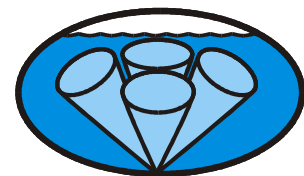


Navigator ADCP/DVL Read This First



P/N 957-6174-00 (September 2001)



RD Instruments
Acoustic Doppler Solutions

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NOTES



RD Instruments
Acoustic Doppler Solutions

Navigator Read This First

1 Introduction

Thank you for purchasing the RD Instruments (RDI) WorkHorse Navigator Acoustic Doppler Current Profiler/Doppler Velocity Log (ADCP/DVL). This guide is designed to help first time ADCP/DVL users to get familiar with their system.

2 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 Navigator and its manual/s easy to use. However, the Navigator *is* a complex instrument. You must take time to read the manuals.

The Reference Guides includes:

- **Read This First.** This guide is an introduction to the Navigator ADCP/DVL.
- **Installation Guide.** Use this guide to plan your installation requirements. This guide includes specifications and dimensions for the Navigator (including outline installation drawings).
- **Maintenance Guide.** This guide covers Navigator maintenance. Use this guide to make sure the Navigator is ready for a deployment.
- **Test Guide.** Use this guide to test the ADCP/DVL.
- **Troubleshooting Guide.** This guide includes a system overview and how to troubleshoot the Navigator. If the Navigator fails a built-in test or you cannot communicate with the system, use this guide to help locate the problem.

The Navigator User's Guide includes:

- This guide contains an overview of the Navigator hardware and software.

The Commands and Output Data Format Guide includes:

- This guide contains a reference for all commands and output data formats used by the WorkHorse series of ADCP/DVLs including the Navigator. Use the *Command Quick Reference Card* to help remember the direct commands used by the Navigator.

The Documentation CD includes:

- The Documentation CD has Adobe Acrobat® Portable Document File (pdf) versions of all the user documentation. Use the electronic documentation to quickly search for information. See [“Using the Documentation CD,” page 10](#) for details on how to use Adobe’s Acrobat Reader®.

The Reference Cards include:

- **Setup Cards.** The *Setup Cards* are designed for *first time users* to connect the ADCP/DVL and establish communications.
- **Command Quick Reference Card.** The *Command Quick Reference Card* is designed for *experienced* users to help remember the direct commands used by the Navigator.

3 What’s New

New systems are shipping with firmware version 9.13 installed.

3.1 Upgrading Firmware from 9.xx to 9.13

If you have a Navigator ADCP/DVL with version 9.xx firmware and wish to upgrade to version 9.13 firmware, please do the following.

- a. Connect your DVL to one of your computer's serial ports. By default, we assume you will connect to COM2.
- b. After determining to which serial port the DVL is connected, change to the drive/directory that contains the UPGRADE.BAT batch file. At the DOS prompt, enter “UPGRADE n” where “n” is the number of the serial COM port. For example:

```
C:\A:      (to switch to the floppy A: drive)
A:\UPGRADE 2 (if connected to COM2)
```
- c. Follow the on-screen instructions.
- d. After successfully upgrading your firmware, we recommend you use *DumbTerm* to run the Pre-Deployment Test (PA command).

3.2 Firmware History

Version 9.10: 19FEB99

- Added support for the Applied MicroSystems SVSS. See the “D” commands in the [WorkHorse Commands and Output Data Format](#) guide.
- Fixed a bug in Speed Log (PD3) which caused the temp., pitch, roll and heading to be improperly averaged.
- Modified RDS^3 routines. See “Ping Synchronization” in the [WorkHorse Commands and Output Data Format](#) guide.
- Fixed BOOT CODE to acknowledge breaks and re-start (i.e. no more cycling power.)
- Added BB command to the bottom-tracking command set. BB lets you define the depth at which the ADCP/DVL switches between bottom modes 4 and 5. The units are in decimeters (dm). A setting of zero disables bottom mode 5. A setting of 9999 disables bottom mode 4.
- Implemented ability to turn off AutoStart with the CT command.
- Changed the default Scale Factor for 300kHz Navigators.
- Added Terrain Bias to Bottom Tracking Data. Please see below for more details. If you have a 300kHz Navigator and wish to disable the terrain bias correction, Enter '&Z1000' at the command prompt.

Changes to Navigator Output Data Format in Version 9.10

- Added CPU Serial number to Fixed Leader Data (Bytes 43-50).
- Added Spare Word to Fixed Leader Data (Bytes 51-52).
- Added Spare Byte to Variable Leader Data (Byte 57).
- Fixed Byte 32 of the Fixed Leader Data to properly acknowledge the presence of a pressure sensor and SVSS.

Version 9.11: 07JUN99

- Fixed a bug that caused no time between bottom and water pings during the last loop of an ensemble.
- Changed the default Percent Good Threshold from 25% to 0%.
- Fixed a bug which caused RDS^3 Slaves to hang. The units would hang when connected to the masters and the masters were woken up before the slaves.

Version 9.12: 03Aug2001

- Added PB Command to run PA Tests with brief results.
- Added Carriage Return, Line Feed Between Hex-ASCII ensembles if CF contains xx2xx.
- Added PB Command to run PA Tests with brief results.
- Added CX Command - low latency trigger.
- Added CP Command to control periodic output.

Changes to Navigator Output Data Format in Version 9.12

- Added number of Bottom track pings and Water Mass pings to end of Bottom Track data in bytes 82 through 85.

Version 9.13: 23Aug2001

- Added PD10 Output Data Format.

3.3 New or Changed Software

RD Instruments is pleased to announce that new Windows software has been released. The Windows software is now included with your system. These programs will give you all of the capabilities of our older DOS software plus additional data analysis capabilities. Each program includes a separate User's Guide that documents the software.

The **RDI Tools** CD includes *DumbTerm* and several DOS utility programs. This program is used for testing and "talking" to the ADCP/DVL. *DumbTerm* replaces BBTALK and TESTADCP. *DumbTerm* also helps you recover data and erase the recorder (DOS equivalent programs RECOVER, MEM-INFO, ERASEMEM).

The Navigator 3.5" disk includes the DOS program SHIPTRAK that allows you to collect and view your data with an integrated graphical display. Use the batch file GO-DVL to start SHIPTRAK using the command file WHDVLCMD to setup the Navigator. The included command file may be edited as needed.

WinADCP gives the user a visual sense of the entire set of data. It also allows the user to zoom in on a portion of the data for closer analysis. *WinADCP* replaces CHECKDAT, QUIKLOOK, and WATCH (playback of data portion).



NOTE. The *WinADCP* CD is included only if the Water Profiling upgrade is included with your system.

4 Conventions Used in Manuals

Conventions used in the Navigator manuals have been established to help you learn how to use the Navigator quickly and easily.

Windows menu items are printed in bold: **File** menu, **Collect Data**. Items that need to be typed by the user or keys to press will be shown as <F1>. If a key combination were joined with a plus sign (<ALT+F>), you would press and hold the first key while you press the second key. Words printed in italics or uppercase include program names (*DumbTerm*), DOS commands (TIME) and file names (WHDVL.CMD).

Code or sample files are printed using a fixed font. Here is an example:

```
Navigator Broadband ADCP/DVL
RD INSTRUMENTS (c) 1997-2000
ALL RIGHTS RESERVED
Firmware Version 9.xx
>
```

You will find two other visual aids that help you: Notes and Cautions.



NOTE. This paragraph format indicates additional information that may help you avoid problems or that should be considered in using the described features.



CAUTION. This paragraph format warns the reader of hazardous procedures (for example, activities that may cause loss of data or damage to the ADCP).

5 Navigator Options

The following section explains the options available for Navigator ADCPs.

- **Water Profiling** – You can use your Navigator ADCP/DVL to measure water profiles with the Water Profiling Upgrade.
- **High-Pressure Housing** – The standard Navigator housing allows deployment depths to 2000 meters. High-pressure housings are available in depth rating of 3000 and 6000 meters. See the [Installation Guide](#) outline installation drawings for dimensions and weights.
- **Spare boards kit** – Contains a complete set of spare printed circuit boards for a Navigator ADCP/DVL. The set does not include the receiver board (not field replaceable).
- **External Batteries** – Use an External Battery with a Navigator ADCP/DVL to provide backup power or for self-contained deployments.

- **Flash Memory** – Flash memory cards are available in 16, 20, 40, 85 and 220-MB cards. The internal recorder holds two cards for a maximum of 440 MB of recording space. The PC Card recorder is located on the Digital Signal Processor (DSP) board inside the Navigator's electronics. To recover data, the card can be removed and used in a personal computer (PC), or left in the Workhorse, and accessed by using *DumbTerm* (see the [RDI Tools User's Guide](#)).
- **VmDas Software** – Controls the ADCP/DVL and displays profile data through a personal computer.

6 Navigator Care

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

6.1 General Handling Guidelines

- Never set the transducer on a hard or rough surface. **The urethane faces may be damaged.**
- Always remove the retaining strap on the end-cap underwater-connect cable and dummy plug when disconnecting them. **Failure to do so will break the retainer strap.**
- Do not apply any upward force on the end-cap connector as the I/O cable is being disconnected. **Stressing the end-cap connector may cause the ADCP/DVL to flood.** Read the [Maintenance guide](#) for details on disconnecting the I/O cable.
- Do not expose the transducer faces to prolonged sunlight. **The urethane faces may develop cracks.** Cover the transducer faces on the Navigator 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 Navigator if it will be exposed to sunlight.
- Do not store the ADCP/DVL in temperatures over 75 degrees C. **The urethane faces may be damaged.** Check the temperature indicator inside the shipping case. It changes color if the temperature limit is exceeded.
- Do not scratch or damage the O-ring surfaces or grooves. **If scratches or damage exists, they may provide a leakage path and cause the ADCP/DVL to flood.** Do not risk a deployment with damaged O-ring surfaces.

- Do not lift or support a Navigator by the external I/O cable. **The connector or cable will break.**

6.2 Assembly Guidelines

- Read the [Maintenance guide](#) for details on Navigator re-assembly. Make sure the housing assembly O-rings stay in their groove when you re-assemble the Navigator. Tighten the hardware as specified. **Loose, missing, stripped hardware, or damaged O-rings can cause the Navigator transducer to flood.**
- Place a light amount of DC-111 lubricant on the end-cap connector pins (rubber portion only). **This will make it easier to connect or remove the I/O cable and dummy plug.**
- Do not connect or disconnect the I/O cable with power applied. An exception to this is the optional external battery case. The external battery case connector is always “hot” when batteries are installed. When you connect the cable with power applied, you may see a small spark. **The connector pins may become pitted and worn.**
- The Navigator I/O cable is *wet* mate-able, not *under water* mate-able.

6.3 Deployment Guidelines

- Read the Navigator User’s Guide. **This guide has a Deployment Guide and a Frequently Asked Questions section to help you learn how to use the ADCP/DVL.**
- Align the compass whenever the optional recorder module is replaced, or when any ferrous metals are relocated inside or around the Navigator housing. **Ferro-magnetic materials affect the compass.**
- If you are using the optional external battery pack, place it at least 30cm away from the ADCP/DVL to avoid affecting the compass.
- The AC power adapter is not designed to withstand water. **Use caution when using on decks in wet conditions.**
- Avoid using ferro-magnetic materials in the mounting fixtures or near the Navigator. **Ferro-magnetic materials affect the compass.**

7 Unpacking

When unpacking, use care to prevent physical damage to the transducer face and connector. Use a soft pad to protect the transducer. When handling any electronics modules, follow electrostatic discharge (ESD) prevention measures.

7.1 Inventory

You should have the following items.

- ADCP/DVL transducer
- I/O cable
- AC Power adapter
- Ship Kit (includes manuals, software, Documentation CD, and power cords)
- Shipping crate (please save all foam for reshipping use)

7.2 Visual Inspection of the Navigator

Inspect the Navigator using the following table and [Figure 1, page 9](#) and [Figure 2, page 9](#). If you find any discrepancies, call RDI for instructions.

Table 1: Visual Inspection Criteria

Item	Inspection Criteria
Transducer	Check the urethane face. There should be no gouges, dents, scrapes, or peeling (see Figure 1, page 9).
I/O connector	Check the I/O connector for cracks or bent pins (see Figure 2, page 9).
I/O Cable	Check the cable connectors for cracks or bent pins.



Figure 1. Navigator Transducer Face View



Figure 2. Navigator End-Cap Connector View



NOTE. Refer to the Navigator User's Guide for instructions on how to connect and use the ADCP/DVL.

8 Using the Documentation CD

The documentation CD contains an electronic version of the Navigator Technical Manual. All of the files are in Adobe® Portable Document Format (*.pdf). To use these files, you must install the Acrobat version 4.0 Reader. This program is included on the documentation CD.



NOTE. If you have an earlier version of Acrobat Reader installed on your computer, please uninstall it prior to installing the version 4.0 Reader.

Table 2: Acrobat Reader Toolbar

Tool	Description
	Use these tools to visit Adobe's website.
	Use these tools to open or print a pdf file.
	Use the navigation pane button to turn on or off the table of contents or thumbnail pane.
	Use the hand tool to move the page around so that you can view all the areas on it.
	Zoom In/Out tool
	Text select tool. Use this button to highlight text to be copied into another document.
	Select the Graphics Select tool by holding down the mouse button on the text select tool and dragging to the graphics select tool. Use this button to select a graphic to be copied into another document.
	Use these buttons to page through a document.
	Use these buttons to return to a previous or next view.
	Actual size tool.
	Fit in window tool.
	Fit width tool.
	Rotates page 90 degrees.
	Find tool. Find will search only the current open document.
	Search tools. Use search to find information located in the Navigator Technical Manual.

8.1 Opening PDF Documents

Do one of the following:

- Start Acrobat Reader. Choose **File, Open**. In the Open dialog box, select the filename, and click **Open**. Acrobat Reader documents have the extension *.pdf.
- Double-click the file icon in your file system.

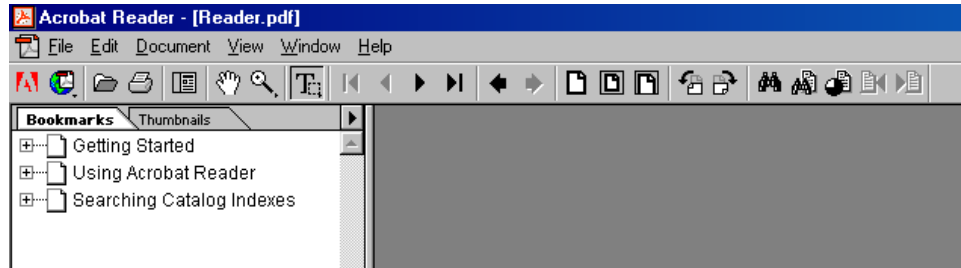


Figure 3. Adobe Acrobat Reader Screen

8.2 Viewing Documents

The minimum and maximum zoom levels available depend on the current page size. If you magnify a page to a size larger than the window, use the hand tool to move the page around so that you can view all the areas on it. Moving a PDF page with the hand tool is like moving a piece of paper on a desk with your hand.

To Resize a Page to Fit the Window:

Do one of the following:

- To resize the page to fit entirely in the window, click the **Fit in Window** button, or choose **View, Fit in Window**.
- To resize the page to fit the width of the window, click the **Fit Width** button, or choose **View, Fit Width**. Part of the page may be out of view.
- To resize the page so that its text and graphics fit the width of the window, choose **View, Fit Visible**. Part of the page may be out of view.

To Increase Magnification:

Do one of the following:

- Select the **Zoom-In** tool, and click the page.
- Select the **Zoom-In** tool, and drag to draw a rectangle, called a marquee, around the area to magnify.

- Click the **Magnification** button in the status bar, and choose a magnification level.

To Decrease Magnification:

Do one of the following:

- Select the **Zoom-Out** tool, and click the page.
- Select the **Zoom-Out** tool, and drag to draw a marquee the size you want the reduced page to be.
- Click the **Magnification** button in the status bar, and choose a magnification level.



NOTE. When the **Zoom-In** tool is selected, you can press **Ctrl** while clicking or dragging to **Zoom Out** instead of in. When the **Zoom-Out** tool is selected, press **Ctrl** to zoom in.

To Return a Page to Its Actual Size:

Click the **Actual Size** button, or choose **View, Actual Size**.

8.3 Paging Through a Document

Acrobat Reader provides buttons, keyboard shortcuts, and menu commands for paging through PDF documents.

To Go to Another Page:

Do one of the following:

- To go to the next page, click the **Next Page** button in the command bar or status bar, press the **Right Arrow** key, press **Ctrl + Down Arrow** key, or choose **Document, Next Page**.
- To go to the previous page, click the **Previous Page** button in the command bar or status bar, press the **Left Arrow** key, press **Ctrl + Up Arrow** key, or choose **Document, Previous Page**.
- To move down one line, press the **Down** Arrow key.
- To move up one line, press the **Up** Arrow key.



NOTE. The **Down** and **Up** Arrow keys move you one line at a time when you are not in Fit in Window view. In Single Page mode, these keys move you one page at a time if the page fills the entire screen.

- To move down one screen, press **Page Down** or **Return**.
- To move up one screen, press **Page Up** or **Shift + Return**.

- To go to the first page, click the **First Page** button in the command bar or status bar, press the **Home** key, or choose **Document, First Page**.
- To go to the last page, click the **Last Page** button in the command bar or the status bar, press the **End** key, or choose **Document, Last Page**.

To Retrace Your Viewing Path:

Do one or more of the following:

- To retrace your path within a PDF document, click the **Go to Previous View** button in the command bar, or choose **Document, Go Back** for each step back. Alternatively, click the **Go to Next View** button, or choose **Document, Go Forward** for each step forward.
- To retrace your viewing path through other PDF documents, choose **Document, Go Back Doc** for each step back or **Document, Go Forward Doc** for each step forward. Alternatively, hold down **Shift**, and click the **Go Back** or **Go Forward** button. This command opens the other PDF documents if the documents are closed.

8.4 Using Find

You can use the Find command to find a complete word or part of a word in the *current* PDF document. Acrobat Reader looks for the word by reading every word on every page in the file, including text in graphics.

To Find a Word Using the Find Command:

- a. Click the **Find** button, or choose **Edit, Find**.
- b. Enter the text to find in the text box.
- c. Select search options if necessary:
 - **Match Whole Word** Only finds only occurrences of the complete word you enter in the text box. For example, if you search for the word *stick*, the words *tick* and *sticky* will not be highlighted.
 - **Match Case** finds only words that contain exactly the same capitalization you enter in the text box.
 - **Find Backwards** starts the search from the current page and goes backwards through the document.
- d. Click **Find**. Acrobat Reader finds the next occurrence of the word.

To Find the Next Occurrence of the Word:

Do one of the following:

- Choose Edit, Find Again.
- Reopen the **Find** dialog box, and click **Find Again** (the word must already be in the **Find** text box).

8.5 Using Search

The Acrobat **Search** command allows you to perform full-text searches of PDF document collections (i.e. the Navigator Technical Manual), whereas the Acrobat **Find** command allows you to search only a single document. The **Search** command also provides powerful tools for limiting and expanding a search. Opening a PDF document associated with an index automatically makes the index searchable.



NOTE. The documentation CD version of the Adobe® Acrobat Reader has the Search plug-in included.

To Select an Index:

Choose **Edit, Search, Select Indexes** to list the currently available indexes and to add or delete indexes, and then do one of the following in the **Index Selection** dialog box:

- To add an index to the available indexes list, click **Add**, navigate to the index, and double-click on the index file.



NOTE. The documentation CD has an index file in the same directory as the pdf files.

- To remove an index, select the index name, click **Remove**, and then click **OK**.
- To select or deselect an index, select the box for the index, and then click **OK**. Indexes that are grayed out are currently unavailable for searching.

Using the Search Command

The **Search** command allows you to perform a search on PDF documents. You can search for a simple word or phrase, or you can expand your search query by using wild-card characters and operators. You can use the search options to further refine your search.

To Perform a Full-Text Search:

- a. Choose **Edit, Search, Query**.
- b. Type the text you want to search for in the **Find Results Containing Text** box: The text that you type in can be a single word, a number, a term, or a phrase.
- c. To clear the search dialog box and redefine the search, click **Clear**.

To View a Document Returned From a Search:

- a. Double-click the document name to open the document.
- b. Use the **Search** buttons on the tool bar to view all the matches for your query.
- c. Review the search results that automatically appear in the text box: To highlight the next occurrence of a match in the document, click **Next Highlight**. To highlight the previous occurrence of a match in a document, click **Previous Highlight**.
- d. To highlight the first occurrence of a match in the next document listed or previous document listed, **Shift-click Next Highlight** or **Previous Highlight**.
- e. To view any other document listed, select **Search Results** to redisplay the list, and then double-click the document name.

8.6 Copying Text and Graphics

You can select text or a graphic in a PDF document, copy it to the Clipboard, and paste it into a document in another application such as a word processor.



NOTE. If a font copied from a PDF document is not available on the system displaying the copied text, the font cannot be preserved. A default font is substituted.

To Select Text and Copy It to the Clipboard:

Select the **Text Select** tool, and do one of the following:

- To select a line of text, select the first letter of the sentence or phrase and drag to the last letter.
- To select all the text on the page, choose **Edit, Select All**. To deselect the text and start over, click anywhere outside the selected text.

Choose **Edit, Copy** to copy the selected text to the Clipboard.

To Copy Graphics to the Clipboard:

Select the **Graphics Select** tool by holding down the mouse button on the text select tool and dragging to the graphics select tool, or press **Shift-V** as necessary to cycle through the group of tools. The cursor changes to the cross-hair icon.

Drag a rectangle around the graphic you want to copy. To deselect the graphic and start over, click anywhere outside the selected graphic.

Choose **Edit, Copy** to copy the graphic to the Clipboard.



NOTE. The graphic is copied using the *.wmf file format.

9 How to Contact RD Instruments

If you have technical problems with your instrument, contact our field service group in any of the following ways:

RD Instruments

9855 Businesspark Ave.

San Diego, California 92131

(858) 693-1178

FAX (858) 695-1459

Sales - rdi@rdinstruments.com

Field Service - rdifs@rdinstruments.com

RD Instruments Europe

5 Avenue Hector Pintus

06610 La Gaude, France

+33(0) 492-110-930

+33(0) 492-110-931

rdi@rdieurope.com

rdifs@rdieurope.com

Web: www.rdinstruments.com

www.dvlnav.com

10 **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 that 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 in writing and properly executed by an officer of RDI.

NOTES