

USCGC Healy Commissioning Report

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Both ADCPs are healthy, and working within profiling range and accuracy specifications for this environment. Profiling range is dependent on various factors including backscatter density, background noise, absorption rate, temperature, and insertion loss through acoustic windows.

The USCGC Healy acoustic windows are two inches thick, and made of a polyurethane material called SBI Orange. The USCGC Healy is the first vessel with ADCPs profiling through SBI Orange acoustic windows, known to RD Instruments. RD Instruments recommends windows with one inch maximum thickness, made of polycarbonate for OS75s and BB150s.

Range testing:

Although RD Instruments has no previous experience with SBI Orange, RD Instruments does know what to expect from two inch thick polycarbonate acoustic windows. Two inch thick polycarbonate acoustic windows result in two-way insertion losses of 6dB and 9.2dB for the OS75 and BB150 ADCPs respectively. This attenuation results in range losses of 115m and 83m for the OS75 and BB150 ADCPs respectively.

Range test results show 500m and 260m profiling ranges for the OS75 and BB150 ADCPs respectively. It should be noted that no other acoustic devices were transmitting, and speed over ground was six knots, minimizing background noise.

These ranges meet the RD Instruments specifications for two inch thick polycarbonate or SBI Orange acoustic windows, in this environment.

Built In Tests (BITs):

RD Instruments equips all ADCPs with internal diagnostic tests called BITs. While the BB150 ADCP passes all of its BITs, the OS75 ADCP does fail one BIT. This BIT checks the bandwidth of each of the four receive channels within the OS75 ADCP, and beams one and two have lower than expected bandwidths. The low bandwidths typically indicate reception of an external interfering signal, which would bias the velocities. No bias is detected. These BIT errors may be related to SBI Orange composition.

Environmental affects:

The main environmental factors affecting range are the acoustic windows, the noise of breaking ice, acoustic transmissions of other USCG Healy sonar devices, and the bow thruster. Every time the bow thruster goes on, the ADCPs sense very high background noise, and cannot properly estimate current velocity.

With the other acoustic devices on, the profiling range will be decreased. The ADCPs should be synchronized with the other sonar devices for highest data quality. The OS75

chassis has synchronization capabilities. The BB150 chassis does not have that capability, but a BB chassis synchronization upgrade option is available.

SVSS:

The SVSS sensor integration directly into the BB150 chassis is not currently possible. SVSS manufacturers no longer supply BB ADCP compatible devices. The SVSS data should be connected to the BB150 computer for logging in VmDas.

Recommendations:

- Upgrade the BBVM150 chassis to include synchronization capabilities.
- Synchronize the ADCPs with the other Sonar to avoid acoustic interference.