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Configuring a Seaspy Magnetometer in HYPACK® & Precisely Time Stamping the Magnetic Data

By Peter Ramsay

INTRODUCTION

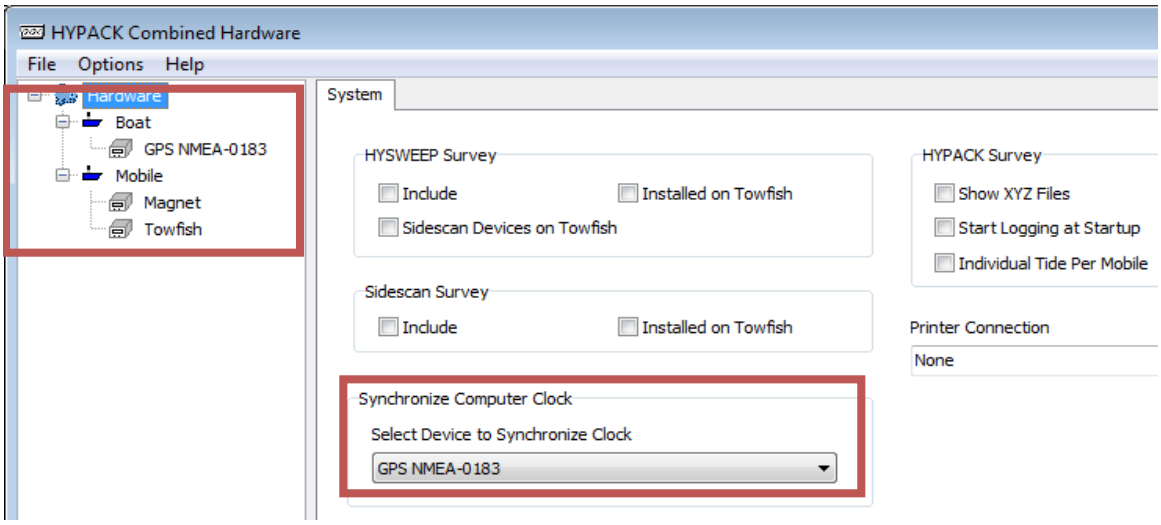
Marine Magnetics produces a variety of Overhauser magnetometers which are marketed as SeaSpy or Explorer magnetometers. These magnetometers (Figure 1) can be provided with a time stamp from the acquisition PC or the GPS NMEA message. In marine surveys, it is important to be able to time stamp any sensor to account for latency which can minimize positional errors. Latency is the time delay between measurement and transmission to the data acquisition computer. For example, a latency of 1 second between the position time stamp and the sensor time can result in a positional error of 2.5 m at a survey speed of 5 knots. Latency in magnetometer data affects the precision of targeting magnetic anomalies and can also result in artefacts in tinned, contoured or gridded magnetic data especially where cross-lines are included in the data sets. Fortunately, the Marine Magnetics magnetometer towfish can be precisely time synchronized in the HYPACK® Magnet.dll.

FIGURE 1. *Marine Magnetics SeaSPY2 Overhauser Magnetometer.*

CONFIGURING A MARINE MAGNETICS MAGNETOMETER IN HYPACK®

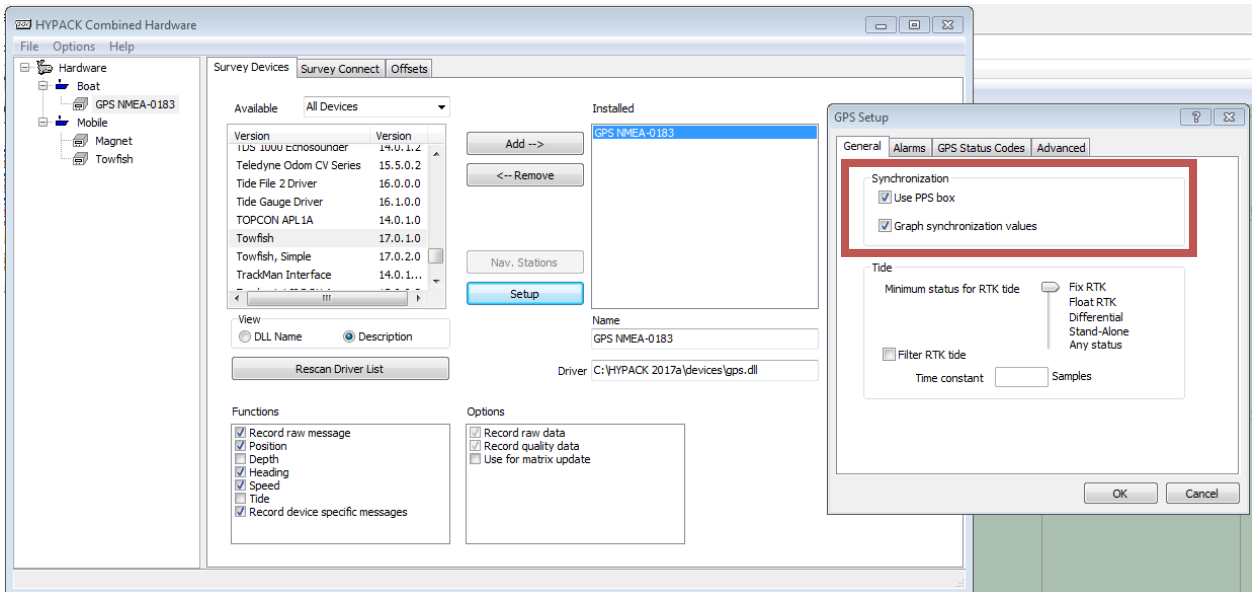
In the HARDWARE program, select the GPS driver and add a Mobile with the magnetometer driver (Magnet.dll) and the towfish driver (Towfish.dll) to provide towfish positioning for the magnetometer data. Synchronize the computer clock to the GPS time stamp and ensure that the ZDA NMEA message is selected in the GPS output.

FIGURE 2. *Hardware Device Drivers and Clock Synchronization in the HARDWARE Program.*



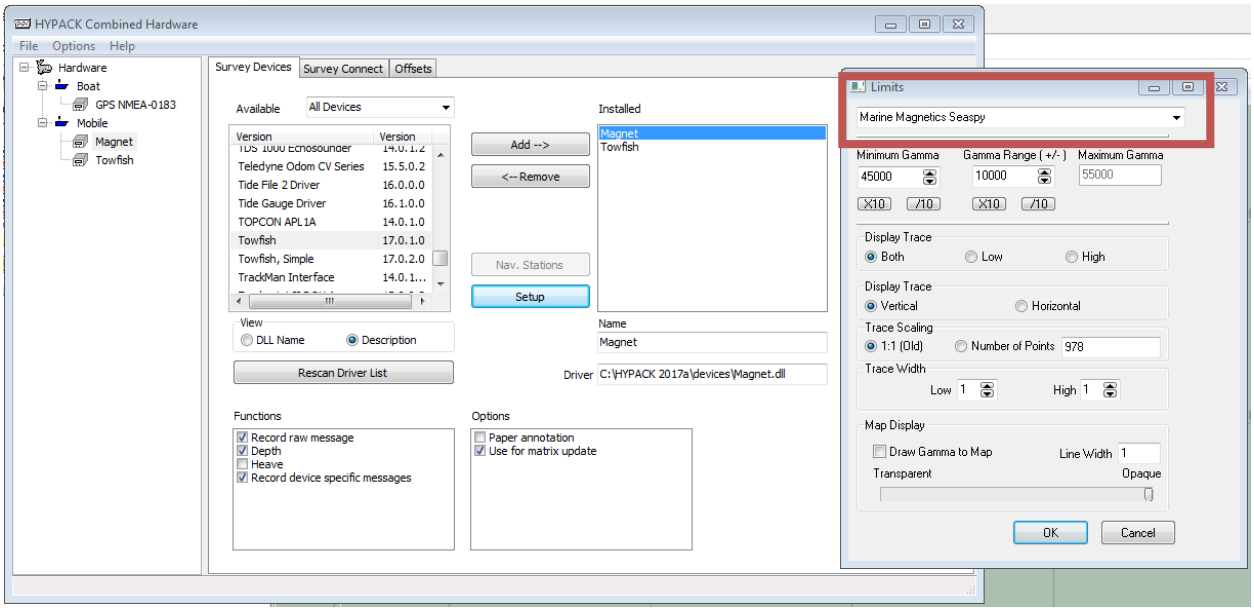
The clock synchronization and sensor time stamping will be greatly improved if a PPS box (Figure 3) is used to time-stamp or an Ethernet inertial navigation system such as the Applanix POS MV.

FIGURE 3. *Selecting the PPS Box Time Synchronization in the GPS Setup.*



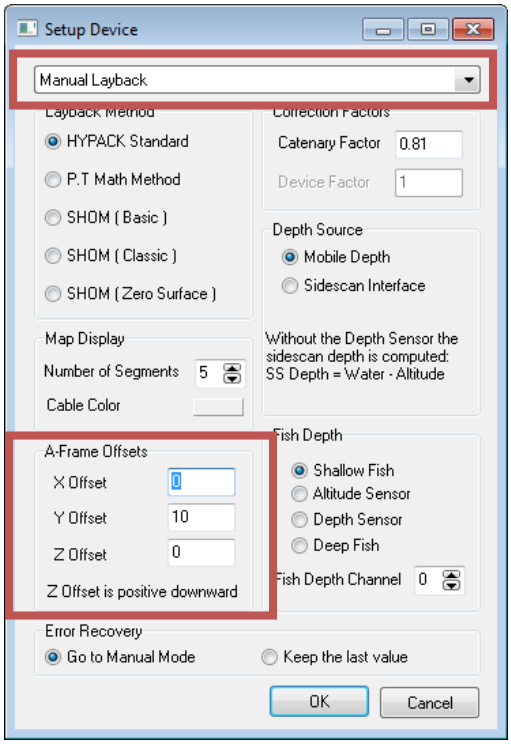
Select the Marine Magnetics SeaSPY or Explorer from the setup device options and configure the mimimum gamma and range together with various data viewing options (Figure 4).

FIGURE 4. *Setup for the Magnet.dll.*



Next setup the options for the Towfish driver (Figure 5). The layback calculation options can be based on manual layback or one of 17 cable counters. The position of the tow point on the vessel can be specficed in the A-Frame Offsets from the GPS position at boat reference point. Other setup options include: catenary factor & towfish depth source.

FIGURE 5. *Towfish Driver Setup Options.*



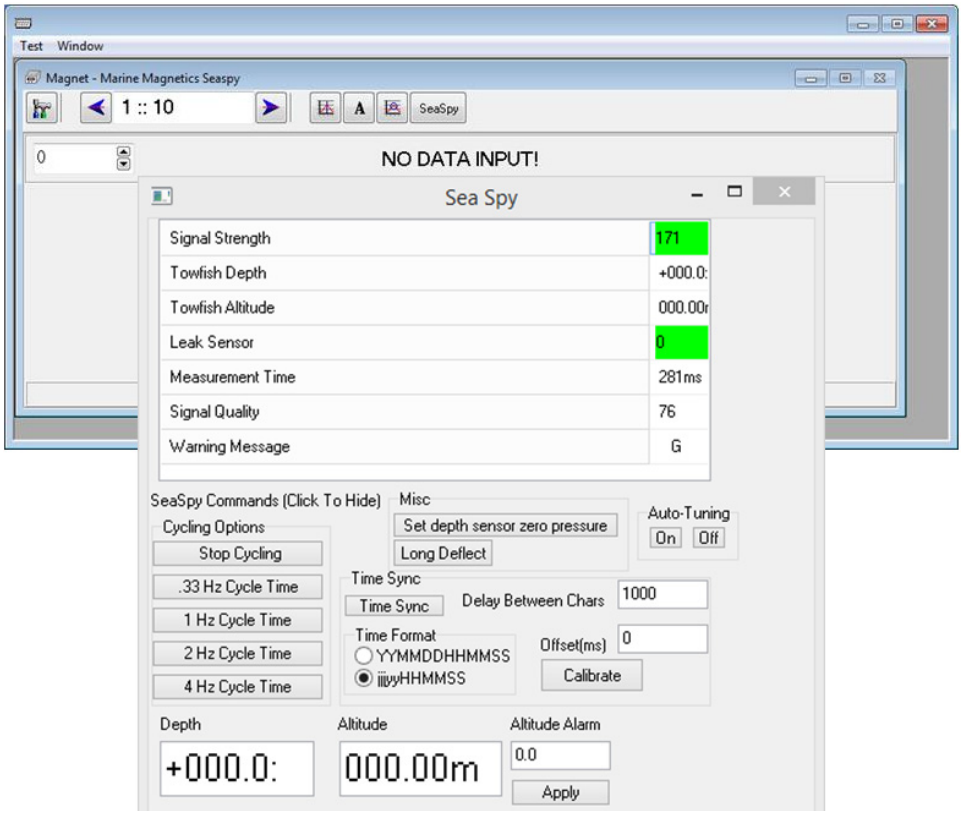
Additional Configuration Settings in Magnetometer Interface

These additional magnetometer configuration settings can be set by selecting the Test Device button under the Survey Connect tab of the HARDWARE program. This sends a series of commands to the magnetometer. Select the SeaSPY button to access the options to set the Cycling (Sampling) interval, set the depth sensor, apply auto-tuning, apply long deflect and perform time synchronization (Figure 6). Alternatively, these settings can be accessed from the Magnetometer Interface in the HYPACK® SURVEY program. HYPACK recommends that these additional configuration settings be applied from within the SURVEY program rather than from the HARDWARE program.

These commands can be sent to the magnetometer if the magnetometer is connected via the Marine Magnetics blue isolation transceiver or connected via a side scan sonar towfish in a tandem tow configuration. An example of this would be connecting a SeaSPY to a Klein side scan sonar. All commands from HYPACK® then go via the Klein TPU (topside processing unit) and down to the magnetometer.

IMPORTANT: To send these commands to the magnetometer, it is recommended that the side scan sonar triggering should be stopped if the magnetometer is connected through the scan scan sonar via the TPU.

FIGURE 6. *Additional Configuration Options.*

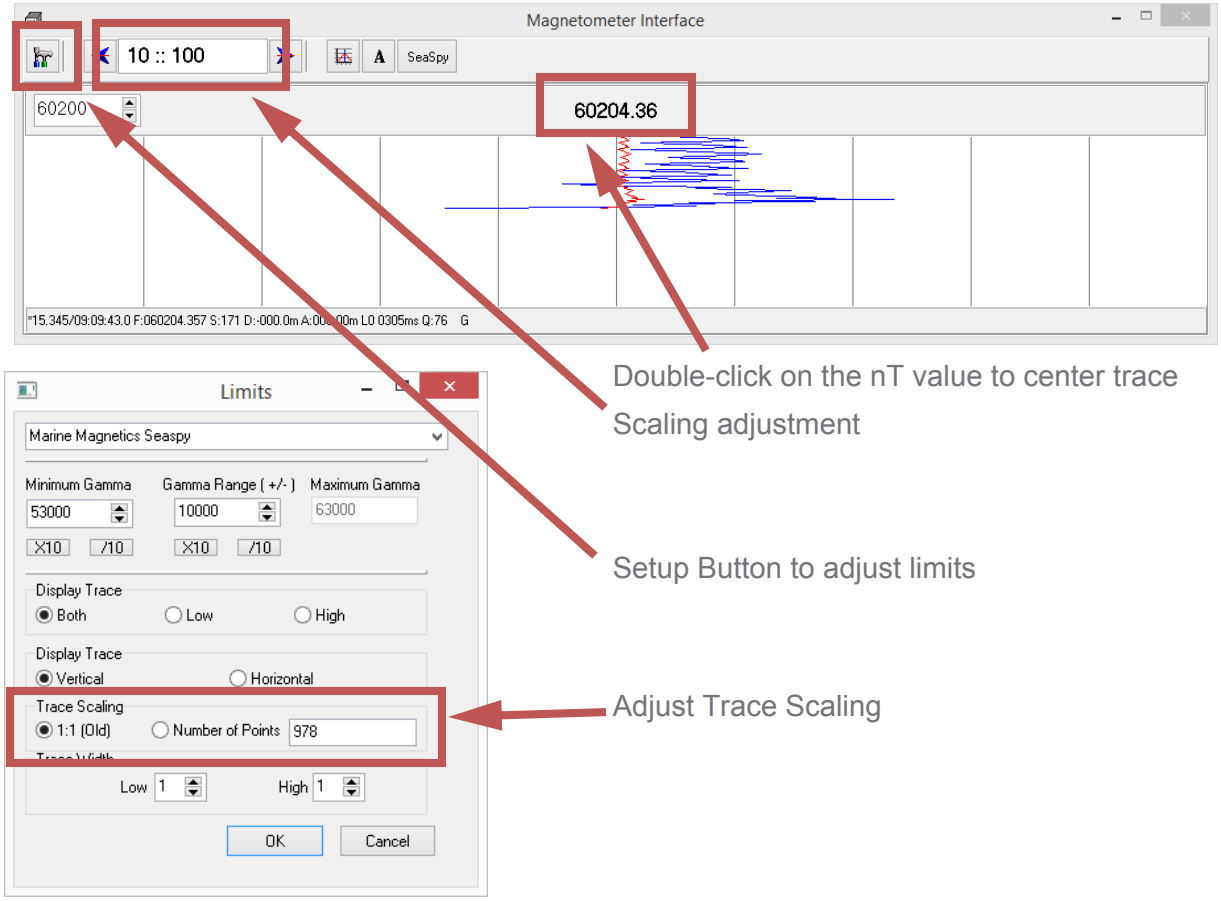


In general the recommended settings for most surveys are as follows:

- Zero pressure sensor with the magnetometer deployed just underwater.
- Set the Long Deflect to Auto On.
- Set the Auto-Tuning to On.
- Set cycling to 2 Hz.

In order to center the data trace on the display, double-click on the nT value. This will automatically center the trace; one can then adjust the scaling as required. If the display becomes too cluttered, check the setup settings and adjust the Number of Points or select 1:1 display (Figure 7).

FIGURE 7. *Settings in the Magnetometer Interface in SURVEY.*

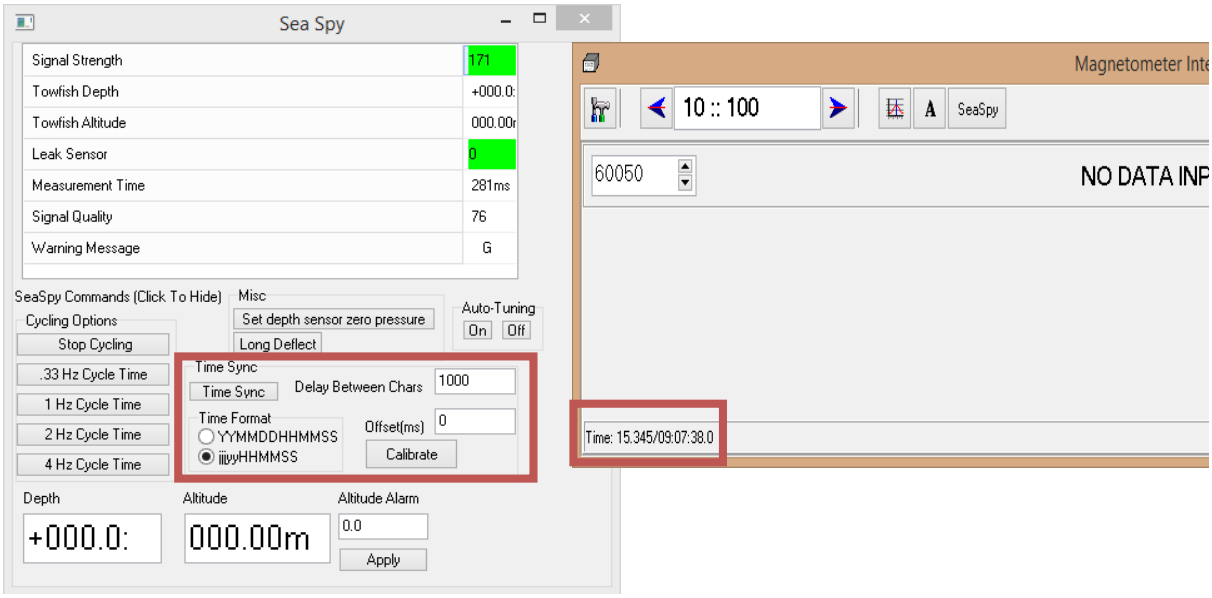


TIME SYNCHRONIZATION IN THE MAGNETOMETER INTERFACE

In order to Time Synchronize the SeaSPY magnetometer in the HYPACK® Magnetometer interface accurately, the recommended procedure is as follows (Figure 8):

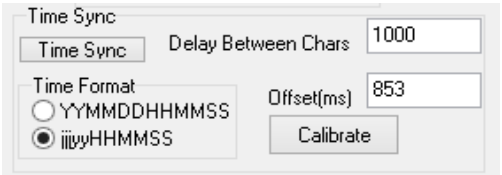
1. **Stop cycling the magnetometer**.
2. **Set the time format.**
   - **If the magnetometer is connected to the blue isolator transceiver**, one can time synchronize the magnetometer using the YYMMDDHHMMSS format.
   - **If the magnetometer is connected to a side scan sonar via a TPU,** select the jjjyyHHMMSS format.
3. **Set the delay to 1,000 ms and make sure the Offset is 0 ms**.
4. **Click the Time Sync button once**. Wait until the time sync is correctly displayed at the bottom left of the Magnetometer Interface window. The program may be non-responsive for a few seconds.

FIGURE 8. *Time Synchronization in the Magnetometer Interface.*



5. **Start cycling at 2 Hz Cycle Time** or whatever cycle time one wishes to use.
6. **Whilst cycling, click [Calibrate] (making sure the offset window is initially set to 0 ms)**. This will provide the time delay between the SeaSPY time and HYPACK® Veritime (Figure 9).

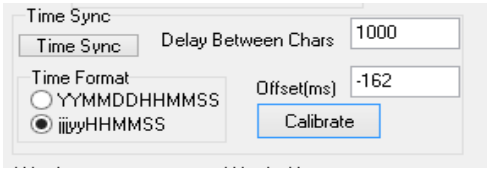
FIGURE 9. *Calibrating the Time Synchronization*



Now one needs to apply this offset to the SeaSPY:

7. **Stop cycling the magnetometer**.
8. **Leave the Delay of 1,000 ms and the Offset to what was calculated, and ensure the time format is set to YYMMDDHHMMSS or jjjyyHHMMSS** as mentioned in Point 2 .
9. **Click [Time Sync] and again wait for the time stamp** to be displayed in the bottom left of the Magnetometer Interface Window.
10. **Reset the Offset to 0 ms and Start Cycling** at 2 Hz or other desired value.
11. **With the Offset at 0ms, click on [Calibrate].** Check that the Offset is now within specification (generally between 100 and 300 ms) (Figure 10).

FIGURE 10. *Further Calibrating the Time Synchronization*



TROUBLESHOOTING

If for any reason the time synchronization did not work properly, one will notice that the Time Format is displayed as “Enter Julian date and time” in the bottom left of the window (Figure 11).

FIGURE 11. *Time Synchronization Failure.*

If this happens, just click the 4Hz cycle command. This will send a number 1 to the SeaSPY that should clear the error. The time will now be incorrect and one will need to restart the Time Sync process from the beginning.