.2 Utilize available radar tools (EBL, VRM, range rings) to determine range and bearing of an object.

2.2.1 Determine whether there is constant bearing and decreasing range and a risk of allision.

2.3 Use variable range markers (VRM) to measure distance between objects.

2.4 Convert a relative bearing to a true bearing.

2.5 Interpret natural and man-made features (i.e., breakwaters, bridges, headlands).

2.6 Demonstrate the use of a radar overlay on a MFD and distinguish differences between boats and buoys.
3.0 Collision Avoidance

3.1 Determine the risk of collision by analyzing target motion and calculating closest point of approach (CPA), and time to closest point of approach (TCPA).

   3.1.1 Determine whether there is constant bearing and decreasing range and a risk of collision.

3.2 Demonstrate the ability to track multiple targets and prioritize collision risks.

3.3 Apply appropriate actions to avoid collision, considering both maneuverability and the limitations of radar.

3.4 Demonstrate creating a guard zone.

3.5 Demonstrate activating and utilizing Mini-Automatic Radar Plotting Aid (MARPA), including acquiring targets.