Inside SeaSonde

How to Setup GPS SeaSondes operating on the same Freq

When using multiple SeaSonde Receivers with GPS synchronization operating on the same frequency, there are certain control settings, which must be configured in order to guarantee that the sites will never interfere with each other.

a. Software SeaSondeController 10.1 and Firmware Version 2.4
Make sure the site's SeaSonde Receiver is using AWGIII Module firmware 2.4 or later. This can be discovered, by using SeaSondeController and send a 'VER' command to the receiver. The version should then be reported then in the status window. The reason for this firmware is that it has several improvements in the Transmit Watch. (Ver 2.x will also work but 2.4 is highly recommended)

SeaSondeController version 10.1 has several improvements dealing with TransmitWatch, GPS, and also creates diagnostic files to record temperature, voltages, transmit and other value over time.

If updating the firmware from earlier versions you need to be aware that prior to GPS_Timing version 2.2 the reset timing delay interval used a 100ns increment and is now 1000ns increment. The change shows in SeaSondeController refresh.

Any previously stored reset time delay value prior to the Firmware upgrade to 2.4 will now be reported at a tenth of was stored. Make sure the value is still what the Codar recommendation was.

Earlier versions of SeaSondeController don't recognize this and will think the increment is still 100ns. So, if you use an older SeaSondeController with the new firmware the timing delay value you enter will actually be ten times greater in the hardware than the reported and entered value.

b. Timing Alignment Value
Obtain from Codar, time delay values for each site. These time delays are calculated for the network based upon all the sites' location, maximum range coverage, and frequency usage. The time delay value is entered into SeaSondeController Advanced controller window into the 'Align' entry.

What these time delay values do is offset the timing of each site from the GPS PPS (PulsePerSecond). This causes each site to appear as an artificial distance from each other. Depending on the configuration you might be able to see the other sites by looking at farther out range cells in the cross spectra.

c. GPS Synchronization.
Using SeaSondeController, ensure that the GPS Sync monitor is enabled. This is done, by entering the command 'GMON 10' into the 'Send' entry of the advanced control window. This command tells the receiver to watch the GPS PPS every ten seconds do an alignment if the receiver timing is too far off from the PPS. SeaSondeController will see a '!GpsSync Out of Alignment #. Fixing…' message when re-alignment happens and also SeaSondeAquisition will lose its data sync and restart the data collection.

The current GPS Sync status can be read in the SeaSondeController status window after doing a 'Refresh' from the control window. You will see a line like this:

RC1:Read 03E6 Sweep Reset Delay. 03E7 GSync Delay. Check 10.s Timing 1000.ns

The Read 03E6 is the entered align value divided by the 1000.ns interval and converted to Hexidecimal. The '03E7' before 'GSync Delay' is the actual delay measured by the receiver (it may be several counts off from the align value due to the way it's measured). If you do not see the 'GSync Delay' text, it is because your receiver is not configured to use GPS Timing. The measured GSync Delay will change as the GPS warms up or if the PLL loses lock. The purpose of the 'GMON' command is check for loss of alignment and resync as necessary. The command to do a manual GPS Sync is 'GS'. You can tell that 'GMON 10' is enabled by the 'Check 10.s' in the text. If 'Check' is not in the line then 'GMON' is off. The last part of the line is 'Timing 1000.ns' which indicates that the timing base for the alignment entry is 1ms (older versions of firmware will show 100ns or nothing which is assumed to be 100ns).

d. Transmit Watch
Using SeaSondeController open the special controls Transmit Drive Control. Make sure the following under 'Turn Off Transmit Drive' are checkmarked:
        'When GPS Not Ready.'
        'When PLL Unlocked.'
        'When GPS Unsynced.'

These items cause the receiver to turn off drive to the transmitter when any off them are tripped. This is to prevent this site when not ready to not cause interference with the other sites in the network.
'When GPS Not Ready.' monitors the Receiver's GPS for worthiness. GPS must be in Normal Discipline mode. No Major alarms are set (ROM, RAM, FPGA, VCO). These Minor alarms must not be set (VCO in Range, Antenna Short,Sat Tracking, Disciplining,

Position Valid)

'When PLL Unlocked.' monitors whether the PLL is locked to the 10MHz reference from the GPS. The PLL drives all SeaSonde Timing and when unlocked causes the site's timing to drift in relation to the other sites. A continuously unlocked PLL will also cause continuous GPS Syncs.

'When GPS Unsynced.' monitors the GPS Sync correction. Each time the GPS Sync from the 'GMON' is performed, this setting is tripped; it will then take two GMON cycles with no Sync action required before this trip is cleared.

You can tell when the Transmit Watch is tripped by:
Examining the SeaSondeController Transmit Control window and looking at the Trip column for checkmarked items.
The SeaSondeController RF Monitor window will show under 'Xmit' a 'OFF' message.
The SeaSondeController Status window after doing a 'Refresh' button will show after the Xmit control setting a message of "Forced Off due to..."
Examine the Diagnostic files STAT_XXXX_YYYY_MM_DD.hdt in the column XmtTrip for any non zero value.

e. Store Settings
Be sure to save the SeaSondeController settings after the above changes by doing the 'Store' button in the controller window; otherwise they will be lost the next time power is cycled to the receiver.

Note that the Store button does not apply to the GPS store location. The GPS unit has its own non-volatile memory and is done by the GPS command store location.

f. GPS Notes
In order for the SeaSonde's to be in timing alignment with each other, the receiver depends upon the internal GPS unit operating correctly. After power is lost, the GPS unit can take quite a while to return to normal operation. It must wait for its oven controlled crystal oscillator to stabilize and then it must go through the typical GPS algorithm of locating where it is. Then it takes a thousand valid lat, lon readings to finish its survey. When it has a valid location it will enter the normal discipline mode, which aligns the PPS (pulse per second), and is used by the SeaSonde network sites to enter a shared timing alignment.

You can significantly speed up the GPS power up procedure, by storing the position after a completed survey. In SeaSonde Controller GPS Monitor, checkmark the 'Command:' box. This will enable the command popup menu. Carefully select the 'Store Survey Position' item. *(If you select the 'Cold Reset or 'Factory Reset' it will clear and restart the survey all over again.)* The indicator 'Position Stored' should change from yellow to green. When you move a SeaSonde site and have a store position, the indicator 'Position Valid' will change to yellow. This means that you will need to do a

'Factory Reset', wait for the survey to complete and then store the new position. Failure to do so will result in a wrong timing alignment and if the Transmit Watch 'When GPS Not Ready' is not enabled then the site may interfere with others in the network.