

Forum

Interference to GPS in the Marine Environment

Captain Sven Gylden

In a paper in the May 1996 issue of this *Journal*, Ward and Johannessen¹ gave an excellent summary of the work carried out for the General Lighthouse Authorities on the significance of potential interference to GPS. They identified three possible types of interference for their study:

- (i) Interference from other systems on board the ship using GPS.
- (ii) Interference from emissions generated onboard other ships or at structures in the vicinity of the ship using GPS.
- (iii) Deliberate interference from malicious persons.

There is an important fourth source of possible interference, and that is from natural phenomena. In this respect, I would like to report the circumstances of a break in GPS service which I observed during a thunderstorm between Denmark and Sweden.

A few years back, we left the Danish port Skagen (the Skaw), bound for our home port of Kovikshamn situated some 20 miles north of Gothenburg. The boat was our 35 foot offshore cruiser *Spindrift* built of mahogany and the GPS, by a leading manufacturer, was working without any problems whatsoever. The GPS receiver was placed in the cockpit under the sprayhood. It had only an internal antenna and was connected to the 12 Volt mains of the boat. The sprayhood consisted of one layer of impregnated canvas and was supported by a couple of thin steel tubes.

About an hour after departure, the weather deteriorated and some thunderstorms passed over us. The wind force increased to about 40 knots, so we only carried the no. 1 Genoa, area about 350 square feet, and lightning struck the water all around us. The boat itself was protected from the lightning because the rigging was earthed to the iron keel by substantial copper wires.

For the duration of one thunderstorm, the GPS remained dead but, as soon as it had passed over us, the GPS operated normally again and it has worked without any problems ever since.

The thunderstorm functioned as a lid on top of us, as I saw it, and I did not think any more of the fact until I read the article of Drs Ward and Johannessen. Did the earthed rigging work as a Faraday's cage or what could have been the reason, because the power supply was uninterrupted during the entire time? The only thing that happened was that the GPS lost track of all the satellites it had caught onto at first and then picked up again after the thunderstorm had passed. This phenomenon repeated itself each time a thunderstorm passed over us, and it happened in intervals for the duration of the trip home. The average time the GPS was knocked out on this occasion was about one hour at a time.

REFERENCE

¹ Ward, N. and Johannessen, R. (1996). Interference to GPS in the Marine Environment. This *Journal*, 49, 210.

KEY WORDS

1. Satellite navigation.
2. Interference.
3. Reliability.

Drs Ward and Johannessen *comment* :

It is not possible from Captain Gylden's contribution to fully explain the phenomenon. It is, however, important to note his experience and to encourage other practical navigators to report similar events. It is essential to have the best possible picture of circumstances when GPS suffers problems, before it is decided to close down alternative systems, which might not be affected in the same way.

Editor's note

Reports of GPS outages or other operational problems experienced by practical navigators would, as suggested by Drs Ward and Johannessen, be welcomed by the Institute. To be of maximum value for subsequent analysis, reports should give a complete as possible description of the circumstances. The following information would always be useful :

- (1) Date and time of day (GMT).
- (2) The observer's position.
- (3) Make, model and other details of the receiver.
- (4) The antenna used, its position and a note of any obstructions in the vicinity which might have masked part of the sky.
- (5) The power supply.
- (6) The weather conditions.
- (7) Whether the receiver was using GPS or DGPS.
- (8) A description of the abnormality being reported. For example if the display showed wrong information or no information. Was there a message saying 'power down and re-initialize?' How long the condition lasted and whether it recovered by itself, etc.
- (9) Whether any other electrical equipment which might have caused interference to the GPS was in use at the time. For example, was HF, MF or VHF equipment being operated and, if so, on what frequency?
- (10) Any other information which might be relevant.