FIELAX Gesellschaft für wissenschaftliche Datenverarbeitung mbH
Schleusenstr. 14, D-27568 Bremerhaven, GERMANY
Fon: +49 (0)471 30015-0, Fax: +49 (0)471 30015-22, Mail: info@fielax.de

Quick Start Guide for
Teledyne RD Instruments Ocean Surveyor
150 kHz ADCP on RV ‘Heincke’

Source: Teledyne RDI Ocean Surveyor Datasheet

Contact:

FIELAX Gesellschaft für wissenschaftliche Datenverarbeitung mbH
Schleusenstr. 14, D-27568 Bremerhaven, GERMANY
Fon: +49 (0)471 30015-0, Fax: +49 (0)471 30015-22
Mail: echo-support@fielax.de

Ref.:	Vers.:	Date:	Status:
RV_Heincke_ADCP_Support_150kHz.pdf	6	2019-02-27	final

Contents

Document history

Version	Date	Description
1	2012-04-03	First version of this manual
2	2015-03-18	600 kHz ADCP added
3	2016-06-22	600 kHz ADCP and Saab DGPS changes
4	2016-08-15	Separate manual for 150 kHz and 600 kHz ADCPs
5	2017-02-17	Complete removal of 600 kHz ADCP information; updated wiring chart
6	2019-02-27	Communication settings changed, BBTalk result added

1 ADCP Installation Overview

1.1 Sensor Equipment

The following sensors are installed on the RV ‘Heincke’ (Table 1).

Table 1: Sensor specification

Sensor	Model	Details from Manufacturer
ADCP 150 kHz - vessel mounted -	Teledyne RDI Ocean Surveyor	Range: 400 m Vertical resolution cell size: 4 - 8 m Velocity accuracy: ± 1.0 % of the water velocity relative to the ADCP ± 0.5 cm/s Velocity resolution: 9 - 30cm/s Number of depth cells: 1 - 128
Inertial Navigation System (INS)	IXSea Phins	Heading accuracy: 0.05 deg (without aiding) Roll, Pitch accuracy: 0.01 deg Heave accuracy: 5 cm or 5%
Primary Positioning Unit	Trimble SP461	Primary Positioning system DGPS 0.5 - 3 m accuracy
Backup Positioning Unit	Saab R5	Secondary Positioning system DGPS 1 - 3 m accuracy

1.2 Sensor Structure

Table 1 and Figure 1 show the sensor structure of the Teledyne RDI Ocean Surveyor 150 kHz ADCP hardware and Figure 2 shows the installation in the laboratory. The 150 kHz transducer is hull mounted. The deck units of both ACDPs (Teledyne RDI Ocean Surveyor 150 kHz and Teledyne RDI Workhorse Mariner 600 kHz) are permanently installed in the server rack next to the operator PC. The operator PC receives data from one ADCP deck unit at a time (no parallel operation!), position information from the Trimble DGPS receiver, as well as attitude data (heading) from the IXSea PHINS III Inertial navigation system (INS). Recorded data should be regularly copied to the network shares of the XDC storage server.

Setup using the 150 kHz ADCP and VmDas

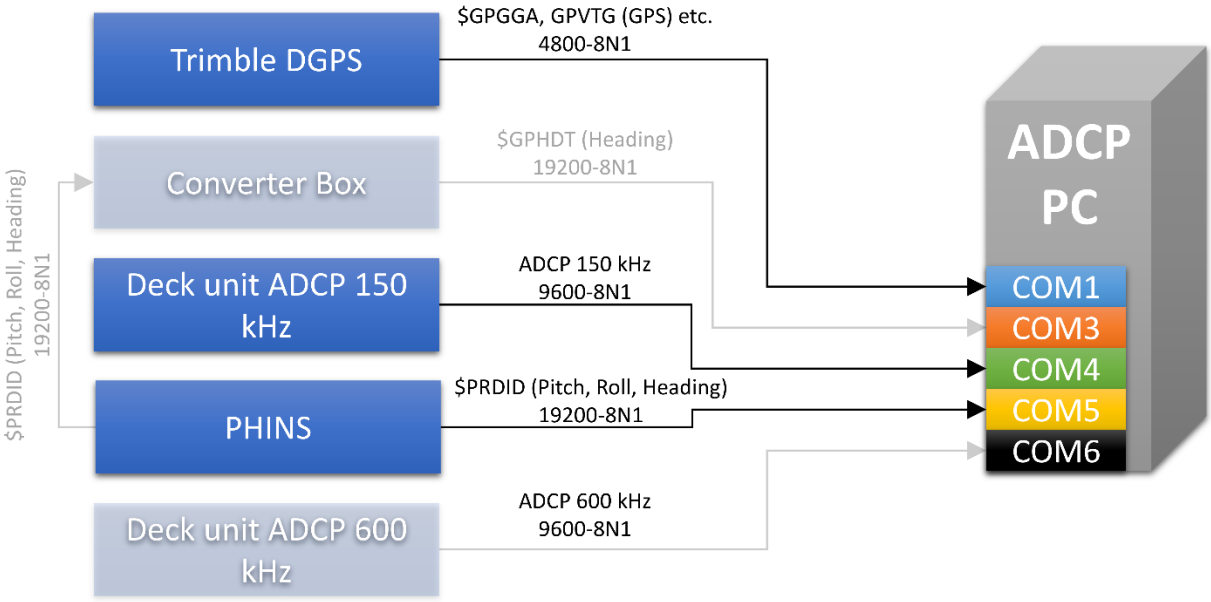


Figure 1: Wiring diagram

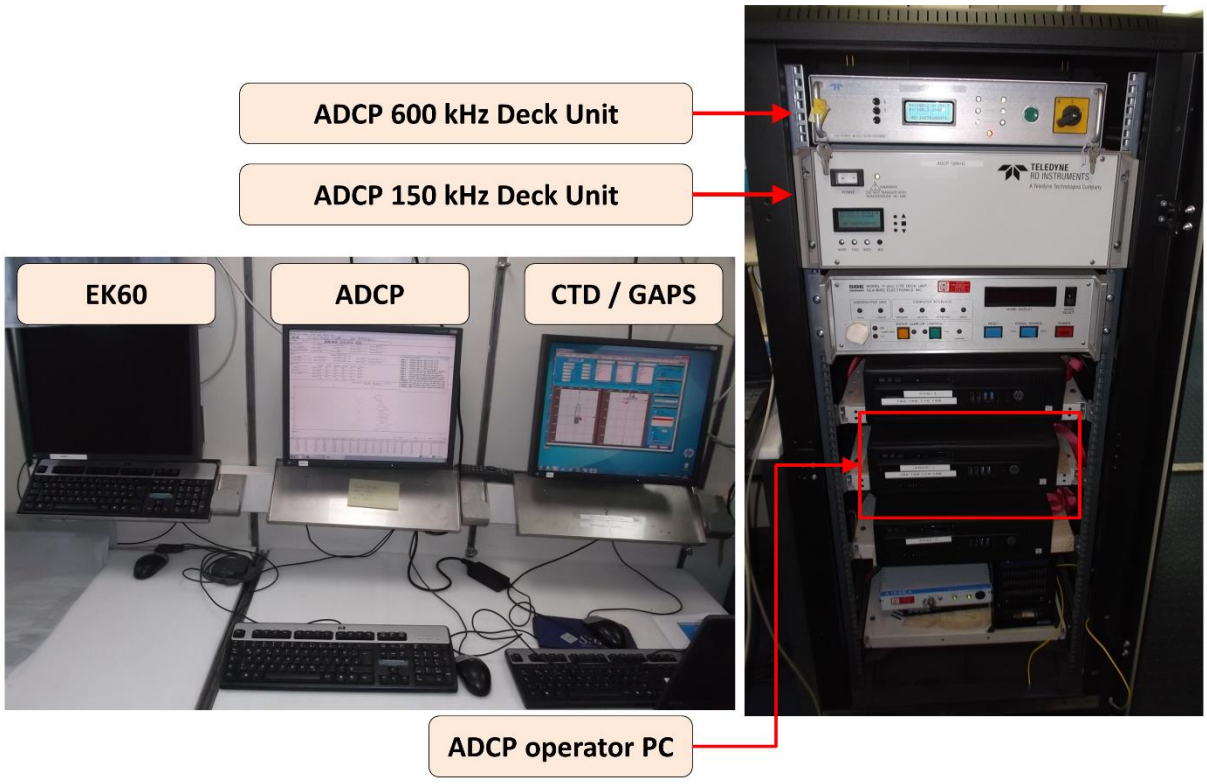


Figure 2: Photo showing the system in the lab

1.3 Software

The software *VmDas* (Vessel-mount data acquisition system) is used for data acquisition and configuration of the Teledyne RDI Ocean Surveyor 150 kHz ADCP. The software *WinADCP* can be used for visualization and export of recorded raw data. Both software packages are installed on the ADCP operator PC.

Please note: On the operator PC, also the software WinRiver II is installed. WinRiver II does not support the Teledyne RDI Ocean Surveyor 150 kHz ADCP. Do not use WinRiver for this system, it is exclusively installed for use with the Teledyne RDI Workhorse Mariner.

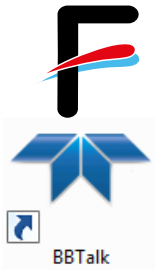
2 System Start-up

This manual is created for the specific use of the Teledyne Ocean Mariner 150 kHz ADCP (ADCP in the following text) on RV 'Heincke' and focuses on the most important parameters to be looked after during data acquisition. We recommend to additionally check the ***VmDas Quick Start Guide*** and ***VmDas User Guide***.

2.1 Switch on ADCP

1. Power up the ADCP operator PC (Figure 2, right)
2. Power up the deck unit in the server rack (Figure 2, right)

2.2 System Test (BBTalk)



Before you start a survey, you should perform a hardware system test.

1. Start the BBTalk program from the desktop of the operator PC.
2. Connect to the ADCP unit by selecting the settings:

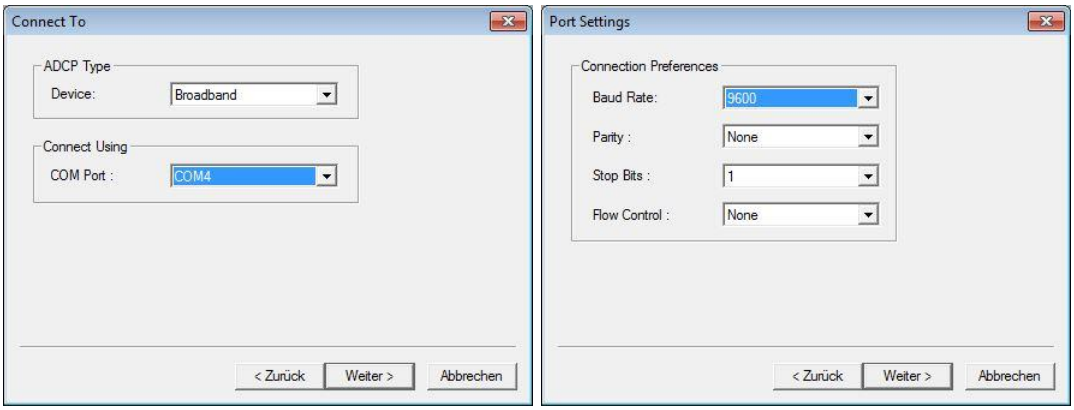


Figure 3: Define COM port and serial connection settings in BBTalk

3. Select Options as shown below:

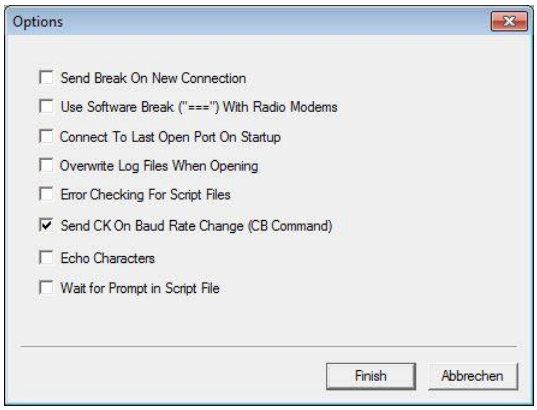
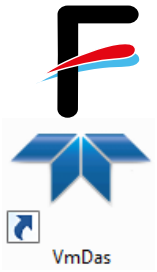


Figure 4: Program settings in BBTalk

4. To run the test, several commands need to be sent to the ADCP.
5. Select the menu ***File → Send script file*** or press ***<F2>***.
6. Select the file ***C:\Program Files (x86)\RD Instruments\RDI Tools\ TestOS.rds.***
   This file contains the following set of commands for the ADCP which is executed one after another (The Enter button can be pressed to skip the delays.):
   CR1, TS?, PS0, PA, PT3, PT6
   The results can be saved to a text file via copy & paste (see Appendix).

3 VmDas Acquisition Software



The software VmDas is used for data acquisition and playback.

1. Start the VmDas program from the desktop of the operator PC
2. Select ***File → Collect Data*** and then import the default configuration settings using ***Options → Load***. The default configuration is: ***C:\ADCP\150kHz_OceanSurveyor\config\150kHz_OceanSurveyor_TCPIP.ini***.
3. The configuration settings should be checked before data acquisition. Enter the menu ***Options → Edit Data Options*** and edit the settings as described in the section 3.1 to 3.11.
4. After checking the settings carefully, **start the data acquisition**. Select the menu ***File → Collect Data*** or press the button at the upper left of the main window. The data recording starts immediately and the screen looks about the same as the screenshot in Figure 5.

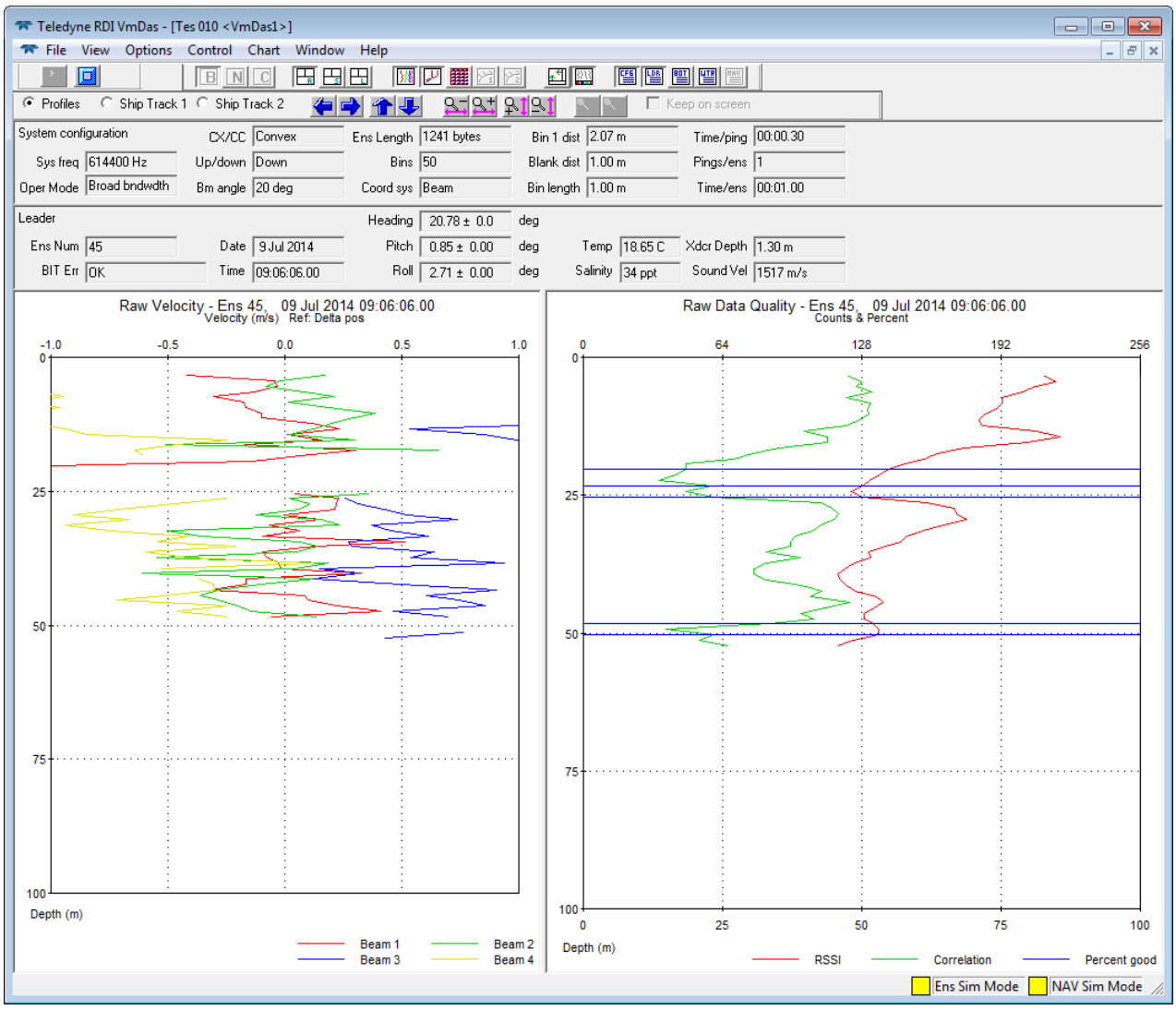


Figure 5: VmDas screen layout during data collection (raw display mode)

3.1 Communications Settings

The Communications tab (in menu ***Options → Edit Data Options***) configures the serial or network connections to the ADCP, the GPS and the motion sensor. Make sure that the inputs correspond to those in Figure 6 (red rectangle).

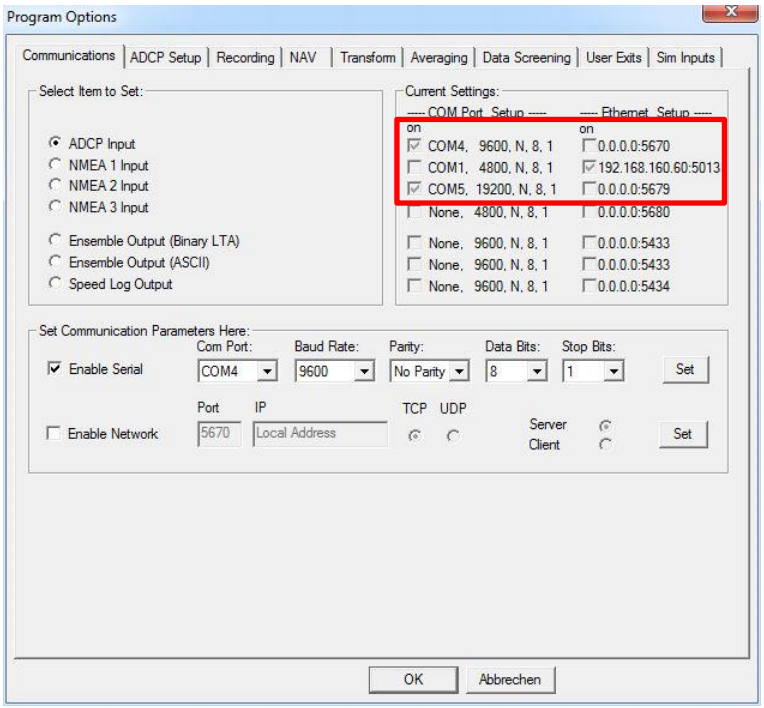


Figure 6: Required communication settings for 150 kHz ADCP

Please note: Due to several problems with the COM1 Port, the NMEA 1 Input (GPS input) has now been changed to TCP/IP (Figure 7).

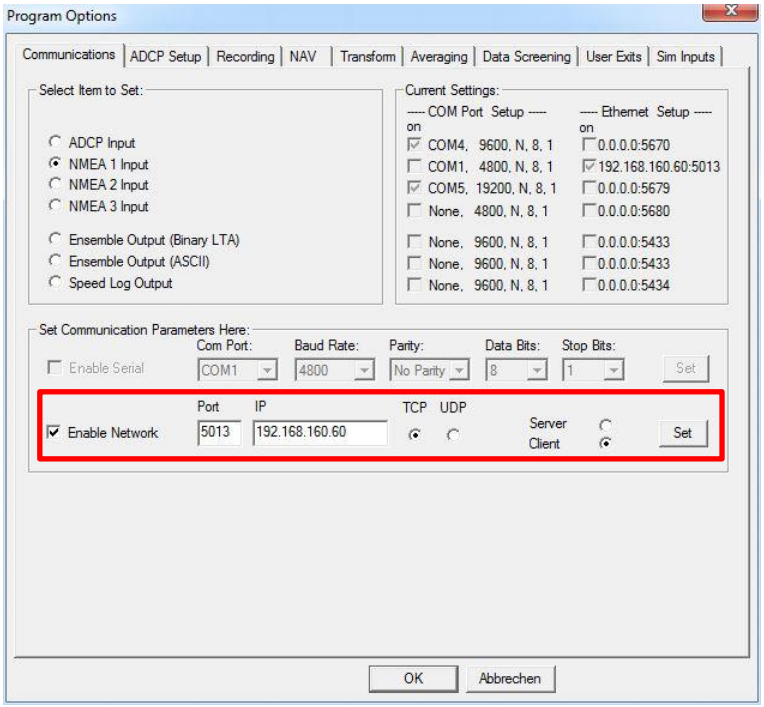


Figure 7: Changed NMEA 1 Input (GGA, VTG from Trimble DGPS)

3.2 ADCP Settings

For the 150 kHz ADCP, both ADCP Setup are possible in VmDas. For standard usage, we recommend however to use ***ADCP Setup from File***. Please do not overwrite the default file ***OS150BBDEF_shortrange_broadband_highres.txt***. If bottom tracking is activated (default setting and recommended), the ***Ensemble Time*** should be set to ***Ping as fast as possible*** (Figure 8).

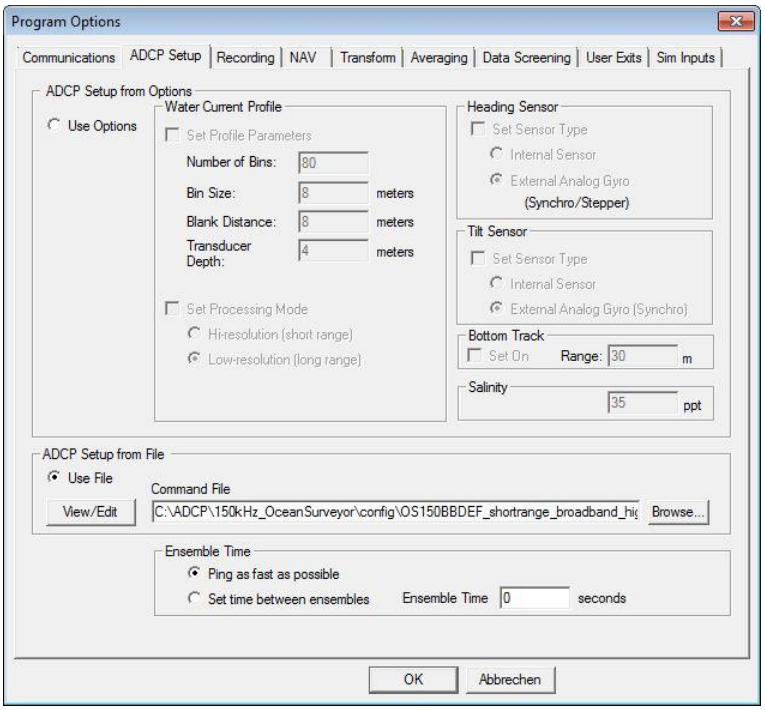


Figure 8: ADCP and auxiliary sensor setup

3.3 Changes in the ADCP Setup File

The setup file contains the following commands (Table 2) that can be modified by the user:

Table 2: command description

Command	Description	Default
CR	Retrieve Parameters	CR1
CF	Flow Control	CF11110
BM	Bottom Track Mode	BM5
BP	Bottom-Track Pings Per Ensemble	BP1
BX	Maximum Tracking Depth	BX1500
EA	Heading Alignment	EA03400
EB	Heading Bias	EB0
ED	Depth of Transducer [decimeter]	ED40
ES	Salinity [PSU]	ES35
EX	Coordinate Transformation	EX11111
EZ	Sensor Source	EZ1111101
WA	False Target Threshold Maximum	WA50
WB	Mode 1 Bandwidth Control	WB0
WD	Data Out	WD111100000
WF	Blank after Transmit [centimeter]	WF200
WN	Number of Depth Cells	WN23
WP	Pings Per Ensemble	WP1
WS	Depth Cell Size [centimeter]	WS200
WV	Ambiguity Velocity	WV175
TE	Time Per Ensemble	TE00:00:01.46
TP	Time Between Pings	TP00:00.73
CK	Keep Parameters	CK
CS	Start Pinging (Go)	CS

Only the settings marked red should be modified according to the desired range and resolution. WB0 stands for wide bandwidth with a high sample rate and a low profiling range, WB1 should be chosen for narrow bandwidth with a low sample rate and a high profiling range. Blank after transmit specifies the space between the transducer and the first depth cell.

3.4 Recording Settings

The Recording tab (in menu ***Options → Edit Data Options***) configures the recording options for your survey/expedition. Choose an adequate name for your survey/expedition. Set the primary path for recorded files to ***C:\ADCP\150kHz_OceanSurveyor\data*** as shown inFigure 9. If a backup is desired, check ***Dual Output Directories*** and provide a path (***H:\Scientist\data\ADCP***).

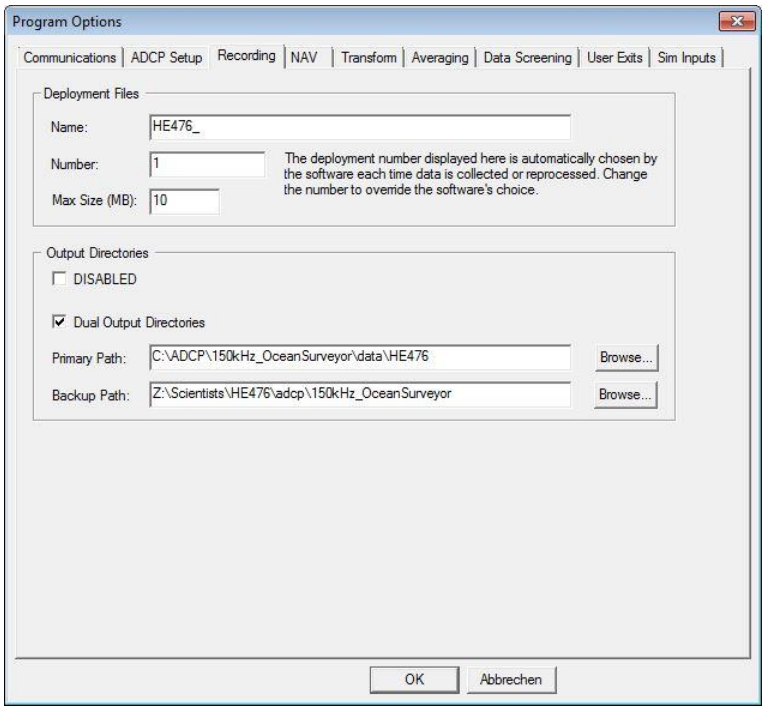


Figure 9: Recording settings; make sure to set correct output and backup directories.

3.5 Navigation Settings

This tab configures the navigation input sources for the ship's position and the ship's speed over ground. Ensure the settings are as shown in Figure 10.

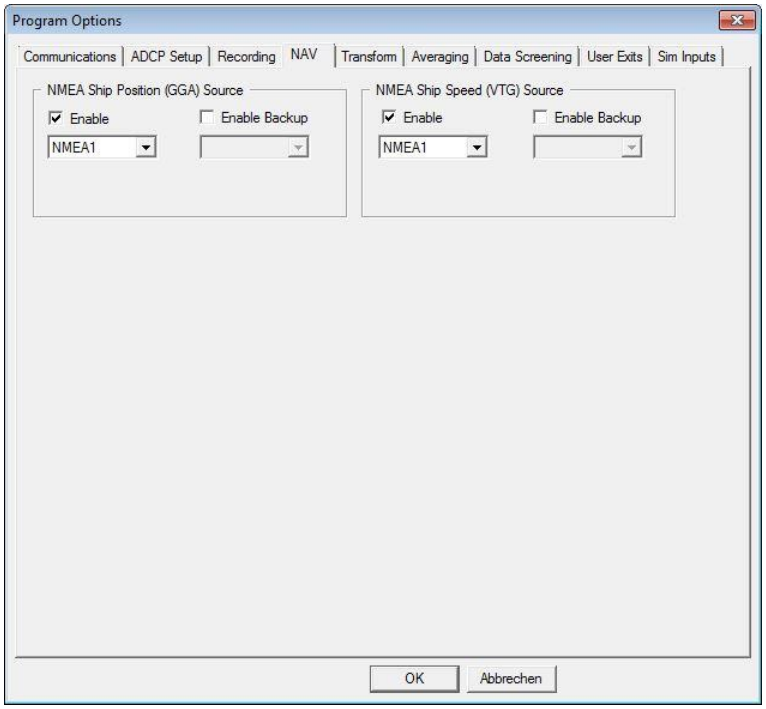


Figure 10: Required navigation input settings

3.6 Transformation Settings

The reference beam 3 of the ADCP is mounted 45° relative to the ship's longitudinal axis which has been detected by a bottom and water track measurement. Ensure this offset is given as the EA Heading Alignment Error in the configuration!

The Transform tab configures heading and roll/pitch input sources as well as angular offsets for each parameter.

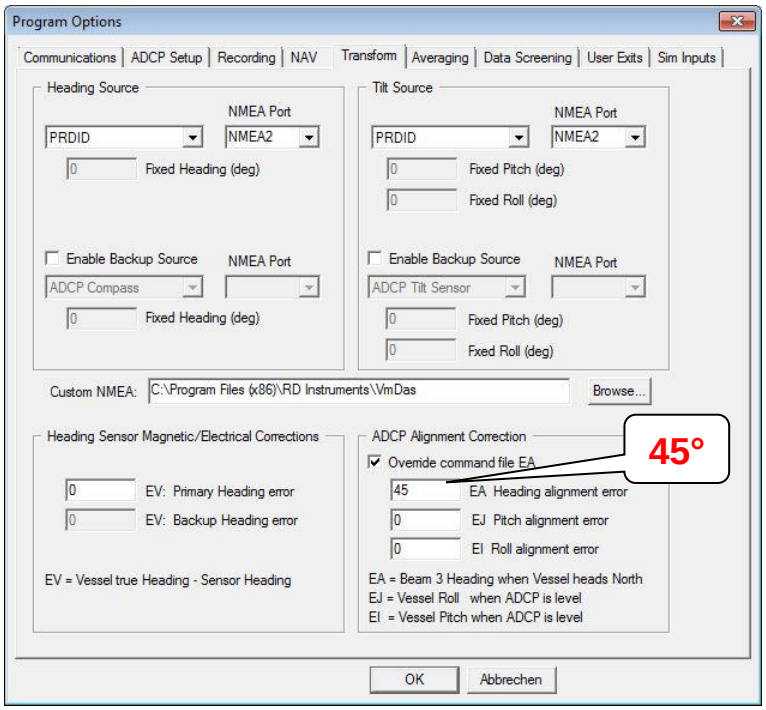


Figure 11: Required transformation settings

3.7 Averaging Settings

This tab (in menu ***Options*** → ***Edit Data Options***) configures the averaging of the ADCP raw data. Configure as shown in Figure 12 or adjust the settings according to your requirements. The settings will not affect the raw data.

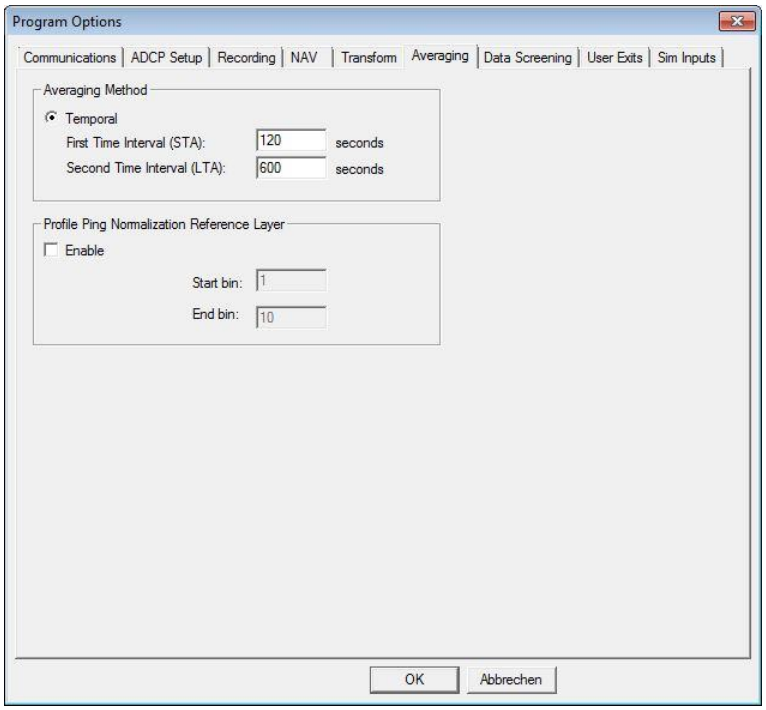


Figure 12: Averaging settings, adjustable to your requirements

3.8 Data Screening Settings

The Data Screening tab (in menu ***Options*** → ***Edit Data Options***) configures the screening settings for the visualization of the ADCP raw data. Adjust these settings according to your requirements.

You can set limits for RSSI (amplitude), correlation, percent good, error velocity, vertical velocity and fish screening. If the raw values are below the selected minimum limits the values will not be displayed nor included in the short time and long-time averages. The raw data is of course not affected by these settings.

3.9 User Exits

In this tab it is recommended to check the ***Launch WinAdcp*** box as shown in Figure 13.

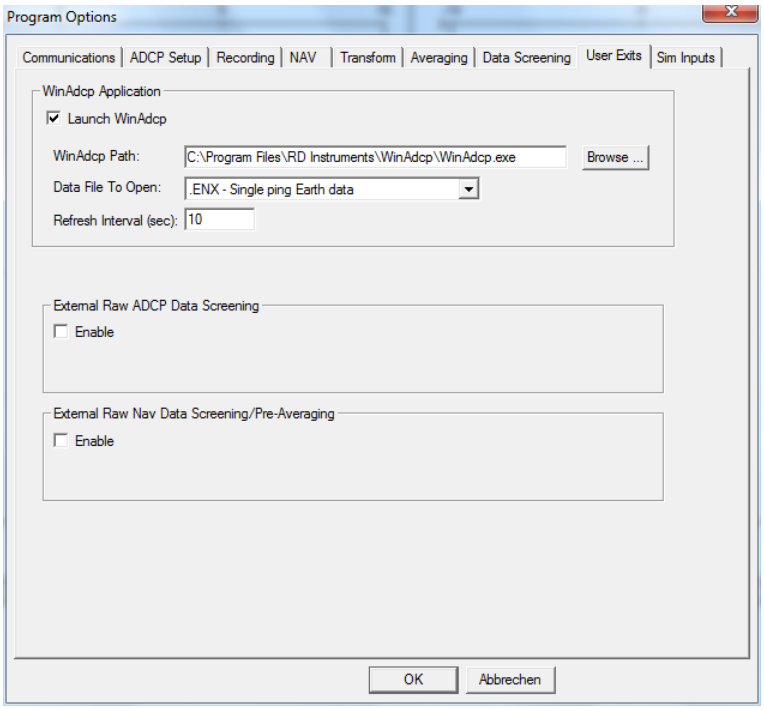


Figure 13: Recommended User Exits settings

3.10 Sim Inputs

This tab shows options to replay already recorded data. For data collection (default) it should be configured as shown in Figure 14.

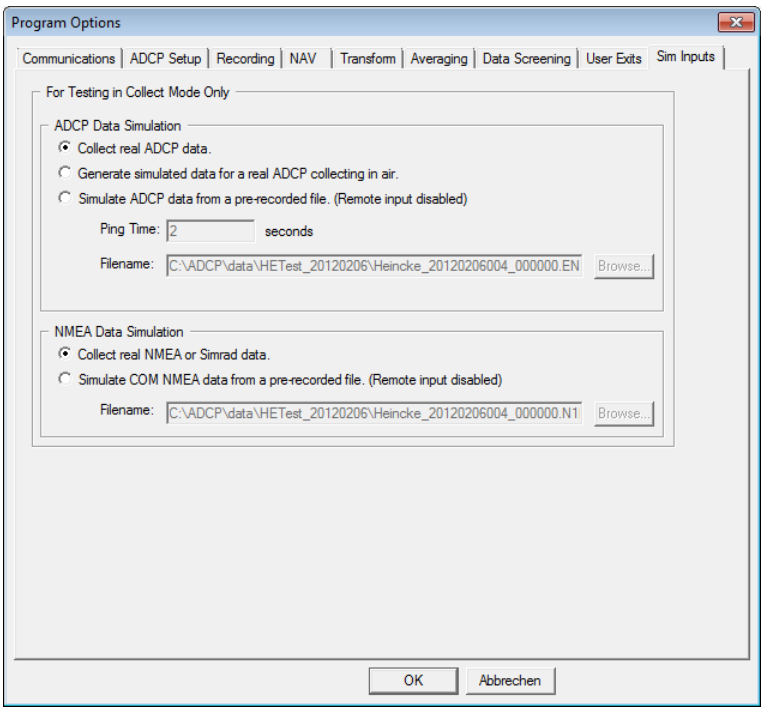


Figure 14: Configuration for data collection

3.11 Short Term Averages (STA) in VmDas

VmDas offers the possibility to display already averaged velocities (according to the averaging settings, Figure 12) on a map including the ship movement on a map (screenshot in Figure 15). Therefore, press the tab  in the toolbar. You can change the references / displayed velocities under ***Options → Edit Display Option*** (this will not affect the raw data collection).

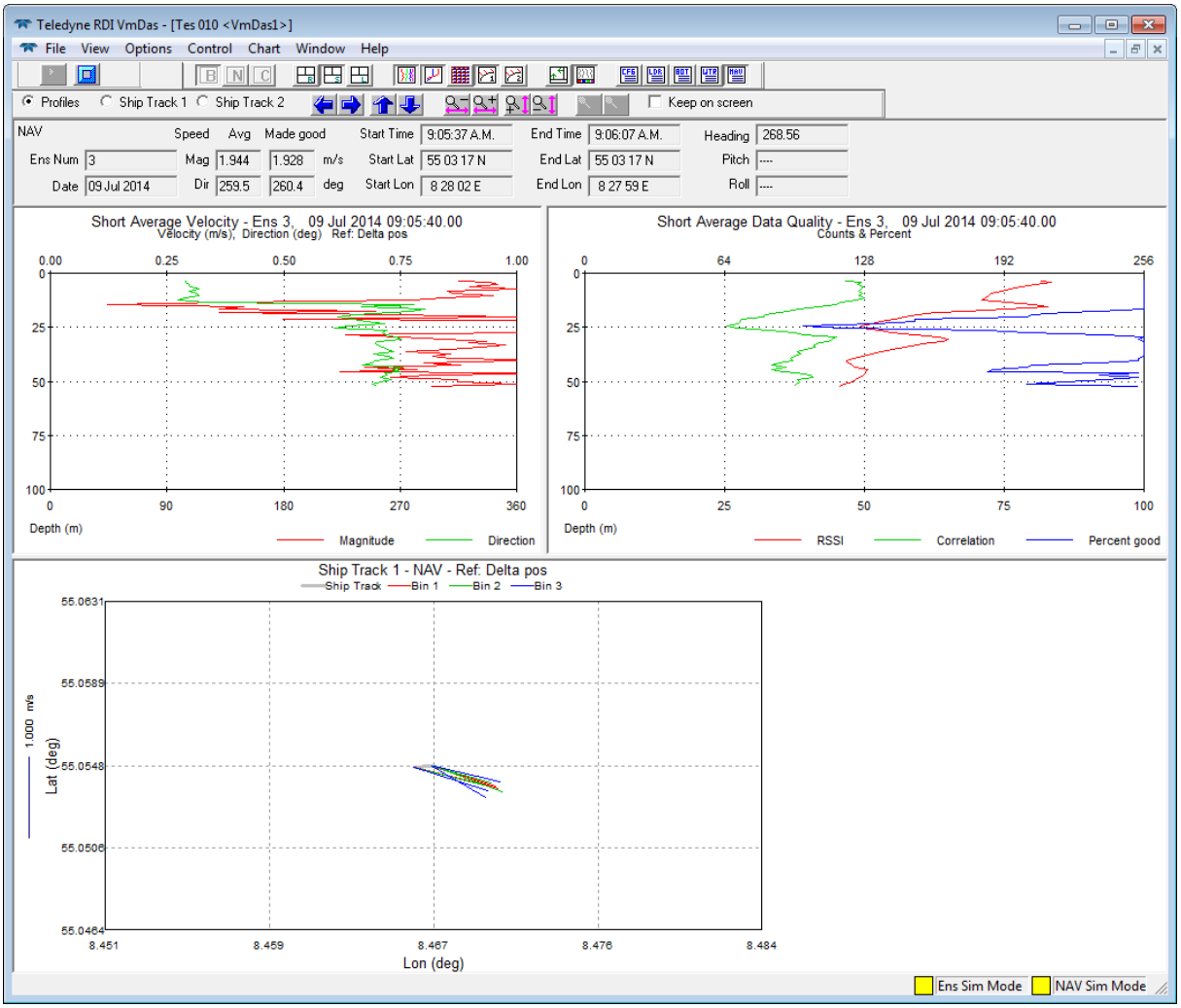
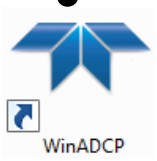


Figure 15: Screenshot of VmDas during data replay

4 WinADCP



The WinADCP software can be used for visualization and export of the recorded ADCP data (screenshot in Figure 16). For a detailed description, please read the ***WinADCP User Manual*** for help on how to use the software.

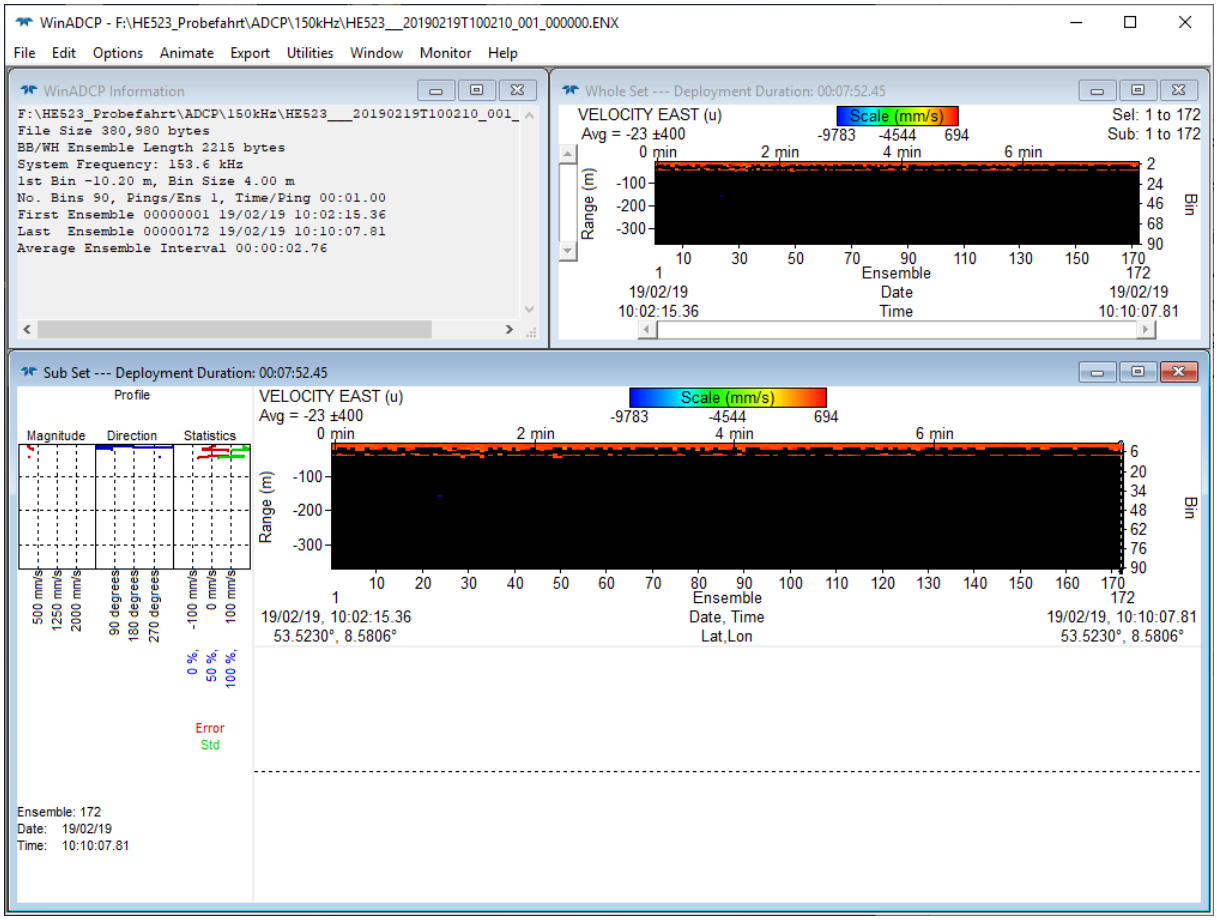


Figure 16: Screenshot of WinADCP during data replay

4.1 Exporting Data

Besides several displaying and replay features of the collected data, WinADCP is used to Export the data to ASCII-format. Before that, open the ***WinADCP Chart Options*** with a right-mouse-click in either the ***Whole Set*** or ***Sub Set*** window (Figure 17). Here you can choose under ***Processing*** if the velocity is already corrected using the ***Bottom Track*** or the ***Navigation (VMDAS)***, or if it is not corrected (***None***). We recommend the not-corrected output, so you can choose during further processing the most suitable correction.

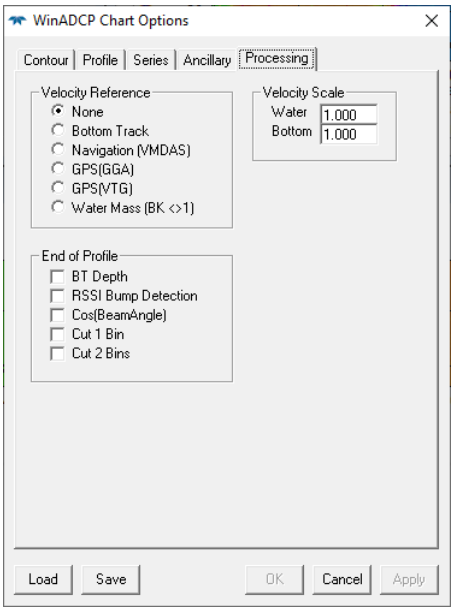


Figure 17: WinADCP Chart Options window

The ASCII-export is done choosing ***Export*** in the menu and then select ***Series/Ancillary*** (Figure 18). Here, a selection can be made which bins should be exported and which primary data types (typically the zonal, meridional, and error velocities) and which ancillary data types should be exported (typically Bottom Track and Navigation data). If bottom track has been chosen as velocity reference, the exported velocities are already representing the true water velocities (i.e. ship movement corrected).

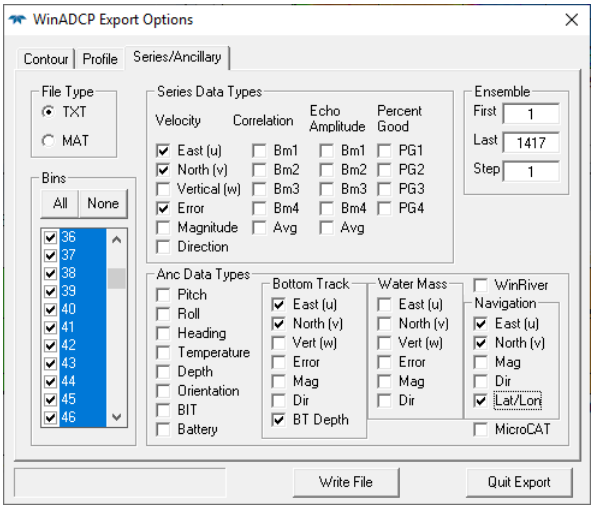


Figure 18: Data export in WinADCP

Appendix

BBTalk Test Result

```
Ocean Surveyor Broadband/Narrowband ADCP
Teledyne RD Instruments (c) 1997-2008
All rights reserved.
Firmware Version: 23.19

>CR1
[Parameters set to FACTORY defaults]
>TS?
TS 18/09/26,20:20:44.01 --------- Set System Date and Time
>PS0
       Frequency:  153600 HZ
   Configuration:  4 BEAM, JANUS
 Transducer Type:  ROUND 32x32
  Beamformer Rev:  A02 or later
      Beam Angle:  30 DEGREES
    Beam Pattern:  CONVEX
     Orientation:  DOWN
    CPU Firmware:  23.19
    FPGA Version:  A0
         Sensors:  TEMP  SYNCHRO

>PA
RAM test...........PASS
ROM test...........PASS
Receive test.......PASS
Bandwidth test.....PASS

>PT3
Correlation Magnitude:
      Lag     Bm1      Bm2      Bm3      Bm4
        0     1.00     1.00     1.00     1.00
        1     0.82     0.81     0.82     0.81
        2     0.46     0.42     0.43     0.39
        3     0.16     0.12     0.11     0.05
        4     0.02     0.02     0.05     0.08
        5     0.05     0.05     0.04     0.07
        6     0.08     0.05     0.04     0.03
        7     0.10     0.05     0.07     0.01

RSSI: 169 164 171 161

PASSED

>PT6
Receive Bandwidth:
.............................
  Expected     Bm1    Bm2    Bm3    Bm4
  --------    -----  -----  -----  -----
    15500     13272  14711  14456  14651

PASSED
```