Unabara's Unique Noise Suppression Technology

Many manufacturers of Unmanned Surface Vessels (USV's) have elected to use thrusters/propulsion systems containing brushless DC motors (BLDC). BLDC's are characterized by high efficiency, high reliability, nearly instantaneous control of speed and torque, and low maintenance.

As the term "brushless DC motor" implies the energy applied to the motor is direct current (DC) in nature, but the commutated wave forms are "very dirty" noise wise. A pulse width modulated, multiphase drive signal is used to control the motor's speed and direction of rotation.

While it is true the motor runs on a DC current, the multiphase drive signals ride on it as a high frequency alternating current (AC) with a varying amplitude. A typical BLDC motor controller will normally use a 25 KHz, three phase drive waveform.

Brushless DC motor (BLDC) propulsion systems can cause low frequency sonar noise problems when used aboard autonomous and remote controlled boats (USV's). How sonar systems are affected is simply a matter of physics and thus not dependent upon which brand/manufacturer sonar device the USV has onboard.

Normally, single frequency echosounders in the 200 KHz and above range are not adversely affected, but those echosounders below 100 KHz can be affected by the noise.

Electromagnetic interference (EMI) has two components, an electric field (E field) and a magnetic field (H field). The E field component can easily be shielded using Aluminum shielding if constructed as a Faraday Shield, but Aluminum is ineffective in shielding the H field. To shield from the H field component ferromagnetic materials must be used.

All Unabara Hydrographics dual frequency echosounders are shielded against both E/H fields using Unabara's proprietary noise suppression technology. Numerous tests have proven this to be effective in such echo sounder applications.

After suppressing the EMI, Unabara Hydrographics has discovered another noise source potentially affecting echosounders operating below 50 KHz.; that is propeller noise due to cavitation. This effect can be mitigated in two ways, first locate the echosounder farther from the propellers or replace the faster rotating smaller propeller with a larger diameter, slower turn propeller.

Lastly, cavitation can result in various sizes and levels of bubbles which may cause problems with any type of acoustic device when the bubbles pass over the transducer element; this is most concerning on mono-style USV hulls rather than catamaran hulls. If bubble problems are suspected, a bubble sweep-down analysis should be performed.

In addition to Unabara already incorporating EMI noise suppression into our dual frequency products, we can help the USV provider with transducer placement suggestions and bubble sweep-down analysis.

Our staff is also available to help USV system integrators to interface our products with other onboard electronics such as data loggers and telemetry systems.

Please feel free to ask us any questions related to this subject matter. Our contact information is listed below:

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