

RD Instruments

Acoustic Doppler Current Profilers

Workhorse

Read This First

This binder contains specific information on your ADCP system. This binder also may contain special technical bulletins or last-minute changes to your manuals. Please read the information within this binder and keep it for future reference.

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1-0. Introduction

Thank you for purchasing the RD Instruments (RDI) Workhorse Monitor (Direct-Reading) or Sentinel (Self-Contained) Broadband Acoustic Doppler Current Profiler. This manual is designed to help first time ADCP users to unpack, set up, and test their ADCP.

1-1. Getting Started

You are probably eager to get started, but take a moment to read a few words of guidance. We have tried to make the ADCP and its manual/s easy to use. However, the ADCP *is* a complex instrument. You must take time to read the manual/s.

The Read Me First covers:

- This booklet contains last-minute changes to the manual and other helpful information about your system.

The Workhorse Technical Manual covers:

- **Initial Equipment Inspection and Setup.** Use the *Setup Card* and Chapter 1 to help unpack, inspect, install the software, and do a simple communication test with the ADCP.
- **Collecting Data.** Chapter 2 covers planning a deployment and self-contained data recovery. Use the *Quick Reference Card* and the *User's Guide* once you are familiar with the ADCP operation.
- **Viewing Data.** Chapter 3 covers real-time data collection (*WATCH*), data playback, and using *BBLIST* to convert data to an ASCII format. Use the *Quick Reference Card* and the *WATCH Command Reference Card* once you are familiar with the ADCP operation.
- **Maintenance.** Chapter 4 covers ADCP maintenance. Use this chapter to make sure the ADCP is ready for a deployment.
- **Test Procedures.** Chapter 5 covers ADCP test procedures and compass alignment. You should test the ADCP before your deployment.
- **Troubleshooting.** Chapter 6 covers troubleshooting the ADCP. If the ADCP fails a built-in test, use this chapter to help locate the problem.

- **Data Analysis.** Chapter 7 is an overview on processing data after a deployment and using the Data Handling software included on the BBTOOLS disk. Use this chapter to validate your data.
- **Appendixes.** Appendixes cover system overview, commands, and specifications and dimensions (including outline installation drawings).

The User's Guides covers:

- These booklets contain pointers, figures, and suggestions to make your deployments more reliable and effective.
- A step-by-step deployment guide.

The Reference Cards cover:

- **Setup Card.** The *Setup Card* (Sentinel or Monitor) is designed for *first time* users to unpack, setup, install the software, and run a system test on the Workhorse.
- **WATCH Command Reference Card.** The *WATCH Command Reference card* is designed to help *experienced* users remember the commands used by *WATCH*. First time users of *WATCH* should read Chapter 3 in the Workhorse Technical Manual.
- **Quick Reference Card.** The *Quick Reference Card* is designed to help *experienced* users remember the proper steps needed to deploy the Workhorse for either a real-time or self-contained deployment. First time users should read the User's Guide (Monitor or Sentinel) and Chapter 2 before deploying the Workhorse.

1-2. Workhorse Care

This section contains a list of items you should be aware of every time you handle, use, or deploy your ADCP. *Please refer to this list often.*

General Handling Guidelines

- Never set the transducer faces on a hard or rough surface. The urethane faces may be damaged.
- Do not expose the transducer faces to prolonged sunlight. The urethane faces may develop cracks. Cover the transducer faces on the Workhorse if it will be exposed to sunlight.
- Do not expose the I/O connector to prolonged sunlight. The plastic may become brittle. Cover the connector on the Workhorse if it will be exposed to sunlight.
- Do not scratch or damage the plastic o-ring surfaces or grooves. All o-ring grooves and surfaces must be inspected for scratches or damages on every re-assembly. If scratches or damage exist, they must be sanded out using 400 to 600 grit sandpaper. If the damage can not be repaired, contact RDI. Do not risk a deployment with damaged o-ring surfaces.
- Do not lift or support a Workhorse by the external I/O cable. The connector will break.

Assembly Guidelines

- Always remove the retaining strap on the underwater-connect cable and dummy plug when disconnecting them. Failure to do so will break the retainer strap.
- A light amount of DC-111 lubricant on the underwater-connect cable connector pins (rubber portion only) will make it easier to connect or remove the cable.
- Do not over tighten the transducer or end-cap mounting hardware. If you over-tighten the bolts, you can crack or break the plastic flanges. The plastic bushing must not be damaged or warped. Over a long period, over-tightening can cause the plastic to creep (permanent deformations are formed primarily at the edges of washers). Consequently, under-torquing the transducer or end-cap mounting hardware can cause the Workhorse to flood. Read Chapter 4 - Workhorse re-assembly.
- Make sure the O-rings stay in their groove when you re-assemble the Workhorse. Tighten the hardware as specified. Read Chapter 4 - Workhorse re-assembly.

Deployment Guidelines

- The AC power adapter is not designed to withstand water. Use caution when using in wet conditions.
- Align the compass whenever the battery pack is replaced.

- Avoid using ferro-magnetic materials in the mounting fixtures or near the Workhorse. They effect the compass.
- Before you deploy the ADCP, you must connect the battery (Sentinel systems only). Refer to Chapter 4 in the Workhorse Technical Manual for instructions on ADCP assembly and battery connection.

1-3. Direct-Reading or Self-Contained

The Monitor is a direct-reading version of the Sentinel that is less than half as long. By adding internal recording (PCMCIA card) and an external battery case, the Monitor can be used the same as a Sentinel. Alternatively, the Sentinel can be used in direct-reading mode the same as a Monitor with internal batteries (or powered externally) and/or recording for backup. All of the electronics (PC boards) are the same regardless of the system type.

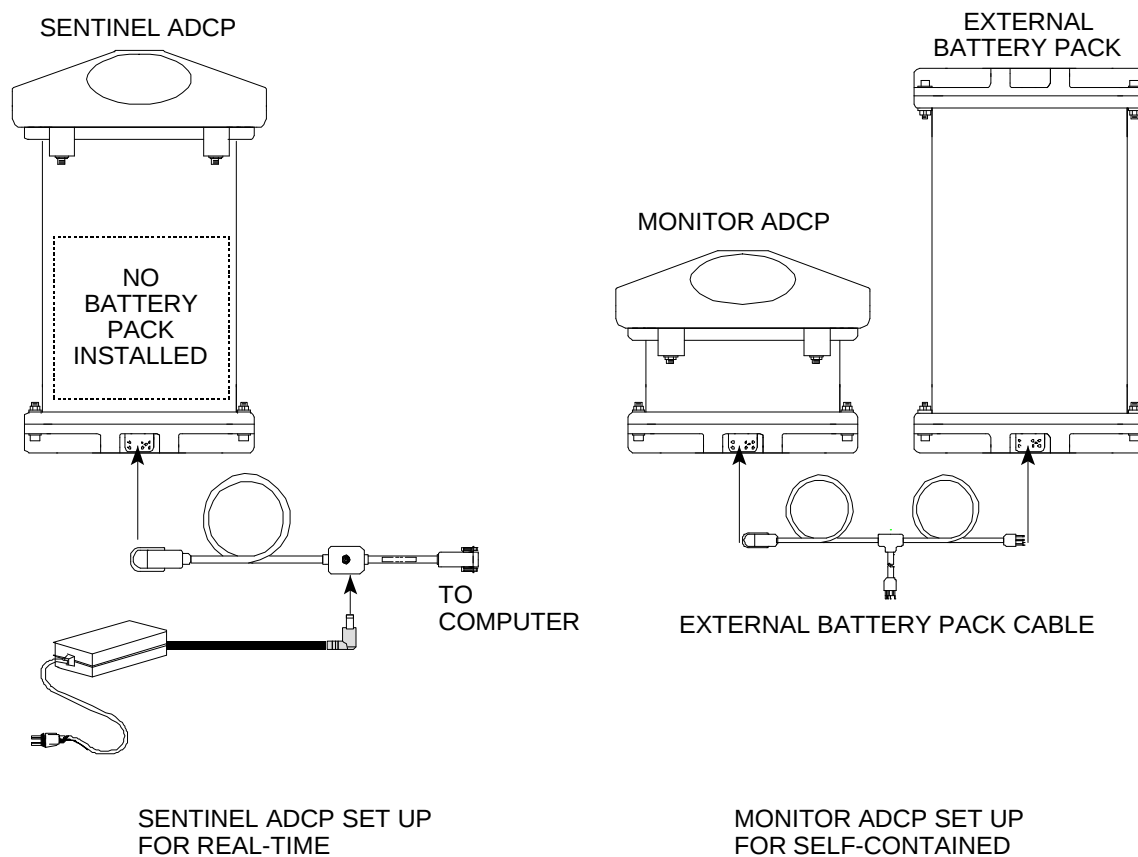


Figure 1. Workhorse systems can be used as real-time or self-contained

1-4. Monitor System

The Workhorse Monitor ADCP is designed for general-purpose shallow-water current monitoring at instrument depths ranging from 5-200 m. The Monitor consists of a transducer and a four-board system electronics. The transducer housing and pressure case are made from plastics and resins, internally reinforced with metal where required. Its plastic housing will not corrode or degrade with time. The ADCP can be painted with anti-fouling paint.

Data are transmitted in either an ASCII or binary format through the I/O cable. Factory setup is for RS-422 communications.

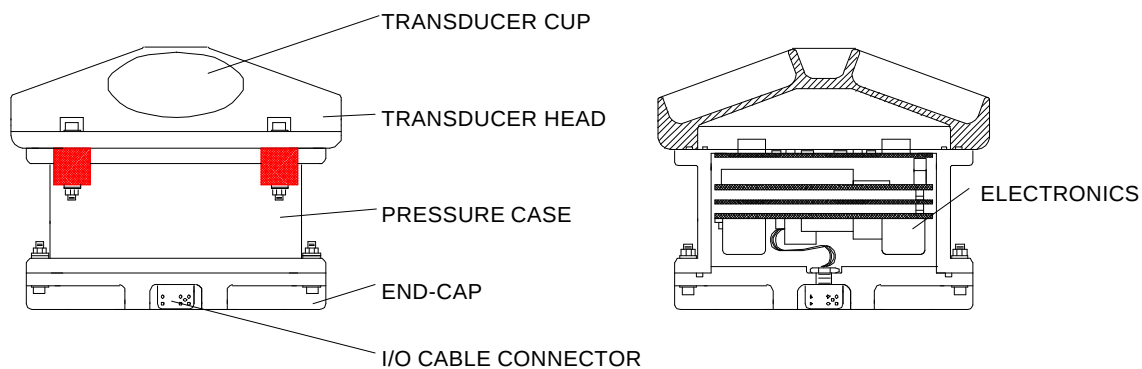


Figure 2. The Monitor Workhorse ADCP

1-5. Sentinel System

The Workhorse Sentinel is designed for self-contained current profile measurement in the upper ocean or in shallow water at depths less than 200 m. The Sentinel consists of a transducer and a four-board system electronics, PCMCIA recorder, and batteries. The transducer housing and pressure case are made from plastics and resins, internally reinforced with metal where required. Its plastic housing will not corrode or degrade with time. The ADCP can be painted with anti-fouling paint.

Data are transmitted in either an ASCII or binary format through the I/O cable. Factory setup is for RS-232 communications. Data are recorded in a DOS-compatible format on removable PCMCIA flash memory cards. When you remove a card from the ADCP and put it into your computer, the card looks like a hard disk with your data files on it. The standard 10 MB capacity can be increased to as much as 80 MB.

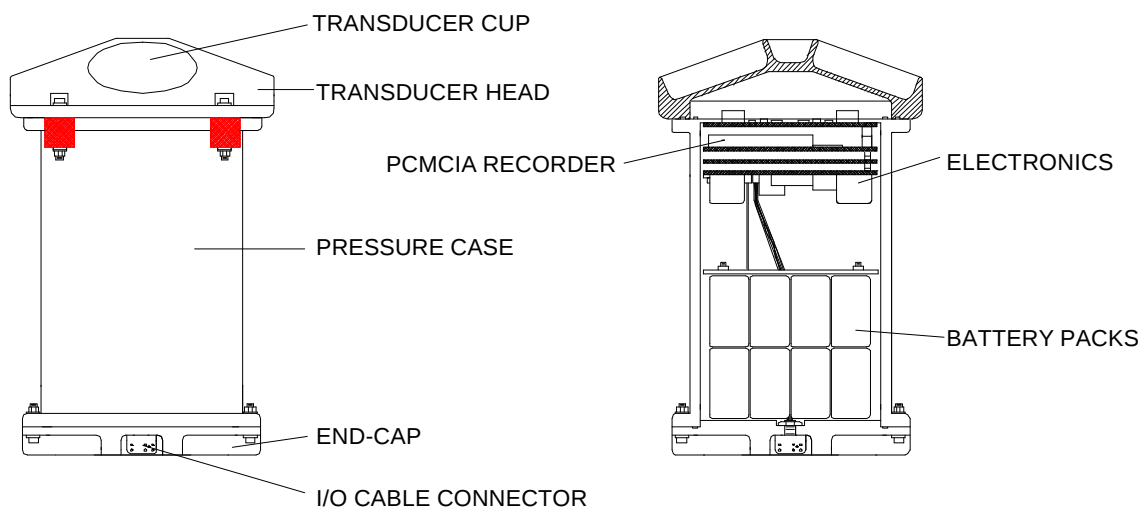


Figure 3. The Sentinel Workhorse ADCP

2-0. Software

RDI has programs to help you set up, use, test, and trouble-shoot your Workhorse ADCP. Each program has a help file that you can print, or you can view help while running the program.

Table 1. Workhorse Software Main Modules

Program Name	Description
BBBATCH	Batch program uses BBLIST .FMT files to convert data to ASCII
BBLIST	View and convert ADCP data files to ASCII
BBTALK	Terminal emulation program, talk to ADCP, runs script files
CHECKDAT	Checks ADCP data file integrity
CONNECT	Finds ADCP serial port, sets baud rate to 9600, saves settings for other Workhorse software, runs ADCP system test
DEPLOY	Calls INITADCP to start the ADCP for a self-contained deployment
ERASEMEM	Erases the internal ADCP recorder
INITADCP	Performs checks and starts the ADCP data collection cycles (used by DEPLOY and START-UP)
MEM-INFO	Lists what files are on the ADCP internal recorder
PLAN	Plan and create a configuration command file with choices -vs- consequences
QUICKLOOK	Calls WATCH to look at recorded data using a predefined display format
RECOVER	Recover data from the internal recorder
RESET	Resets the ADCP serial settings (also displays information about ADCP)
START-UP	Calls INITADCP to start a real-time deployment and starts the WATCH program
TESTADCP	Performs comprehensive ADCP tests
WATCH	Collect, monitor and playback ADCP data

If you have a RDI Broadband ADCP, some Broadband software can be used on a Workhorse and vice versa. The following table shows software compatibility.

Table 2. Software Compatibility

SOFTWARE	SYSTEM
BBSC	Broadband only

BBTEST	Broadband only
BBLIST	Broadband and Workhorse
BBTALK	Broadband and Workhorse
PLAYBACK	Broadband and Workhorse
TRANSECT	Broadband (and Workhorse without bottom-track)
WATCH	Broadband and Workhorse
PLAN	Workhorse only
DEPLOY	Workhorse only
STARTUP	Workhorse only
RECOVER	Workhorse only

Section

3

3-0. Warranty

Solely for the benefit of the original buyer, RD Instruments (RDI) warrants all new products of its manufacture to be free from defects in material and workmanship. RDI will replace or repair free of charge, F.O.B. at its factory in San Diego, California or other location designated by RDI, any part or parts returned to it within one year of original delivery, which RDI's examination shall show to have failed under normal use and service.

For those parts or components of a product which RDI does not manufacture itself but which are acquired from other vendors, the duration on times of this warranty given above shall not exceed those of the vendor's warranties for such parts or components.

This warranty applies to all goods manufactured by RDI and is included in the Terms and Conditions contained in sales documents of RDI which Terms and Conditions set forth the provisions which govern all sales made by RDI. This warranty also applies to all other activities performed by research, design, design and development, joint development, field engineering, field testing and operation training and is the **ONLY WARRANTY GIVEN FOR THE SALE OF PRODUCTS OR SERVICES. NO WARRANTIES IMPLIED IN LAW, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PARTICULAR PURPOSE, SHALL APPLY. IN NO EVENT WILL RDI BE LIABLE FOR CONSEQUENTIAL DAMAGES RESULTING FROM THE PURCHASE OR USE OF RDI PRODUCTS, OR RESULTING FROM ANY DELAYS OR FAILURE OF PERFORMANCE OR RDI UNDER ANY AGREEMENT, OR RESULTING FROM ANY SERVICES FURNISHED BY RDI.**

This warranty may not be modified, amended, or otherwise changed except by a writing properly executed by an officer of RDI.

Section

4

4-0. Field Service Bulletins

We have included the most-recent FSBs in this section. FSBs may be downloaded from our web or FTP site.

To automatically receive all new bulletins, newsletters, upgrade notices, etc., send an e-mail message to rdifs@rdinstruments.com with the word SUBSCRIBE on the Subject line and with your name and organization in the body text. Only FSBs issued in the last 12 months are shown in the directory listings at the above sites. To get all FSBs ever issued, past and present, download the file named ALL-FSD!.EXE.

Best viewed/printed with a fixed font such as Courier 10 point

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RD INSTRUMENTS'
FIELD SERVICE DOCUMENT INDEX
LAST UPDATE - DECEMBER 1, 1997

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Web: <http://www.rdinstruments.com>

FTP: <ftp://ftp.cts.com/pub/rdifs>

NOTES:

1. To automatically receive a notification of all new bulletins, newsletters, upgrade notices, etc., send an e-mail message to rdifs@rdinstruments.com with the word SUBSCRIBE on the Subject line and with your name and organization in the body text.
 2. Only FSBs issued in the last 12 months are shown in the directory listings at the above sites. To get all FSBs ever issued, past and present, download the file named ALL-FSD!.EXE. This file also includes all FSAs, FSTs, and FAQs.
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BULLETIN INDEX

(Items are listed in reverse chronological order and separated by year)

FSB	Description	(Release/Rev)
115	Workhorse ADCP Pressure Sensor Problem	(01DEC97/0)
114	1200-kHz WHADCP May Fail TRANSMIT and PT4 Tests	(01OCT97/0)
113	RAM Contamination Problem with WHADCP PIO Board	(01SEP97/0)
112	Broadband Transect v2.80 Side-Estimate Discharge Error	(01AUG97/0)
111	Recovering "Same-Name" Deployment Files in Workhorse	(01AUG97/0)
110	SC/CS-BBADCP Deployment 21 Recovery Bug	(15JUN97/0)
109	CS-BBADCP/SC-BBADCP Recorder Error	(01JUN97/1)
108	Workhorse Lockup at High Data Rate in RS-422	(01MAY97/0)
107	WH Bug Causes Low Intensity/Percent-Good Values in Bin 1	(01APR97/0)
106	Higher than Normal Standard Deviations in BBADCPs	(01FEB97/1)
105	Heading/Pitch/Roll Error in DR/SC-BBADCPs	(01DEC96/0)
104	How to Pass NBADCP/BBADCP/WORKHORSE Receiver Tests	(15NOV96/0)
103	How to Correct BBADCP Up/Down Orientation in Post-Processing	(15NOV96/0)
102	Workhorse and Broadband Speed of Sound Error	(15NOV96/0)
101	Workhorse Non-Volatile RAM Corruption	(01SEP96/0)
100	Antifouling Paint Recommendations for all RDI ADCPs	(15AUG96/0)
099	NBADCP Up/Down Switch Setting Interpretations/Ramifications	(15JUL96/0)
098	Workhorse Recorder Download Error	(15JUN96/0)
097	BBADCP Recorder Firmware Version 3.16 Error	(01JUN96/0)
096	Downloading Firmware for Workhorse ADCPs	(01APR96/0)
095	New Commands and Revisions for Firmware Versions 5.45	(01APR96/0)
094	New Commands and Revisions for Firmware Versions 4.30	(01APR96/0)
093	Correct RS-232/RS-422 Jumper Settings in BBADCPs	(30SEP95/0)
092	Robustness of RDI Software Programs	(15SEP95/0)
091	Narrowband DAS has Recording Drive Size Limitation	(15SEP95/0)
090	Documentation Changes in Narrowband Technical Manuals	(15SEP95/0)
089	User-Defined External Sensor Data Formats in BB-TRANSECT	(15JUL95/0)
088	PT3, PT6, PT7 Test Failures in BBADCPs	(20JUN95/0)
087	TRANSECT CFG/ADCP Hardware Conflict in Acquire Menu	(20JUN95/0)
086	Ordering Lithium Battery Packs	(20JUN95/0)
085	BBADCP Mode 5 (WM5) and Mode 6 (WM6) Descriptions	(15JUN95/0)
084	BBADCP Number-of-Bytes Calculation Errors	(01JUN95/0)
083	BBADCP WT-Command Error in 75 and 150-kHz Systems	(01JUN95/0)
082	SC-BBADCP Does not Wake Up	(15MAY95/0)
081	New Commands for Firmware Versions 4.21 & 5.36	(01MAY95/0)

080	Biased Earth-Coordinate Data in BBADCPs	(01MAY94/0)
079	Interim Changes to RDI Documents	(01NOV93/0)
078	Using TRANSECT/PLAYBACK to Replay Data Without Bottom-Track	(01NOV93/0)
077	Release of New Version of NAVSOFT Program	(01NOV93/0)
076	Biased Temperature Readings in BBADCPs	(01NOV93/0)
075	NBADCPs and the Fish Rejection Algorithm	(01NOV93/0)
074	Battery Pack Update	(01NOV93/0)
073	VM-BBADCP AC-to-DC Power Supply Failures	(01AUG93/0)
072	BBADCP Bottom-Track Mode 4 Command (v4.04)	(01AUG93/0)
071	DR/SC-BBADCP Up/Down Sensor Problem	(01AUG93/0)
070	Intermittent Excess Sleep Current in SC-BBADCPs	(01AUG93/0)
069	BBADCP End-Cap Problems	(01AUG93/0)
068	Interim Changes to RDI Documents	(01APR92/0)
067	NBADCP Firmware Upgrade from v17.07 to v17.09	(01APR92/0)
066	VMTEST/DAS Conflict	(01APR92/0)
065	Special Shipping Instructions	(01APR92/0)
064	Baud Rate and Clock Bugs in the COLLECT Program	(01APR92/0)
063	Playback/V-Command Bugs in NB-TRANSECT Program	(01APR92/0)
062	AC Power Considerations	(01APR92/0)
061	Error Velocity Scaling	(01APR92/0)
060	Reference Layer Bugs in the DAS Program	(01APR92/0)
059	Discontinuing Distribution of Lithium DD Battery Packs	(01APR92/0)
058	Lithium Battery Pack Safety Notice	(01APR92/0)
057	Interim Changes to RDI Documents	(01JUL91/0)
056	Use of COM1-COM4 with RDI Narrowband Programs	(01JUL91/0)
055	NBADCP Ensemble & Ping Cycle Priorities for Firmware v17.07	(01JUL91/0)
054	Differences between 1 and 2-MB EPROM Recorder Memory Boards	(01JUL91/0)
053	O-ring Size Change for DR and SC-NBADCPs	(01JUL91/0)
052	Bug in DAS Playback Mode	(01JUL91/0)
051	DAS Computer Requirements	(01JUL91/0)
050	E-command Error in Some Versions of Firmware v17.07	(01JUL91/0)
049	Interim Changes to RDI Documents	(01FEB91/0)
048	Power Limitations for 1200-kHz NB Models	(01FEB91/0)
047	Measuring Power Consumption in SC-NBADCP Alkaline Batteries	(01FEB91/0)
046	Fixing NB Pendulum Tilt Angles to Zero Degrees	(01FEB91/0)
045	Modification to X-Command Output for NB Firmware v17.07	(01FEB91/0)
044	Toxic Safety Hazard	(01FEB91/0)
043	Modification to NBADCP CPU Reset Time	(01FEB91/0)
042	DR-NBADCP and SC-NBADCP Compass Bias Problem	(01FEB91/0)
041	Interim Changes to RDI Documents	(01AUG90/0)
040	Narrowband Firmware Upgrades	(01AUG90/0)
039	Calculating Absolute Backscatter Using NBADCP Amplitude Data	(01AUG90/0)
038	SC-NBADCP Transducer Assembly O-Rings	(01AUG90/0)
037	SC-NBADCP Compass Oscillations when Using Wakeup Delay Time	(01AUG90/0)
036	Compass Problems in 75-kHz NBADCPs	(01AUG90/0)
035	Use of B-Command in NB Firmware Version 16.37	(01AUG90/0)
034	Loose Memory Boards in NB EPROM Recorder	(01AUG90/0)
033	NBADCP Firmware Catastrophic Coordinate Transformation Error	(01AUG90/0)
032	Interim Changes to RDI Documents	(01MAR90/0)
031	Damage Caused by Marine Antifouling Materials	(01MAR90/0)
030	DR-NBADCP AC Power Supply Connections	(01MAR90/0)
029	SC-NBADCP Deployment Program Bugs	(01MAR90/0)
028	Pitch and Roll Alignment when using an External Gyrocompass	(01MAR90/0)
027	NBADCP Fuse Locations and Sizes	(01MAR90/0)
026	E-command Bug in NB Firmware	(01MAR90/0)

025	NBADCIP Velocity Errors	(01MAR90/0)
024	Use of Ancillary Data in NB Data Acquisition Software (DAS)	(01MAR90/0)
-----+		
023	VM-ADCP Cathodic Disbondment	(01NOV89/0)
022	Setting Communication Protocol for NAVSOFT Program	(01NOV89/0)
021	Modification to NBADCIP X-command / Leader Data	(01NOV89/0)
020	Time Input for NAVSOFT Program	(01NOV89/0)
019	Narrowband DAS Disk File Format	(01NOV89/0)
018	Caution for User-developed NBADCIP Software	(01NOV89/0)
017	Interim Changes to RDI Documents	(01NOV89/0)
016	NBADCIP Accuracy in Shear Environments	(01NOV89/0)
015	Reduced Number of Good Pings in NBADCIPs (rev. to FSB-010)	(01NOV89/0)
014	Electrical Isolation Requirements for DR and SC-NBADCIPs	(01AUG89/0)
013	NBADCIP Blank Beyond Transmit Setting	(01AUG89/0)
012	Temperature Sensitive NBADCIP CPU Boards	(01AUG89/0)
011	Downward-Facing NBADCIPs Using a Flux-Gate Heading Sensor	(01AUG89/0)
010	Reduced Number of Good Pings in NBADCIPs	(01AUG89/0)
009	Transducer Care - Urethane Coating	(12APR89/0)
008	Bit Test Errors (CPU failures at temperatures above 35 degC)	(12APR89/0)
007	Manual T-command Time Settings in NBADCIPs	(12APR89/0)
006	Transducer Care - Handling	(12APR89/0)
005	Aluminum Pressure Cases	(12APR89/0)
004	Narrowband Deep-water Deployments (depth > 500 m)	(12APR89/0)
003	Anti-fouling Grease	(12APR89/0)
002	NBADCIP 60-MB Sea Data Recorder (recorder firmware 9.10)	(12APR89/0)
001	Narrowband ADCP Firmware Version 16.24	(12APR89/0)
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APPLICATION NOTE INDEX
(Items are listed in reverse chronological order)

FSA	Description	(Release/Rev)
-----+		
003	BBADCIP Water-Profiling Modes	(01DEC97/1)
002*	DGPS-Like Positioning Accuracies for Underwater Vehicles	(01OCT96/0)
001	BBADCIP Shallow-Water Profiling Modes 5 and 8	(15JUL95/0)
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* = written in Word for Windows; file extension is ZIP instead of TXT

TECHNICAL PAPER INDEX

FST	Description	(Release/Rev)
-----+		
002*	Information on Building Your Own WHADCIP Battery Packs	(01SEP97/0)
001*	Broadband ADCP Advanced Principles of Operation	(01OCT96/0)
-----+		

* = written in Word for Windows; file extension is ZIP instead of TXT

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DESCRIPTION OF THE RDI FIELD SERVICE DOCUMENT SYSTEM

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INTRODUCTION

A system is now in place for handling Application Notes, Bulletins, and Technical Papers. The system consolidates these articles under the title of Field Service Documents. Before continuing, here is a definition of each item.

FIELD SERVICE APPLICATION NOTE (FSA) - FSAs cover a particular use for an ADCP not found in the manual (e.g., shallow-water use, using the ADCP to

transect a river). FSAs are usually sent to users only when requested.

FIELD SERVICE BULLETIN (FSB) - FSBs provide updated information that may not be in our manuals. FSBs describe a problem or enhancement. FSBs are usually five pages or less. Each FSB lists the instrument/program affected, the problem/enhancement, and a solution/action.

FIELD SERVICE TECHNICAL PAPER (FST) - FSTs cover one procedure or topic in detail (e.g., Upgrade Procedures, Conversion Procedures, Formula Computations). In many cases, FSTs amplify existing information. FSTs also may be lengthy FSBs that take more than five pages to describe. FSTs are usually sent to users only when requested.

NOTE: ADCP users are encouraged to submit application notes, problems/solutions/enhancements, and technical papers for posting. RDI reserves the right to publish or not publish any submission.

Consolidating these documents allows easier indexing, searching, and storage on the BBS/Internet. Consolidation makes it easier to find an article without regard to it being an Application Note, Bulletin, or Technical Paper. Additionally, all articles are in an ASCII-text format for easier viewing/printing. If graphics are used, a separate graphics file will exist.

FILE-NAMING CONVENTIONS

The FS-INDEX.TXT file (this file) contains an ASCII-text index of all Application Notes, Bulletins, and Technical Papers. The numbering system used to identify these documents is as follows:

Application Notes	Bulletins	Technical Papers
-----	-----	-----
FSA-001	FSB-001	FST-001
FSA-002	FSB-002	FST-002
: :	: :	: :
FSA-999	FSB-999	FST-999

As much as possible, documents are written in plain ASCII-text. In these cases, the file uses an extension of TXT (e.g., FSA-001.TXT). If a graphic drawing must be used, a self-extracting, Windows-compatible graphics file will be included (usually a Windows MetaFile, *.WMF). The associated graphics file will have a name that ends with the letter "G" and a ZIP extension (e.g., FSA-001G.ZIP).

Complex documents (usually those with many figures, formulas, or special characters) are written in the latest version of Word for Windows. In these cases, the files are usually "zipped" and have an extension of ZIP; for example, FSA-002.ZIP.

In all cases, the file's date and time fields are used to identify the release date of the article and its revision number. For example,

FSA-001.TXT 05-01-94 0:00 a.m.

indicates a release date of May 1, 1994. The time of 0:00 indicates an original release with no revisions. Should this Application Note be revised and released on September 1, 1996, the fields would change as follows:

FSA-001.TXT 09-01-96 0:01 a.m.

This file-naming convention also lets you easily mark/tag/locate/download only Application Notes, Bulletins, or Technical Papers. For example,

COPY FSA*.* A:

would copy only Application Notes to the A: drive.

SEARCHING FOR ARTICLES

There are several ways you can search this index for a particular article. Here are some suggestions.

For items related to...	Try searching for...
Hardware/Firmware	BB or BBADCP (broadband related) NB or NBADCP (narrowband related) DR (direct-reading systems) SC (self-contained systems) VM (vessel-mounted systems) DVL (doppler velocity log systems)
Programs	A program name (TRANSECT, BBLIST, DAS, etc)
Applications	FSA or APPLICATION
Bulletins	FSB or BULLETIN
Technical Papers	FST or TECHNICAL
Chronology	A date (15JUL95) or a 2-digit year (94, 95, etc) Note: Articles are divided into yearly "groups"
Particular items	A key word (FUSE, URETHANE, SHEAR, GYRO, MODE, etc)

FINAL COMMENTS

We WANT to help you achieve a successful deployment. Successful deployments make BOTH of us look good. We can help you optimize your setups for the desired profiling range, accuracy, resolution, and any special environmental conditions. We also can give you the latest information on hardware, software, documentation, experience, and "bugs." After a deployment, we can help you screen your data for anomalies. All you have to do is call us.

Bob Mains
Customer Service

To print this text file, a 10-point/12-pitch fixed font (e.g. Courier) is best

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BULLETIN

FSB-108 - WORKHORSE LOCKUP AT HIGH DATA RATE IN RS-422

DATE/REV: 01MAY97 / 0

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ABSTRACT: Workhorse units can lock up when operating at a high data rate in RS-422 mode.

INSTRUMENT/PROGRAM AFFECTED: All Workhorse ADCPs.

DESCRIPTION: It is possible to completely lock up a Workhorse by operating at a high data rate in RS-422 mode. For this to happen, (1) the unit must be communicating in RS-422 mode at 115200 baud, (2) binary serial output must be enabled, and (3) the system is set for a high ping rate.

We are still researching the cause of this problem.

SOLUTION/ACTION: Until we discover and resolve the cause of this problem, you can take any of the following actions to work around the problem:

Best solution:

- Lower the baud rate to 57600. This problem has not been encountered at baud rates less than 115200.

If you must use the 115200 baud rate, then one or both of the following:

- Use ASCII output instead of binary output.
 - Lower the ping rate of the system.
- =====

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(View MAXIMIZED or PRINT with a fixed font such as Courier 10 pt)

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BULLETIN

FSB-115 - WORKHORSE ADCP PRESSURE SENSOR PROBLEM

DATE/REV: 01DEC97 / 0

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ABSTRACT: Workhorse ADCPs with a pressure sensor installed in the transducer before 01OCT97 may have corrosion or leakage problems.

INSTRUMENT/PROGRAM AFFECTED: All Workhorse ADCPs with a pressure sensor installed in the transducer before 1 October 1997.

DESCRIPTION: The original design of the WH pressure sensor used silicone oil to isolate the sensor from the water. This design does not adequately keep the oil in place. The seal protecting the pressure sensor does not work properly, which can allow water to come in contact with the sensor. Water will damage the sensor, and if allowed to corrode, can cause flooding of the WH ADCP.

SOLUTION/ACTION:

Long-Term: RDI has a new design that prevents water from coming into contact with the sensor. The design repair cannot be done in the field. The ADCP must be returned to RDI for this repair. If you currently have a WH pressure sensor that was delivered to you before 01OCT97, please contact RDI to schedule a time to return the system and have the sensor upgraded. Please note that the upgrade will take a minimum of three weeks to perform.

Short-Term: If you must use your ADCP before the repair can be done, we do not know of a way to prevent the sensor from getting water against the pressure sensor.

If you intend to do short deployments (e.g.; less than 30 days), and you are NOT in an area known for high corrosion, you can place fresh silicone oil inside the cavity just before your deployment. The oil will not remain in place, but it does provide some protection for this period of time. Note that prolonged exposure to water will cause failure and corrosion of the sensor. If the corrosion becomes severe, the system will flood.

If you intend to do longer deployments, we suggest that you plug the pressure sensor. The sensor data will no longer be valid, but the ADCP can still be used. If you do use the ADCP in this fashion, be sure to manually edit your *.cmd file to change the EZ command from EZ1111111 to EZ1011111. This will turn off the use of the pressure sensor in calculating the speed of sound.

We apologize for the inconvenience this may cause you.

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5-0. Corrections to the Manual

We have included the most-recent corrections to the Workhorse Technical Manual in this section. This file is also maintained on our web site @ www.rdinstruments.com.

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 WORKHORSE MONITOR/SENTINEL TECHNICAL MANUAL INTERIM CHANGES
 AS OF: 29JAN98

These are the most-recent corrections to the Workhorse Technical Manual. New figures are included in the Read This First document or can be faxed if necessary. These changes will be documented in the next release of the Workhorse manual.

Rev.	Page	Correction
Apr 96	1-2, 1-4, 1-6, 1-7	The I/O cable has changed. The 25-to-9-pin adapter is no longer required.
Apr 96	4-5	Add the following note to section 4-4. Note: The factory compass calibration is done without the battery pack installed. You must perform the compass calibration (with the battery installed, if applicable) before deploying the ADCP.
Apr 96	4-6	The compass calibration has changed. Please follow the prompts as shown on your screen. The new text is included in the Read Me First document.
Apr 96	6-2	Add the following paragraph to Section 6-2: The desiccant pack inside the Workhorse is not tied to anything. A potential problem exists when the pack is jostled against the RS-422/RS-232 switch and changes the setting or places the switch in an in-between state. Verify the switch is fully in the correct position and try to wakeup the ADCP again.
Apr 96	6-6	Replaced the I/O cable wiring drawing with a new drawing. The power connection has been moved and the 24-pin connector has been replaced with a 9-pin connector. Also, remove all reference to RS-485.
Apr 96	C-2	Remove the word "battery-backed" in Section C-1.2, paragraph 4. The commands are stored in RAM only. RAM is buffered from a temporary power loss by a capacitor.
Apr 96	C-23	Time of First Ping command: Change the format to TFyy/mm/dd, hh:mm:ss (remove "ff", hundredths of seconds).

Apr 96	N/A	Add Appendix Z - Internal Pressure Sensor to your technical manual if you have this option. This appendix is included in the Read This First document. Appendix-Z also documents changes to the output data format.
Apr 96	6-7	Replaced the internal I/O cable wiring drawing with a new drawing. Where shown, "IN A" was changed to "OUT A", "IN B" to "OUT B", "OUT A" to "IN A", and "OUT B" to "IN B". Also, all references to "RS-485" were removed.
Apr 96	6-4	Change section 6-2.6 step a to read: Connect a jumper between pin 2 to pin 6 and another jumper between pin 1 to pin 5 of the underwater connector at the Workhorse end of the cable.
May 97	4-1	Delete the first sentence in the NOTE box.
May 97	4-5	Change step a to read: Remove the end-cap (see "End-cap Removal," page 4-1). Change step h to read: Install the end-cap (see "End-cap Replacement," page 4-3).
May 97	D-27	Add a note to the bottom of the page: NOTE The PD8 command is designed for serial output only. No data is recorded to the internal recorder. Use this command for real-time applications only.
May 97	2-4	Change CONSEQUENCES: Last Bin Range to read: This is the vertical distance from the Workhorse transducer face to the middle of the last (furthest) measured bin or depth cell. It is determined from the number of bins x bin size + first bin range. If this number is displayed in RED, then the CHOICES are set to collect data further from the Workhorse transducer than this expected maximum range.
May 97	2-2	Add a note under CHOICES: Bin Size to read: Adjust the CHOICES "number of bins" and "bin size" until the CONSEQUENCE "last bin range" is approximately five percent greater than the "expected max range".
May 97	C-27	Change the example for the EB-command to read: A bottom-mounted ADCP is receiving heading from its internal compass. A magnetic declination map for the deployment area shows a declination of W3.5 (-3.5). To counteract the effects of this magnetic field, you must enter a heading bias value of -3.5. To convert -3.5 to an EB-command value, multiply the desired bias angle in degrees by 100: $EB = -3.5 \times 100 = -350 = EB-350$
Jan 98		New manual released.

NEW/CHANGED COMMANDS BROUGHT ABOUT BY FIRMWARE CHANGES

Ver. Description

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- 8.13 -Added combined hard and soft iron calibration under the "AF" command.
 -Improved existing displays of hard iron calibration and compass performance examination "AX" command.
 -Added capability to support an internal pressure sensor (adds 8 bytes to Variable Leader output). Changes were documented in the Jan 97 version of the Output Data Format booklet.
 -Added two extra reserved bytes to Variable Leader output to be software. Changes were documented in the Jan 97 version of the Output Data Format booklet.
- 8.14 -Added WU command to allow triangle weighting of pings in an ensemble.
 -Added CPU serial number to fixed leader output. Changes were documented in the Jan 97 version of the Output Data Format booklet.
 -Added CP polling mode command
 -Added CM master/slave ping synchronization.
- 8.15 -Manual not affected by changes.
- 8.16 -Added PD8 console ASCII output format.
 -Added 'O' ("oh" not zero) menu entry for Feature Select options. Added OL command to list features.
 -Added BP command on "Deploy?" menu if Bottom-Track is installed.
- 8.17 -Changed BX default for 300-kHz from 2500 to 2000.
 -Removed obsolete 'CA' and 'RT' commands.
 -Added RDS3 capability to allow synchronization of ADCPs with other instruments. Includes new 'S' menu. The RD Instruments Sleepy Sensor Synchronization protocol allows a Workhorse to synchronize measurements with another Workhorse or any other instrument which adheres to the RDS3 spec. The implementation of RDS3 in the Workhorse adds a new 'S' menu with 5 new commands:
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- SA - Synchronize Before/After Ping/Ensemble
 Format: SAxy
 Range : x: 0, 1
 y: 0, 1
 Desc. : SA sets the rough timing of the synchronization pulse. The first parameter chooses whether to send the pulse immediately before or after the condition set in the second parameter. The second parameter sets the condition of either ping or ensemble.
 Example: SA00 - Send pulse before ping.
 SA10 - Send pulse after ping.
 SA01 - Send pulse before ensemble.
 SA11 - Send pulse after ensemble.
 Note : This command has no effect unless SM=1.
-
- SI - Synchronization Interval
 Format: SIn
 Range : 0 - 65535
 Desc. : SI sets how many pings/ensembles (depending on the SA command) to wait before sending the next synchronization pulse.
 Note : This command has no effect unless SM=1.

SM - RDS3 Mode Select

Format: SMn

Range : 0 - 2

Desc. : SM sets the RDS3 Mode. SM0 turns off RDS3 mode and disables all other commands on this menu. SM1 sets RDS3 Master Mode and enables SA, SI, and SW commands. SM2 sets RDS3 Slave mode and enables the ST command.

SW - Synchronization Delay

Format: SWn

Range : 0 - 65535 (1/10 milliseconds)

Desc. : SW sets the amount of time to wait after sending the pulse before proceeding. This allows precise timing of measurements. For synchronizing two Workhorses, setting SW=5 allows them to ping within 100 microseconds of each other.

Note : This command has no effect unless SM=1.

ST - Slave Timeout

Format: STn

Range : 0 - 65535 seconds

Desc. : ST sets the amount of time a slave will wait to hear a sync pulse before proceeding on its own. If a slave times out, it will ignore future sync pulses. Setting ST=0 tells the slave to wait indefinitely.

Note : This command has no effect unless SM=2.

- 8.18 -Manual not affected by changes.
8.19 -Added 300-baud communication mode to CB command (CB0xx).
8.20 -Manual not affected by changes.

Please report any documentation problems or errors to our Customer Service department:

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