Shallow Water Bottom Tracking Bottom Mode 7

Introduction

Shallow Water Bottom Tracking Mode 7 improves the performance envelope of our standard bottom tracking. A 1200 KHz ZedHed™ system will work in water as shallow as 30 cm. Bottom Mode 7 has an improved bottom location algorithm that improves performance in all locations and specifically in high backscatter environments. While its main improvement has been in shallow water performance, it can be used to the full range of the instrument.

Recommended Applications

- Current profiling and discharge measurements in shallow rivers and streams.

Basic Operation

When Bottom Tracking is enabled (BP1 or more) the WorkHorse transmits pulses that are dedicated to determining the velocity of the WorkHorse relative to the bottom. The bottom pings are interleaved with the water pings with a separation determined by the TP command (Time Between Pings). As with Bottom Mode 5 a Bottom Track Ping actually consists of several pings with computations to determine the best velocity measurement for the depth and speed. The highest precision is obtained in depths less than 5 meters and velocities less than 90 cm/sec. When operating in shallow water the slower the velocity of the boat or float the more precise the velocity measurement.

The Bottom Track mode is by default Bottom Mode 5 (BM5). By enabling Bottom Mode 7 (BM7), you are able to improve your Bottom Track data in high backscatter environments such as rivers and improve shallow water performance.

What is Required

- Update the WorkHorse ADCP firmware version to 16.19 (Monitor/Sentinel) and 10.12 (Rio Grande), or higher.

- Install the Shallow Water Bottom Tracking Mode 7 feature upgrade in your WorkHorse ADCP.

- Add the BM7 and &R30 command to your existing configuration command files to take advantage of this new mode.

Commands Relevant to Shallow Water Bottom Tracking

BP1	Enables Bottom Tracking
BM7	Selects Bottom Mode 7
BX80	Selects the maximum range for bottom detection. This can be adjusted to improve the time taken for bottom relocation in poor conditions in shallow water. The default for a 1200KHz ZedHed™ system is BX300 (30 meters). When debris or other factors are causing bottom tracking to be lost, the BX value can be reduced e.g. BX80 (8 meters). This will reduce the time for bottom relocation.
BV aaaaa,bbb,cc	This command adjusts the characteristics of Bottom Mode 7 and should be left at frequency dependant defaults. It should only be changed on the recommendation of RD Instruments Customer Service. Please refer to the WorkHorse Commands and Output Data Format guide for more details.
&R30	Adjusts the transmit pulse length to 30% of depth. This command MUST be used in conjunction with BM7. Also see section "other considerations".

Environmental Limits

- Minimum Tracking depth for 1200KHz – 30cm

- Bottom Mode 7 is currently not recommended for 600KHz systems.

- Maximum horizontal velocity measurement is ±9m/sec.

- Long term Accuracy is 0.3% velocity measurement ±0.1cm/s

Other Considerations:

Ping times for Shallow Water Bottom Tracking (Bottom Mode 7) are approximately 3 times longer than standard bottom tracking (Bottom Mode 5) in shallow water and approx. 1.5 times in water > 5m. If it is necessary to collect data as fast as possible, Bottom Mode 5 will give faster ping times but at the expense of shallow water performance.

When using WinRiver, the &R30 command must be added to the User Commands after the BM7 command to override the &R20 command which is coded into WinRiver and is also the Rio Grande firmware default. This adjusts the length of the bottom track transmit pulse as a percentage of depth. The &R20 command is used with Bottom Mode 5 for slightly improved performance in shallow water. The &R30 must be added for Bottom Mode 7.