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Sounding Better!

HARDWARE Setup Edgetech 6205 Combined Bathymetry & Side Scan Sonar Pt 2: Component System Setup

By Peter Ramsay

INTRODUCTION

In [Part 1 of this series](#), I covered the setup of an EdgeTech 6205 with a POS MV (or similar inertial navigation system).

In this *Sounding Better!* article (Part 2), I will work through the method of setting up an EdgeTech 6205 using a standard RTK GPS, motion sensor (e.g. TSS DMS-05) & gyro (e.g. TSS Meridian). This is referred to as a Component System Setup in which the motion and heading data interfaced to the 6205 is time-stamped in the sonar and sent to HYPACK® along with the bathymetry and sonar data using the GPS and EdgeTech 4600/6205 device drivers.

To operate the EdgeTech 6205 sonar, please ensure that Discover is installed and running on the PC together with HYPACK®/HYSWEEP®. In this article, it is assumed that both Discover & HYPACK®/HYSWEEP® are running on the same acquisition PC.

SETTING THE HYPACK PROJECT GEODESY

Firstly, start a new project in HYPACK® and define the survey geodesy for the area in which the survey is to be conducted. For a bathymetry survey, if you want to process and apply RTK tides, it is important to select the RTK Tide Method. In this particular example, the survey is being conducted off New Bedford (MA) and will be using the VDatum model referenced to Mean Lower Low Water as the vertical datum (see [Figure 1](#)).

FIGURE 1. Geodesy & RTK Method Project Setup

Geodesic Parameters

File Tools Options Help

Predefined

Grids
State Plane NAD-83

Zone
MA-2001 MASSACHUSETTS MAINLAND

Distance Unit
Meter

Depth Unit
same as horizontal

☐ Elevation Mode (Z-axis positive going up)

Projection

Projection
Lambert Conformal Conical

Central Meridian
071 30 0 W

Reference Latitude
41 00 0 N

Scale Factor
1.0000000000

North Parallel
42 41 0 N

South Parallel
41 43 0 N

False Easting
200000.0001

False Northing
750000.0000

☐ Local Grid Adjustment Local Grid

Datum transformation parameters

Delta X 0.000 Delta rX 0.00000

Delta Y 0.000 Delta rY 0.00000

Delta Z 0.000 Delta rZ 0.00000

Delta Scale 0.00000

Datum shift file ... X

RTK Tide Method

☐ Not using RTK tide

☐ (K-N) from KTD file

☐ N from geoid model, K from KTD file

☒ N from geoid model, K from VDatum

☐ N from geoid model, K from user value

☐ (K-N) from user value

Geoid Model

g2012b-CONUS ... X

Orthometric Height Correction

0.000 m

VDatum zone

Maine, New Hampshire, Massachusetts (Gulf of Maine) v. 1.3

Chart Datum

Mean Lower Low Water

OK Cancel

MEASURING & ENTERING OFFSETS BASED ON THE HYPACK® PREFERRED METHOD (JOE BURNETT, 2017)

1. Find the Boat Reference Point (BRP):
 - a. On the vessel, locate the fore-aft, port-starboard center point and mark it somehow. (Put a screw in the deck, permanent marker, whatever works.) This mark will now be your Boat Reference Point.
 - b. From the BRP, measure its vertical offset to the waterline.
2. In HYPACK® HARDWARE, measure and enter the sonar, GPS, motion sensor & gyro offsets.

NOTE: Enter offsets for the sonar heads, as well as the motion sensor and gyro, in the Edgetech Offsets tab. Select each sensor at the top of the tab, then enter the offsets below.

Sonar:

- Measure the distances forward and starboard from the BRP to the acoustic center of the sonar and enter these offsets for the Sonar Head (both 1 & 2) in the Starboard and Forward boxes.

NOTE: The acoustic center is not the center of the 6205 sonar head, and the position varies with frequency. A diagram of the EdgeTech 6205 Sonar Acoustic Centre position is provided in [“APPENDIX A”](#) on page 11.

- Measure from the waterline to the Sonar Acoustic Center and enter the result in the vertical box.

GPS, Gyro and Motion Sensor:

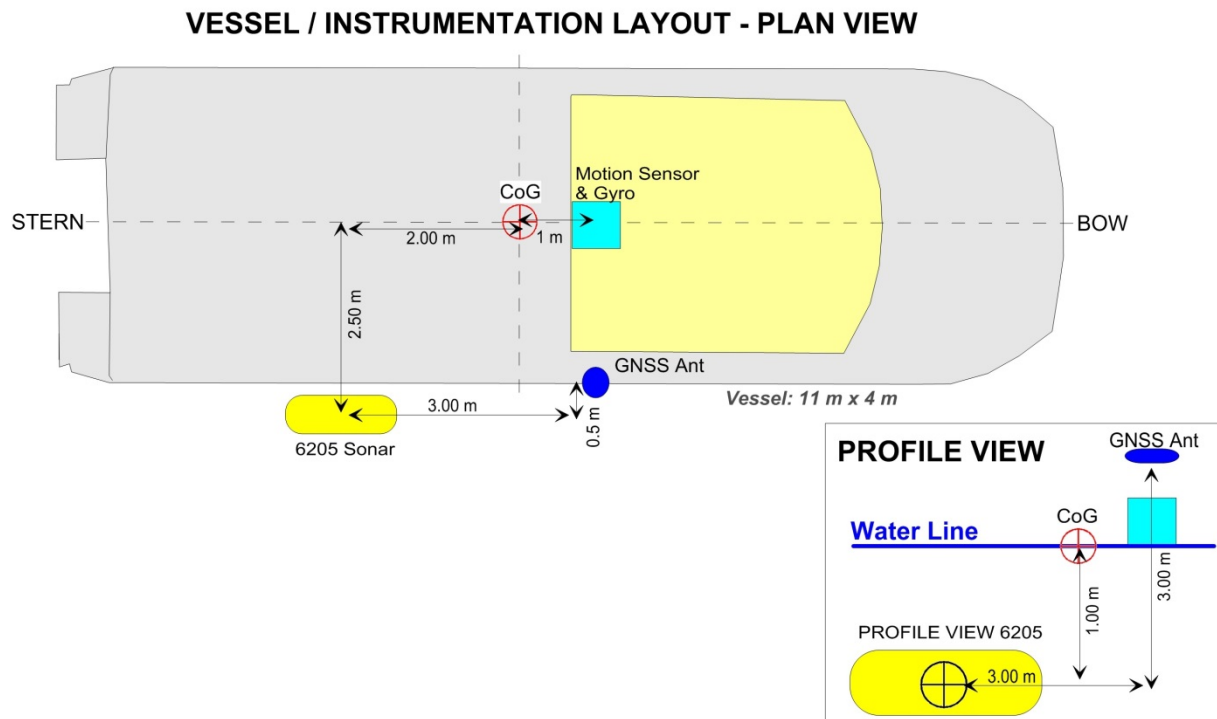
- Measure the distances forward and starboard from the BRP to the GPS, gyro and motion sensor (TSS DMS-05) reference points, and enter the offsets for each in their Starboard and Forward boxes.
- Measure from the waterline to the GPS, gyro and motion sensor reference points and enter the results in their Vertical boxes.

The offset configuration is now complete.

CONFIGURING A 6205 WITH A MOTION SENSOR, GYRO & RTK GNSS

In this example, the 6205 sonar and GNSS antenna are mounted in the same places as the previous ([Part 1](#)) example, but the motion sensor & gyro are installed 1 m forward of the CoG (Center of Gravity or Boat Reference Point) and at the waterline. The RTK GPS, motion sensor and gyro data are interfaced into the 6205 sonar and the position and motion data are output from the EdgeTech Discover software to HYPACK®. All offsets are handled in the HYPACK® HARDWARE program and will be referenced to the CoG. The vessel/instrumentation layout diagram ([Figure 2](#)) shows the plan and profile view offsets.

FIGURE 2. HYSWEEP® Vessel & Instrumentation Offset Diagram.



DISCOVER HARDWARE SETUP

1. **Connect each data stream to the EdgeTech 6205 interface box via the provided RS232 serial ports.** This step applies to serial inputs to the 6205 only. Note, you may need a null modem to ensure proper communications.
2. **In Discover, select Configuration - Sonar Port Settings.** If the sonar head is powered on and connected, the following dialog will appear ([Figure 3](#)):

FIGURE 3. Discover Serial Data Configuration

The screenshot shows a window titled "Sonar Serial Configuration" with a "Done" button in the top right corner. The window contains four configuration sections, each for a different port:

- Port 1:** Type: SAIB High Timestamp Accuracy Serial Port, Baud Rate: 115200, Parser: NMEA / TSS1 - Time, Position, Heading, Roll, Pitch, Heave. The "Enabled" checkbox is checked.
- Port 2:** Type: SAIB High Timestamp Accuracy Serial Port, Baud Rate: 38400, Parser: NMEA / TSS1 - Time, Position, Heading, Roll, Pitch, Heave. The "Enabled" checkbox is checked.
- Port 3:** Type: SAIB High Timestamp Accuracy Serial Port, Baud Rate: 38400, Parser: NMEA / TSS1 - Time, Position, Heading, Roll, Pitch, Heave. The "Enabled" checkbox is checked.
- Port 4:** Type: Standard Serial Port, Baud Rate: 19200, Parser: Valeport Mini SVS / AML SVXchange - Sound Velocity. The "Enabled" checkbox is checked.

3. **Configure the sonar serial ports ingesting the GPS, motion, and gyro (heading) data.**

NOTE: When you are using three sensors (position, motion, and gyro) make sure to connect the GPS to Port 3 (it has a longer latency).

Port 4, is dedicated to the onboard/integrated sound velocity sensor and cannot be altered.

4. **When finished, click [Done].**
5. **Activate Pinging.** In the Sonar Control tab, check the box next to Sonar (low frequency). If the serial port configuration is correct, all data streaming to the sonar head will populate in the status bar at the bottom of the Discover window. If something is missing, go back and check your settings.

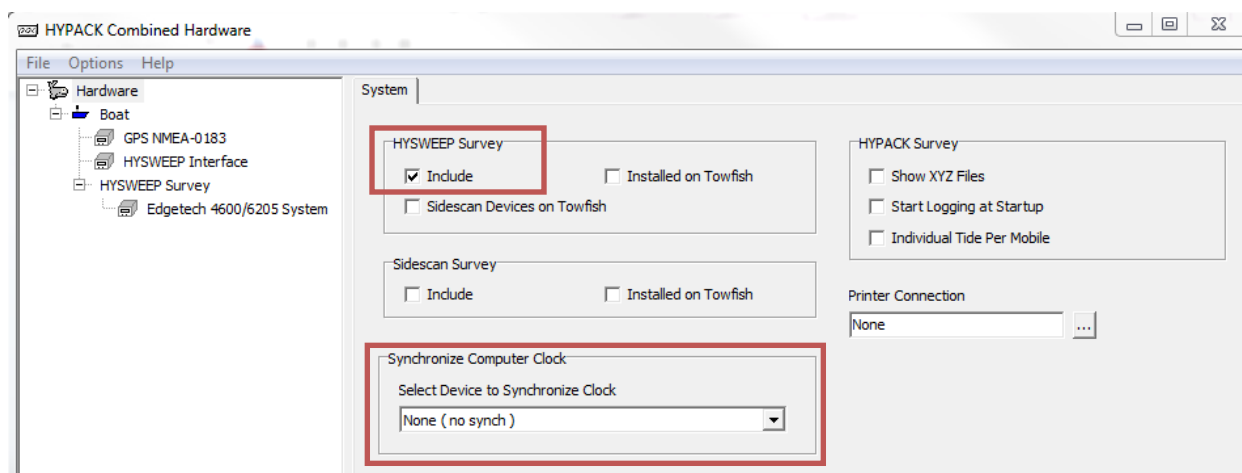
BEWARE! If pinging more than a few minutes, the sonar must be in water. Pinging the sonar in the air may cause damage to the transducers.

The Discover serial port setup is now complete.

HYPACK® HARDWARE SETUP

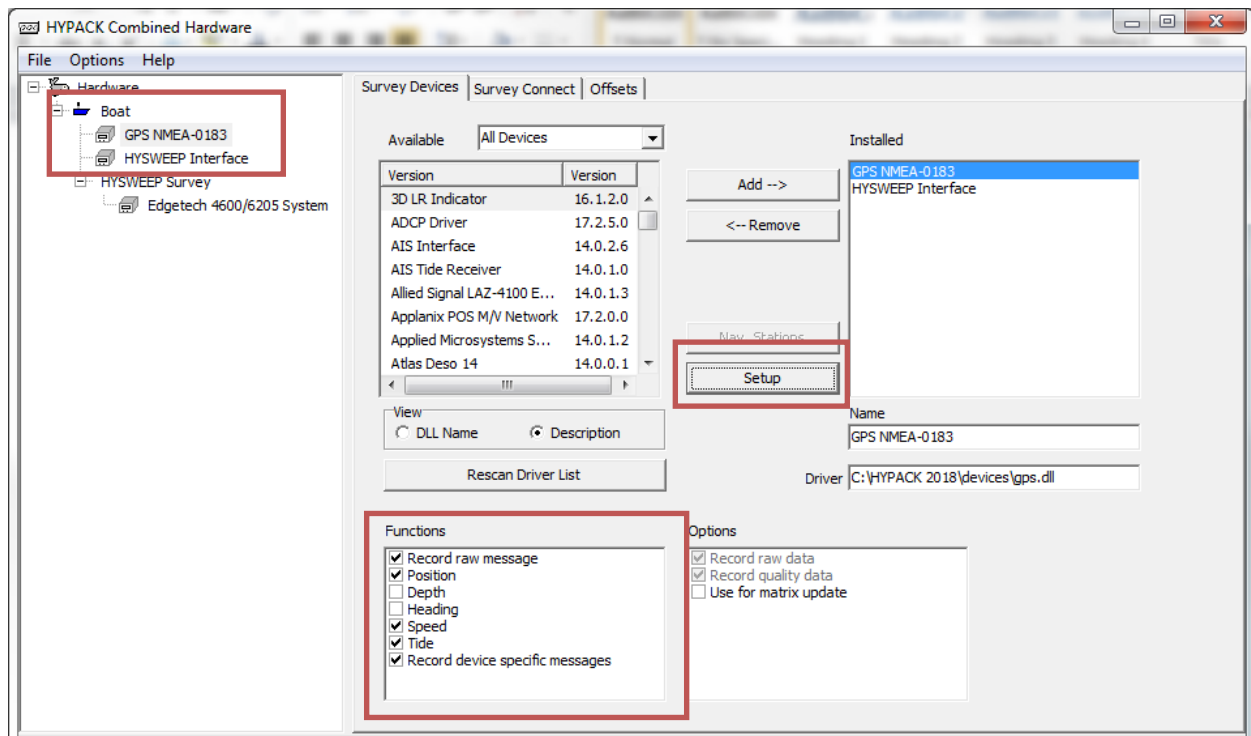
1. In HYPACK® HARDWARE, include the HYSWEEP® SURVEY option and add the following devices (Figure 4):
 - **Boat Mobile:**
 - GPS NMEA-0183 (used to decode the navigation and motion data from the sonar data packets)
 - HYSWEEP® Interface
 - **HYSWEEP® SURVEY:**
 - EdgeTech 4600/6205 System
2. **Select None (no synch)** as the device to Synchronize the Computer Clock, as *all* the data is now coming into HYPACK® and HYSWEEP® via the sonar network and with embedded timing.

FIGURE 4. HARDWARE System Setup.



3. Under the GPS NMEA-0183 functions, select all options except depth & heading (Figure 5).
4. For the HYSWEEP® Interface device functions, select depth & heading, but leave heave unchecked. Depth allows the nadir depth to be displayed in the Data Display window, and heading allows the boat shape to have the correct heading in the Survey Map window.

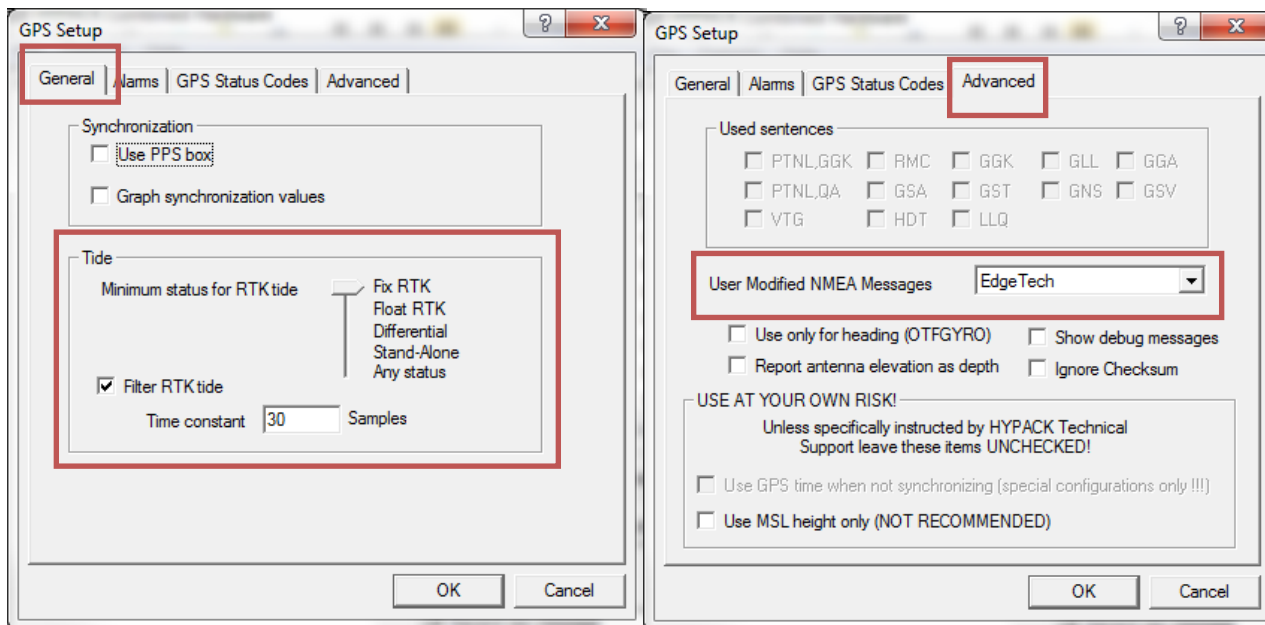
FIGURE 5. GPS NMEA-0183 Driver Configuration.



GPS Configuration

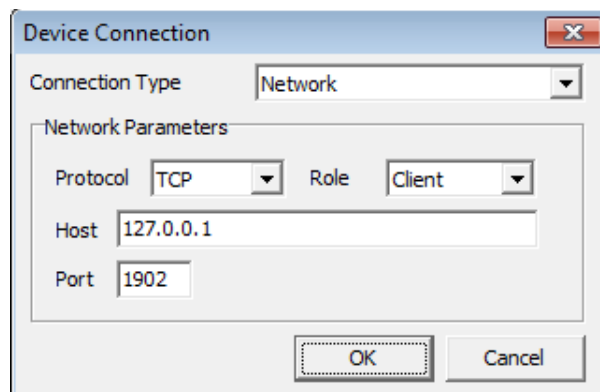
5. **Access the GPS Setup options (select GPS NMEA-0183 and click [Setup]) and set them up as shown in Figure 6.**
 - **In the General tab**, set the minimum status for RTK tides to Fixed RTK, and filter the RTK tide for 30 seconds (if required) .
 - **In the Advanced tab**, select the EdgeTech option for “User Modified NMEA sentences (Figure 6). The “EdgeTech” option is used for navigation data from bathymetry systems like the 6205, whilst the “EdgeTech-NMEA” option is used for navigation from side scan and sub-bottom systems. These will be renamed in future HYPACK® versions to reflect the functionality of these modified NMEA messages.

FIGURE 6. GPS NMEA-0183 Setup Options.



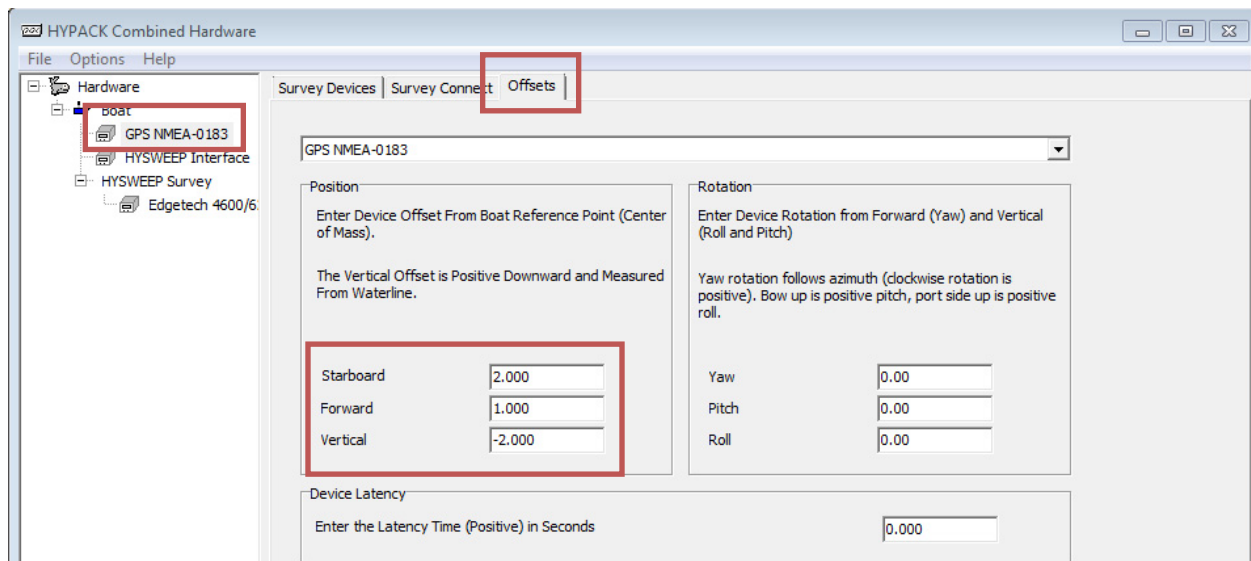
6. Select the **GPS Survey Connect** tab and select the **GPS NMEA-0183 connection parameters** as shown in [Figure 7](#) to allow the HYPACK® to internally read the GPS data.

FIGURE 7. GPS NMEA-0183 Connection Parameters to get the Positioning Data from Discover. Use the IP address below if Discover and HYPACK® are on the same computer. If Discover is installed on another computer, use the IP address of the other computer.



7. Input the **GPS offsets from the Boat Reference Point (CoG) to the GNSS antenna** ([Figure 8](#)). If you get a message regarding the Offset Differences select the “Use GPS NMEA-0183” option.

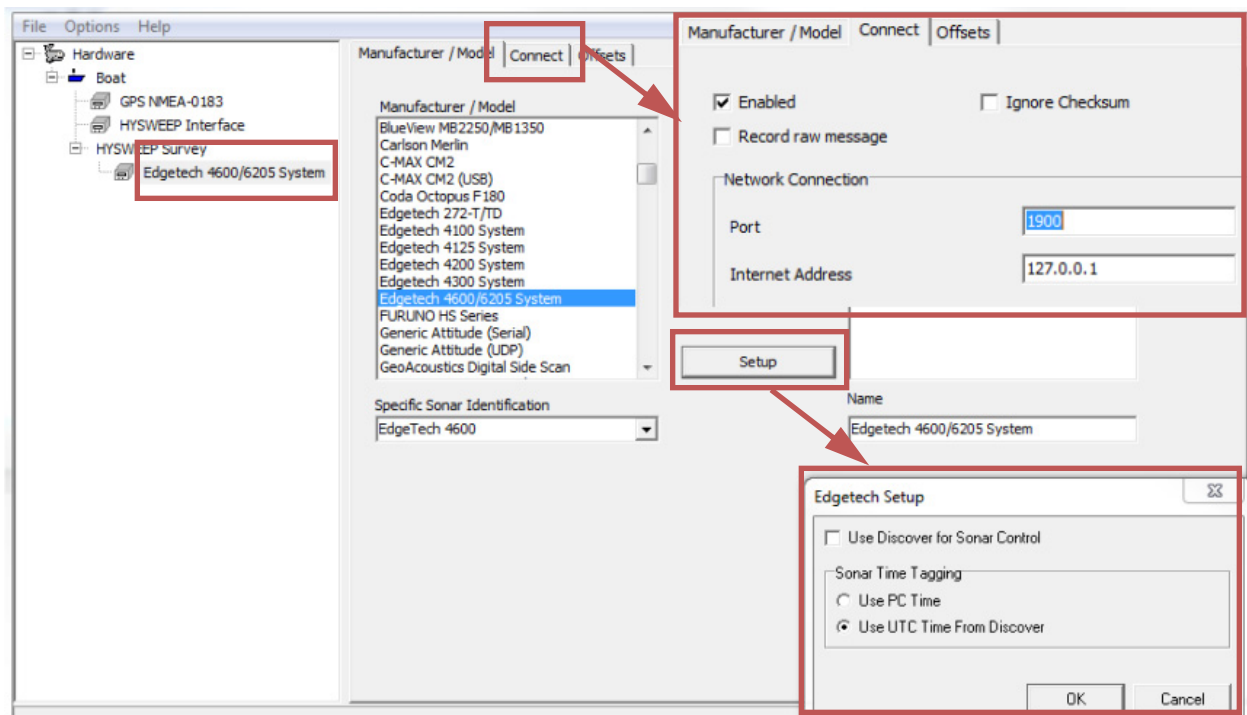
FIGURE 8. GPS NMEA-0183 Offsets.



EdgeTech 6205 Configuration:

8. In the HYSWEEP® Survey branch of the device list, add the EdgeTech 4600/6205 System driver.
9. Click [Setup] and choose to control the sonar using Discover or HYPACK® and Use UTC Time from Discover (Figure 9).
10. In the Connect Tab, set the Internet Address and Port number (1900) of the 6205 sonar.

FIGURE 9. EdgeTech 6205 Driver Setup



11. Populate the offsets from the Boat Reference Point (CoG) to the EdgeTech 6205, MRU (motion sensor) and the Gyro (heading) (Figure 10 & Figure 11).

The EdgeTech 6205 is considered to be a dual head sonar. However, when performing the patch test, the pitch and yaw tests can be conducted as a single head sonar, while the roll test will need an extra patch test line run, so that the port and starboard head roll offsets can be determined. There is a YouTube video for [Patch Testing a 6205](#).

FIGURE 10. EdgeTech 6205 Offsets and Rotation (Patch Test) Values.

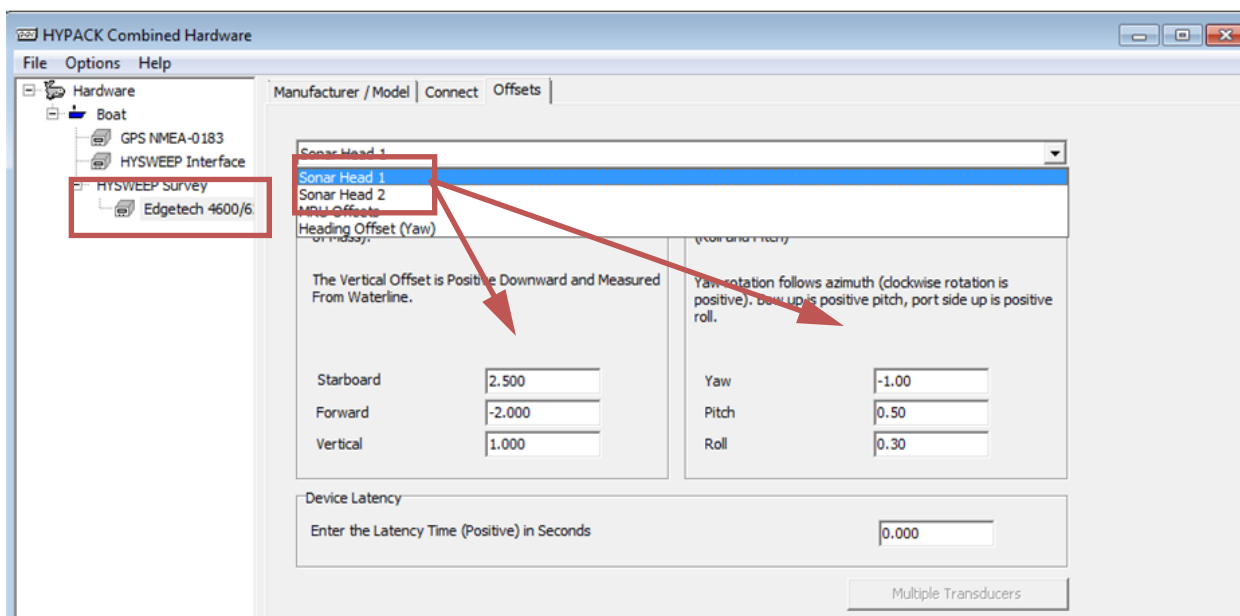
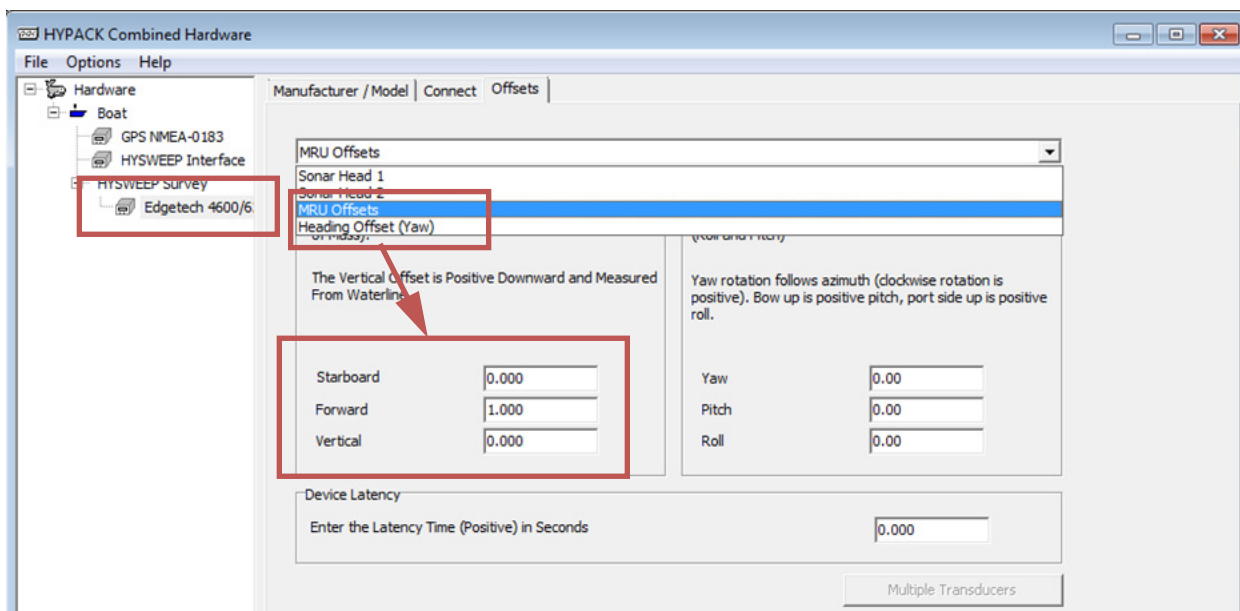


FIGURE 11. MRU & Gyro Offsets



12. Save and Exit the HARDWARE program

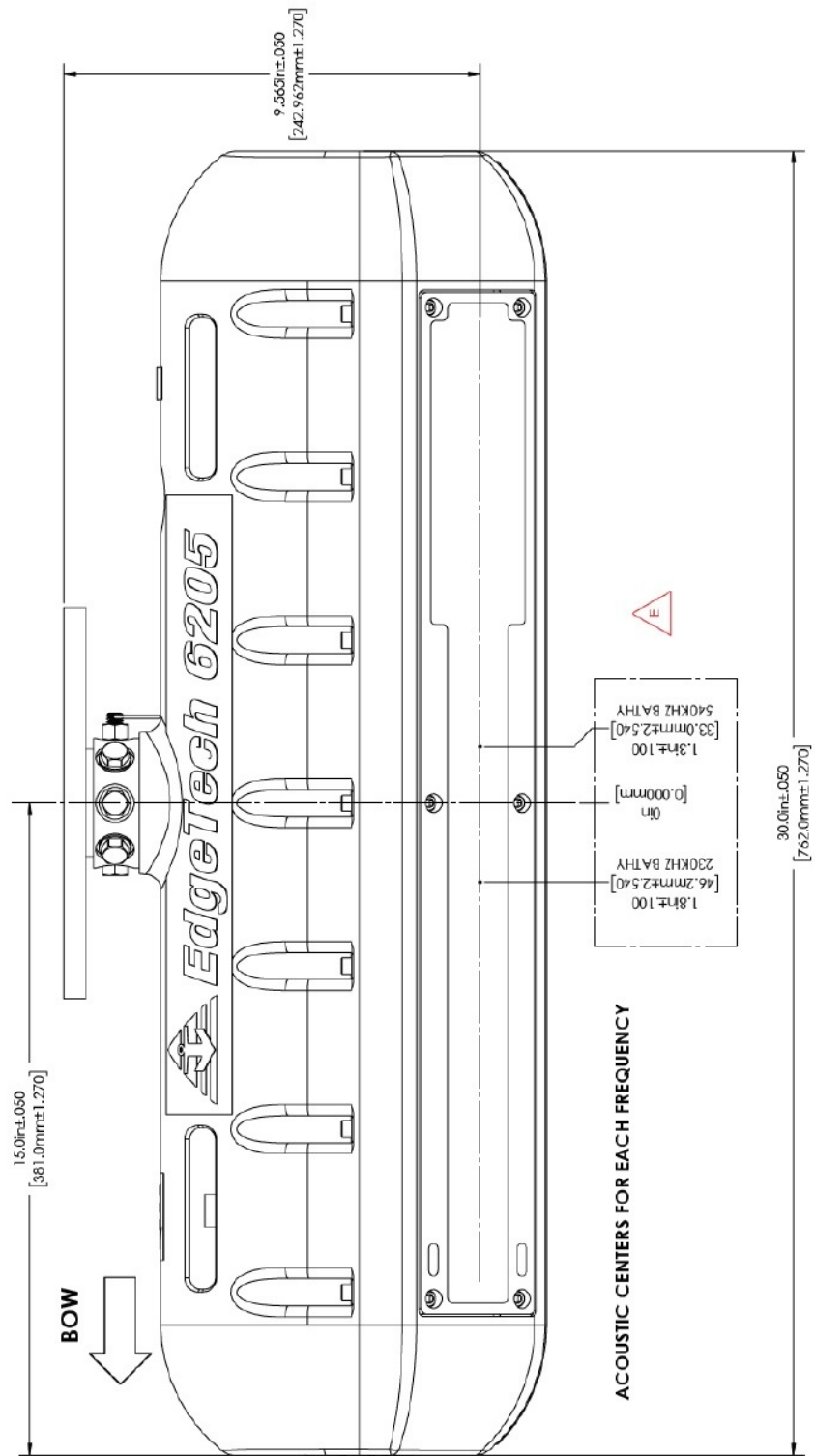
13. **Start SURVEY to acquire data.**

This concludes the HYPACK® setup for the EdgeTech 6205 and the simple motion sensor and gyro!

Thanks to Joe Burnett of HYPACK, and Lisa Brisson from ECHO81 for providing comments which assisted in the preparation of this article.

APPENDIX A

FIGURE 12.



NOTE: The Acoustic Center along the Y axis is different for the 230kHz model than the 550kHz model.

FIGURE 13. Acoustic Center Location in Y and Z Dimensions

