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APPLICATION NOTE

FSA-001 - BBADCP SHALLOW-WATER PROFILING MODES 5 AND 8

DATE/REV: 15JUL95 / 0

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ABSTRACT: Explains the use and recommended settings for BBADCP shallow-water profiling modes 5 (WM5) and 8 (WM8).

INSTRUMENT/PROGRAM APPLICABILITY:

- 300, 600, and 1200-kHz BBADCPs
- CPU firmware v4.00 and later for Mode 5 use
- CPU firmware v5.27 and later for Mode 8 use
- BB-TRANSECT v2.00 and later

0 - INTRODUCTION

There are many applications where the BBADCP can be used in shallow-water environments. This led to the development of two BBADCP shallow-water profiling modes -- Mode 5 (WM5) and Mode 8 (WM8).

Mode 5 operation is available in both WATER-profiling and BOTTOM-TRACKING in CPU firmware versions 4.00 and later. Mode 8 is a WATER-profiling ONLY mode and is available only in CPU firmware versions 5.27 and later.

The shallow-water profiling feature for both modes has been designed to work with bottom-tracking applications. We recommend using BOTTOM-TRACK MODE 5 (BM5) whenever you use either water-profiling Mode 5 (WM5) or Mode 8 (WM8).

1 - WATER-PROFILING MODE 5

Mode 5 ADVANTAGES compared to Mode 8:

- Smaller depth cell (bin) sizes that allow a lower single-ping standard deviation (see Tables)

Mode 5 DISADVANTAGES compared to Mode 8:

- A reduction in the maximum profiling range (see Tables)
- A reduction in the maximum velocity the ADCP can measure (see Tables)
- Does not work well in dynamic water environments that have water velocity changes greater than 80 cm/s (e.g., eddies, shear)

2 - WATER-PROFILING MODE 8

Mode 8 ADVANTAGES compared to Mode 5:

- A longer maximum profiling range (see Tables)
- An increase in the maximum velocity the ADCP can measure (see Tables)
- Works well in dynamic water environments that have water velocities changes up to 250 cm/s (e.g., turbulence, eddies, shear)

Mode 8 DISADVANTAGES compared to Mode 5:

- Small bin sizes can still be used, but a higher single-ping standard deviation occurs that is 10-15 times greater than Mode 5 (see Tables)

3 - SETUP RECOMMENDATIONS

The setup for water profiling Modes 5 and 8 (including the settings for the associated commands) are listed in the following tables.

- Table 1. Setup Specification for Mode 5 with 20-degree Transducer
- Table 2. Setup Specification for Mode 5 with 30-degree Transducer
- Table 3. Setup Specification for Mode 8 with 20-degree Transducer
- Table 4. Setup Specification for Mode 8 with 30-degree Transducer

4 - USING THE TRANSECT PROGRAM WITH MODE 5 OR MODE 8

The TRANSECT program (v2.0 and later) will not display any data if you use Mode 5 or Mode 8 unless you modify the configuration file. Using any ASCII-text editor, you must add a line to the PROCESSING section of the configuration file (*.CFG). For example, here is how an existing CFG file was modified:

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PROCESSING
{
Average every (30.00 s)
Depth sounder ( NO )
Btm Layer % ( 100 )  <- - - - - THIS LINE WAS ADDED
External_formats ( N N N N )  [ HDT HDG RDID RDIE ]
External_decode  ( N N N N )  [ heading pitch roll temp ]
:
:

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Table 1. Setup Specification for Mode 5 with 20-degree Transducer

Freq	BinSize	MaxVel	MaxRange	AmbigVel	Blanking	Single-ping StdDev
1200	5cm WS5	3.50 m/s	1.8 m	WZ05	30cm WF30	2.3-4.5 cm/s
600	10cm WS10	3.00 m/s	3.6 m	WZ05	80cm WF80	2.3-4.5 cm/s
300	20cm WS20	2.70 m/s	7.2 m	WZ05	160cm WF160	2.3-4.5 cm/s
1200	5cm WS5	1.80 m/s	3.6 m	WZ05	30cm WF30	2.3-4.5 cm/s
600	10cm WS10	1.50 m/s	7.2 m	WZ05	80cm WF80	2.3-4.5 cm/s
300	20cm WS20	1.35 m/s	14.4 m	WZ05	160cm WF160	2.3-4.5 cm/s

Table 2. Setup Specification for Mode 5 with 30-degree Transducer

Freq	BinSize	MaxVel	MaxRange	AmbigVel	Blanking	Single-ping StdDev
1200	5cm WS5	3.00 m/s	2 m	WZ05	30cm WF30	1.5-3.0 cm/s
600	10cm WS10	2.80 m/s	4 m	WZ05	80cm WF80	1.5-3.0 cm/s
300	20cm WS20	2.10 m/s	8 m	WZ05	160cm WF160	1.5-3.0 cm/s
1200	5cm WS5	1.50 m/s	4 m	WZ05	30cm WF30	1.5-3.0 cm/s
600	10cm WS10	1.40 m/s	8 m	WZ05	80cm WF80	1.5-3.0 cm/s
300	20cm WS20	1.05 m/s	16 m	WZ05	160cm WF160	1.5-3.0 cm/s

Table 3. Setup Specification for Mode 8 with 20-degree Transducer

Freq	BinSize	MaxVel	MaxRange	AmbigVel	Blanking	Single-ping StdDev
1200	5cm WS5	4.00 m/s	3.6 m	WZ05	30cm WF30	22.5-33.8 cm/s
600	10cm WS10	4.00 m/s	7.2 m	WZ05	80cm WF80	22.5-33.8 cm/s
300	20cm WS20	2.70 m/s	14.2 m	WZ05	160cm WF160	22.5-33.8 cm/s

Table 4. Setup Specification for Mode 8 with 30-degree Transducer

Freq	BinSize	MaxVel	MaxRange	AmbigVel	Blanking	Single-ping StdDev
1200	5cm WS5	4.00 m/s	4 m	WZ05	30cm WF30	15.0-22.0 cm/s
600	10cm WS10	4.00 m/s	8 m	WZ05	80cm WF80	15.0-22.0 cm/s
300	20cm WS20	4.00 m/s	16 m	WZ05	160cm WF160	15.0-22.0 cm/s

NOTES:

1. The Maximum VELOCITY refers to the total apparent water velocity, which is the sum of vessel speed and the actual water speed.
2. The values for the Maximum VELOCITY are the absolute maximum. In about 50% of applications, users find the Maximum Velocity to be about 30% less than what is shown because of shallow-water dynamics.
3. In about 50% of the 20-degree transducer applications, users find the Maximum RANGE to be about 30% less than shown because of shallow-water dynamics.

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