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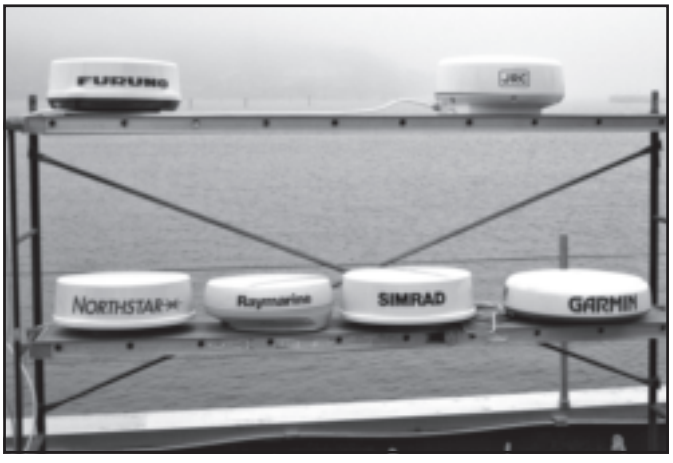

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Color Radar Shoot-out

Furuno's 1834C is our Best Buy. Garmin's GMR-40 comes up short. Northstar's 6000i disappoints.

Above: *The Furuno has it all. It performed flawlessly, it's easy to use, and it's reasonably priced. The only drawback is that the Furuno takes slightly longer to set up than some of the other systems.*

The last radar test we did was back in the fall of 2004, and consisted of small 2 kW entry-level radar units with 7-inch screens. This time, we decided to test 4 kW units with LCD screens from 10 to 12 inches. The units had to have a radome-style antenna in the 4 kW power rating, and we stuck to units capable of being networked into a system (not PC-type configurations). When we cross-checked radar specifications against our test parameters, we came up with a strong field of six best-sellers: Furuno's 1834C NavNet VX2, Garmin's 3010C w/ GMR-40 Radome, JRC's JMA-5104, Brunswick's 10.4-inch Northstar 6000i, Raymarine's E120, and Simrad's RA41C.

How We Tested

To run a controlled performance test on each radar unit, we determined that the job would have to be done on shore, where we had a stable platform to work from. We chose a nice little harbor along the southern Connecticut shoreline that possessed all of the classic New England coastal features: sandy beaches, granite shoreline, a few prominent rock outcroppings in the middle of the harbor, and a resident population of small fiberglass commercial fishing vessels returning to port every day from 15:00-16:30.

A set of pipe staging was assembled about 14 feet above sea level (adjusted for tide change) to support our radome antennas. All units were wired per the manufacturer's provided instructions, shimmed level, and then carefully commissioned and fine-aligned per the set-up instructions. To prevent transmission interference between radar units operating in close proximity, we tested our units two at a time on the top tier of the staging and used the middle tier of the staging as our on-deck platform.

Testing the performance of an individual radar could be considered somewhat subjective. *Powerboat Reports*' two testers are FCC-licensed technicians with radar endorsements. They ran each radar though a general performance test to rate the intuitiveness of the operational interfaces. They also ran some very specific performance tests.

For close-range target resolution, we anchored a pair of lobster trap floats 6 feet apart at a range of about 200 yards (just within the radar units' 1/8 mile scale). Each radar in rotation was set to the 1/8 mile scale with the operational mode to full auto control (tune and gain), and the target expansion feature was toggled off. Notes were made as to which target echoes were detected from the target floats, and then we repeated the test with the operational mode set to manual, as we hand-tuned the controls for best picture.

For long-range target detection, we moved our base camp to the end of the town pier, which had an unobstructed view of the Long Island, NY, shoreline, about 15 nautical miles to our south. According to topographic maps, the area of shoreline in our line of sight is a sand composite hillside that sits about 90 feet above sea level (ASL).

The radars were again set up level to the horizon at 14 feet ASL, and operated in both the automatic and manual modes. We calculated that the theoretical "radar horizon" of a radar antenna sited at 14 feet ASL detecting a target standing 90 feet ASL should be around 16.06 nautical miles, or just within the detectable range of the distant shoreline. Had the calculation yielded a radar horizon of less than 15 nautical miles, then we would have had to raise the height of our radar platform. We judged the radars on the ability to detect the distant shoreline

VALUE GUIDE: 4 KW COLOR RADAR						
MODEL	FURUNO 1834C NAVNET VX2	GARMIN 3010C W/ GMR-40	JRC JMA-5104	BRUNSWICK NORTHSTAR 6000I RAD4K	RAYMARINE E120 M92652-S	SIMRAD RA41C
Display size/Type	10.4" Color TFT	10.4" Color TFT	10.4" Color TFT	10.4" Color TFT	12" Color TFT	10" Color TFT
Range	1/8-36 nm	1/8-36 nm	1/8-48 nm	1/8-36 nm	1/8-48 nm	1/8-36 nm
*Radome Weight	17.6 lbs.	27.5 lbs.	23 lbs.	25.5 lbs.	19 lbs.	25.5 lbs.
Beam Width Horizontal/Vertical (Degrees)	3.9/20	3.6/25	4.0/25	3.9/25	3.9/25	3.9/25
System Power Consumption Standby/TX	2.9A/5.1A	2.0A/3.2A	3.9A/5.1A	3.9A/4.9A	2.7A/4.8A	2.0A/3.1A
Antenna Cable Length (Meters)	15 m	15 m	20 m	10 m	15 m	10 m
Close Range Target Resolution	Excellent	Excellent	Excellent	Fair	Excellent	Excellent
Long Range Target Detection	Excellent	Good	Good	Good	Excellent	Good
Display Brightness/Sunlight	Excellent	Excellent	Fair	Excellent	Excellent	Excellent
Display Brightness/Night	Excellent	Good	Excellent	Excellent	Excellent	Excellent
Human Interface/Menu Operation	Excellent	Good	Excellent	Fair	Excellent	Good
Product Quality	Excellent	Good	Good	Good	Excellent	Excellent
Street Price	$3,878	$4,298	$5,407	$5,348	$5,048	$4,729
Source (websites)	Boatfix	Boater's World	Boatfix	Consumers Marine	Defender	Consumers Marine
Warranty (Parts/Labor)	2/2 years	1/1 year	2/2 years	2/2 years	2/2 years	2/2 years
*All have 24-inch radomes						

in both modes of operation and the quantity of long-range echo return (amount of shoreline detected).

To evaluate controllability, we set out to determine how much user input was required to obtain the best image of our harbor at the 1-nautical mile range in both the automatic and manual modes. We then determined the effectiveness of each unit's automatic mode against the picture that we obtained via manual mode operation.

Sea clutter control was examined, and we also performed the basic LCD monitor screen tests (sunlight brightness, viewing angle, polarized sunglass test, night operation). We measured the loudness of each unit's guard zone alarm.

Furuno 1834C NavNet VX2

In the fall of 2005, Furuno's 1800/1900 second generation NavNet VX2 radar systems were voted the best units on the market by dealers, technicians, distributors, and industry professionals of the National Marine Electronics Association (NMEA). Taking into account that Furuno has a 58-year market presence here in the US and currently markets more than 35 different models of marine radar, one could say that Furuno takes its radar business seriously.

Furuno's 1834C radar system is a well-built, professional-grade radar system that continuously undergoes refinement instead of wholesale redesigns. When we opened up the 1834's radome, we were greeted with the cleanest and most organized design of our test group. The 1834C's antenna array (the component that rotates) is of a composite design. Furuno has opted on its 1834C radome to install a half-height printed circuit board antenna inside of a slotted metallic array to achieve the best technology that each component has to offer. Furuno's attention to detail even shows up in the drive motor that is used to rotate the array. The motor is fitted with a brass gear, not plastic as found on the Northstar and Simrad units. The payoff in using higher-quality motor components is that the Furuno radome spins in complete silence.

The 10.4-inch landscape TFT color multi-function display that Furuno is using with the 1834C has also undergone some tweaking from the previous NavNet 1 design. The NavNet VX2 uses a glass screen with better bonding agents, which help to minimize moisture fogging on the display screen and provides better viewability when wearing polarized sunglasses. These displays are blazingly bright, offer a high level of radar picture control with a precision rotary control knob, and the operational menu is very intuitive.

In the performance arena, Furuno's 1834C garnered top honors in both close-in and distant-target detection when operated in the manual mode. The initial set-up of the 1834C is a bit involved in comparison to the other units in our test, which were basically plug and play devices. The Furuno required that we access an installation menu and select the radar scanner type, radar antenna height, and perform a radar optimization test. As involved as this sounds, the NavNet VX2 is fitted with an on-screen installation wizard menu that guides you through each step. The result after you have initialized the unit with the proper parameters and performed the optimization procedure is a radar picture that gives the user a high level of control.

The auto mode of operation is not the 1834C's strong point, as we were consistently able to tune a better picture than the 34's auto mode provided. But the picture that the 1834 delivers in the auto mode of operation is clearly more defined than that of the Garmin or the Northstar.

Bottom Line: Years of design refinement have served this product well, not only in the performance category but also in cost. It appears that refinement instead of redesign for Furuno paid off in lower manufacturing costs, and Furuno has passed along at least a portion of those savings to its customers: This excellent unit is also the least expensive radar in our test group.

Garmin 3010C with GMR-40 Radome

The GMR-20 (2 kW) and the GMR-40 (4 kW) are Garmin's first entries into the marine radar market. The GMR-40 stands out from all other radome antennas in our field because of its low-profile radome. The GMR-40 stands just 7 inches tall, vs. the standard 10-inch "wedding cake" style of most other 4 kW radomes. Unfortunately, the attractiveness

of the Garmin's low-profile comes with a weight penalty as the radome weighs almost 10 pounds more than a Furuno 1834 radome, which makes the Garmin the heaviest in our field. Garmin shipped us a GMR-40 with its 3010C 10.4-inch color LCD multifunction display. The 3010C is an excellent GPS chartplotter, exhibiting fine control and viewability. But when we connected the GMR-40 radome to the 3010C display, we noticed from the very beginning that this radar scanner had a very different operational feeling and style of control than the other units. The difference: The Garmin is being controlled via an Ethernet connection to the 3010C. This means that the radar picture is actually being collected and processed in the GMR-40 antenna and then downloaded to the 3010C display. We noted that the radar picture's refresh rate or "sweep" looks a little choppy until all sectors download. (Garmin attributed this to software algorithims in the scanner that could be fixed, but they had not logged any complaints so far.) Although the Garmin 3010C is an excellent GPS chartplotter, it lacks a rotary control knob, which makes it easier to shape and fine tune radar images. Pushbuttons, sliding scales, and track pads are nice for certain functions, but in our opinion, nothing beats a rotary knob for sea- and rain-clutter control.

The GMR-40's radome does not need to be opened for installation, but we opened it anyway to get a first-hand look at the new design. "Unique" is the first word that comes to mind. The GMR-40 uses a convex circuit board antenna that actually rotates around (rather than on top of) the radome's electronic circuitry. Garmin wanted to achieve a low radome profile and improve the radar's radiation pattern. Garmin engineers told us that when a conventional, two-dimensional (non-convex) antenna array is positioned above the metal electronic housing, the antenna pattern is distorted due to field-induced currents in the housing. This is avoided with Garmin's three-dimensional (convex or bent) array by positioning the metal housing behind the antenna. The result is a narrower beam with good side lobe performance and a pattern that is independent of azimuth.

The GMR 40 functioned well in the close-range target resolution test and was able to detect our foam floats as individual targets in both the automatic and manual modes. Although this unit has the narrowest horizontal beam width (3.6 degrees), which should produce better target resolution, it stumbled a few times in the automatic mode when we were tracking some of the commercial fishing vessels entering the harbor at the half- and 1-nautical mile scale. It appeared as if strong target returns of the harbor's granite walls confused the auto gain feature, so the vessels entering the harbor adjacent to the seawall were painted as blobs extending from the wall. At the same time, we had the Simrad unit in full auto operation, tracking the targets at the same scales, and the commercial vessels were never lost or painted into the seawall. In the long-range detection test, the GMR 40 was very sensitive and displayed good target return echoes in the manual mode; the auto mode sensitivity was average.

When we reviewed installation considerations, we noticed that the interconnect cable that couples the Garmin's radome to the scanner unit is an unconventional flat style cable that splits into a "Y" configuration at the radome (one for DC power and one for signal data), unlike the industry standard that uses a single round cable. The radome interconnect cable on the GMR-40 plugs directly into a set of exterior jacks on the underside of the radome, which means the radome does not need to be opened for cable attachment like the other units we tested. But—and this is a big but—with molded cable ends attached at both ends of the flat-style interconnect cable, the time you gain from not having to open up a radome and physically connect an interconnect cable will be lost many times over when trying to route a cable with large permanently attached plugs on it. This interconnect cable is not going to be easy to install or conceal on many installations, especially when trying to run it down the inside of a tower leg on a powerboat or inside the wire channel of a sailboat's mast. Garmin's brief installation hand-out clearly advises not to cut the ends off of the radome interconnect cable.

Bottom Line: The Garmin 3010C

Above: *Performance tests included how well each radar showed shoreline 15 miles away and two lobster pot floats 200 yards away.*

is a quality GPS product that is an attractively priced crowdpleaser. GMR 40's radome is too heavy, its one-year warranty period is too short, and the possible installation issues with the radome interconnect cable keep this unit from rising above the middle of the pack. In our opinion, Garmin needs to work on the details, like adding a rotary control knob to the multi-purpose display for better control and providing a product installation book with more substance. Eight photocopied pages that are stapled together are not good enough, in our opinion.

JRC JMA-5104

Although this unit is marketed by JRC as a "black box" radar, we wanted to include it in our test because of JRC's radar experience and the JMA-5104's unique installation configuration. Although the 5104 can be ordered standard with JRC's 10.4-inch LCD monitor, this unit is gaining market popularity for those who want a no-nonsense, stand-alone radar, and don't need a fancy waterproof TFT sunlight-viewable monitor.

The JMA-5104 consists of a nice, compact remote keyboard, a robust black box processor, and a 4 kW radome. The unit that was shipped into us from JRC included a 10.4-inch color TFT monitor, which falls short of the brilliance exhibited by all of the other monitors that we tested.

JRC's 4KW radome antenna is fitted with the new style PCB circuit board style antenna array. The component layout and EMI shielding of the 5104's radome is nowhere near as neat and compact as the designs of Garmin or Furuno, but the overall design of this unit seems to work very well.

During short- and long-range performance evaluations, our technicians always fought for equal time with the JRC because the unit was such a pleasure to use. The 5104's remote keyboard comes with four rotary knobs, one each for tune, rain, sea, and gain, in addition to one large "jog" dial that controls the EBL/VRM and guard alarm zones, and a trackball. Because this unit is a dedicated radar system, you gain simplicity in picture presentation and control, but lose some embedded features that are taken for granted when a radar antenna shares processor space with an integrated chartplotter. The JMA 5104 is not capable of radar overlay to a chart, which is a standard feature option on most multi-function displays.

Short-range target detection and overall picture presentation of our test harbor was superb. On the long-range test, the quantity of echo return from the distant shoreline was a bit on the low side. The long-range detection was adequate, but a notch below some of our other units.

We called JRC about the shortcomings that we experienced at distant ranges. What we found out was that deep in the JRC radar installation manual, there is a little-advertised menu setting under the title "setting transmission power control" that allows a user to bump up the radar's power level. The manual states that when using the radar in the high power mode, "Although the life span of the magnetron decreases, the sensitivity of the unit increases." We opted not to push our unit's magnetron to the wall, as most users would be operating the unit in the factory default, normal mode. JRC's technical support staff also alerted us that had our unit been equipped with an open scanner antenna (one that had a motor rotation control function), we would have been able to access a second-level menu feature designated "S-Buoy Detect," which helps detect distant faint target echoes. This radar feature is accomplished by reducing the antenna's rotational speed, which allows the unit's transmission beam to become more focused on distant targets.

Above: *Radomes were placed on the top shelf during testing. The weather cooperated, providing some pea-soup fog.*

Bottom Line: The JMA-5104 is a good, solid unit that can be used to solve many below-deck installation problems, where space restrictions don't allow optimum radar display positioning. In using the high-quality remote keyboard of the 5104, coupled with a good grade LCD monitor from a local PC chain store, you can effectively build a custom radar solution. The major draw back of this unit is its price. At a street price of $5,600 with the monitor, this radar is out of range of most recreational vessels, no matter how many secret weapons JRC has loaded into its unit. The 20-meter radar antenna cable that is provided standard with this unit (double the length that is provided with the Northstar and Simrad) is appreciated on vessels that have long cable runs back to the helm station.

Northstar 6000i / RAD4K

Nothstar has been a dominant manufacturer of GPS chartplotters for many years, and its 6000i GPS is another example of the company's capabilities. However, while researching this article, we bumped into a lot owners grumbling about this product's reliability record. When we asked Northstar about this, we were informed that it had shifted the manufacturing of its GPS products overseas to a state-of-the-art facility in New Zealand

(NavMan factory), and quality control is expected to vastly improve through the use of advanced robotics on the production line.

Given that the 6000i is an icon in today's GPS market due to its bright display screen, intuitive menus, and fast chart re-draws, we were ready to be impressed by its 4 kW radome.

Straight out of the box, we immediately noticed that the Northstar's radome looked identical to the Simrad radome. When we flipped both units over, we noticed manufacturer nameplates that indicated that Koden manufactured both units, and that they both were the exact same model number (RB715A). In the bottom of the Northstar's radome shipping container was a radar-processing box with a Koden sticker on it. It was not present in the Simrad system.

When we started pulling all of the installation materials out of the 6000i box, and noticed that all of the cables had bare ends on them, it became apparent that this was not going to be a plug-and-play installation. Nevertheless, we assembled our radar kit per the provided instructions (which we found a bit confusing) and performed the initialization process.

The radar picture is only displayed as a 6-inch-diameter circle on the 6000i's 10.4-inch landscape display. There is no provision to hide or reduce the size of the starboard side menu bar, which would free up more space for the radar's target presentation. The testers also noted that this radar system's menu bar was the first they had ever operated where they had to go looking for the gain and sea clutter controls. Northstar placed them on the display's second menu page.

Let's discuss the "toggle switch" issue. The manual states that "the radar does not automatically turn off when the navigator (6000i) is turned off, unless the power control relay has been installed." Northstar provides a toggle switch to externally control the DC power flow to the Koden radome antenna. Every other unit's radar shuts down when the unit is turned off. The Northstar manual states that if the external toggle switch is omitted in the installation and the system power is left on, even though the 6000i itself is in the off position, the unit will "still draw a tiny amount of power." We measured the 6000i drawing a solid 1.2 amps in the off position (with a radar module connected), which we feel is not a "tiny" draw.

Above: *The Raymarine finished second to the Furuno in performance testing. The 12-inch screen is 2 inches bigger than all other test units, but the Raymarine is also the second-most expensive unit tested: $5,040.*

Both technicians put in a lot of time trying to tune this unit to make the picture of our test harbor wake up and come alive. After numerous system resets, and a dozen or so tries at using the manual tuning option, we accepted the displayed radar image as normal for this set and scored it appropriately. In the long-range test, the 6000i faired a little better, but the performance was still lackluster.

When we operated this unit in the manual tuning mode, the control of the picture seemed to be lagging and unresponsive. In the back of the installation manual (appendix B) is a passage that refers to manual mode tuning: "Make an adjustment with the tune key, and wait five seconds before evaluating the change. If the echo is now stronger, make another adjustment in the same direction. If weaker, try the other direction." Waiting five seconds to evaluate a radar picture every time a tune adjustment is made is not acceptable, in our estimation.

To us, this unit felt like old PC radar—the processor is just too slow to handle the radar data coming in. At least with the old PC radars, you could opt for a faster PC processor, which is not the case with the 6000i.

The Achilles heel of the 6000i's radar system is the method in which Northstar receives data from and sends control signals to the radome. Northstar is using a single NMEA 0183 port on the back of the 6000i as the radar sensor gateway. None of the other units in our test field (not even Simrad, which is using the same exact radome as the 6000i) uses an NMEA data port as the radar gateway, and all of the other units that we tested were much more responsive than the Northstar.

Bottom Line: This unit falls far short of what we expected for Northstar quality and performance.

Raymarine E120

Raymarine, since breaking away from the Raytheon company several years ago, has been churning out a wide array of innovative navigational equipment that's gaining worldwide recognition.

The E120 is Raymarine's 12-inch, sunlight-viewable color MFD (multifunction display) product that showcases its GPS chartplotter capabilities through the use of Navionics' new Platinum cartography. In compari-

son to Raymarine's older sibling, the C-series, the Raymarine E-series is constructed of a machined aluminum housing (not plastic like the C-series or the Garmin 3010C). The screen brilliance on the E-series is about 20 percent brighter. Raymarine has announced that it will offer a Sirius satellite weather channel receiver option for the E-series this spring, and we are told from insider sources that a Sirius satellite radio module—with radio station tuning control right from the rotary control knob of the E-series display—is in the works.

The 4 kW radome scanner that was shipped with our E120 MFD utilizes the new printed circuit board style antenna array found on the Garmin). But, unlike the Garmin, Raymarine's array is not convex. Raymarine also attaches the antenna drive motor to the antenna array via a rubber belt versus a gear-to-gear arrangement as observed on all the other units in this test. Operational noise emitted from this radome was just as quiet as the Furuno 4 kW radome.

Installation of the Raymarine radome to the E120 MFD is straightforward. Once the interconnect cable has been installed into the radome, the rest is plug and play. Right out of the box, the Raymarine had a solid picture of our test harbor. When we performed the close-in target test with the E120, the unit returned three target echoes in the automatic mode, which baffled us. That was until we took our eyes off of the radar screen and looked out at our target floats, which revealed that the third target was actually a curious waterfowl. Obviously, this radar unit's auto mode is on the mark. In the long-range test, the Raymarine exhibited solid target returns from the distant shoreline, scoring it first place in the automatic mode, but yielding to the Furuno when compared side-by-side in the manual mode. The E120 is capable of manual radar tuning via a rotary control knob, like Furuno's NavNet VX2, but Furuno has more depth of control. Raymarine has a sweet set-up on its website that allows users to download the latest software upgrades for the C and E-series (at no charge) onto a flash memory card. Once the update has been loaded onto the blank memory card from your home or office, the card is taken to the boat and inserted in place of the Navionics card. A few button presses later, and the machine has been software upgraded. Another nice thing about having a blank memory card on hand is the ability to store all of your waypoint and track data onto the card—without the assistance of a PC. The memory card now becomes your memory back-up and allows you to directly share your waypoint and trip data with other C- and E-series users. Finally plug and play as it was meant to be.

Above: *To achieve a lower profile, the Garmin radome's circuit board rotates around the guts of the radome instead of on top of it.*

Bottom Line: The performance of this radar product is at the top of our list, as is the brilliance and viewing angles of the MFD display. It also boasts intuitive soft keys, excellent night illumination levels, and flexibility to grow the system with future enhancements. With its 12-inch screen, the Raymarine is about $1,100 more than a comparable Furuno 1834C. That's a lot of money for two more inches of LCD and a short list of software gizmos.

Simrad RA41C

The Simrad RA41 is a two-component, no-nonsense radar system that is supplied with Simrad's excellent 10-inch color TFT sunlight-viewable monitor and a Koden model RB715A radome. Although the Northstar 6000i and Simrad use the same model Koden radome, the Simrad radar, in our opinion, is a much more refined and easier unit to use than the Northstar.

We chose the Simrad RA series radar instead of Simrad's CX series because we wanted to test one of the few remaining stand-alone radars on the market. The RA is not fitted with a GPS chartplotter, so its design and processing power is dedicated to radar performance. This full-feature unit is capable of adding a second station remote (either in color or B&W LCD), which fulfills our intent of testing integrable units. Although the RA does not have radar/chart overlay, it does have a semi "3D" mode and a feature that Simrad coins "multi vision."

Overall, the RA41 performed well. When we tested close-in target resolution, this unit painted two very sharp and defined target echoes from the pair of lobster trap floats that we set out in the harbor. In the long-range test, the RA41 was a bit under par, with results comparable to the Northstar and the Garmin. All three main radar parameter controls —gain, sea clutter (STC), and rain clutter (FTC)—are controlled by a rotary adjustment knob that has an excellent tactical feel.

Deep in the menu mode of the RA41 is a user set-up feature that allows the unit's radar antenna scanner to double its rotational speed from 24 RPMs to 48 RPMs. This feature is not available on Simrad's 2 kW radome products. We activated the high-speed scan rate to see whether we could detect any noticeable difference in the way that the commercial traffic entering the harbor at 10-18 knots was displayed on the TFT display. All we noticed was a marked increase in the amount of gear noise that was being emitted from the radome. We popped open the radome to quickly see where the noise was coming from (never position your body and especially your eyes in the horizontal transmitting path of a radar's antenna) before we shut down the unit for a closer look. Upon further inspection, we found the noise coming from the meshing of the plastic gear on the scanner's drive motor with the metallic gear of the scanner antenna. When the scanner was operating in the high RPM mode, the drive motor was actually wobbling from side to side. The scanner's drive motor is mounted on small rubber bushings to compensate for the lateral movement, but we're still not confi-

Bottom, from left: *Raymarine E120 M92652-S, Furuno 1834C NavNet VX2, Garmin 3010C with GMR-40.* ***Top, from left:*** *Northstar 6000i RAD4K, JRC JMA-5104, Simrad RA41C.*

dent with the configuration.

Simrad's "multi vision" mode allows you to split the radar screen in vertical halves and display a different radar range on each half. The operator can set 50 percent of the display screen to watch the half-mile scale while dedicating the other half to the three-mile range. It's done with a high-RPM antenna option. The RA41's processor addresses each of the two side-by-side radar scales one at a time. The scanner will refresh the port side image first, while holding the image on the starboard side range static. Then the starboard side image will be refreshed while the port side is held static. Because Simrad has the ability to spin its scanner at double speed, the net result when looking at the pictures of two different range scales side-by-side should be almost transparent. But this was not what we experienced when we selected the dual range mode on the Simrad, and set the range scales at one-half NM and 3 NM.

When operating the RA41 in multivision mode, we found that if we made any change to the radar's operational range scale, while we were in the dual range mode, the starboard side picture presentation would go completely blank for a solid 10 seconds before its picture would reappear. Thus, if we were tracking a hot target bearing down on us, and we had to drop the half-mile range scale to one-quarter mile or up the range to three-quarter mile, the starboard 50 percent of our close-range scale would be blank for a very long 10 seconds. That's a big problem, in our view. Simrad said told that when the dual range mode is selected, the high-speed antenna scan does not automatically engage. We went through the rather cumbersome procedure to engage the high-speed rotation and indeed the fast antenna scan rate solved our picture re-draw issue. Still, we felt switching speeds should be automated for this mode, or at least easier, and speed should be indicated on the main display.

Bottom Line: We liked the display's viewability and high quality, but we felt that the radome antenna design was lacking. The upcoming DX series radomes are supposed to automate the rotational speed for multivision mode, as well as be quieter.

Conclusions

The best performer is also the Best Buy: The Furuno 1834C NavNet VX2 is priced right and is a serious navigational tool, manufactured by a company that is synonymous with marine radar. We were hoping for a little more performance and a better warranty with the new Garmin GMR-40. The picture on the Northstar 6000i was just lost in translation, somewhere deep inside the machine. The Raymarine E120 radar has the performance and the wow factor, but the $1,000+ price differential over the Furuno unit keeps it from garnering our top honor.

We liked the rotary controls on JRC's JMA-5104, and found this unit's performance and intuitive operation to be quite good. The optional monitor that JRC provides is not bright enough to be viewed in full sunlight, and needs to be confined to wheelhouse locations. The use of alternative "sunlight viewable" LCD monitors, available from third-party sources, should be considered if you are planning to mount your radar viewing station on deck.

Simrad's RA41C is a good-performer that allows the operator to adjust the picture with relative ease. We definitely are not fans of Simrad's "multi-view" feature when using the radar in close quarters because of the re-draw time associated with the split screen, dual-range mode, as the operator changes a range scale. The good news is that this feature can be easily toggled off and the radar set to a normal presentation. ■

Garmin, *913/397-8200, garmin.com*
Northstar, *800/628 4487, northstarcmc.com*
Simrad, *425/778-8821, simradusa.com*
Raymarine, *800/539-5539, raymarine.com*
Furuno, *360/834-9300, furuno.com*
JRC, *206/654-5644, jrcamerica.com*