Piers and Lin du Pré live on the small 25 square mile island of Guernsey, one of the Channel Islands in the English Channel. The islands are Crown Dependencies owing their allegiance to the Duke of Normandy, a title handed to the British monarch by William the Conqueror in 1066, currently held by the Queen. As such the Channel Islands are not part of the UK or the EU.

Piers and Lin have boated for over 30 years, and currently own Play d'eau, a Fleming 55. The coasts of the UK and France are their main cruising grounds.

'Dad!' shouted Rollo, our 20 years old son, as he pointed at a thick grey mass moving towards us over the water. 'Look. Is that a fog bank?' We were anchored in Havre Gosselin, one of Sark's halcyon bays, having just eaten lunch under clear skies and a scorchingly hot sun. 'Can't be,' I said, disbelievingly. But it was and in minutes we were engulfed in thick, wet, cold fog, obliterating the other anchored boats in a grey soup. We could see nothing. Visibility was zero. I'd never seen anything like it. The problem? We had to get back to base. Packing up, we turned on the radar and started creeping the long 8nm journey back to Beaucette Marina.

Although there weren't many targets it was harrowing avoiding them. It felt like I was playing dodgems whilst blindfolded. I kept thinking I should know how to use radar properly. Soon after this experience both Lin and I enlisted on a specialist radar course and learned far, far more than we'd expected.

What did we learn?

Apart from determining if there's a risk of collision, equally important is knowing what action to take. Then, to cap it all, monsters called MARPA and AIS lurk in the pilothouse, neither of which is a get out of jail free card.

ColRegs

Restricted Visibility is when vessels are not in sight of one another. ColRegs Rule 19 takes over with its very different collision avoidance actions.

First, there's no stand-on vessel. Instead, the onus falls on <u>both</u> vessels to take avoiding action - and in ample time. Bear in mind that any alteration of course or speed should be large enough to be readily apparent to another vessel. A succession of small alterations should be avoided.

Second, and this was the difficult one for us to get our heads around. If you're going to alter course you must avoid altering to port for a vessel forward of the beam, other than for a vessel being overtaken, or an alteration of course towards a vessel abeam or abaft the beam. Fig 1 explains.

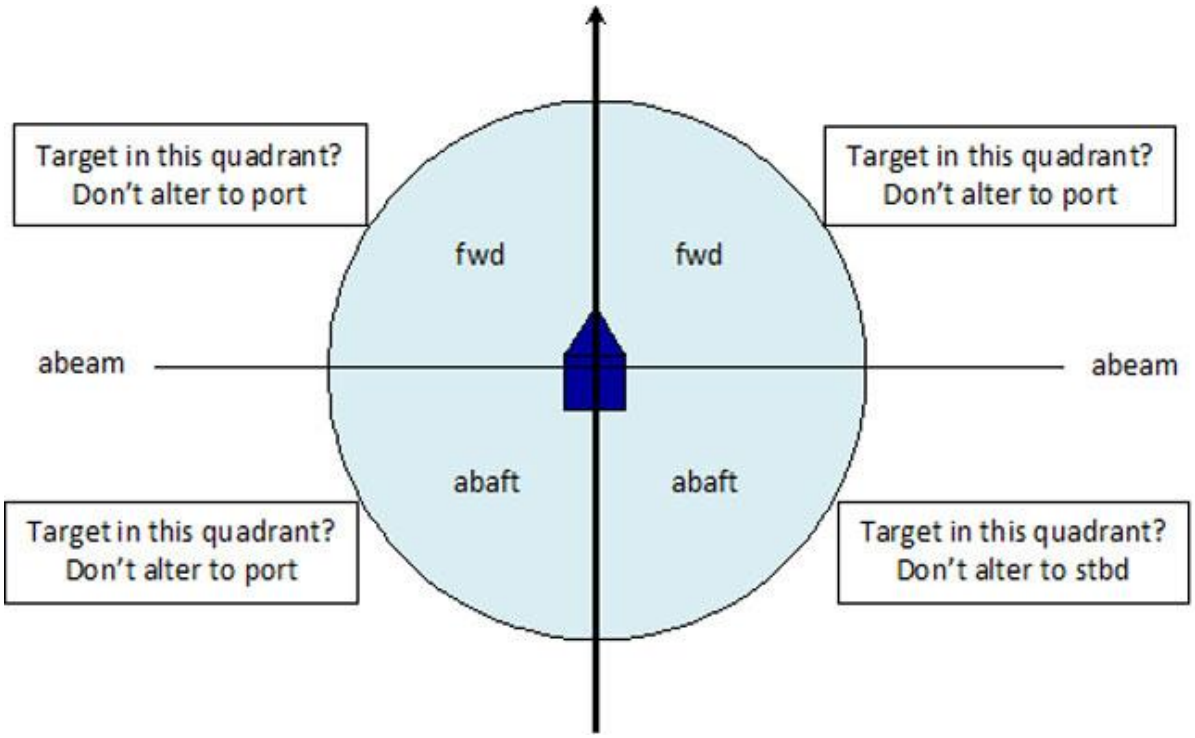

Fig 1

On a collision course?

In good visibility, you eyeball another vessel to see if it stays on a constant bearing relative to you. If its distance decreases your internal warning bell rings and you take the appropriate action. In restricted visibility, the electronic version of your eyeball is the radar's EBL (Electronic Bearing Line). Placing this on the target and watching it slide down the line towards you sounds the same warning bell.

The critical point now is to ensure you take the correct avoiding action. For this, you must know the direction in which the target is pointing. If you don't, you can easily compound the situation.

Radar set-up

A challenge is how to set up your radar in the first place, for which there were four main considerations:

- Screen orientation - Head Up, Course Up or North Up?
- Relative Motion or True Motion?
- Relative Vectors or True Vectors?
- Sea-stabilised or Ground-stabilised

Screen orientation

Head Up is where the display is fixed straight ahead, but as you change heading the image turns with you. It's sometimes called 'dodgem mode' given it's often used to do just that – dodge the traffic. Certainly not scientific, certainly not in accordance with Rule 19 and certainly potentially dangerous.

Course Up has a compass reference keeping the display aligned with your boat's heading. But again, if you change heading, the display turns with you. It's just a more sophisticated version of Head Up.

North Up is often shunned but once you've mastered this mode you really won't go back. In North Up, the compass input keeps the display straight up regardless of any turns you make, making it far easier to interpret. In addition, it displays in the same orientation as your chart plotter enabling you to match images. Plus, you can see other vessels as though they are on your chart.

Relative or True Motion & the '3 Key inputs'

In good visibility, watching the motion of other vessels, relative to you, is called Relative Motion. In effect, you're the centre of the universe with everything moving around you, relative to you. The EBL shows if a vessel is on a constant relative bearing, and if it's closing you'll know there's a risk of collision. Noting the direction in which it's pointing gives you the last of the '3 Key' inputs (constant relative bearing; range decreasing; the direction the other vessel is pointing) from which to decide the correct avoiding action to take.

True Motion is where the land remains static and vessels, including your own, move around the screen. There are specific benefits to True Motion but few to the leisure boater. So, given the main use of radar in leisure vessels is to avoid collisions, keep the set on Relative Motion.

Relative or True Vectors

A vector is the small arrow pointing ahead of the target. Using Relative Vectors, if the arrow points to the centre of the screen (you), it indicates a potential risk of collision. A True Vector indicates the direction the target is pointing but it isn't an indication of risk of collision. So, keep the set on Relative Vectors and only use True Vectors to show the direction the target is pointing.

Using your radar for the 3 Key inputs

First, your eyeball is replaced by the EBL. Second, a target sliding down the EBL tells you you're on a potential collision course. But before taking avoiding action you need to know the direction in which the target is pointing. Third, briefly select True Vectors and you'll see it. Put all three together and you have the 3 Keys. Now apply Rule 19 and take the appropriate avoiding action. Simples!

Practicing in good weather will help you become a great and confident radar operator. Lin and I call it 'going to weapons'.

A Fundamental question

You need to check if your radar is Sea- or Ground- Stabilised. To be Sea-Stabilised your radar needs two key inputs; speed through the water (STW) usually taken from your boat's paddle wheel log, and boat heading (BH) usually taken from a flux gate or satellite compass.

If your radar uses GPS SOG and GPS COG, it's Ground-Stabilised. And here's the issue. Given the effects of tide and/or wind, your STW can differ significantly from SOG, and BH can differ significantly from COG. These differences amplify the slower you travel and/or the stronger the tide and wind. And this is where the direction the other vessel is pointing (shown by its True Vector) can become inaccurate leading to the incorrect avoidance action being taken.

For example, you're on a northerly course at 8kts, with an Easterly 2kt tide. The first image is Ground Stabilised. The second image is Sea Stabilised. Which vessel poses the real threat?

Ground Stabilised
Which is the apparent threat? D?

Sea Stabilised
Which is the real threat? B.

The final word on Sea Stabilisation goes to the IMO, UK MAIB, and UK MCA which all recommend Sea Stabilisation for collision avoidance.

How do I check for Sea Stabilisation?
If you don't know which data sources feed your radar and you have MARPA, the following test will show you. On a day when there's zero wind:

1. Choose somewhere where you know what the tide's doing
2. Target a fixed object such as a buoy
3. Stop the boat and become stationary in the water
4. Locate the buoy and choose a range scale to fit
5. Target MARPA, and wait….

If MARPA shows the buoy moving at the speed of the tide but in the opposite direction from the tide your radar is Sea-Stabilised. If the buoy is stationary and the radar has an apparent speed for your vessel, the radar is Ground-Stabilised.

The elephants in the pilot house
If your radar is Ground-Stabilised, MARPA will be mis-leading and should only be used as an aid and not the gospel truth. As I've said, errors increase if you're travelling slowly and/or the tide or wind is strong.

Even if we assume your radar is Sea-Stabilised, there are other influences on MARPA's accuracy. Radar processors are not fast and take time to calculate target details. An emotional sea state makes matters worse unless you have a really fast BH refresh rate to minimise the error.

Interestingly, AIS is ground stabilised…

Sound signals
Rule 35 defines the sound signals you make in restricted visibility. Having an auto system to do this for you releases you to concentrate without distraction.

One prolonged blast	Power driven making way	At least every 2 minutes
Two prolonged blasts	Power driven, under way but not making way (2 secs between blasts)	At least every 2 minutes
One prolonged and two short blasts	Sailing of Fishing vessel, not at anchor	At least every 2 minutes

What are the morals of this story?
Know if your radar is Sea-Stabilised, know Rule 19 and how to apply it, and remember that MARPA and AIS are only aids and not get out of jail free cards.

Now, where's that fog bank?

 25th September 2019