Raymarine Seminar Series:

Electronics for Fishing & Navigation

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Notice

- Raymarine products are designed as aids to navigation and are not substitutes for the exercise of the discretion and proper navigational skill of the user.

- The information contained in this manual and provided at this presentation is a summary of the capabilities, uses and functions of certain of our products. It does not replace the information contained in the current user manuals that accompany such products. The user manuals contain additional important and comprehensive information regarding the proper use and limitations of the products. Please refer to the applicable user manual before using or operating any Raymarine product.

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Welcome: Housekeeping Items

- In case of emergency…
  - Nearest exit…
  - Fire extinguishers and safety…
- Restrooms
  - Are located…
- Telephones
  - Please turn ringers off and take your calls outside.
  - Pay telephones are located…
- Breaks
  - Lunch will be held…
  - Please come back on time….we can't wait for you!
- Refreshments
  - Please help yourself to beverages.
- Evaluation, Gifts and Door Prize
  - Please complete an evaluation before you leave.

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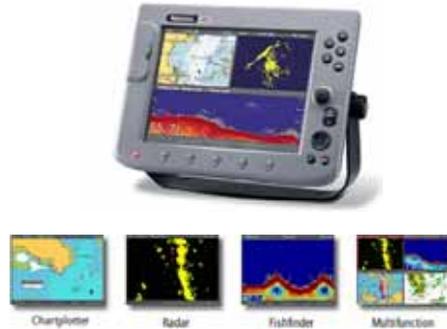**Raymarine**

Raymarine Multifunction Displays

Setup and Customization

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Multifunction Displays: Overview

- GPS-Chartplotter
- HD Digital Fishfinder
- Radar

- Digital Instrument Repeater
- Engine & Generator Data
- Satellite Weather Receiver
- CCTV and Entertainment

Chartplotter   Radar   Fishfinder   Multifunction

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While the concepts presented are primarily for the C70, C80, C120, E80 and E120, almost all of the GPS Navigation and HD Digital Fish finding content is applicable to the A60 and A65 series too.

The concepts are also applicable to the new G-Series Navigation System.

Basic Layout and Controls

- Soft Keys
  - Press to access corresponding on-screen functions.
  - Vary according to active application.
- System Keys
  - Hard-coded functionality.
  - Maneuver, edit, control and manipulate.
- Twist 'N Click
  - Rotary control with press-to-select
  - Navigate menus, enter alphanumeric data

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Applications, Pages and Windows

- Applications are the core system functions.
  - Chart, fishfinder, radar, weather, video etc.
  - Programmed to appear on pages in advance.
  - Active application owns the keyboard.
- Pages contain our applications.
  - 5 pages accessible at any given time,
  - 5 page-sets can be preconfigured and saved.
  - Each page can host 1 to 4 applications.
  - Accessed using the PAGE key.
- Windows host applications on a page.
  - Allow for viewing of 2 or more apps. simultaneously
  - Can be maximized (full screen) or minimized.
  - Windows are accessed with the ACTIVE KEY

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Page sets can be renamed in the Page Set editor. Simply select the set of pages to rename and press the RENAME PAGE SET soft key. Use the Twist 'N Click knob to enter your preferred name and press save.

There are many possibilities for using all of the programmable pages:

-by activity: cruising pages, navigation pages, fishing pages.

-by watch standers: Bob's Pages, Judy's Pages, Ralph's Pages.

Customizing the Layout

1. Select a page set.
   - Press and hold PAGE, or MENU…SELECT PAGE SET
2. Choose the page you want to edit.
   - Look at the Softkey Icons
3. Decide how you want it to appear.
   - Use the track pad to make a choice, then OK.
4. Assign your applications to windows.
   - Use the ACTIVE key and track pad.
   - Press OK to finish and make another.

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This is a good place to have the class build a page with a 4-way split of applications. Chart, Weather, Fishfinder and Weather. You will use this screen for much of the rest of the class.

Upgrading the Software on Your MFD

- Updates are posted regularly to Raymarine.com and are located on the product's page, or in the Customer Support section.
- All that is required is a SanDisk CompactFlash Memory card, and a CF card reader on your computer.
- Download the update from Raymarine.com and unzip it to your CF card.
- Insert the update in the CF slot, and power on the display. Select "Update This Unit" and you're off…

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Props: SanDisk CF card, CF reader/writer.

The latest software version (as of this writing) are:

A60 and A65: v2.28

C-Series: v4.26

E-Series: v3.31 (with version 4.xx imminent.) The demo displays in the classroom are updated to 4.xx.

Go to www.raymarine.com/support and click on Software and Firmware Upgrades for a list of FAQ's.

Go to the E120 product page, then click on the "Downloads and Updates" tab.

To download software updates from Raymarine.com you must register your product online. Contrary to the appearance of the form, the product serial number is NOT required. Enter "not available" if you don't know what it is.

GPS and Chartplotter Fundamentals

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Voyage Planning: Waypoints and Routes

Waypoint: A specific location designated by a set of coordinates. Waypoints mark a destination, a point along the way to a destination, or a point of reference.

Route: A set of waypoints that define the intended path of travel.

Important notes to remember:

- Marine navigation is always "as the crow flies." *You* must make sure your route doesn't go over land, shallows, rocks, etc.
- When plotting waypoints near buoys and channel markers, be sure to plot them safely *next to* the markers, not on them.

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Waypoint Entry (by cursor)

The fastest and simplest way to use the system:

1. Move the cursor with the track pad.
2. Press the WPTS key.
3. Press the WAYPOINT AT CURSOR soft key.

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Waypoint Entry (by exact position)

1. Press the WPTS key.
2. Press the WAYPOINT AT LAT/LON softkey.
3. Use the Twist 'N Click knob to dial in your position.
   - Twist to change the digits, click to advance the field
   - Press OK when you are done.
4. Use the track pad to move to other editable fields
   - Press Soft Key to edit.
   - Twist to change the digits, click to advance the field
   - Press OK when you are done.
5. A final press of OK closes form and saves the data.

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Route Building (by cursor)

1. Enable route building mode:
   - NAVIGATION OPTIONS…ROUTES…BUILD NEW ROUTE
2. Move the cursor to desired location.
3. Press PLACE WAYPOINT softkey.
4. Repeat as necessary!

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Notice the cursor cross hairs are GREEN. This indicates the route builder is on. In normal measuring mode the cross hairs are white.

Tip: If you need to move the chart to see where you are going to plot your next waypoint, RANGE OUT first, reposition the cursor, then RANGE IN. This is much faster than "bumping" the edge of the chart window.

Route Building (existing waypoints)

You can use any pre-existing waypoint that appears on-screen, or is stored in your waypoint list.

On-screen waypoint: Simply hover the cursor over the on-screen icon. Watch for the "USE THIS WAYPOINT" softkey to appear and press to accept.

From the waypoint list: Simply press the USE WAYPOINT LIST softkey. In the form that appears your waypoint list is on the left. Use the track pad or Twist 'N Click to select it, and press the INSERT WAYPOINT softkey.

You can insert more from the list, or press USE CURSOR to go back to the map.

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Recalling and Reversing our Route

- Press the ROUTES softkey and select FOLLOW ROUTE OPTIONS.
- Select the route you created coming out.
- Select REVERSE AND FOLLOW to follow it backwards.

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If a route is visible on screen, you can also access it with the context sensitive cursor. Simply hover on a route rhumb line and select FOLLOW or REVERSE as appropriate. You can also opt to INSERT a waypoint, MOVE a waypoint or HIDE the route from the menu that appears.

Waypoint Archive and Transfer

- Display capacity (internal memory):
  - 1200 waypoints, 150 routes, 10 tracks
- Save or retrieve from CompactFlash memory card
  - Compatible with RayTech Planner, Navionics NavPlanner
  - Accessed through the DATA key.
- Save all of the items in a list, or just a group of them.
- NMEA 0183 Transfer using WPL and RTE sentences.

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If you are importing data and the system detects it to already exist in memory, you are given the options to retrieve the data as new information (create a copy), replace the existing data (overwrite) or to cancel the transfer.

Navigation via Autopilot with SeaTalk

1. Activate the route on your chartplotter.
2. Bring your autopilot on-line by pressing the AUTO key. The pilot locks in on whatever heading the boat is currently on.
3. Press the NAV or TRACK key on your autopilot. This engages navigation mode.
4. The pilot will beep and indicate the waypoint name on its display.
5. The pilot will alternate either PORT or STARBOARD on the display, indicating the direction it intends to turn the boat.
6. **LOOK!** Visually verify it is clear and safe to turn.
7. Press the NAV or TRACK key again to give the pilot permission to turn.

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Letting the autopilot do the steering can save you time and fuel! Plus it frees your hands to do other things. Just don't forget to maintain a proper lookout.

When navigating to a single waypoint, and the pilot arrives at the destination, it will sound an arrival alarm and drop from navigation mode to locked heading mode. The boat will remain locked on the last ordered heading until you press STANDBY.

When following a route, and the pilot arrives at any waypoint along that route, it will sound a waypoint arrival/advance alarm. The pilot display will indicate its desire to turn to the next waypoint by displaying the name of the next waypoint, and the direction of turn PORT or STARBOARD. Again, verify it is clear to turn, then press the NAV or TRACK key to grant the autopilot permission to turn.

Tides and Currents

- Tide tables and tidal current tables are built-in to the Navionics chart card
  - If the card is not inserted, you won't be able to access data
- Look for the "T" or "C" Icons, or use "Nearest"
  1. Press the OK then FIND NEAREST SOFTKEY
  2. Select TIDE STATION or CURRENT STATION then FIND softkey
  3. By GPS, the nearest stations are presented, by distance.
  4. Select a a station then press TIDAL DATA softkey to display .

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The key presses are the same for accessing both tides and currents, the only difference being whether you select TIDE STATION or CURRENT STATION from the menu.

You can use the SHOW ON CHART to jump to the location of the selected item. It will appear in the geometric center of the chart window. You may need to zoom in or out to see the actual icon.

Dynamic Tides and Currents

Available on C and E-Series running v4.xx or higher.

1. Move the cursor over the "T" or "C" icon *on the chart.*
2. Press OK to reveal object information.
3. Press the ANIMATE softkey
4. Use the animation controls on the soft keys to play, pause, go forwards or backwards.

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Depending on your particular geographic region, and the typical range of the tides, you may have to zoom in significantly on the tide icon to see the full change of rise and fall in the animation.

The key presses are the same for accessing both tides and currents, the only difference being whether you select a "T" or "C" Icon initially.

The time interval range is selectable between 15 and 120 minutes in increments of 15 minutes.

3D Chartplotter (E-Series Exclusive)

- Three dimensional view of land and undersea contours around the boat.
  - Pan, zoom, rotate or pitch this display.
  - Active motion mode or planning mode indicated by brackets around the view indicator.
  - Can be show with or without aerial photo overlay.
  - Declutter and exaggeration tools.
  - Depth Plane tool for spotting structure.

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3D Chartplotter is exclusive to E-Series displays, and utilize their built-in 3D graphics coprocessor.

Pan: Track pad

Zoom: Range in/Range out

Pitch/Rotate: Twist 'N Click knob (click to select)

Declutter: enables you to turn off all of the chart text and navigation aids with one button press, making it easier to see the detail of the 3D display.

Exaggeration: magnifies the vertical aspect of the 3D chart, making the differences between the deepest depths and shallowest shallows more apparent. Particularly useful for identifying bottom structure.

2D-3D Simultaneous Chartplotter

- Lock the range and view of both charts together to improve low-visibility navigation.
- PRESENTATION…CHART MODE & ORIENTATION…CHART SYNC (3D)
- Rotation and pitch of the 3D charts is reflected on the 2D display.
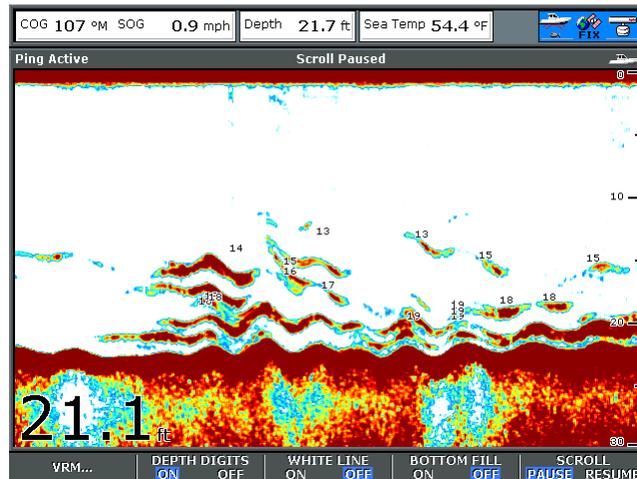
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3D locator can be used to "frame" the 3D view on the 2D display. This aids in identifying exactly what the 3D field of view its. With 2D window active select PRESENTATION…CHART LAYERS…3D LOCATOR (ON.) This will only appear when 2D/3D sync is active on the system.

HD Digital Fish Finding

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HD Digital Sonar Display

Utilizes data from the DSM250 (C-Series) or DSM300 (C or E-Series) sounder module.

Raymarine's patented HD Digital technology brings digital signal processing to the marine sonar.

Dual Frequencies enable the system to optimize itself for water depth, and improve detail level in shallower water.

The BOTTOM is indicated in red, with the WIDTH of the bottom line indicating the bottom type. A narrower bottom line indicates a harder bottom. A wider line tends to indicate mud, while a red line with yellows and oranges on top tends to indicate weeds. Everything below the bottom line is noise and can be ignored, or eliminated with BOTTOM FILL.

How Does It Work?

- DSM & transducer convert electrical impulses into sound, then sound back to electrical impulses.
- DSM measures strength of returning echoes and converts them to an image.
- The fish's GAS BLADDER provides the surface that created the acoustic echo.
- Color denotes ECHO STRENGTH, with red as the strongest, and blue as the weakest.
- Data scrolls left to right, newest to oldest.

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Fishfinder Zoom Mode

- Full or split window operation.
- Magnify water column 2, 3 or 4x.
  - xR: manually select the height of the area you want to see.
- ZOOM POSITION: allows you to scroll up or down the water column.
  - Auto keeps the bottom in view.
  - Use manual to look up from the bottom to see bait or downriggers.

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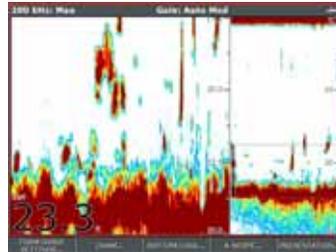
Bottom Lock Mode

- Enhanced spotting of bottom fish by flattening bottom structure.
- Full or split window
- Range control adjust how much water column is visible.
  - Surface will now appear to have contour.
- Move the bottom up or down within the window with the BOTTOM SHIFT control.

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A-Scope Mode

- Live, unprocessed, sonar echoes.
- Displays what is directly under the boat.
- Transducer cone diameter is indicated at the base of the A-Scope display.
- 3 Modes:
  1. Centered display.
  2. Expanded mode (magnified.)
  3. Cone view.

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Marking a Sonar Contact with GPS

- Fishfinder display is correlated with real-time and historical GPS data.
- Double-press WPTS key to drop a waypoint at the boats current position.
- Move the cursor to a historical target and press WPTS…WAYPOINT AT CURSOR.

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SCROLL PAUSE can be accessed from the PRESENTATION softkey. This freezes the display for study, or to mark a historical contact. The digital depth continues to update the actual depth under the boat.

To go back to a saved sonar waypoint touch WPTS, then GOTO WAYPOINT OPTIONS, pick your point from the list, and press GOTO WAYPOINT. Your GPS/Chartplotter is now tracking back to that recorded position. You could easily engage the autopilot's navigation mode to circle back.

Sonar Measuring Tools

- Depth Digits: live depth under the boat, from the 200 kHz element.
- Depth Lines: Horizontal lines, similar to radar range rings. Press MENU…FF SETUP…DEPTH LINES
- Target ID: Numerical depth reading next to individual sonar contacts. MENU…FF SETUP…TARGETDEPTH ID
- Cursor Depth/Position: depth, distance and position to the cursor crosshairs. To see this, you must have the cursor data box enabled.
- Variable Range Markers (VRM): User adjustable depth/distance markers. PRESENTATION…VRM (ON.)
  - Use Twist 'N Click control to adjust.
  - Great for setting and confirming depth of bait!

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Depth Digits can be set to appear large or small, top or bottom of the display (MENU…FF SETUP), or on/off (PRESENTATION). Depth digits come from the 200 kHz element of the transducer. When WHITE LINE mode (PRESENTATION) is on, the white line is plotted directly from the depth digits.

DEPTH LINES automatically split the display into sections. Their interval is dependent on the depth of the display and they are not adjustable.

Target ID: Target Depth Identification places a numerical depth next to each contact detected above the bottom. The sensitivity of this is controlled by the FISH ALARM sensitivity control. If you are getting to few or too many, adjust the alarm threshold up or down. (MENU…ALARMS SETUP…FISHFINDER ALARMS SETUP.)

Cursor Depth/Position: Press the DATA key, then DATABAR (ON).

SIRIUS Marine Weather & Satellite Radio

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SIRIUS Weather Data (Pre-Trip)

- Coastal Zone Forecasts
  - Accessed through the WEATHER REPORTS softkey.
  - Select between accessing forecasts at SHIP or CURSOR
- Choose between the following messages:
  - **Tropical Statements:** latest tropical weather discussion from the National Hurricane Center
  - **Marine Warnings:** late breaking weather for the zone around your cursor or boat. (US coastal or near shore)
  - **Marine Zone Forecasts:** US and Canadian coastal, offshore and high seas forecasts.
  - **Watch box Warnings:** Thunderstorm or tornado warnings.

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Atlantic, Gulf, Caribbean and Pacific Regions are all covered in the TROPICAL STATEMENTS. Scroll down through the text to see all of the regions.

Watch box Warnings are warning of SEVERE weather activity: particularly thunderstorms and tornados. When the system receives a watch box warning, the system generates an alert consisting of a pop-up text message and an audible alarm. To acknowledge an alert, press the acknowledge key and the alert will disappear. The WATCHBOX WARNINGS softkey allows you to recall the most recent warning on the system.

SIRIUS SST Data

- Find the *best conditions, closest to your vessel.*
  - SST fronts (breaks) aid in concentrating schools of fish.
    - Often accompanied by actual water color change
  - Upwelling: cold, nutrient rich water rising to surface
    - Promotes plankton growth, base of the ocean food chain.
  - Fish desire to stay within optimal temp. range to maintain muscle efficiency.
- Use DISPLAY GRAPHICS softkey to turn off or on.
- Context sensitive cursor allows you to get precise temperature at a particular location.

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4km resolution

NOAA AVHRR (Advanced Very High Resolution Radiometer) Weather Satellites (Polar Orbiting.) Image

Ocean Temp. Ranges for Select Species

Species	Lower Avoidance	Optimum	Upper Avoidance	Species	Lower Avoidance	Optimum	Upper Avoidance
Albacore	59	63	66	King Mackerel	70	78	88
Amerjack	60	65	72	Permit	65	72	90
Atlantic Bonito	60	64	79	Pollock	33	45	60
Atlantic Cod	31	47	58	Pompano	68	77	88
Atlantic Croaker	45	63	70	Red Drum	52	72	90
Atlantic Mackerel	45	64	70	Red Snapper	50	57	62
Baracuda	55	78	82	Sailfish	68	80	88
Bigeye Tuna	52	58	66	Sand Seatrout	90	95	100
Blackfin Tuna	50	74	81	Sea Catfish	50	62	70
Black Marlin	68	78	86	Skipjack Tuna	50	62	70
Bluefin Tuna	50	68	78	Snook	60	72	90
Bluefish	50	68	76	Striped Bass	61	68	78
Blue Marlin	70	78	85	Striped Marlin	61	70	80
Bonefish	64	75	85	Swordfish	50	66	78
Dolphinfish	70	75	82	Tarpon	74	85	104
Fluke	55	65	72	Weakfish	48	60	80
Haddock	37	48	52	White Seabass	58	68	74
Jack Crevelle	70	75-85	90	Winter Flounder	36	50	64
Kelp Bass	62	65	70	Yellowfin Tuna	64	72	87

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Source: National Marine Fisheries Service.

SIRIUS Weather Radar

- WSI NOWRad Doppler weather radar
- 2 kilometer resolution, 5-minute update cycle
- To turn on or off:
  1. Press DISPLAY GRAPHICS
  2. NOWRad (on or off)

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Weather Systems International (WSI) is the "gold standard" of weather data providers. The combine data from their own vast network of sensors and stations with data from NOAA, other government agencies, research, commercial and proprietary sources.

Combine your NOWRad layer with the Storm Cast and Lightning layers for maximum effect.

Interpreting NOWRad Radar

| dBZ Level	Rainfall (in./hour)	Equivalent Amount	Color Rain	Color Snow	Color Mix
15-19	<.004″	Very light rain or light snow			
20-29	.01″	Light rain, or moderate to heavy show			
30-39	.08″	Moderate rain or sleet showers			
40-44	.40″	Moderate to heavy rain or sleet showers			
45-49	.75″	Heavy rain showers			
50-54	1.75″	Heavy thunderstorms			
55+	8.00+″	Intense to severe thunderstorms with hail			

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dBZ (decibels) is a measure of the radar echo reflectivity of the precipitation. The higher the dBZ, the larger the precipitation object is.

Generally precipitation with a dBZ value of less that 15 evaporates before reaching the ground, so is not shown on the system.

If you are seeing weather radar echoes on a clear day, the reporting station is in "clear air mode." This allows the radar to detect frontal boundaries, smoke plumes, dust, variations in air temperature, insects, birds, or ground clutter (most common within 30 miles of the radar station.)

SIRIUS Storm Cast & Lightning

- Predictive graphics showing the direction and speed of a storm cell.
- Detailed information is available by moving the cursor over the storm, and pressing OK.
- Cloud to ground lightning strikes over last 15 minutes, updated 5 minutes
- 3-Colors indicate the age of the strike.
  - Yellow: 0-5 minutes
  - Light Gray: 6-10 minutes
  - Dark Gray: 11-15 minutes

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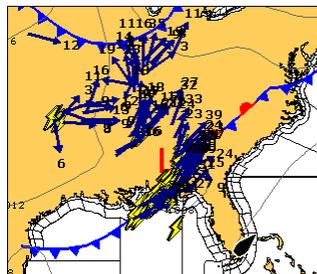
Storm cell speed is indicated in knots.

Echo tops are the radar-indicated top of an area of precipitation. It can be used to assess the intensity of a storm. The rule of thumb is that the higher the echo tops are in a storm then the stronger the updraft produced by the storm. A stronger updraft makes convective wind gusts and large hail more likely. When there are several storms on radar, the ones with the higher echo tops may be the most likely ones to produce the most significant severe weather (convective wind gusts and hail).

SIRIUS Watch Boxes and Warnings

Watch box: a red polygon superimposed on the weather chart indicating a region for which a valid alert is active.

- Controlled under PRESENTATION…WATCHBOX
- Severe thunderstorm, tornado, hurricane, etc.
- To view the related text alert press WEATHER REPORTS…WATCHBOX WARNINGS

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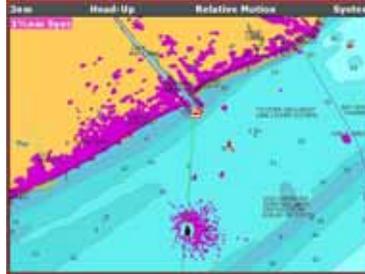**Raymarine**

Raymarine Radar

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Multifunction Radar Integration

- Accessible from either its own application, or within the 2D chartplotter mode as an overlay.
- Waypoints and names can be shown on the radar display, as well at the active waypoint indicator (lollipop.)

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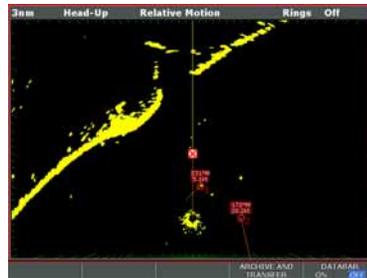
Radar-Chart Overlay Mode

- PRESENTATION…CHART LAYERS…RADAR OVERLAY.
- Live radar superimposed over 2D chart display.
- Easy correlation of radar contacts to landmass and navigation aids.
- MARPA and AIS contacts plotted on the chart with their radar video.

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For best possible overlay performance, your MFD needs a GPS fix and the input from your electronics heading sensor (compass or autopilot.) 5 or 10 Hz update rate is preferred.

The compass needs to be properly calibrated (deviation, heading alignment) for proper overlay. Deficiencies in the calibration will be evident as the radar image will not align correctly with the chart.

Note the dual range scales indicated on top left. Chart range is measured from the bottom of the window to the top of the window. Radar range is measured from the center of the scope to the edge of the scope. Hence the 1.5 mile radar range (3 mile diameter) correlates to the 3 mile chart range.

MARPA and AIS Integration

- Mini Automated Radar Plotting Aid (MARPA)
  - Manually added targets, calculates course, speed, CPA, TCPA.
  - Move cursor to radar contact, press TARGET TRACKING….ACQUIRE TARGET
  - Track up to 10 contacts simultaneously
- Automatic Identification System (AIS)
  - Automatic plotting of up to 100 AIS Transponder equipped vessels.
  - Identifications, course, speed, CPA, vessel details etc.
  - Requires optional AIS receiver.

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For best MARPA results you should have a valid GPS fix, 5 or 10 Hz update input from electronic compass or autopilot.

Bird Hunting with Radar

- Open-array antennas have the advantage.
  - Narrower beam width makes for better target discrimination
  - Increased sensitivity more adept at detecting small targets
- Increase gain control to just below the saturation threshold.
  - Longer range (6+ miles) scales tend to work better (longer pulse length.)
  - Overall blue speckling….we are looking for breaks of yellow.
  - Dense, recurring targets
  - Avoid adding any sea clutter, FTC or rain control.
- Wakes control may make it easier to see traveling flocks (ENHANCE ECHOES…WAKES.)

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Turn target expansion (ENHANCE ECHOES…EXPANSION) on if on a range scale below 6 miles.

End

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