

Ocean Surveyor Ocean Observer

Read This First



RD Instruments

Acoustic Doppler Solutions

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NOTES



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Ocean Surveyor Read This First

1 Introduction

Thank you for purchasing the RD Instruments (RDI) Ocean Surveyor or Ocean Observer Acoustic Doppler Current Profiler (ADCP). This book is designed to help first time ADCP 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 strongly recommend you read *all* of the provided documentation to learn the full capabilities of your Ocean Surveyor/Ocean Observer.

The Documentation CD includes:

- The Documentation CD has electronic versions of all the user documentation. Use the electronic documentation to quickly search for information. The [Read This First](#) guide explains how to use the documentation CD.

The Ocean Surveyor User's Guide includes:

- This book contains an overview of the Ocean Surveyor/Observer hardware and software.

The Reference Guides includes:

- **Read Me First.** Use this guide to help unpack, inspect, and do a simple communication test with the Ocean Surveyor/Observer.
- **Installation Guide.** Use this guide to plan your installation requirements. This guide includes how to setup the optional gyro interface, and specifications and dimensions for the Ocean Surveyor/Observer (including outline installation drawings).
- **Maintenance Guide.** This guide covers Ocean Surveyor/Observer maintenance procedures. Use this guide to make sure the Ocean Surveyor/Observer is ready for a deployment.
- **Test Guide.** Use this guide to test the Ocean Surveyor/Observer.
- **Troubleshooting Guide.** This guide includes a system overview and how to troubleshoot the Ocean Surveyor/Observer. If the Ocean Surveyor/Observer fails a built-in test or you cannot communicate with the system, use this guide to help locate the problem.

The Commands and Output Data Format Guide includes:

- This book contains a reference for all commands and output data formats used by the Ocean Surveyor/Observer. Use the *Command Quick Reference Card* to help remember the direct commands used by the Ocean Surveyor/Observer.

The Reference Cards includes:

- **Command Quick Reference Card.** The *Command Quick Reference Card* is designed for *experienced* users to help remember the direct commands used by the Ocean Surveyor/Observer.
- **Quick Reference Card.** The *Quick Reference Card* is designed to help *experienced* users remember the proper steps needed to deploy the Ocean Surveyor/Observer for a deployment. First time users should read the User's Guide before deploying the Ocean Surveyor/Observer.

3 What's New

This section describes features added to the Ocean Surveyor/Observer II as compared to the Ocean Surveyor/Observer model I.

Real Time Clock (RTC) – A RTC has been added. The TS-command sets the system time (see the [Command and Output Data Format](#) guide). Contrary to earlier behavior in the Ocean Surveyor/Observer I, the RTC now keeps its own time, and does not depend on the PC time. Thus, a BREAK will not reset the time; rather the time is maintained until it is reset using the TS command.

LCD Display and Gyro Offset control – A LCD Display and Gyro Offset control for systems with Synchro-to-Digital converters for interfacing with a vessel's Gyro has been added. The Offset Control buttons are Up, Set, and Down, as depicted by the upward arrow, the square box, and the downward arrow respectively.

To set a heading offset for a multi-rate gyro for example, the user depresses the up or down button and set button simultaneously, using two small aids such as a pencil. When the desired offset is obtained, release the buttons. To prevent accidental re-adjustment, the bottoms have been recessed.

Trigger Input/Output – The Trigger Input allows the Ocean Surveyor/Observer II to be pinged by an external +5V logic level signal. The minimum duration for the Trigger Input is 1ms. The Input resistance is at least 2.7 k Ohm. The Trigger Output is a +5V logic level signal as well. The nominal source resistance of the Trigger Output is 50 Ohms.

The command that controls the Trigger Output and Input is CXa,b , where a controls the Trigger Input mode, and b the Trigger Output mode. For flexibility, several modes for the Trigger Input and Output operation have been implemented. See the [Command and Output Data Format](#) guide for a description of the command.

4 Upgrading an OS-I to an OS-II

To upgrade an Ocean Surveyor/Observer model I to an Ocean Surveyor/Observer model II, the following components must be replaced.

- Chassis
- Transducer Cable
- Transducer Top Hat Assembly
- Beamformer PCB

If you are interested in upgrading, please call our sales department at 858-693-1178.

5 Conventions Used in Manuals

Conventions used in the Ocean Surveyor/Observer manuals have been established to help you learn how to use the Ocean Surveyor/Observer 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.

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

```
Ocean Surveyor Broadband/Narrowband ADCP
RD INSTRUMENTS (c) 1997-2000
ALL RIGHTS RESERVED
Firmware Version 23.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).

6 Ocean Surveyor/Observer Care

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

6.1 General Handling Guidelines



CAUTION. Do NOT ping the Ocean Surveyor/Observer with the transducer in air. The power assembly board will short, causing the electronics chassis to no longer communicate. The transducer is pinged by sending a CS or PT5 command or if *VmDas* is started for collecting data – either of these methods will cause damage if the transducer is in air.

- Never set the transducer on a hard or rough surface. The urethane face may be damaged.
- Do not expose the transducer to prolonged sunlight. The urethane face may develop cracks. Cover the transducer face on the Ocean Surveyor/Observer if it will be exposed to sunlight.

- Do not scratch or damage the 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 cannot be repaired, contact RDI. Do not risk a deployment with damaged O-ring surfaces.
- Do not lift or support an Ocean Surveyor/Observer by the external I/O cable. The connector or cable will break.

6.2 Assembly Guidelines

- Always check that the I/O cable (wet end) O-rings are in place when connecting the I/O cable to the transducer. These O-rings have a tendency to fall out if the cable connector is dropped.
- Read the [Maintenance guide](#) for details on Ocean Surveyor/Observer re-assembly. Make sure the top hat assembly O-rings stay in their groove when you re-assemble the Ocean Surveyor/Observer. Tighten the Top Hat hardware as specified. Loose, missing, or stripped Top Hat mounting hardware or damaged O-rings can cause the Ocean Surveyor/Observer transducer to flood.

6.3 Deployment Guidelines

- Read the Ocean Surveyor/Observer User's Guide and the *VmDas* User's Guide. These guides have tutorials to help you learn how to use the ADCP.
- Use the default Command Files (included on the *VmDas* CD) to help setup the ADCP.

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 transducer
- I/O cable
- Ship Kit (includes manuals, software (*VmDas*, *WinADCP*, *RDI Tools*, and Documentation CD), and power cords)

- Electronics Chassis
- Shipping crates (please save all foam and crates for reshipping use)

7.2 Ocean Surveyor/Observer Visual Inspection

Inspect the Ocean Surveyor/Observer using the following table and [Figure 1](#). 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.
I/O connector	Check the I/O connector for cracks or bent pins.
Electronic Chassis	Check the connectors on the rear panel for cracks or bent pins.
I/O Cable	Check the cable connectors for cracks or bent pins. Check the cable (wet end) has the O-rings installed.

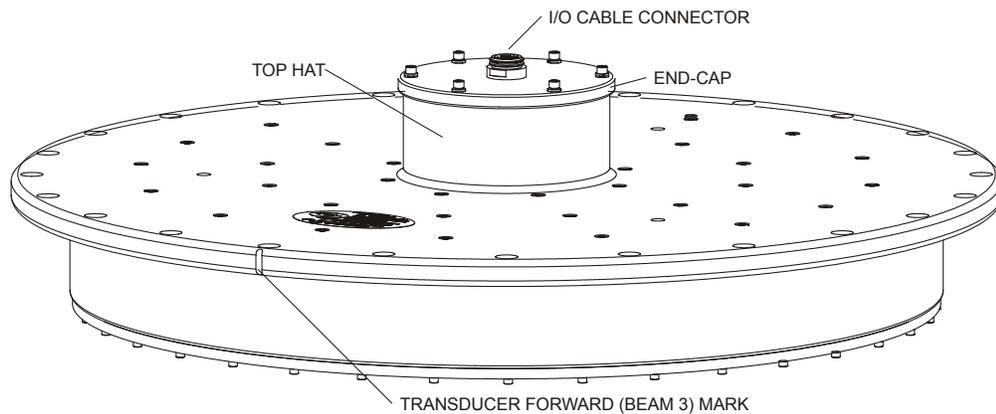


Figure 1. Ocean Surveyor/Observer Transducer Overview (38kHz System Shown)

8 Set Up the Ocean Surveyor/Observer

Use [Figure 2, page 8](#) to connect the Ocean Surveyor/Observer to a computer for a bench test. Read and follow the cautions listed below *before* applying power to the Ocean Surveyor/Observer.



CAUTION. Complete the ground path. **The power cord and the outlet used must have functional grounds.** Before main power is supplied to the Ocean Surveyor/Observer, the protective earth terminal of the instrument must be connected to the protective conductor of the mains power cord. The mains plug shall only be inserted in a socket outlet provided with a protective earth contact. The protective action must not be negated by the use of an extension cord (power cable) without a protective conductor (grounding). Grounding one conductor of a two-conductor outlet is not sufficient protection.



CAUTION. If the instrument power is supplied via an auto-transformer, make sure the common terminal is connected to the earth terminal of the power source.



CAUTION. Any interruption of the earthing (grounding) conductor, inside or outside the instrument, or disconnecting the protective earth terminal will cause a potential shock hazard that could result in personal injury.



CAUTION. Do not operate the Ocean Surveyor/Observer Electronics Chassis in the presence of flammable gasses or fumes. Operation of any electrical instrument in such an environment constitutes a definite safety hazard.

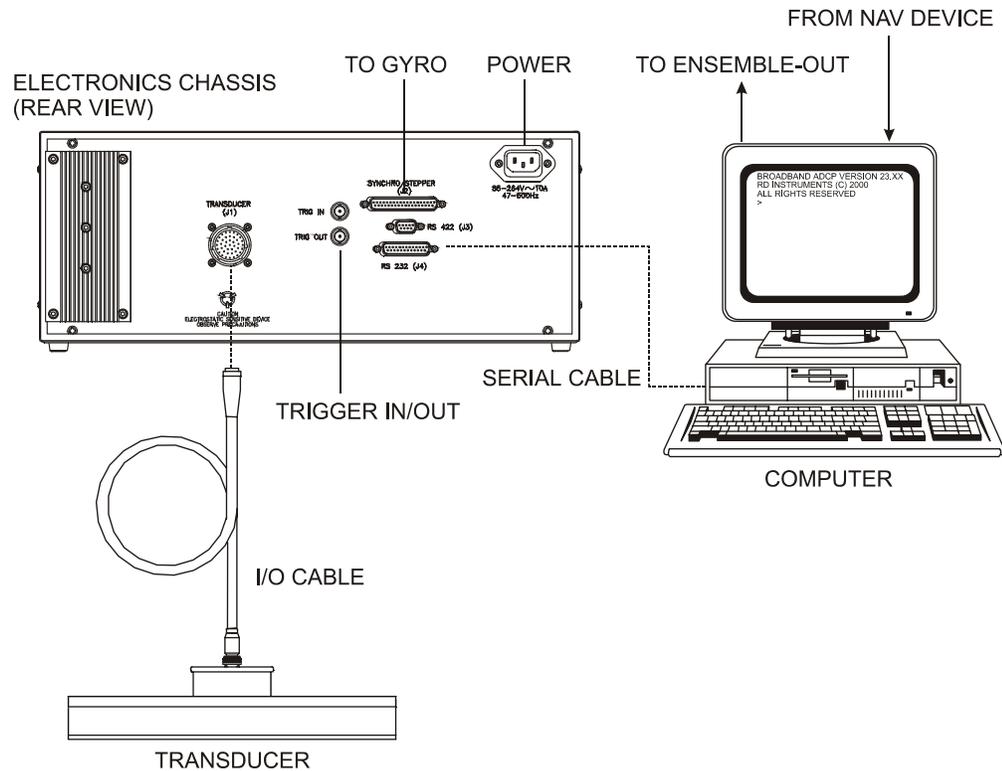


Figure 2. Ocean Surveyor/Observer Connections

 **NOTE.** For complete instructions on how to install the Ocean Surveyor/Observer, see the [Installation Guide](#).

 **CAUTION.** Do NOT ping the Ocean Surveyor/Observer with the transducer in air. The power assembly board will short, causing the electronics chassis to no longer communicate. The transducer is pinged by sending a CS or PT5 command or if *VmDas* is started for collecting data – either of these methods will cause damage if the transducer is in air.

8.1 Establish Communications

Before you can establish communications with the Ocean Surveyor/Observer, you must configure *BBTalk*.

- a. Connect and power up the ADCP as shown in [Figure 2, page 7](#).
- b. Start *BBTalk* (for complete instructions on how to use this program see the [RDI Tools User's Guide](#)).
- c. At the **Connect To** screen, select **Broadband** from the list. Select the COM port the Ocean Surveyor/Observer is connected to. Click **Next**.
- d. On the **Port Settings** screen, select the baud rate, parity, and stop bits. Click **Next**.

- e. On the **Options** screen, select the desired settings. Click **Finish**.



NOTE. If the **Connect To Last Open Port On Startup** box is selected, *BBTalk* will immediately start without going through the configuration screens.

- f. On the **File** menu, click **Break** (you can also press the **End** key to send a break). You should see the wakeup message appear on the log file window.

```
Ocean Surveyor Broadband/Narrowband ADCP
RD INSTRUMENTS (c) 1997-2000
ALL RIGHTS RESERVED
Firmware Version 23.xx
>
```



NOTE. A delay of up to three seconds before the message appears is normal.

8.2 What to do if the Ocean Surveyor/Observer Will Not Wake-up

Wakeup is the process by which the Ocean Surveyor/Observer sets up communication with a computer. Sending a BREAK signal to the Ocean Surveyor/Observer on the serial communication line begins the wake-up process. Pressing **End** while using *BBTalk* sends the BREAK. Each time you press **End**, you should see a message similar to the following.

```
Ocean Surveyor Broadband/Narrowband ADCP
RD INSTRUMENTS (c) 1997-2000
ALL RIGHTS RESERVED
Firmware Version 23.xx
>
```

If the wake-up message does not appear, check the following items.

- Is the I/O cable connected from your computer's COM port to the Ocean Surveyor/Observer electronic chassis?
- Is power connected to the electronic chassis?
- Check the communication setup using *BBTalk*. See the [RDI Tools User's Guide](#) for detailed help on using *BBTalk*. The computer and the Ocean Surveyor/Observer must be using the same baud rate and COM port.
- If wakeup still does not occur, use the [Troubleshooting book](#) to locate the problem.

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

+1 (858) 693-1178

FAX +1 (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

The industry leader in Customer Support has just raised the bar another notch. RD Instruments introduces the After-Hours Emergency Service. When the RDI-US and RDI-Europe office is closed, customers may now call +1 858-578-0781 to have their after-hours emergencies resolved.

10 Using the Documentation CD

The documentation CD contains an electronic version of the Ocean Surveyor/Observer Technical Manual. All of the files are in Adobe® Portable Document Format (*.pdf). To use these files, you must install the Acrobat version 5.0 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 5.0 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 Ocean Surveyor/Observer Technical Manual.

10.1 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.

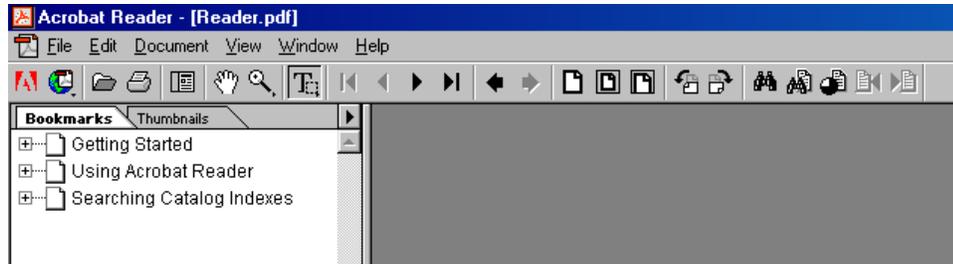


Figure 3. Adobe Acrobat Reader Screen

10.2 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**.

10.3 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.

10.4 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).

10.5 Using Search

The Acrobat **Search** command allows you to perform full-text searches of PDF document collections (i.e. the WorkHorse 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.

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 file named *index.pdx*, and double-click on the index file.



NOTE. The index file (*index.pdx*) is in the same folder 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.



Figure 4. Selecting the Index

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.

10.6 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.

11 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.