Doppler Volume Sampler (DVS)

Software User's Guide

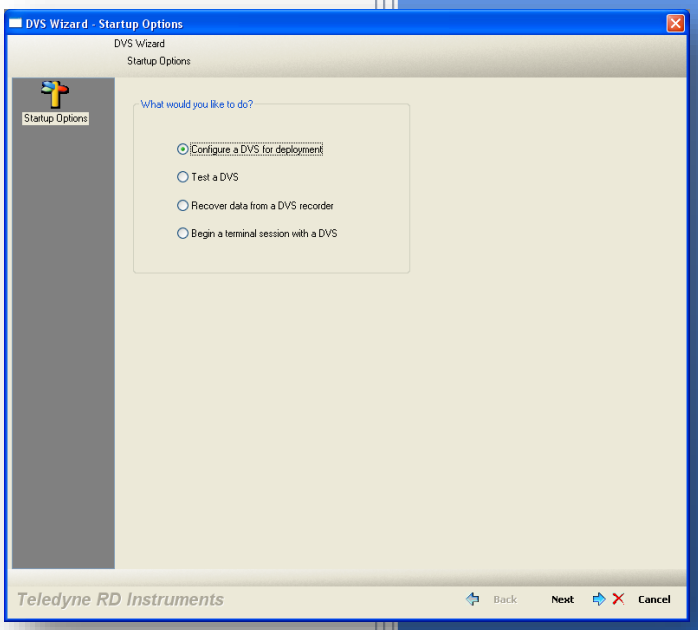

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TABLE OF CONTENTS

CHAPTER 1 - AT A GLANCE 1
- How to Contact Teledyne RD Instruments 2
- Conventions Used in this Manual 2
- Introduction 3
- System Requirements 3
- Software Installation 3

CHAPTER 2 – USING THE DVS SOFTWARE 5
- Starting the DVS Software 6
- Set Up DVS RS232 Communication 7
- Configuring the Inductive Modems 8
  - System Setup 8
  - Configuring Serial Connection to Surface IMM 8
- Using the DVS Terminal Screen 11
- Testing the DVS 12
- Compass Alignment 13

CHAPTER 3 - PLANNING A DEPLOYMENT 15
- Saving Deployment Files 16
- Opening Deployment Files 16
- Using the Deployment Wizard 16
  - Error Messages 16
  - Warnings and Cautions 17
  - Running the Deployment Wizard 18
- DVS Preparation 25
- Deploying the DVS 26

CHAPTER 4 – USING THE DVS RECORDER FUNCTIONS 28
- Recovering the Entire Data Set 29
- Getting Data during the Deployment 30
  - Collecting Average 31
  - Collecting Last Ensemble 32
  - Collecting One New Ensemble 32
- Converting Data 33
  - Convert PD20 to PD0 33
  - Convert PD20 to ASCII 34
- Checking the Recorder Status 35
- Erasing the Recorder 36

APPENDIX A – DVS SOFTWARE HISTORY 37

LIST OF FIGURES

Figure 1. DVS Startup Options Screen 6
Figure 2. Communication Setting - RS232 Configuration 7
Figure 3. Communication Setting – Inductive Modem Configuration 9
Figure 4. Configure Modems Dialog 9
Figure 5. Configuration Complete Message Box 10
Figure 6. DVS Terminal Screen 11
Figure 7. Testing the DVS 12
Figure 8. ISM Compass Calibration 13
Figure 9. TCM5 Compass Calibration 13

EAR-Controlled Technology Subject to Restrictions Contained on the Cover Page.

Figure 10. DVS Wizard - Deployment Planning 18
Figure 11. DVS Wizard – Water Profile 19
Figure 12. DVS Wizard – Measurement Frequency 20
Figure 13. DVS Wizard – Deployment Date/Duration 21
Figure 14. DVS Wizard – Deployment Settings 21
Figure 15. DVS Deployment Consequences 23
Figure 16. DVS Deployment Screen 26
Figure 17. DVS Wizard – Deployment 27
Figure 18. Recover Data Screen 29
Figure 19. Convert PD20 File to PD0 34
Figure 20. Convert PD20 File to ASCII 34
Figure 21. Recorder Status 35
Figure 22. Erase the Recorder 36

LIST OF TABLES

Table 1: Command File Created Using DVS 24

REVISION HISTORY

September 2015

- Updated the Software Installation section
- Added TCM5 compass calibration
- Updated software history for DVS 2.04

June 2012

- Added DVS pressure sensor settings to Deployment Settings screen
- Updated Figure 10, DVS Wizard – Deployment Settings
- Updated Styles and fonts used in manual
- Updated software history section for DVS 2.03 software

May 2012

- Internal release of 2.02 software

April 2012

- Added manual revision history
- Updated software history section for DVS 2.01 software

April 2010

- Manual updated to document DVS 2.00 software

Chapter 1

AT A GLANCE

In this chapter, you will learn:

- System requirements
- Software Installation

How to Contact Teledyne RD Instruments

If you have technical issues or questions involving a specific application or deployment with your instrument, contact our Field Service group:

Teledyne RD Instruments	Teledyne RD Instruments Europe
14020 Stowe Drive Poway, California 92064	2A Les Nertieres 5 Avenue Hector Pintus 06610 La Gaude, France
Phone +1 (858) 842-2600	Phone +33(0) 492-110-930
FAX +1 (858) 842-2822	FAX +33(0) 492-110-931
Sales – rdisales@teledyne.com	Sales – rdie@teledyne.com
Field Service – rdifs@teledyne.com	Field Service – rdiefs@teledyne.com

Client Services Administration – rdicsadmin@teledyne.com

Web: http://www.rdinstruments.com

24 Hour Emergency Support +1 (858) 842-2700

Conventions Used in this Manual

Conventions used in this documentation have been established to help you learn how to use the system quickly and easily.

Software 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 include program names (*StreamPro*) and file names (*default.txt*).

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

```
StreamPro ADCP
Teledyne RD Instruments (c) 2012
All rights reserved.
Firmware Version: 31.xx

>?
```

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

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

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

Introduction

This guide is an overview on using the DVS[1] software provided with your system. The *DVS* program allows the user to create a deployment file. After creating a deployment file (or loading an existing file) the *DVS* program will continue with the testing, deployment, and recovery of data.

This guide covers *DVS* software version 2.04.

DVS software version 2.04 supports DVS firmware 55.03 and higher and is not backwards compatible.

- For DVS firmware 41.17 through 55.01 please use DVS software version 2.01.
- For DVS firmware 41.16 or earlier please use DVS software version 1.05.

System Requirements

The *DVS* software requires a Windows® compatible computer with the following specifications:

- Windows 8®, Windows 7®, Vista®, Windows XP® or Windows 2000®

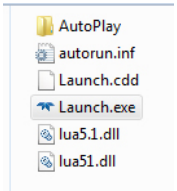
You must have administrator rights on the computer if you are using Windows 7®/Vista®.

- Pentium III 600 MHz class PC (higher recommended)
- 64 megabytes of RAM (128 MB RAM recommended)
- 50 MB Free Disk Space plus space for data files (A large, fast hard disk is recommended)
- One Serial Port (two or more High Speed UART Serial Port recommended)
- Minimum display resolution of 1024 x 768, 256 color (higher recommended)
- CD-ROM Drive
- Mouse or other pointing device

Software Installation

To install the *DVS* software:

1. Insert the CDs into the drive.
2. Use Windows Explorer® to open the CD drive folder.
3. Double-click on the *launch.exe* file. When the browser starts click the **Install** button and then click the **Install DVS Software** button.



Many companies require that Autorun is disabled. Double-click on *Launch.exe* to start the browser on all TRDI software and documentation CDs.

[1] DVS is a registered trademark of Teledyne RD Instruments, Inc.

NOTES

Chapter 2

USING THE DVS SOFTWARE

In this chapter, you will learn:

- Starting the DVS software
- Set up DVS RS232 communication
- Configuring the inductive modems
- Using the DVS terminal screen
- Testing the DVS
- Compass alignment

The program *DVS* is designed to take a user from the planning stage through data recovery.

Starting the DVS Software

To start *DVS*:

1. In *Windows*, click **Start**, **Programs**, **RD Instruments**, **DVS** (default location – use your installation settings if different). The *DVS software* will start and display the **DVS Wizard Startup Options** screen.

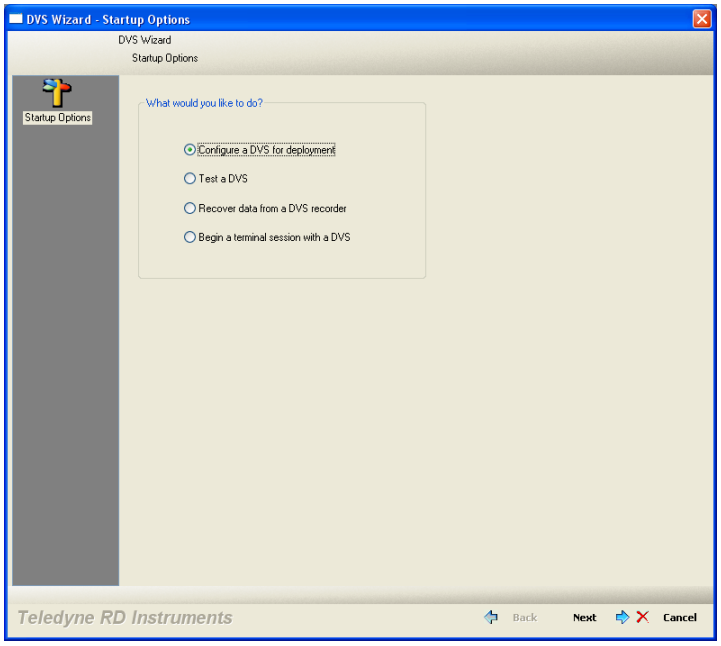


Figure 1. DVS Startup Options Screen

If the **Startup Options** screen does not display when using Windows 7® or Vista®, right-click on the DVS shortcut and select **Run as Administrator** from the pop-up menu. Select **Yes** on the **User Account Control** dialog to start the DVS software.

To always have DVS start with administrator rights, right-click on the DVS shortcut and select **Properties**. On the **Compatibility** tab, check the **Run this program as an administrator** box.

2. The **DVS Wizard Startup Options** screen provides quick access to the most often used functions of the *DVS* software. You may select one of the functions and click **Next** or click **Cancel** to begin using *DVS*.

   - **Configure a DVS for a new deployment –** This will create a new deployment file and start the deployment wizard (see Deployment Wizard).
   - **Test a DVS –** this will start the testing portions of the deployment wizard (see Test the DVS).
   - **Recover data from a DVS's recorder –** This will open the recover data screen (see Recover Data).
   - **Begin a terminal session with a DVS –** This will open a terminal window and allow you to "talk" to the DVS unit (see DVS Terminal).

Set Up DVS RS232 Communication

The DVS software assumes the last communication protocols configured are correct and opens directly to the **DVS Wizard Startup Options** screen. However, the first time the software is run it is unlikely that the default protocols will apply.

Therefore, on the first start up:

1. Connect and power up the DVS unit as shown in the DVS Operation Manual.
2. Start the *DVS* software.
3. At the **DVS Wizard Startup Options** screen, click **Cancel**.
4. From the **Configure** menu, click **Serial Communications**.

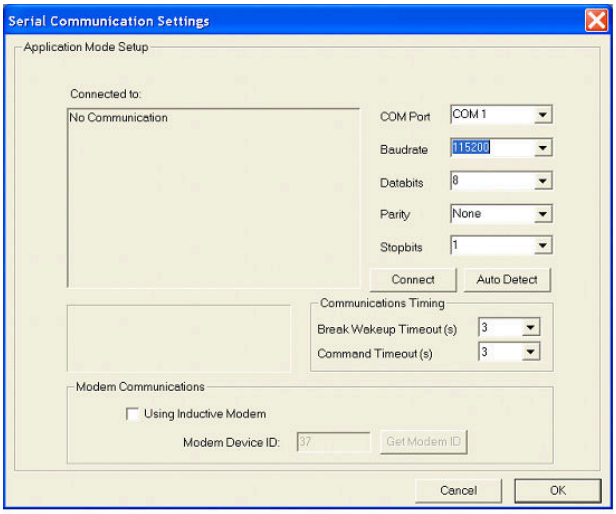


Figure 2. Communication Setting - RS232 Configuration

5. Select the COM port, baud rate, parity, and stop bits that the DVS unit is connected to. If you are unsure of the setting, click the **Auto Detect** button.
6. Click **Connect**. You should see the wakeup message appear on the deployment log window. For example;

```
>
DVS
Teledyne RD Instruments (c) 2010
All rights reserved.
Firmware Version: 55.xx
>
```

7. Click **OK**.

Once you establish communications with the DVS unit for the first time, the *DVS* software uses the same settings for future communications.

Configuring the Inductive Modems

This section describes how to setup communications with a DVS unit and how to verify communication with the inductive modems.

System Setup

The DVS system has an assumed bench top configuration consisting of a surface IMM (a Sea-Bird Inductive Modem) connected to a PC through a serial port and independently powered (i.e. by a 9V battery). The surface modem is connected to a powered DVS device via the test cable. See the DVS Operation Manual for the expected bench top setup for the DVS system.

The modem communications have only been tested using Sea-Bird IMM's with a firmware version of 0.99A or higher. The surface IMM used to communicate with the DVS device will need to have this firmware version to ensure proper communications.

Both the surface IMM and the IMM built into the DVS system can be configured with the *DVS* software. The surface IMM will need to be configured using this process in order for the software to successfully communicate with the DVS device. The DVS IMM is pre-configured upon delivery from Teledyne RD Instruments. However, this process can be run to ensure that the DVS device has the correct settings or to reset it to a valid state if settings are changed accidentally.

Configuring Serial Connection to Surface IMM

The first step is to configure the serial connection to the surface IMM.

1. Connect and power up the DVS unit as shown in the DVS Operation Manual.
2. Start the *DVS* software.
3. At the **DVS Wizard Startup Options** screen, click **Cancel**.
4. From the **Configure** menu, click **Serial Communications**.
5. Select the appropriate COM port (i.e. the port that the surface modem is connected to).
6. For the baud rate, select 9600. Serial communications with the IMM's should always be set to 9600 baud.

The inductive modems actually communicate with each other at a baud rate of 1200, and do not support communication with the DVS system at baud rates above 9600.

7. Leave the other settings at their default values as shown in Figure 3.

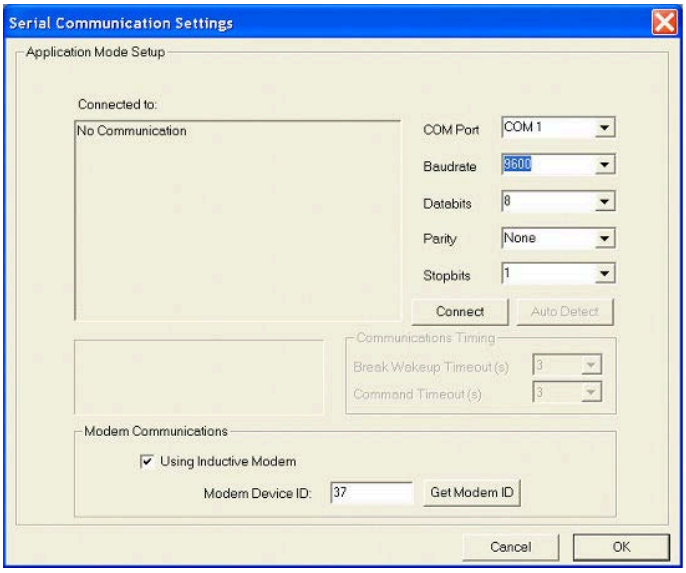


Figure 3. Communication Setting – Inductive Modem Configuration

8. Select the **Using an Inductive Modem** box and click the **Get Modem ID** button.

> You do not need to check the **Using Inductive Modem** box to specify the modem communication settings. The DVS modem configuration process will fill in these settings for you.

9. Press the **OK** button to close the **Serial Communication Settings** dialog.
10. On the **Configure** menu, select **Modems**. This will launch the dialog shown in Figure 4 below. Select which modem(s) you wish to configure (i.e. the surface IMM connected to the serial port and/or the DVS IMM).

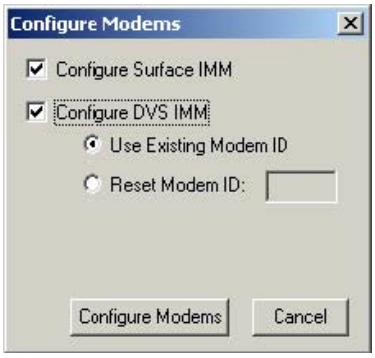


Figure 4. Configure Modems Dialog

11. If you are configuring the DVS IMM, you have the option of **Use Existing Modem ID**, or **Reset Modem ID** (from 00 to 99).

> The DVS Modem ID that is configured will be applied to the software serial communication settings for future modem communications.
>
> The DVS IMM can only be configured when it is the only device on the line.

12. Press the **Configure Modems** button to start the configuration process. The dialog will update with a status bar and information on the configuration steps being run. The configuration process will take a few minutes to complete. Once the process in completed, a message box will appear letting you know that the selected configuration(s) are completed (See Figure 5 below).

Figure 5. Configuration Complete Message Box

If the modem configuration process does not complete successfully, check the serial connection from the PC to the surface IMM, and the connection to the DVS system (if you are attempting to configure the DVS modem). If the connections look correct and the modem configuration still fails, you will need to test your modem connections. The DVS Operation Manual describes how to verify modem communications.

Using the DVS Terminal Screen

Use the DVS terminal screen to send any command to the DVS unit. The commands are listed on the left hand side of the window. Selecting any of the commands will display a definition of its use on the right-hand side, with options to choose depending on the command.

To send a command to the DVS:

1. Set up communications with the DVS.
2. On the **Tools** menu, click **Terminal**.
3. Click **Send Break** to wake up the DVS unit. For every break sent, you should see the wakeup message.
4. Select the name of the command and parameters to be run. Click the **Send** button.

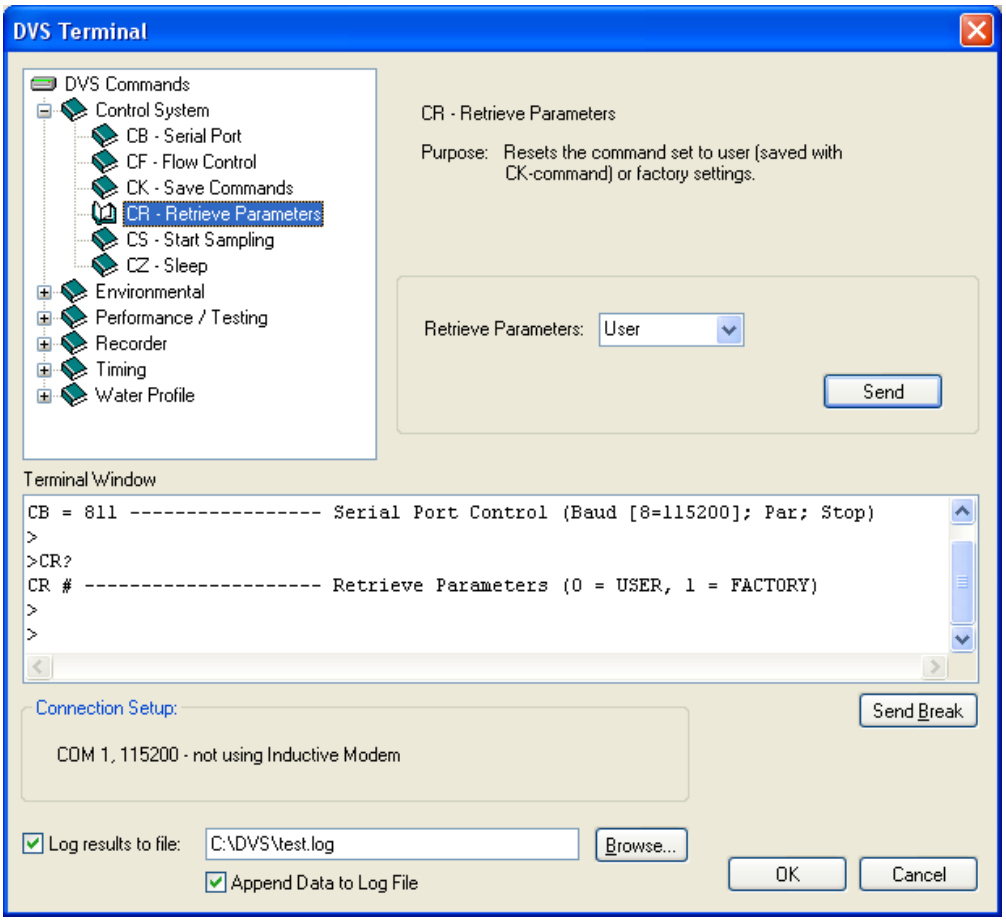


Figure 6. DVS Terminal Screen

Testing the DVS

To test the DVS:

1. Connect and power up the DVS unit as shown in the DVS Operation Manual.
2. Start the *DVS* program.
3. At the **DVS Wizard Startup Options** screen, click **Test a DVS**. Click **Next**.
4. On the **Test DVS** screen, select **Run All Tests** (includes the recorder test) or **Run Individual Tests** and select the desired tests. Click the **Start Test** button. The selected tests will run (see the DVS Operation Manual for details on the test printouts). A green check mark next to the test name indicates the test passed. If a selected test fails, a red X will be placed next to the test name and a dialog box will prompt if you want to continue testing.
5. The results of the test will be displayed in the **Terminal Window** area and saved to the log file (*.log) if the **Log result to file** box is selected.
6. Click **OK** to exit the **Test DVS** screen.

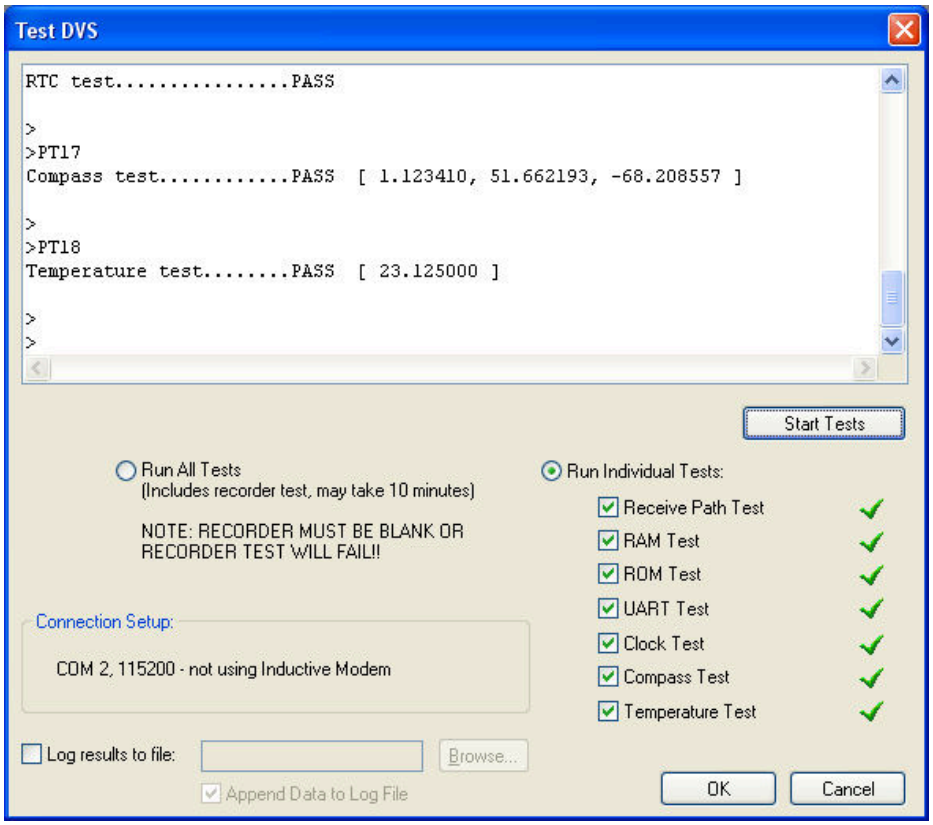


Figure 7. Testing the DVS

Compass Alignment

The ISM compass calibration algorithm collects magnetic field vector information for various measured headings during the calibration. Hard and soft iron effects rotating with the compass are made observable during the calibration by causing the local field to be perturbed as the compass is spun during the calibration. That is, each component of the hard and soft iron has to alternately increase the local field for some orientations and decrease for orientations 180 degrees (or 90 degrees for soft iron) from those orientations for the algorithm to "notice" it. Tilting and rotating the compass about the vertical axis is sufficient to do this.

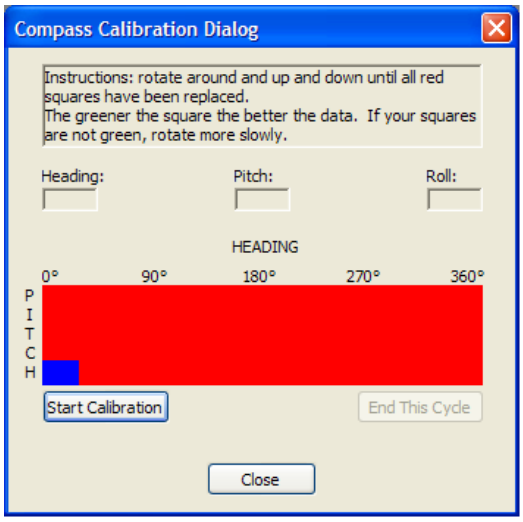


Figure 8. ISM Compass Calibration

The TCM5 compass calibration is an automated built-in test that measures how well the compass is calibrated. The procedure measures compass parameters over 16 samples. When it has collected data for all required directions, the DVS unit computes and displays the results.

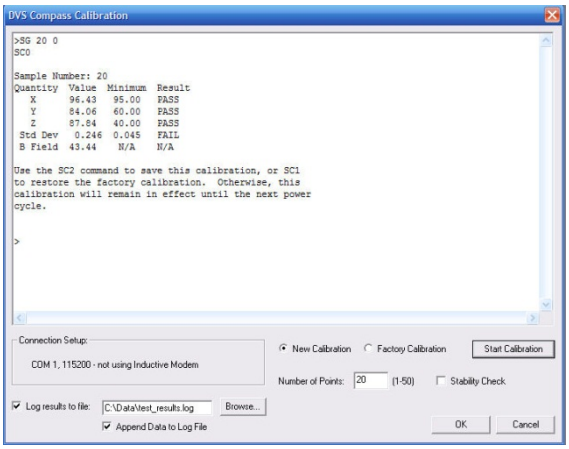


Figure 9. TCM5 Compass Calibration

For step-by-step instructions on the compass calibration procedure, see the DVS Operation Manual.

NOTES

Chapter 3

PLANNING A DEPLOYMENT

In this chapter, you will learn:

- Saving and opening deployment files
- Using the Deployment Wizard
- DVS Preparation
- Deploying the DVS

The *DVS* software uses a wizard to step you through a series of self-explanatory pages to configure the desired profiling range and resolution, the number of ensembles per hour, and the time/date to start the deployment. Once the planning portion of the wizard is complete, it leads to the **Deployment Settings** page where the final steps can easily be completed to deploy the DVS system.

Saving Deployment Files

Save the deployment file by clicking **File**, **Save As**. This deployment file will save which steps have been completed in the Deployment Wizard.

Opening Deployment Files

To open a deployment file, on the **File** menu, click **Open**. Select the deployment file to open and click **Open**.

Using the Deployment Wizard

The *DVS* software lets you enter known or "best-guess" values for the various DVS system profiling parameters and shows predictions of expected results. This lets you play "what if?" with the input parameters to evaluate trade-offs you may have to make with regard to standard deviation, profiling range, and timing.

All new configurations start with the wizard. The wizard guides you through questions about the environment, and how you want to setup the DVS unit.

The *DVS* software saves the profiling parameters, predicted consequences, and any notes you make in a deployment file. The file is intended to configure a DVS unit for a deployment. It is also a record of the configuration you chose.

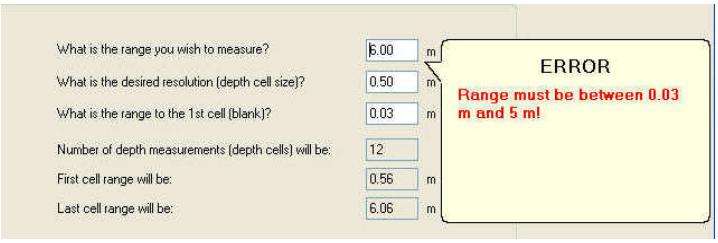
For more information about DVS system commands, see the DVS Operation Manual.

The *DVS* software does not send the commands to the DVS until you are ready. Consequently, the *DVS* software can be run at your desk without a DVS unit connected.

After completing the wizard, you can look at the parameters and/or edit them and see the consequences change. When you are satisfied, you can save the changes to update the deployment file. As you edit settings, the *DVS* software reviews your changes.

Error Messages

If you enter an illegal value, the *DVS* software displays an error message. For example, if you sent a command that specified too large a range to a DVS unit, it would reject the illegal command. To prevent this, the *DVS* software displays this error message if you choose a range under 0.03 meters or over 5 meters.



Warnings and Cautions

The *DVS* software also displays warnings and cautions when a parameter is not advisable or is noteworthy. For example, the length of a deployment may be limited by the amount of battery power in the DVS. You can enter a longer deployment length, but if you do, the *DVS* software displays this message.

Some messages may not appear until you reopen a deployment file.

You must correct errors before you can continue. You can save a deployment when a warning or caution is present.

Running the Deployment Wizard

To run the deployment wizard:

1. Connect and power up the DVS system as shown in the DVS Operation Manual.
2. Start the DVS software.
3. Start the Deployment Wizard by doing *one* of the following:
   - At the **DVS Wizard Startup Options** screen, click **Configure an DVS for a New Deployment**.
   - Click **File**, **New Deployment** (on the tool bar).
   - If you are working with a deployment file (**.dvs*), on the **File** menu, click **Open**.
4. The first step is planning. If you want to skip this step, check the **Skip Planning Step** box (see Figure 10), or click **Next** to continue.

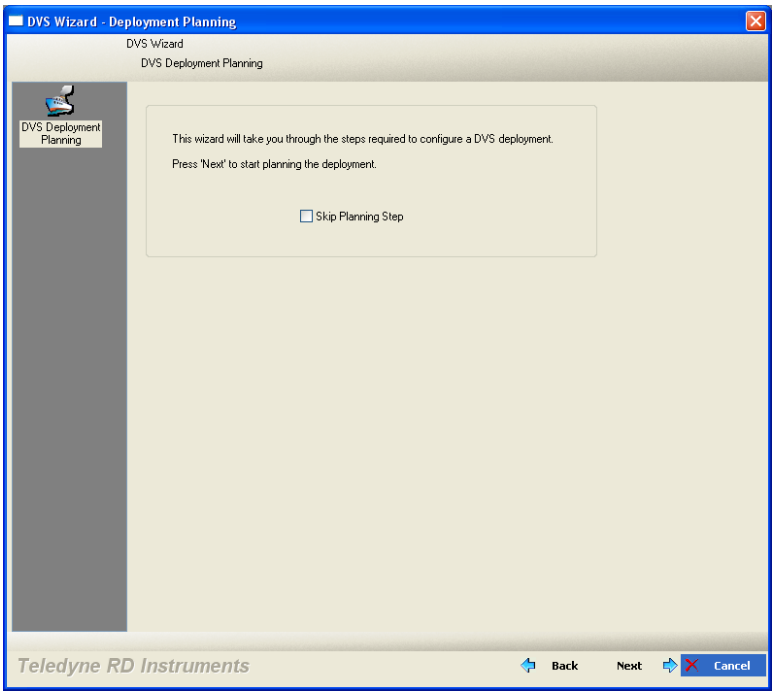


Figure 10. DVS Wizard - Deployment Planning

5. Select the depth range (1 to 5 meters) you wish to measure (see Figure 11).
6. Set the resolution (depth cell size) to between 0.03 to 5.0 meters. A larger depth cell (bin) size decreases the standard deviation, but shallow water situations may need to use small depth cells (bins) to get more data points.
7. Set the range to the 1st cell (blank) to between 0.03 (default) to 5 meters.
8. The *DVS* software will automatically set the number of depth cells (bins) and show the first and last cell range. Click **Next**.

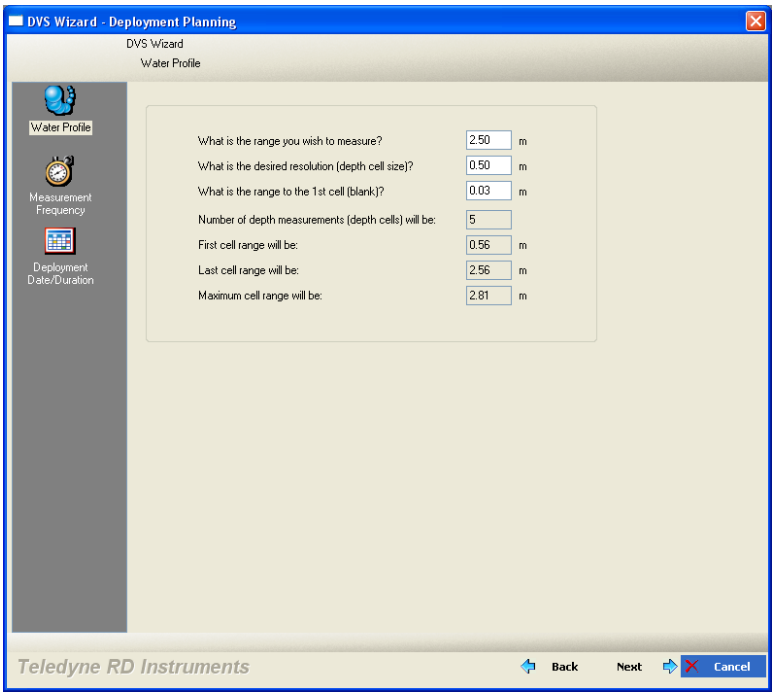


Figure 11. DVS Wizard – Water Profile

9. Select how many ensembles per hour you want to record (Figure 12). The *DVS* software will automatically set the time between ensembles. Click **Next**.

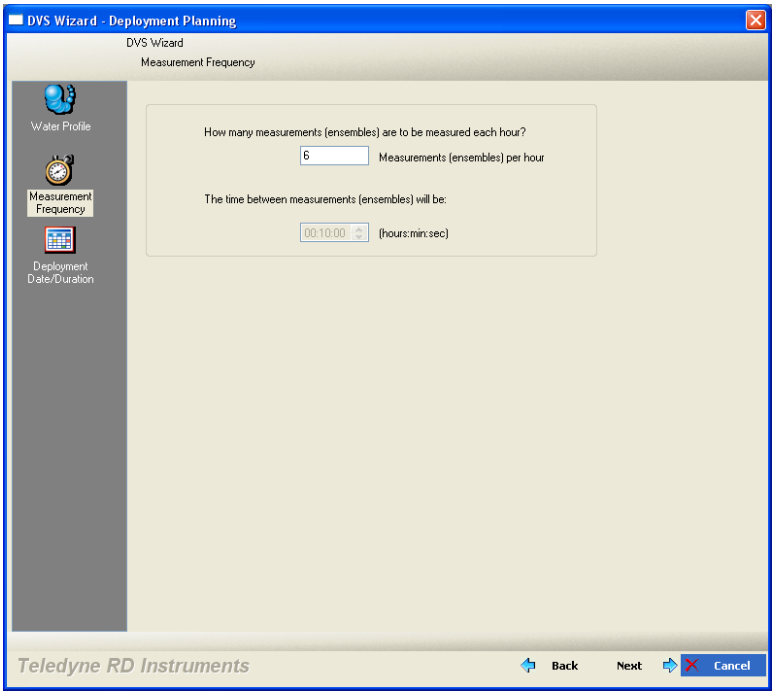


Figure 12. DVS Wizard – Measurement Frequency

10. Enter the expected duration of the DVS deployment from the time of the first water profiling ping (either immediately or first ping date/time, see Figure 13). This duration *does not* produce a command to instruct the DVS to stop data collection; it is for estimating consequences only. This duration is used to estimate the following *consequences*: Battery Power usage, and Storage required. Click **Next** to continue.

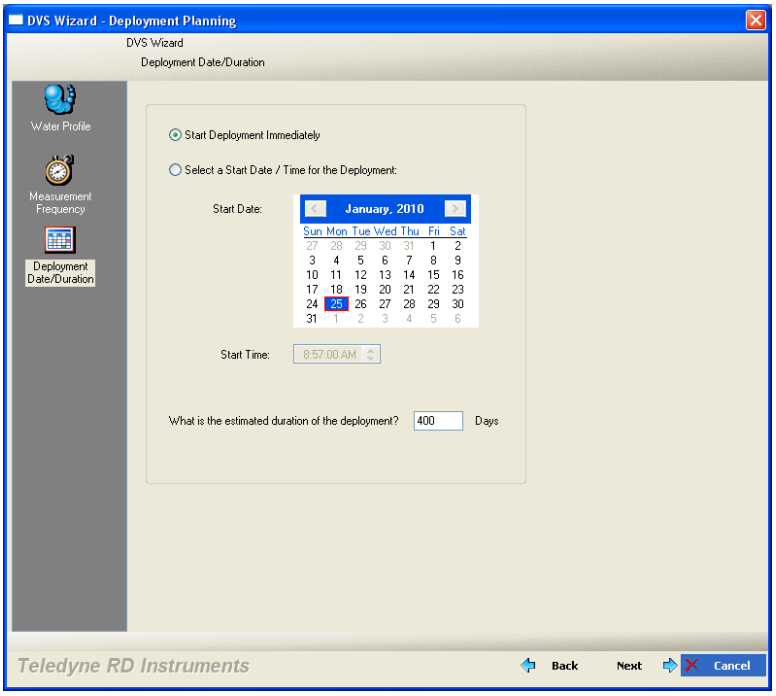


Figure 13. DVS Wizard – Deployment Date/Duration

11. The **DVS Deployment Settings** screen opens using the settings you selected with the wizard.

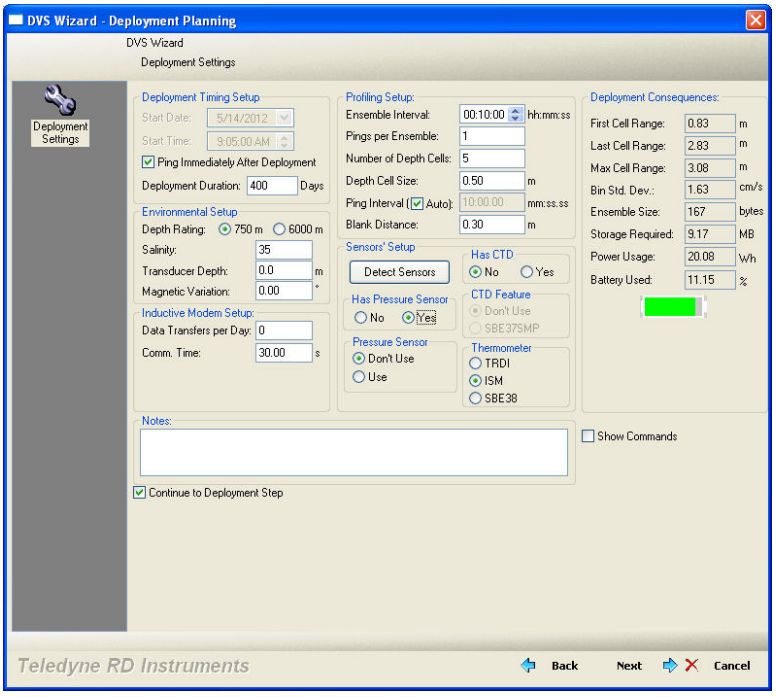


Figure 14. DVS Wizard – Deployment Settings

Deployment Timing Setup

- **Start Date/Time - Ping Immediately After Deployment** – Select whether to start the deployment immediately or delayed. Un-checking the box and entering a **Start Date** and **Start Time** in this field enables a delay from the start of a deployment to the first water profiling ping. When enabled, the DVS system will begin collecting velocity data at the date and time specified by the first ping date and time. The DVS will sleep from the time the commands are sent to the DVS until the first ping date and time. Make sure that the time is in the future and that the DVS clock is properly set.
- **Duration** – Enter the expected duration of the DVS deployment. This duration *does not* produce a command to instruct the DVS to stop data collection; it is for estimating consequences only.

Environmental Setup

- **Depth Rating** – Select if the DVS is rated to 750 meters (Standard) or 6000 meters.
- **Salinity –** Fresh water is 0 and salt water is typically 35. Salinity is used to calculate the speed of sound. The speed of sound is used by the DVS unit to scale the velocity data properly.

If you use 0 for salinity when you deployed in water with salinity of 35, then your data will have a 3% velocity estimate error.

- **Transducer Depth –** The DVS uses depth in its speed of sound calculations. If the pressure sensor is not available, then the DVS will use this manual depth setting.
- **Magnetic Variation** – The DVS uses a flux-gate compass that measures magnetic north. You must set the magnetic offset in order to obtain true north referenced velocity data directions.

Profiling Setup

- **Ensemble Interval** – This sets the (minimum) interval over which the DVS will collect and average the pings per ensemble and record data. The format of this field is *hh*:*mm*:*ss*, where *hh* = hours, *mm* = minutes, and *ss* = seconds.
- **Pings Per Ensemble** – Adjust the number of pings to get the desired Standard Deviation. To increase the expected accuracy of the velocity measurement (reduce the Standard Deviation), you can increase either pings per ensemble, bin size or both.
- **Number of Depth Cells** – Sets how many depth cells (bins) are used. The **Last Cell Range** field provides the last range that you have setup the system to collect. To increase the **Last Cell Range**, enter more depth cells or increase the depth cell size. A maximum of five depth cells can be used.
- **Depth Cell Size** – Set the depth cell (bin) size.
- **Ping Interval** – Selecting the **Auto** box will evenly space the pings throughout the ensemble, up to the maximum ping interval. If a quick burst of pings is preferred, then the time between pings can be programmed directly by un-checking the **Auto** check box.
- **Blank Distance** – Moves the location of the first depth cell away from the transducer head.

Sensor Setup

To automatically detect what sensors are installed on the DVS, click the **Detect Sensors** button.

- If the DVS **Has a CTD**, select **Yes**, otherwise select **No**.
- Under the **CTD Feature**, select **Don't Use** or **SBE37SMP** (data from the CTD will be saved to the PD20 Output Data Format).
- Select **Yes** if the DVS includes a Pressure Sensor, otherwise select **No**.

- Under **Pressure Sensor**, select **Don't Use** or **Use** (data from the pressure sensor will be saved to the PD20 Output Data Format).
- Select the type **Thermometer** the DVS is using. Choose between the **TRDI** standard thermistor, Integrated Sensor Module (**ISM**), and the Sea-Bird **SBE38** thermistor.

Inductive Modem Setup

- The **Inductive Modem Setup** allows evaluation of modem communications on power consumption; it does not configure the actual communications. Enter a **Data Transfers per Day** value to see the **Power Usage** and **Battery Used** consequences. All Inductive Modem communications are initiated from the surface modem, not the DVS.

12. Review the following consequences.

- **First Cell Range –** The range from the transducer face to the middle of the first depth cell (bin). The depth cell (bin) size and the WF (blank) command in the command file primarily affect where it is located.
- **Last Cell Range –** The last depth cell range is determined from the number of depth cells (bins), depth cell size, and first depth cell range.
- **Max Range –** The maximum profiling range is dependent on the DVS frequency, water salinity, water temperature, and the depth of the DVS. A warning message will appear if the maximum range exceeds 6 meters (see Warnings and Cautions).

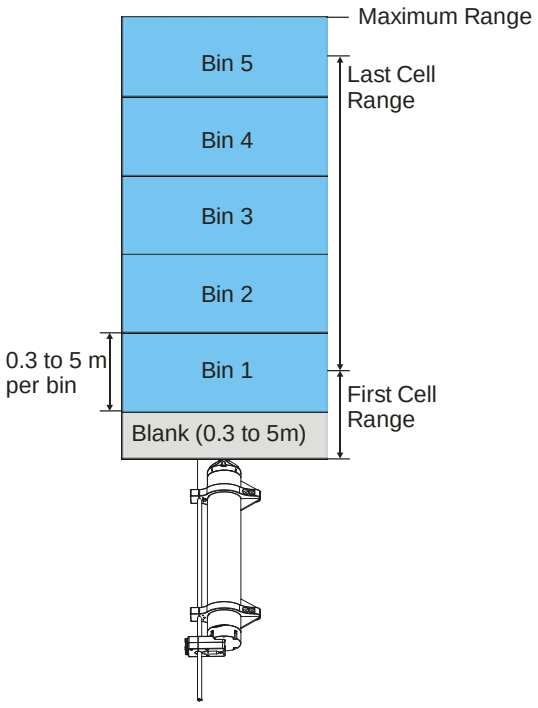


Figure 15. DVS Deployment Consequences

- **Bin Standard Deviation –** Shows the expected standard deviation of the velocity data stored in each bin of the ensemble being collected by the DVS. Most users will want to minimize this value so that they obtain the best data possible (i.e. data containing the least amount of noise). Standard deviation is dependent on depth cell (bin) size, the number of pings in an ensemble, the water mode, and the ambiguity velocity.

- **Ensemble Size –** Shows the size in bytes of the each ensemble that is either transmitted or recorded by the DVS.
- **Storage Required –** Shows the amount of storage space required in megabytes (MB) to record the data generated by the DVS over the duration of the deployment. This value should be compared to the free space available on the internal DVS PC card recorder and/or free space on the Computer logging the data transmitted to the serial interface. Free space on the DVS internal recorder can be determined by using the MM command (see Check the Recorder Status). To convert MB to bytes, multiply the number by 1,048,576 (1024*1024).
- **Power Usage –** The **Power Usage** will reflect how many watt-hours are required.
- **Battery Used –** The **Battery Used** will reflect what percentage of the battery is used.

13. Select the **Show Commands** box to view the commands generated by *DVS*. The commands shown in Table 1 explain each command set or added by *DVS*. These commands directly affect the range of the DVS, standard deviation (accuracy) of the data, and battery usage. Table 1 explains the commands used in the sample deployment file for a DVS.

Table 1: Command File Created Using DVS

Command	Choices	Description
CR1	Sets factory defaults	This is the first command sent to the DVS to place it in a "known" state.
CF11100	Flow control	Record binary data internally on the PC card recorder.
TF060712080000	Time of first ping	DVS will begin pinging on July 12, 2006 at 8:00 am.
ES35	Salinity	Salinity of water is set to 35 (saltwater).
ED0	Transducer depth	Manually set depth of the transducer. If a pressure sensor is installed, the ED-command will be used only if the depth sensor fails.
EB0	Heading bias	Magnetic variation.
TE00100000	Time per ensemble	Ensemble interval is set to 10 minutes.
WP1	Number of pings	Number of pings is set to 1
WN5	Number of depth cells	Number of depth cells (bins) is set to 5.
WS50	Depth cell size	Depth cell (bin) size is set to 0.50 meters.
TP100000	Time between pings	The DVS software automatically sets the time between pings to spread the pings evenly throughout the ensemble.
WF030	Blank after transmit	Moves the location of the first depth cell more than 0.3 meters away from the transducer head. The First Cell Rage is displayed under Deployment Consequences.
CK	Keep parameters as user defaults	If power is lost and then restored, all commands will be restored as last sent. Sent right before the CS-command.
CS	Start pinging	Last command sent to begin collecting data.

14. Move the cursor to the **Notes** section. Use the area to include notes about the deployment.
15. Any step beyond this point requires communication with a DVS system. If a DVS is not available, you can save this configuration for later use by un-checking the **Continue to deployment** check box and clicking **Next**. Otherwise, you will be prompted to save the deployment file generated here, and will proceed to configuring the DVS for deployment (see DVS Deployments and Figure 17.
16. Name the deployment file and click **Save** to save the deployment file (see Saving Deployment Files). The *DVS* software will automatically add the extension **.dvs* to the file.

DVS Preparation

Proper DVS preparation is critical for a successful deployment. Use this list to ensure the DVS is prepared for deployment.

DVS preparation can take place up to one month before the deployment in a land-based laboratory. It can be configured for deployment at this time, with a programmed wake-up time for the anticipated time of deployment.

Deployment Checklist

- ❑ **Visual Inspection and Cleaning**
  - ❑ Check the housing condition for damage
  - ❑ Check the transducer faces are clean and free from defects
  - ❑ Clean the optional temperature sensor guard
  - ❑ Apply antifouling paint as needed
- ❑ **Seal the DVS for deployment**
  - ❑ Install and connect a fresh battery
  - ❑ Use fresh desiccant (1 bag) inside DVS
  - ❑ Install new O-rings; use silicone lubricant
  - ❑ Check all mounting hardware is installed
- ❑ **Bench Test**
  - ❑ Test the DVS unit using the *DVS* software
  - ❑ Align the compass using the *DVS* software
- ❑ **Final Preparation for Deployment**
  - ❑ Plan the Deployment using the *DVS* software
  - ❑ Set Clock Data and Time using the *DVS* software
  - ❑ Erase the recorder using the *DVS* software
  - ❑ Send deployment commands using the *DVS* software

Deploying the DVS

To deploy the DVS:

1. Connect the DVS unit to a computer running the *DVS* software via either the RS232 communications or the inductive modem.
2. A command file must be loaded into the *DVS* software, either having been generated in the planning module (see Using the Deployment Wizard), or loaded directly from the **File**, **Open** menu. In either case, the *DVS* software display should be at the **Deployment Settings** screen as shown in Figure 14.
3. Check the **Continue to deployment** checkbox and click **Next** to reach the **DVS Deployment** screen shown in Figure 16.

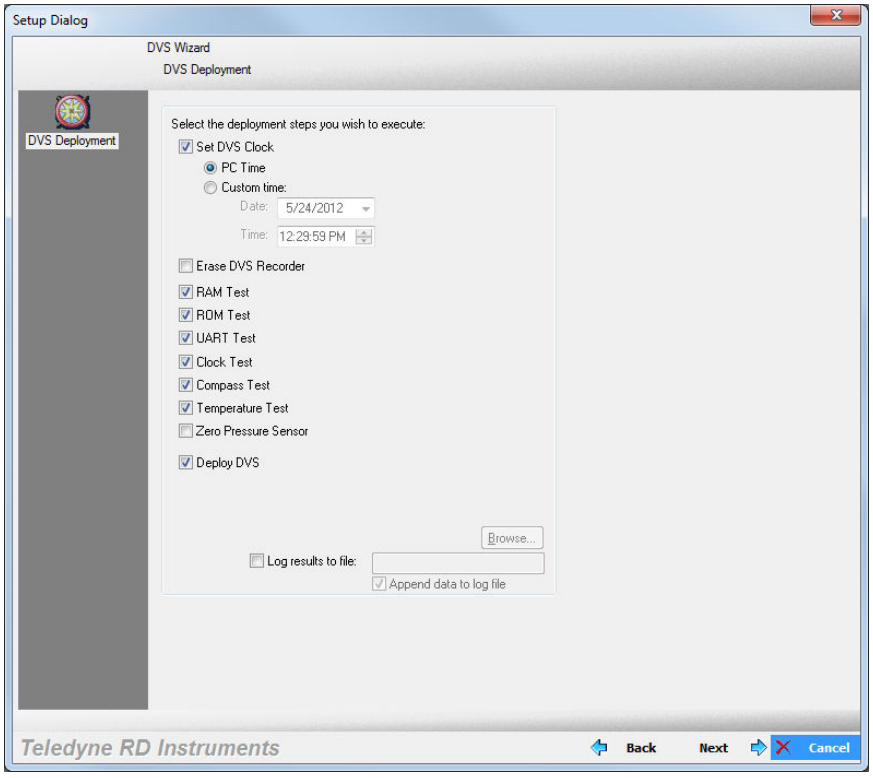


Figure 16. DVS Deployment Screen

This screen contains the most commonly used "last minute" items done just prior to physically deploying the DVS unit. These include: **Set DVS Clock** (usually to the time on the connected PC); **Erase DVS Recorder** (not selected by default to avoid inadvertent loss of data); selecting the diagnostic tests to be run, **Zero Pressure Sensor** (will be checked if the DVS has a pressure sensor), and **Deploy DVS** (which uploads the selected command file to the DVS unit).

4. Select the **Log results to file:** check box and select a file name using the **Browse** button. This will save the communications to the DVS to a text file.
5. Once all of the desired options are checked, click the **Next** button.

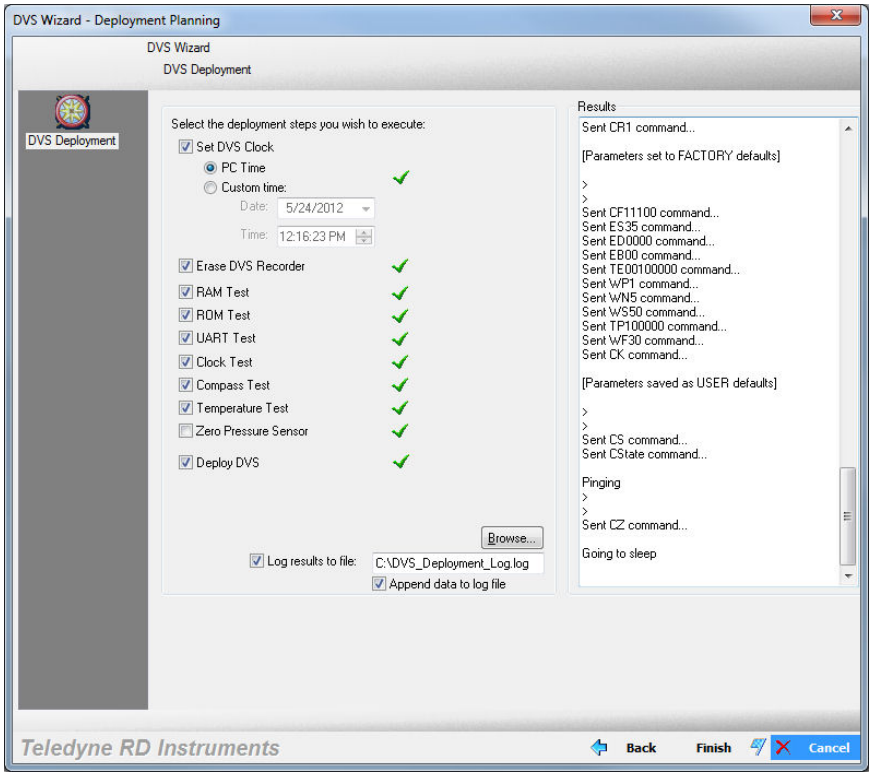


Figure 17. DVS Wizard – Deployment

6. A **Result**s box will open and display the communications to the DVS in real time as the steps are run. A green check mark next to each step indicates there were no problems; a red X indicates a problem or that the step was skipped.

   Once the commands have been sent to the DVS:

   - Disconnect the test I/O cable and use the DVS Operation Manual to verify the DVS unit is sealed and ready for deployment.
   - Deploy the DVS.

Chapter 4

USING THE DVS RECORDER FUNCTIONS

In this chapter, you will learn:

- Recovering the entire data set
- Getting data during the deployment
- Converting data
- Checking and erasing the recorder

EAR-Controlled Technology Subject to Restrictions Contained on the Cover Page.

The *DVS* software has the capability to recover and convert data, check the status, and erase the recorder.

Recovering the Entire Data Set

Once you have recovered the DVS, you should refer to the Maintenance section of the Operation Manual for instructions on cleaning the DVS unit exterior. Use the *DVS* software to recover the data once the DVS is clean and dry. The *DVS* software reads the data from the DVS's internal recorder and transfers the data to the computer's hard disk. Select a directory name on the computer's hard drive where the data will be written.

It is highly recommended to use the I/O cable and increase the baud rate to 115200 BAUD to reduce the download time. Use external power to save battery power.

1. Connect and power up the DVS unit as shown in the DVS Operation Manual.
2. Start the *DVS* software.
3. At the **DVS Wizard Startup Options** screen select **Recover Data from an DVS's Recorder** or from the **Tools** menu, select **Recover Recorder Data**.
4. Browse to an appropriate directory for the download.
5. Select what **Download Entire Data Set**.
6. Select the data format. The raw data format is a compressed file format created to minimize the memory requirements for the DVS unit and better accommodate long deployments. The raw data stored can be converted to TRDI standard PD0 format on extraction, which can then be read by TRDI standard software tools such as *WinADCP* (see Convert Data).
7. Click the **Download...** button to begin downloading data.

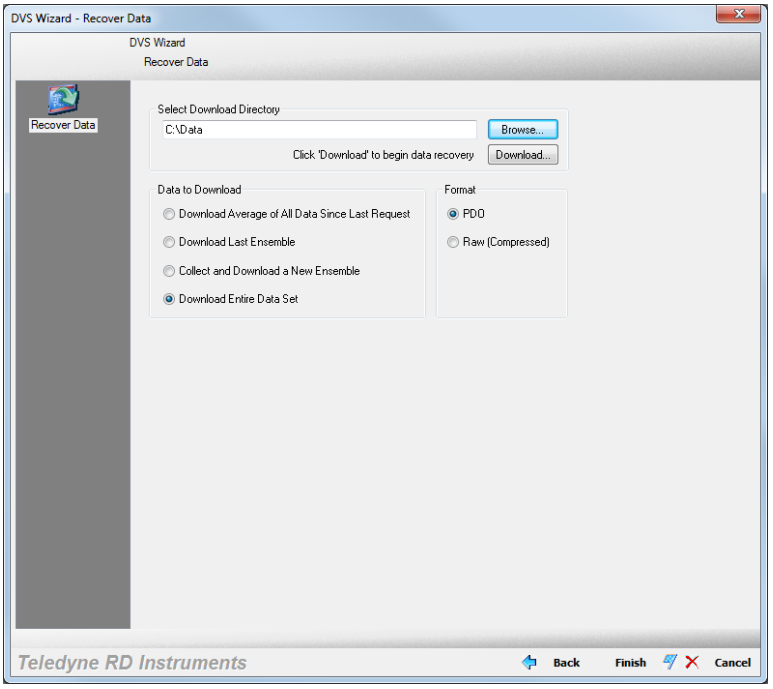


Figure 18. Recover Data Screen

Getting Data during the Deployment

The DVS unit allows communication with the outside world without interrupting the data acquisition schedule. There are three special ways to collect data from a DVS that is deployed and gathering data autonomously. These three are:

- **Download Average of All Data Since Last Request** – This command returns the average of all ensembles collected since the last time the command was sent.
- **Download Last Ensemble** – This commands the DVS to return the most recently recorded ensemble.
- **Collect and Download a New Ensemble** – This commands the DVS to gather an additional ensemble right now and send it back (this ensemble is not recorded - so if it gets lost, it's gone). If an ensemble is requested will interfere with a preprogrammed ensemble (within two seconds), then the DVS will send an error message.

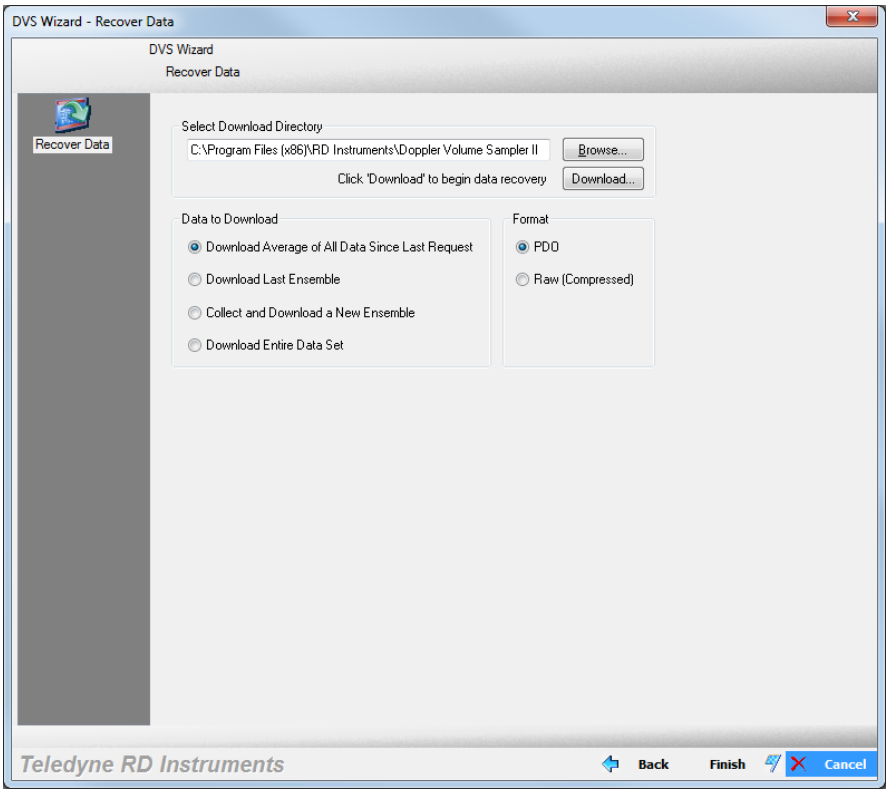
When using these commands via the inductive modem, it is important to follow with a CZ command after successful execution of this command. The CZ command will force the DVS to sleep immediately; otherwise, the IMM will keep the DVS awake for its time-out window of 2 to 3 minutes, which will drain the battery much sooner than the planning software would indicate.

If the ensemble time is less than 30 seconds, - **Download Last Ensemble** and **Collect and Download a New Full Ensemble** may not work.

Collecting Average

To collect an average of all ensembles collected since the last time the command was sent:

1. Start the *DVS* software.
2. At the **DVS Wizard Startup Options** screen select **Recover Data from a DVS Recorder**.
3. Browse to an appropriate directory for the download.
4. On the **Data to Download** section, select **Download Average of all Data Since Last Request**.
5. Select the **Raw (Compressed)** data format.
6. Click the **Download...** button to begin downloading data.

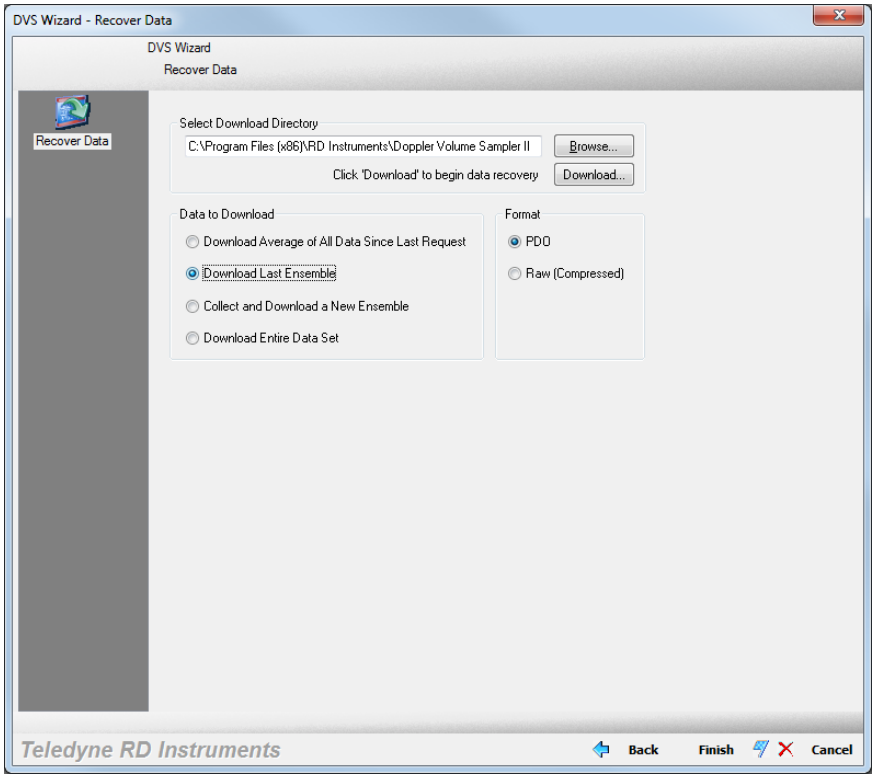


Collecting Last Ensemble

To return the most recently recorded ensemble:

1. Start the *DVS* software.
2. At the **DVS Wizard Startup Options** screen select **Recover Data from a DVS Recorder**.
3. Browse to an appropriate directory for the download.
4. On the **Data to Download** section, select **Download Last Ensemble**.
5. Select the **Raw (Compressed)** data format.
6. Click the **Download...** button to begin downloading data.

If the ensemble time is less than 30 seconds, - **Download Last Ensemble** may not work.

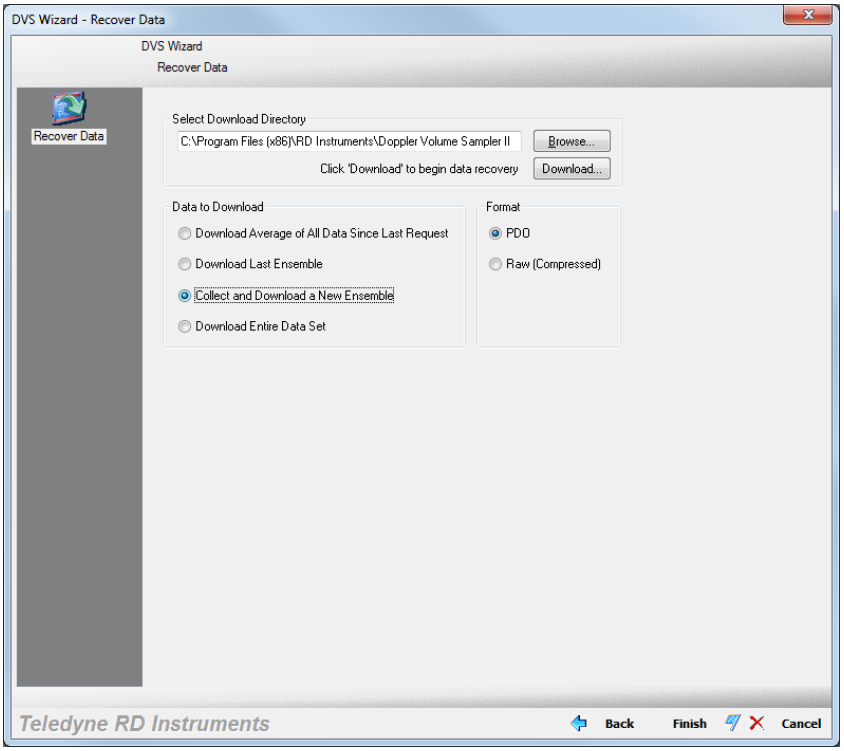


Collecting One New Ensemble

To collect a new ensemble:

1. Start the *DVS* software.
2. At the **DVS Wizard Startup Options** screen select **Recover Data** from a DVS Recorder.
3. Browse to an appropriate directory for the download.
4. On the **Data to Download** section, select **Collect and Download a New Ensemble**.
5. Select the **Raw (Compressed)** data format.
6. Click the **Download...** button to begin downloading data.

If the ensemble time is less than 30 seconds, - **Collect and Download a New Full Ensemble** may not work.



Converting Data

Convert PD20 to PD0

The PD20 raw data format is a compressed file format that is not readable by *WinADCP*. To convert the PD20 data to TRDI standard PD0 format, do the following.

1. Recover the raw PD20 (compressed data) from the DVS recorder (see Recover Data).
2. On the **Tools** menu, select **Convert PD20 to PD0**.
3. Use the **Browse** button to locate the PD20 file to convert.
4. Click **Browse** to select a folder and file name for the PD0 file. Click **Save**.
5. Click the **Convert File** button to begin the conversion.
6. Click **OK** on the File Converted message box.

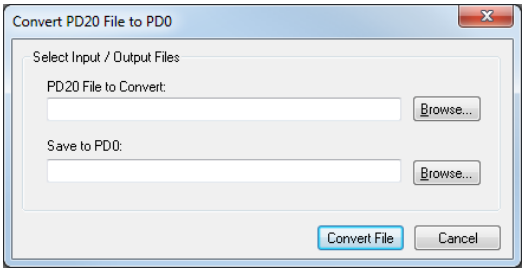


Figure 19. Convert PD20 File to PD0

Convert PD20 to ASCII

To convert the PD20 data to ASCII format:

1. Recover the raw PD20 (compressed data) from the DVS recorder (see Recover Entire Data Set from DVS).
2. On the **Tools** menu, select **Export PD20...**
3. Use the **Browse** button to locate the PD20 file to convert.
4. Click **Browse** to select a folder and file name for the ASCII file. Click **Save**.
5. Click the **Export File** button to begin the conversion.
6. Click **OK** on the File Converted message box.

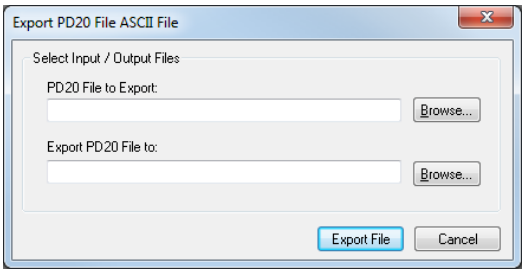


Figure 20. Convert PD20 File to ASCII

Example ASCII file

```
Ensemble #,Year,Month,Day,Hour,Minute,Second,Time Between Pings (seconds),# of Pings,BIT,Sensor
Source,Battery Voltage (volts),Average Heading (degrees),Average Pitch (degrees),Average Roll
(degrees),Average Omega,Average Temp (degrees C),Average Pressure,Std Dev Heading (degrees),Std
Dev Pitch (degrees),Std Dev Roll (degrees),Std Dev Omega,Std Dev Temp (degrees C),Std Dev Pres-
sure,Coordinate System,Bin Size (cm),Bin 1 Distance(cm;>0=up;<0=down),# of Ensembles,# Bins,Bin 0
Velocity 1 (m/s),Bin 0 Velocity 2 (m/s),Bin 0 Velocity 3 (m/s),Bin 0 Velocity 4 (m/s),Bin 0 Am-
plitude 1,Bin 0 Amplitude 2,Bin 0 Amplitude 3,Bin 0 Amplitude 4,Bin 0 Correlation 1,Bin 0 Corre-
lation 2,Bin 0 Correlation 3,Bin 0 Correlation 4,Bin 0 % Good 1,Bin 0 % Good 2,Bin 0 % Good 3,Bin
0 % Good 4,Bin 1 Velocity 1 (m/s),Bin 1 Velocity 2 (m/s),Bin 1 Velocity 3 (m/s),Bin 1 Velocity 4
(m/s),Bin 1 Amplitude 1,Bin 1 Amplitude 2,Bin 1 Amplitude 3,Bin 1 Amplitude 4,Bin 1 Correlation
1,Bin 1 Correlation 2,Bin 1 Correlation 3,Bin 1 Correlation 4,Bin 1 % Good 1,Bin 1 % Good 2,Bin 1
% Good 3,Bin 1 % Good 4,Bin 2 Velocity 1 (m/s),Bin 2 Velocity 2 (m/s),Bin 2 Velocity 3 (m/s),Bin
2 Velocity 4 (m/s),Bin 2 Amplitude 1,Bin 2 Amplitude 2,Bin 2 Amplitude 3,Bin 2 Amplitude 4,Bin 2
Correlation 1,Bin 2 Correlation 2,Bin 2 Correlation 3,Bin 2 Correlation 4,Bin 2 % Good 1,Bin 2 %
Good 2,Bin 2 % Good 3,Bin 2 % Good 4,Bin 3 Velocity 1 (m/s),Bin 3 Velocity 2 (m/s),Bin 3 Velocity
3 (m/s),Bin 3 Velocity 4 (m/s),Bin 3 Amplitude 1,Bin 3 Amplitude 2,Bin 3 Amplitude 3,Bin 3 Ampli-
tude 4,Bin 3 Correlation 1,Bin 3 Correlation 2,Bin 3 Correlation 3,Bin 3 Correlation 4,Bin 3 %
Good 1,Bin 3 % Good 2,Bin 3 % Good 3,Bin 3 % Good 4,Bin 4 Velocity 1 (m/s),Bin 4 Velocity 2
(m/s),Bin 4 Velocity 3 (m/s),Bin 4 Velocity 4 (m/s),Bin 4 Amplitude 1,Bin 4 Amplitude 2,Bin 4
Amplitude 3,Bin 4 Amplitude 4,Bin 4 Correlation 1,Bin 4 Correlation 2,Bin 4 Correlation 3,Bin 4
Correlation 4,Bin 4 % Good 1,Bin 4 % Good 2,Bin 4 % Good 3,Bin 4 % Good 4
0,2009,10,20,06,50,11,360,77,0,0x1022201,3.0,0.84,51.58,586.99,32768,23.192,2147483648,0.11,0.05,
```

```
0.10,32768,0.005,2147483648,0x1f,50,-55,6,5,-32768,-32768,-32768,-
32768,84,85,71,82,32,26,28,29,0,0,100,0,-32768,-32768,-32768,-
32768,65,67,49,62,7,7,6,6,0,0,100,0,-32768,-32768,-32768,-32768,65,67,49,62,9,6,6,6,0,0,100,0,-
32768,-32768,-32768,-32768,65,67,49,62,8,7,7,7,0,0,100,0,-32768,-32768,-32768,-
32768,65,67,49,61,8,6,7,6,0,0,100,0
```

Checking the Recorder Status

To see how much memory is used on the recorder:

1. Connect and power up the DVS unit as shown in the DVS Operation Manual.
2. Start the *DVS* software.
3. On the **Tools** menu, click **Recorder Status**. This will open **Recorder Status** screen (see Figure 21).
4. Click the **Get Status** button.
5. The results of the test will be displayed in the **Recorder Status** area and saved to the log file (*.log) if the **Log result to file** box is selected.
6. Click **OK** to exit the **Recorder Status** screen.

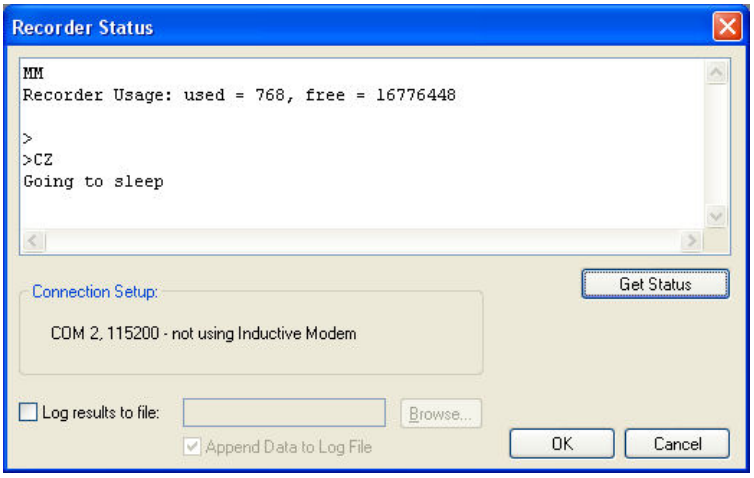


Figure 21. Recorder Status

Erasing the Recorder

Once all data has been recovered, the recorder can be erased. *Once erased, the data is not recoverable.*

To erase the recorder:

1. Connect and power up the DVS unit as shown in the DVS Operation Manual.
2. Start the *DVS* software.
3. Recover the data (see Recover Data). Once erased, the data is not recoverable.
4. On the **Tools** menu, click **Erase Recorder Data**.
5. Type **ErAsE** (you must use the exact upper and lower case characters).
6. Click **OK**.

Figure 22. Erase the Recorder

Data is not recoverable after erasing.

Appendix A

DVS SOFTWARE HISTORY

In this chapter, you will learn:

- DVS software history

Version 2.04

- Added compatibility for TCM5 compass calibration.

Version 2.03

- Power model updated to support Pressure Sensor, Seabird Temperature Sensor, and the TRDI Temperature Sensor
- When the system creates the PD0 file it now writes the correct firmware version (55.01) into the file.
- DVS software now recognizes the TRDI Temperature Sensor.
- Pressure data is now included when converting from PD20 to PD0.
- Update DVS ISM calibration to latest code.
- Add Depth to .TXT output.
- Depth and Pressure changed in PD0 Variable Leader to match FW change.
- Terminal Window EZ command updated to include enabling/disabling the Depth/Pressure sensor.

Version 2.02

- Internal release

Version 2.01

- Power model updated.
- Fixed problem with the calendar control on Windows 7.

Version 2.00

- Software now supports DVS Firmware 55.xx and higher. DVS firmware versions 55.xx are NOT backwards compatible with DVS 41.xx firmware. For DVS Firmware 41.16 or earlier please use DVS Software v1.04.
- Added support for the new ISM compass.
- Added option to export PD20 as ASCII.
- Corrected Max Range warning and added to water profile page.
- Added validation for ensemble time with number of samples.
- Updated Copyright to 2009.

Version 1.04

- Updated a warning about DVS not sleeping if TP<= 3.0s
- Made it easier to enter custom sample intervals such as 00:02.00
- Added 'approx' to the calculation of pings per ensemble

Version 1.03 (internal TRDI release only)

- Fixed problem with installation on foreign machines.
- Added ability to set IMM communication time used in the power consumption calculation.
- Added display for calculated 'Pings per Sample'.
- Changed warning font.
- Added ability to send PC2 and PC4 commands over IMM.
- Fixed problem with allowing disabled IMM commands when in lower case.
- Added depth rating setting to DVS setup.

Version 1.02

- Fixed problem with TF format generated in the wizard

Version 1.01 - Initial Release.

NOTES