See and be seen

Chandlery bargains prompt Gilbert Park into fitting a nearly-new radar and radar target enhancer to his displacement motorcruiser

With the boat living in front of the kitchen window a tall radar mast would have spoiled the view

On a previous boat of mine an Echomax Active-X Radar Target Enhancer (RTE) was fitted and when using it I felt confident that I might be more visible to bigger boats, especially at night and in poor visibility.

I was at a boat jumble and saw a brand new one at a give away price and snapped it up. Then I bought my little Trusty T23 motorboat that I was eventually going to use for trips, perhaps as far as the West Country. I thought I'd probably fit radar in a year or two when I was using this boat more.

But when I saw an ex-demonstration, virtually brand new Raymarine Quantum Radar for sale on an internet site I couldn't resist and jumped at the opportunity.

Following all the excitement of the bargain purchases I now had to fit them to my boat. The boat only had a tiny mast that neither device would fit. My wife and I often walk to the nearby marina in Emsworth which gave us the opportunity to look at different types of mast. Our boat is moored in front of the house, to be

Trying the arch before drilling any holes. Notice the steaming light has been removed to allow the arch to go as far aft as possible so as not to restrict opening of the hatch

I spent some time working out where the radar arch should go on the cabin roof so that the hatch would open as much as possible even when the radome was installed on the arch

more specific in front of the kitchen window. My wife enjoys spending time in the kitchen so a design criteria for fitting the equipment was that it mustn't be any higher than the anchor light, otherwise it would spoil her view!

Ladder arch

After several weeks of searching the Internet and looking at boats in the marina I chose one of the least expensive ones available from Southern Marine Products. It was a ladder arch and it fitted exactly between the aerials that were already installed on the boat and would enable me to fit several bits of equipment over time, as well as the RTE and radar.

I did need an additional plate to fit the radar to the narrow arch. Olly, at Taylor Engineering in Emsworth Marina, laser cut a piece of 6mm stainless steel with all the holes needed cut into it. Once I had this I could work out exactly where to fit the arch with the radar on top of it. There was an opening hatch that would be obstructed if the radar was too far forward. To put the radar as far aft as possible I decided to move the forward steaming light. I fitted it underneath the radar on the same plate and in advance had drilled holes for a navigation light.

The arch arrived with no holes drilled in the plates to fit equipment. I'd always been worried that drilling stainless steel was difficult. In fact, if you're careful and have the right equipment it's not too difficult. I drilled out the holes for the radar, enhancer and also a spare set of holes for a standard aerial deck mount.

While I was sourcing all the parts for fitting the arch, etc. I put the wiring in – feeding the wires proved the most difficult bit of the job! I used fibreglass rods and nylon draw tapes to get the first draw string in place. Once I had a draw string in place I pulled through the radar wire. Fortunately, the Quantum Radar does not need a wired connection between the

Drilling stainless steel

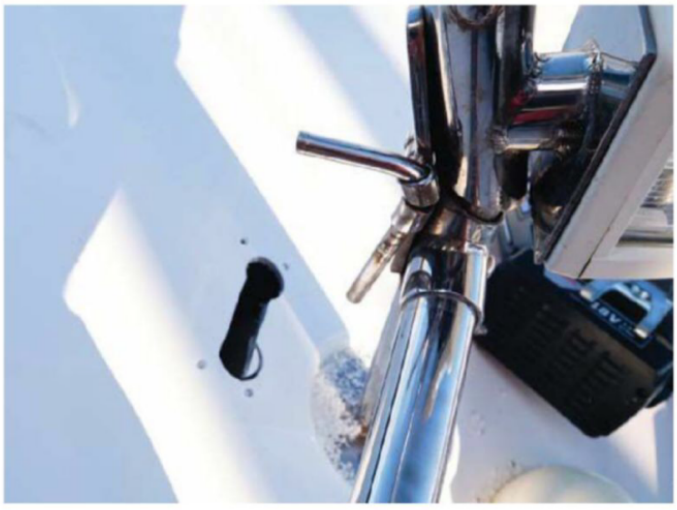
Having had some bad experiences drilling stainless steel I was slightly nervous about drilling the radar arch to take the radar and the RTE. However, I was not drilling big holes (maximum 12mm) and the plate on the arch is only 2 mm thick.

The major risk is generation of heat as the drill bit goes through. Overcooking it by trying to take it too fast causes the case hardening of the metal which makes the drilling of the steel much more difficult and blunts the drill bit.

These tips worked for me:

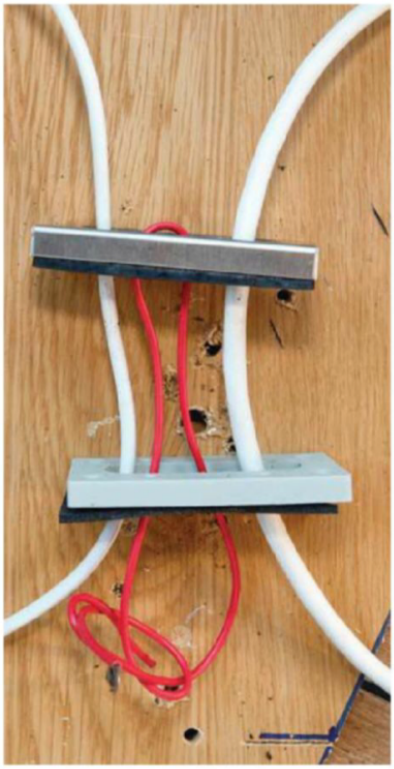
- **Wear proper personal protective equipment (eyes, hearing and hands)**
- **Make sure the metal you are drilling is securely clamped, so it can't spin around and injure you if the drill jams.**
- **Use a slow speed for the drill bit. The bigger the hole you are drilling the slower the speed.**
- **You may need to use even, but considerable pressure to drill through. Drilling 'downhill' such as through a deck plate makes things easier as you can place the drill in your chest with your spare hand cupped over the back of it, lending the full weight of your upper body to the task.**
- **Don't try to drill a large hole in one go. Start small and increase the size in several steps.**
- **Use high quality drill bits, you can get away with HSS bits, but really take it slow with these. I used cobalt tipped bits which are the recommended, more forgiving ones for stainless steel.**
- **Use a cutting fluid. This both cools and lubricates the drilling. There is considerable debate as to what to use, but anything is better than nothing. Water, bacon fat and even fermented bananas have been used. Probably, the best thing to use is a proper, viscous, cutting oil. Use of a cutting fluid will make drill bits last longer and reduce heat and case hardening of the piece being drilled.**

Stainless steel is very hard. With the right tools and patience drilling it is possible. I started with cutting oil and a small (4mm) drill and gradually worked up in size.



To take the two cables I decided to fit a waterproof through deck connector that could take multiple wires. This needed one large slotted hole

The best way I found of getting the cable through was to tape the cable firmly to a pull through cord, which means there are no knots to snag as it goes through. Lubrication with washing up liquid on the tape helps it slide through



As I'm almost certain to fix other items needing a wire going through the cabin top I decided to fit a large multiwire deck seal

LEFT The Echomax Active X control box. This was very straightforward to fit and connect. The control box is not waterproof so needs to be fitted somewhere protected

BELOW The power cable for the radar finally through to the helm switch panel, where it could be connected to a switch

multifunction device and radome, only a 12V power supply. This 12V power supply wire is still quite thick, but has no plug on the end to be pulled through.

Futureproofing

As I'll almost certainly fit other electrical gadgets to the arch, I fitted a multi wire thru-deck waterproof gland. I drilled this to take extra wires and put short lengths of wire through the holes to ensure it remained watertight in the meantime.

Pulling through with a drawstring, the wire frequently jammed when going through small gaps. The easiest way I found to pull the wire through was to put the wire and drawstring alongside each other and tape them together with insulating tape for about 20cm, thus avoiding the bulk of a knot.

Once the wires were through and I had all the stainless steel parts it was time to fit the arch and the other parts. Unfortunately, I couldn't get access to the area behind the cabin top so I couldn't use nuts and bolts and I would have to screw the arch to the cabin top with stainless steel self-tappers.

Wiring

Both the RTE and radar along with the AIS and foghorn were wired through a 15A thermal breaker as the 'At Sea' switch making it easier to ensure everything that was not needed at anchor or in the marina could be switched off. The radar then had

Using self tapping screws in fibreglass

I had no option but to use screws to hold the arch on as there was no access to the underside of the cabin top. I wanted to make sure the screws were as strong as possible, but without any cracks in the fibreglass.

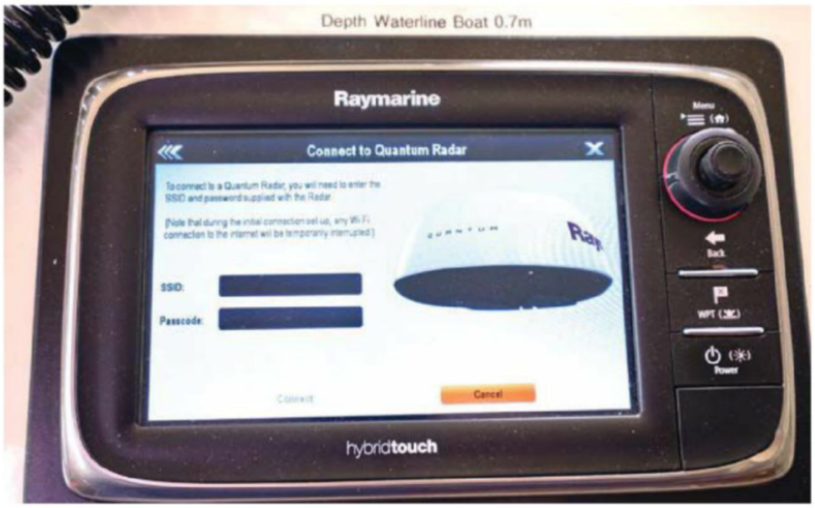
Self tapping screws have two diameters. The major diameter being the outside diameter of the threads and the minor diameter is the width of the shaft of the screw. The size of the pilot hole should not be less than the diameter of the shaft because fibreglass is not compressible – if the pilot hole is less than this the screw will exert a lot of pressure as it screws into the fibreglass and may crack it. If cracking is excessive you have a potential leak and the screw will not hold as well as it should.

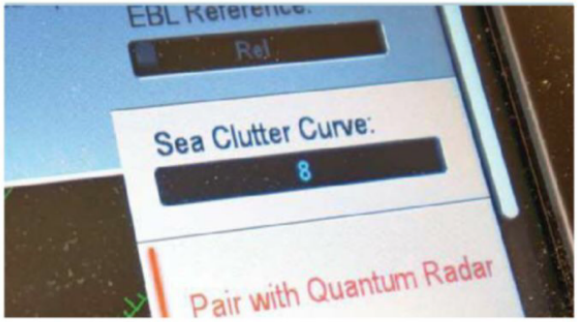
It's important to drill the correct size hole

How do you determine the right size of hole to drill? There are some tables that may help but I measure the outside diameter of the screw, using either the holes in the drill box or a metal plate with standard size holes drilled out. Next I usually go 1-1.5mm less depending on the size of the screw. I try the screw in a hole in a piece of scrap. If it screws in easily the hole is too big. Once I have the right size I drill the hole in the fibreglass.

I then use a rose countersink bit to just take a little out of the gelcoat and go down to the fibreglass underneath. I then try and screw the self tapper in using a handheld screwdriver: if it goes in relatively easily then I have the right size pilot hole. If it's hard I stop and redrill the hole the next size up.

When I'm screwing the self tapper in – using an electric screwdriver with an appropriate torque setting – I put sealant into the countersink area which not only waterproofs the fitting but also acts as a lubricant for tightening.





ABOVE The final page of the wireless connection menu. The SSID and password are found on the base of the radome and on labels with the paperwork
RIGHT Part of the menu to connect the multifunction device to the radar

a separate fuse (5A) as did the RTE (3A). A main switch for the radar was sourced from ebay. The RTE came with its own control box, including a power switch.

Once they were all wired up it was time to switch and connect the radar and the RTE, they both worked! Then I had to wirelessly connect the radar to the Multi Function Device (MFD). This was the easiest part of the job. The sequence from the menu in the MFD was Setup/System settings/External devices/Quantum radar/ Pair with Quantum radar. The screen wanted the SSID and Password. Both are found on the base of the radome (tip: photograph it before you finally bolt it on) as well as several labels in the packing. That's it – all done.

For the RTE it's simply a case of turning it on and waiting until it's painted by another radar and then it will ping.

As for my wife I got a few brownie points for not having the radar above the anchor light and spoiling her view.

ABOVE After installation of radar and Echomax, even the swans can still be seen swimming past. If I do need to fit an extension to the RTE then I will fit a folding aerial mount
LEFT The view from the kitchen window – fitting the radar was not to obstruct this view

Active X

Marine radar is classified as working on the X-band (9.32-9.5 GHz) or S-band (2.9-3.1 GHz) frequencies. The X-band, being of higher frequency, is used for a sharper image, better resolution and is used for collision avoidance. In addition to X-band bigger ships use S-band (which needs a bigger antenna) to penetrate rain or fog and for identification and tracking.

The Echomax Active-X Radar Target Enhancer (RTE) I have fitted receives a signal from transmitting X-band radars, then amplifies and returns a stronger signal. This helps to alert nearby vessels of my position and reduces the risk of collision. In addition, the RTE sounds a visual and audible alarm that tells me the unit has been painted by a radar and therefore another vessel is close.

Echomax also supplies a dual band XS-band RTE that not only enhances signals from X-band radars but also enhances those from S-band radars.

When fitting an RTE to any boat with its own radar the RTE is designed to be fitted directly above the radar scanner dome, otherwise the RTE might 'see' the boat's own radar.

It was also necessary to amend my Ship's Radio Licence to include the RTE.

Echomax Active-X Radar Target Enhancer

ABOUT THE AUTHOR

Gilbert Park has been sailing various craft for much of his life, and for the past few years it has been motorboats. Having done the RYA Yachtmaster Ocean course and gone straight into the first lockdown he decided it was time to slow down and travel at 6 knots most of the time. This allowed him to take sights and also make tea and bake bread underway instead of having to sit at the helm seat and hang on. Much more relaxing!