

Many owners of motor boats have become so confident of their navigation with their GPS (Global Positioning System) chart plotters that they don't even carry a paper chart, an almanac or a pilot book on-board. This is the same mentality as car drivers who are totally reliant on their car's GPS and no longer carry a map in the car. BUT there is a big difference, if your GPS system in a car breaks down you can stop at the next petrol station and buy a map; at sea in a boat this is not possible. This is one of the reasons that I focus so much on traditional navigation techniques in my ICC training courses, some of the reasons for my doing this are as follows:



1. Whilst GPS has taken all the stress out of navigation, it has also taken some of the excitement and most of the feeling of achievement when making a landfall close to a planned destination as a result of traditional navigation. And, whilst our GPS equipment is extremely reliable, we are totally dependant upon the American government (they could switch the entire system off for a period). We are also reliant on our vessel's electrical systems which in a salt water environment are notoriously fickle, and with just a small problem can leave us with no GPS.

I recently heard of a skipper of a 60 foot motor cruiser who - while cruising in the eastern Mediterranean - was unable to read his chart plotter positioned on the fly bridge because of a problem with the screen. He had no knowledge of traditional navigation, no charts or pilot books on board and despite having land on either side of him was completely lost. A telephone call to a friend in England did not help him find his position, but eventually a local naval vessel guided him back to the marina that he had come from.

2. Radio waves produced during solar flare eruptions on the sun can cripple GPS signals. Solar flares are tremendous explosions on the surface of the Sun. In a matter of just a few minutes

they heat material to many millions of degrees and release as much energy as a billion megatons of TNT. They occur near sunspots, usually along the dividing line (neutral line) between areas of oppositely directed magnetic fields.

During solar flares, high-energy electrons are injected into the Sun's upper atmosphere. Radio waves are produced during this process and some of them propagate toward Earth. These solar radio waves, which cover a broad frequency range, act like noise that interferes with frequencies used by GPS and other navigational systems. The best remedy is to be aware of the problem and operate GPS systems with the knowledge that they may fail during a solar flare. On December 6th 2006, a solar flare created the most intense solar radio burst ever recorded. This made all GPS receivers lose their position over the entire sunlit side of Earth for several hours. The size and timing of this burst were completely unexpected and the largest ever detected, and scientists do not know how often we can expect solar radio bursts of this size or even larger. But they have said that larger solar radio bursts, expected during heightened periods of solar activity, called the solar maximum, will disrupt GPS receiver operations even further.



3. SOLAS (Safety of life at sea) Chapter V Regulation 34. (These are international regulations which we are expected to follow.) Skippers should practice safe navigation and avoid dangerous situations. This means that you are expected to make a navigational plan prior to going to sea, which should involve the following: working out a course to steer, checking the weather forecast, check that the tides are suitable for your planned passage, take into consideration the limitations of your vessel, take into account the experience and ability of your crew, check a chart and pilot book to make certain that you are familiar with any navigational dangers en-route. You should have a contingency plan for every conceivable thing that might go wrong, this should involve 'ports of refuge', and - taking into account wind and tide - when you can realistically reach them. You must make certain that your navigational plan is not over

## THE DANGER OF BEING OVER RELIANT ON GPS

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reliant on GPS and you should at any time during the passage be able to navigate yourself to safety without the help of GPS should it fail.

I don't expect people to go back to using a sextant and spherical geometry as I was in the photograph to the left taken about 15 years ago. But I do expect people to mark their position every hour or, if you are on a long passage every four hours, on a paper chart. If the GPS should have gone wrong in that period, you can soon estimate your approximate position by dead reckoning and an estimated position. Certainly, when approaching the coast and about 15 miles from our destination it is important to determine an accurate position either from the GPS or by using a hand-bearing compass and then to work out what course to steer on a paper chart. If you practise this type of traditional navigation then the next time you are out at sea during a solar flare or when salt water has found its way into your chart plotter rendering it completely useless you won't have to go through the embarrassment and potential danger of being 'lost at sea'.