WinRiver II Section-By-Section User's Guide

TELEDYNE
RD INSTRUMENTS
A Teledyne Technologies Company

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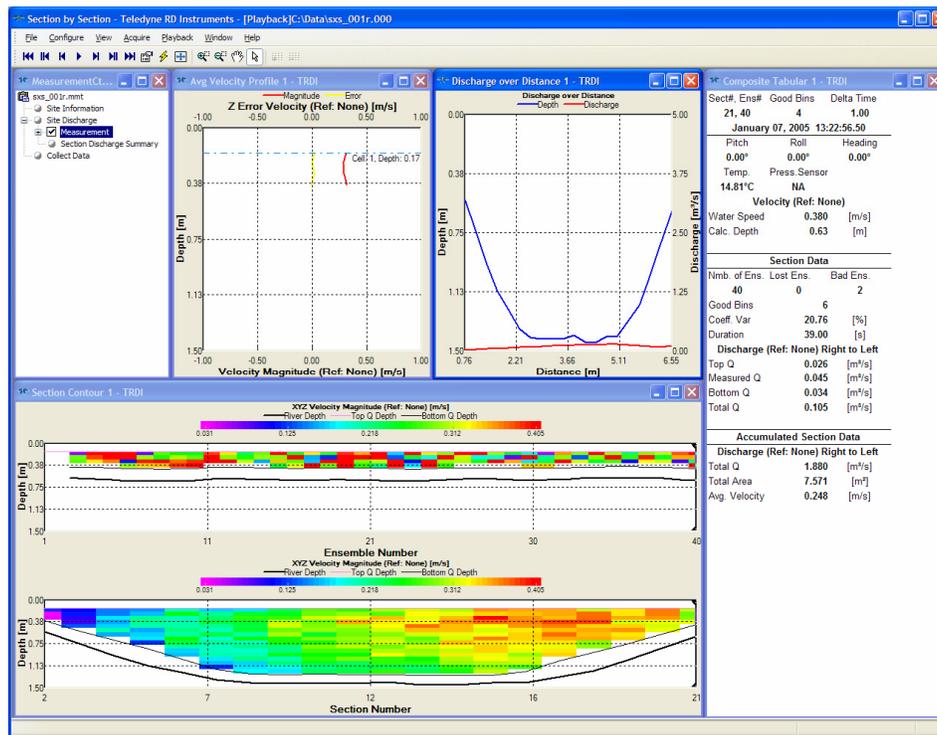
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WinRiver II Section-By-Section User's Guide

1   Introduction

WinRiver II Section-By-Section (SxS) is Teledyne RD Instrument's (TRDI) real-time discharge data collection program. This program creates a measurement file to operate the ADCP, checks each command, and verifies that the ADCP has received the commands.

Making accurate discharge measurements is less difficult than you probably believe now. You will soon see that you need to use only a few keystrokes on the computer to collect data in the field.

Please take the time to read this entire manual. It will be useful to have the ADCP and a computer available to follow along. You may also want to keep the other ADCP Technical manuals handy for reference when you want more detail.

> **NOTE.** This guide covers *WinRiver II* Section-By-Section version 2.01.

1.1   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	2A Les Nertieres
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1.2 Conventions Used in this Guide

Conventions used in the *WinRiver II SxS* User's Guide have been established to help you learn how to use these programs quickly and easily.

Windows menu items are printed in bold: **File** menu, **Save Measurement**. 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 (*BBTalk*) and file names (*Test_000_000.PD0*).

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

```
WorkHorse Broadband ADCP Version X.XX
RD INSTRUMENTS (c) 1996-2006
ALL RIGHTS RESERVED
>
```

You will find three other visual aids that help you: Notes, Cautions, and Recommended Settings.

> **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).

> **Recommended Setting.** This paragraph format indicates additional information that may help you set command parameters.

1.3 Software Requirements

WinRiver II SxS requires the following:

- Windows XP Pro® or Windows 2000®
- 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 Ports recommended)
- Minimum display resolution of 1024 x 768
- CD-ROM Drive
- Mouse or other pointing device

1.4 Software Installation

To install *WinRiver II SxS*, do the following.

a. Insert the compact disc into your CD-ROM drive and then follow the browser instructions on your screen. If the browser does not appear, complete Steps "b" through "d."

b. Click the **Start** button, and then click **Run**.

c. Type **<drive>:launch**. For example, if your CD-ROM drive is drive D, type **d:launch**.

d. Follow the browser instructions on your screen.

1.5 Enabling the Section-By-Section Option

Before you can collect data, you must enable the SxS option.

a. Start *SxS* by clicking the **Section-By-Section** icon on your desktop.

b. On the **Configure** menu, click **Add/Remove Option**.

c. Enter the **ADCP serial number**.

d. Enter the **Key code**.

e. Click the **Add ADCP** button.

f. Click **OK**.
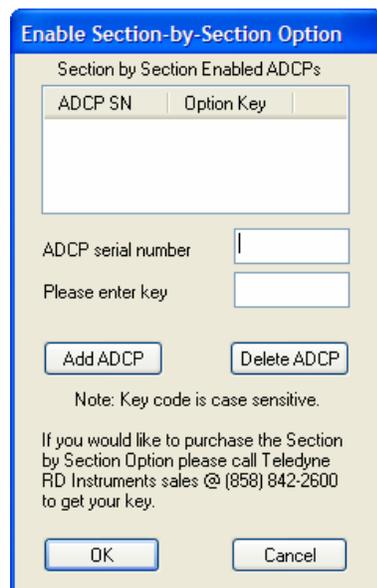
Figure 1.   Enabling the Section-By-Section Option

2   Overview of WinRiver II SxS

This section includes a brief overview of the inputs, displays, and outputs provided by *WinRiver II SxS*.
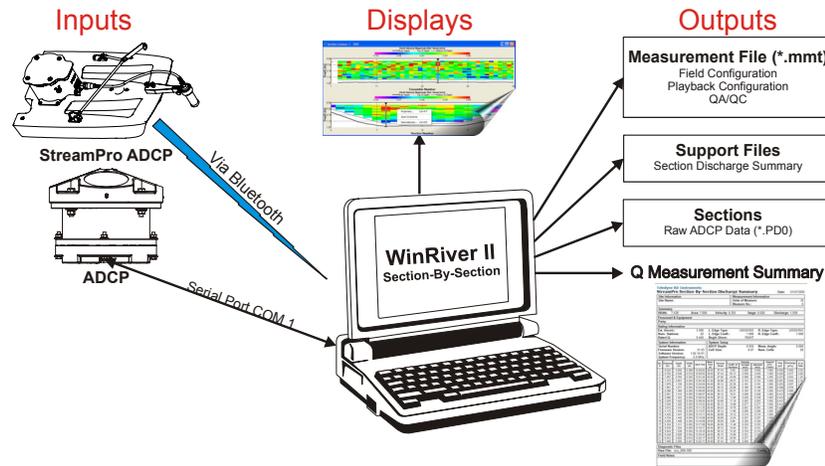
Figure 2.   Overview of WinRiver II Section-By-Section

2.1   Comparison of WinRiver II and SxS

You will notice several similarities between *WinRiver II* and *Section-By-Section* and also several differences.

- Many of the displays are similar but some are unique to *Section-By-Section*. Note that when you are in *Section-By-Section*, the title bar at the top of the display is **Section-By-Section**. This makes it easy to see which program is running.

- In *WinRiver II*, the transect is done by crossing from bank to bank of the river. In *Section-By-Section*, transects are done by measuring at different user selected points on the river. This makes it possible to measure streams that are frozen over. This makes the **Discharge Summary** display different. *WinRiver II* shows the history of the entire transect; *Section-By-Section* shows the history of each section measured.

- Measurement files are different between *WinRiver II* and *Section-By-Section*. Use the proper program to play back data. A measurement data file created with *Section-By-Section* can not be used to play back data using *WinRiver II*.

- *WinRiver II* uses Bottom Tracking or GPS for velocity reference and *Section-By-Section* does not. This makes it possible to use *Section-By-Section* software to measure discharge in streams with moving beds.

2.2 Inputs

In order to use *WinRiver II SxS,* your Workhorse ADCP must meet the following criteria.

- WorkHorse Rio Grande ADCP or the WorkHorse ADCP **must** have the Bottom Track upgrade installed

NOTE. The Bottom Track and High Resolution Water Modes upgrades are available for WorkHorse Monitor and Sentinel ADCPs (included with the Rio Grande ADCP). *This guide assumes you will be using a WorkHorse Rio Grande ADCP.*

The Rio Grande, Monitor / Sentinel, and Mariner ADCPs can benefit from the upgrade to the High Rate Pinging (Water Mode 12) and Shallow Bottom Mode (Bottom Mode 7). Contact your local sales representative if you are interested in upgrading your system.

- *WinRiver II SxS* can also be used with a StreamPro ADCP if your computer has a Bluetooth connection.

ADCP Mounting Requirements

The ADCP must be mounted as follows.
- Over the side or through the hull mounted
- Downward facing
- Within 5 degrees of vertical (see note)

TRDI recommends using a fixed mount to achieve the best performance (see the WorkHorse Technical Manual for recommended sources of mounts).

NOTE. See the WorkHorse Commands and Output Data Format Guide for details on how the ADCP uses tilts in transformation (see the EX command).

2.3 Displays

All of the *WinRiver II SxS* displays may be saved to files or printed. For more information, see "Available Displays," page 22 and "Print a Graph or Display," page 58.

2.4 Outputs

The "heart" of *WinRiver II SxS* is the measurement file (*.mmt*). A measurement file is created by running the **Measurement Wizard** (see "Using the Measurement Wizard," page 29). The **Measurement Control** window helps keep track of the files used in the measurement and provides a quick way to access program controls by right-clicking on items in the list. For

more information about the measurement control window, see "Using the Measurement Control Window," page 15.

Measurement File

- Configuration information – The **Field Configuration** for each measurement contains the settings used to collect the data. No changes can be made to this information once a measurement has started. A **Playback Configuration** is created when a measurement is reprocessed (see "Post-Processing of Discharge Data," page 54).

- QA/QC information (ADCP tests, etc.)

- The **Measurement Control** window shows a list of all the measurement and support files.

Sections

- Raw ADCP data files (*.PD0) – These files contain all data sent from the ADCP during data collection. Refer to the WorkHorse Commands and Output Data Format guide for a complete description of the format of raw ADCP data files. For any specific deployment, raw data files contain the most information and are usually the largest.

  Each time you start a section (using the **Acquire** menu or the shortcut key **F5**), *WinRiver II SxS* adds a section node to the **Measurement Control** window and opens a new *.PDO* raw data file. The section number is incremented for each section. For more information on how to collect data, see "Acquiring Discharge Data," page 48.

  The raw ADCP data files are saved to the same folder as the measurement file. Other TRDI software like *RDI Tools* may be used with the data files as needed. For more information about the format of the of raw ADCP data, see the WorkHorse commands and Output Data Format guide.

> **CAUTION.** TRDI's software *WinADCP* is not compatible for viewing and/or exporting *WinRiver II SxS* data, or data collected in Ship or Instrument coordinates. Using *WinADCP* to display and/or export *WinRiver II SxS* data results in an incorrect naming structure. Data is called Earth coordinates when it is actually Ship coordinates.

Q Measurement Summary

- The **Q Measurement Summary** is a printed report of the discharge. See "Using the Q Measurement Summary," page 60 for more information.

3 Communications Setup

When *WinRiver II SxS* is first started, you can set up the communications with the ADCP. Once setup, *WinRiver II SxS* will remember the settings and use them each time the program is started.

> **NOTE.** Using the **Measurement Wizard** (see "Using the Measurement Wizard," page 29) will also prompt you to set up communications if they are not already configured.

a. Connect and power up the ADCP as shown in the appropriate ADCP User's Guide.

b. Start *WinRiver II SxS*. To open the **Peripheral Configuration Dialog** box, on the **Configure** menu, select **Peripherals**.
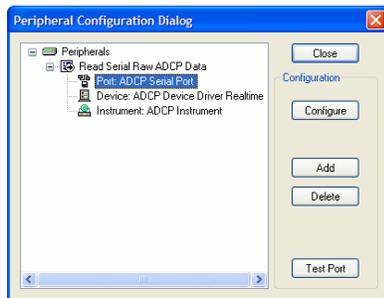
Figure 3.   Peripheral Configuration Dialog

c. Click the + box next to **Read Serial Raw ADCP Data** to expand the list and then select **Port: ADCP Serial Port**. Press the **Configure** button.
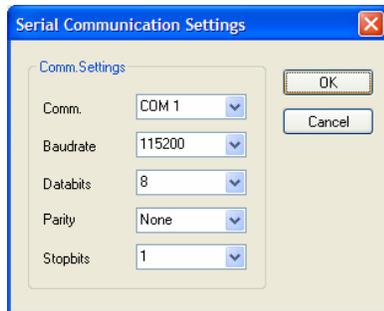
> **NOTE.** The default baud rate for WorkHorse ADCPs is 9600. Use the **Advanced ADCP Communications Configuration** screen (see Figure 4, page 8) to set the ADCP's baud rate as high a rate as possible and configure *SxS* to match the ADCP's baud rate.

d. Select the communication port, Baudrate, Databits, Parity, and Stopbits. If you are unsure of the setting, click **Cancel** and <u>right-click</u> on **Instrument: ADCP Instrument** and select **Auto Detect**. Click **OK** to con-

tinue. Click **Test Port** to have *WinRiver II SxS* connect to the device and confirm the communication setting.

e. Once set up, select **Close** to exit the **Peripheral Configuration Dialog** box.

3.1 Advanced ADCP Communications Configuration

Use the following steps to communicate with the ADCP or verify command settings.

a. On the **Configure** menu, select **Peripherals**.

b. Click the + box next to **Read Serial Raw ADCP Data** to expand the list and then select **Instrument: ADCP Instrument**.

c. Press the **Configure** button.
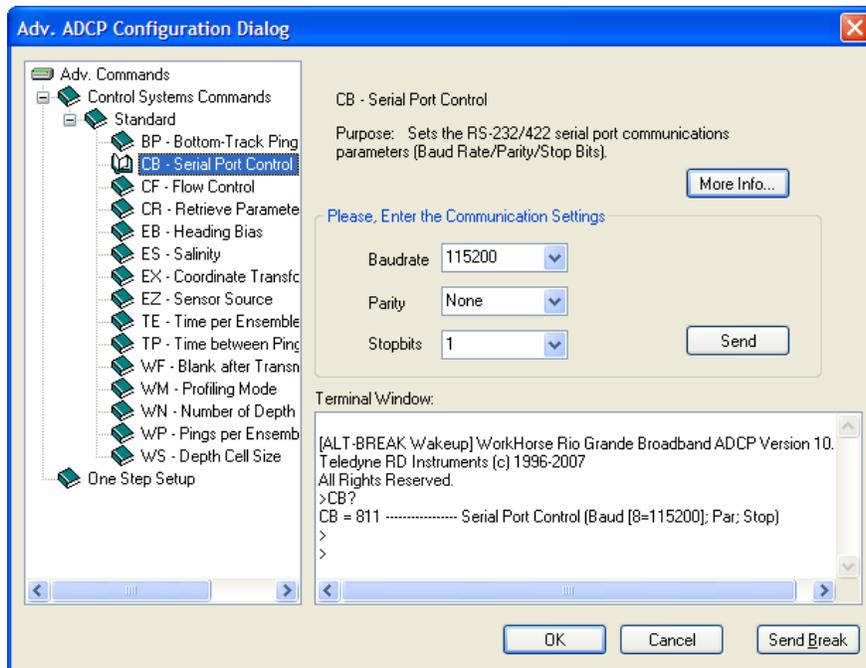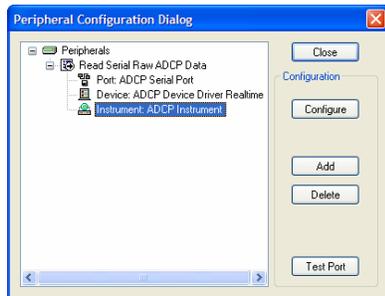
Figure 4.   Advanced ADCP Configuration Dialog

d. Use the **Advanced ADCP Configuration Dialog** screen to send or verify command setting as needed. Click the **Send** button to send the command to the ADCP and view the results of the command in the **Terminal Window**.

e. Use the **Send Break** button to wake up the ADCP.

f. If the command you want to send the ADCP is not on the list, type it next to the ">" prompt in the **Terminal Window** and press return.

> ⚠️ **CAUTION. Do not use this screen to deploy or configure the ADCP.** The commands will be overwritten when **Acquire**, **Start Pinging** (**F4**) is pressed. Only the commands generated through the wizard and sent via **Acquire**, **Start Pinging** (**F4**) can be used to deploy the ADCP.

> 📝 **NOTE.** WorkHorse Monitor/Sentinel ADCPs will go to sleep if a command is not sent within five minutes; Use the **Send Break** button to wake the ADCP before sending a command.
>
> WorkHorse Rio Grande ADCPs do not sleep. For more information, see the CL command in the WorkHorse Commands and Output Data Format guide.
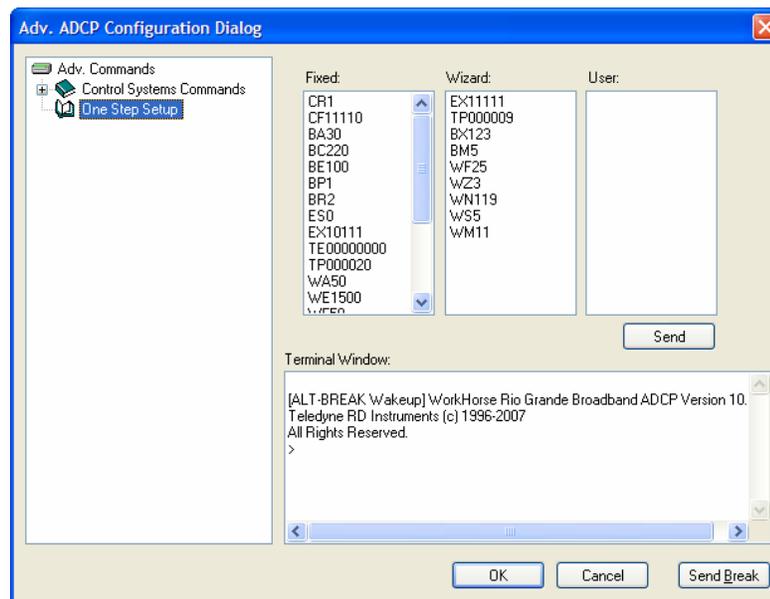
Figure 5.   One Step Setup

One Step Setup

Use the **One Step Setup** to <u>check</u> the deployment commands sent to the ADCP after the **Measurement Wizard** has been completed.

a. Run the Measurement Wizard (see "Using the Measurement Wizard," page 29).

b. Click **One Step Setup**. Click the **Send** button.

c. If any command generates an error message, stop and correct the problem before deploying.

> **CAUTION. Do not use this screen to deploy or configure the ADCP.** The commands will be overwritten when **Acquire**, **Start Pinging** (**F4**) is pressed. Only the commands generated through the wizard and sent via **Acquire**, **Start Pinging** (**F4**) can be used to deploy the ADCP.

> **NOTE.** The **One Step Setup** is a good way to <u>check</u> if any command generates an error message (for example, if the commands depend on the High Resolution Water Profiling upgrade but you are not sure the ADCP has this feature).
>
> If a command generates an error, a message box will appear.
>
> The **One Step Setup** does not check the commands for "reasonableness".
>
> If the wizard has not been run, the **Fixed** and **Wizard** command boxes will be blank.
>
> Commands can be entered in the **User** box or at the ">" prompt.

4   Customizing WinRiver II SxS

WinRiver II SxS can be customized to look and act, as you prefer.

4.1   Workspace

A Workspace is a collection of windows arranged and sized, as you prefer. To create a Workspace file, open all the windows you want to see during data collection or post-processing. Open and arrange the views you are interested in. When you have the displays set up the way you prefer, on the **File** menu, click **Save Workspace As**. To use a Workspace file, on the **File** menu, click **Load Workspace**. How workspaces are loaded and saved when starting/closing *WinRiver II SxS* depends on the **User Options** (see).

4.2   User Options

On the **File** menu, click **Properties**. The **Properties** dialog sets how *WinRiver II SxS* behaves upon entering the Acquire mode and how workspace files are loaded or saved.

4.2.1   Acquire Mode Properties
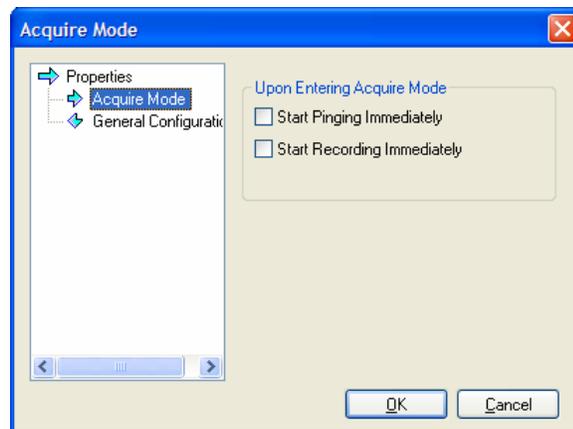
Figure 6.   User Options – Acquire Mode

Upon Entering Acquire Mode

- **Start Pinging Immediately** – Select this option if you want the ADCP to begin pinging as soon as the Acquire mode is started.

- **Start Recording Immediately** – Select this option if you want the ADCP to begin recording as soon as the Acquire mode is started.

4.2.2   General Configuration
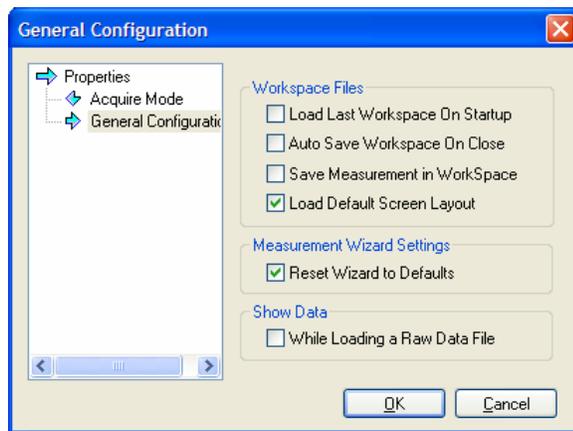
Figure 7.   User Options – General Configuration

Workspace Files

- **Load Last Workspace On Startup** – Select this option if you want the same graphs and displays opened as soon as *WinRiver II SxS* is started.

- **Auto Save Workspace On Close** – Select this option if you want to automatically save any changes to the workspace whenever *WinRiver II SxS* is exited.

- **Save Measurement in Workspace** – Select this option to include the measurement file with the workspace.

- **Load Default Screen Layout** – Check this box to use the default workspace.

Measurement Wizard Settings

Check the **Reset Wizard to Defaults** box to have the measurement wizard use the default settings based on the frequency of the user's ADCP.

Show Data

Check the **While Loading a Raw Data File** box to begin displaying data while the file is loading. For smaller data files, this may not be noticeable.

4.3   Display Options

The following options are available for all graphs.

> **NOTE.** All graph scales and font sizes are user-selectable in real-time by right-clicking on the graph and selecting **Properties**.

4.3.1   Changing Units

To change the units for all displays, on the **Configure** menu, select **Units**. You can change units to **All English**, **All SI** or use the **Advanced** menu and select each unit for **Velocity**, **Range**/**Depth**, and **Temperature**.

> **NOTE.** When using a StreamPro ADCP on small streams/channels, change the Velocity units to mm/s or cm/sec. This will change the discharge to mm^3/s or cm^3/s.
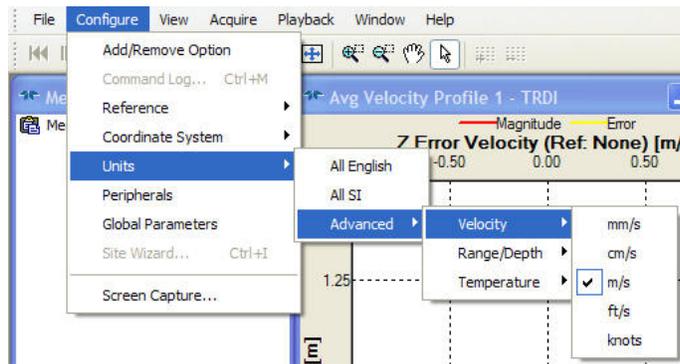
Figure 8.   Changing the Units

4.3.2   Changing the Reference

To change the reference, on the **Configure** menu, select **Reference**. You can select one of the following references.

- **Bottom Track** – ADCP Bottom-Track velocity (standard configuration)

- **None** – No reference is used.

4.3.3   Coordinate System

To change the coordinate system for the displays, on the **Configure** menu, select **Coordinate System**. The default coordinate system is **Earth** for Rio Grande ADCPs and **XYZ** for StreamPro ADCPs.

4.3.4   Global Parameters

To change the global parameters of the displays, select the **Configure** menu, and click **Global Parameters**. This menu allows changes to the number of sections on the X and Y axis, the Grid Lines (visible, style, and color), and Background Color. To return to the factory defaults and the default window layout, check the **Reset to Factory Defaults** box and select **Apply**. Click **OK** to exit the screen.
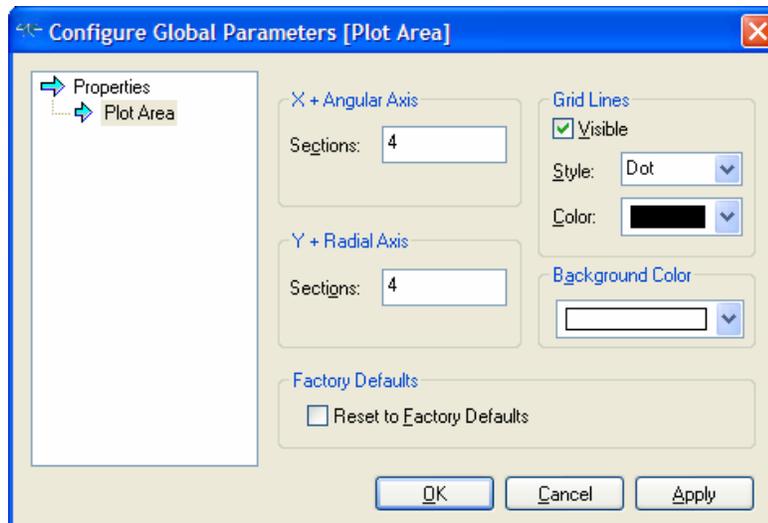
Figure 9.   Global Parameters for Graphs

4.3.5   Zoom Functions

- **Zoom to Extents** – click the blue title bar at the top of the window to select the graph and then click the **Zoom to Extents** button on the toolbar (⊞). The data will be zoomed to the full graph width.

- **Zoom In** – Click the Zoom In (🔍) button on the toolbar. The cursor will change to a "+" magnifying glass. Hold down the left mouse button and drag over an area on the window to zoom in. The chosen region will be zoomed to the full graph width.

- **Zoom Out** – Click the Zoom Out (🔍) button on the toolbar. The cursor will change to a "-" magnifying glass. Hold down the left mouse button and drag over an area on the window to zoom out.

- **Pan** – Use the **Pan** button on the toolbar (✋) to move the graph data as needed.

- **Arrow** – Use the Arrow button on the toolbar to identify the data under the cursor point.

5 Using the Measurement Control Window

The **Measurement Control Window** gives the user a quick and easy way to manage the files used in a measurement. It uses a tree structure; click the + box to expand the list or – to collapse. Right-clicking on a name will bring up menus to quickly access different functions.
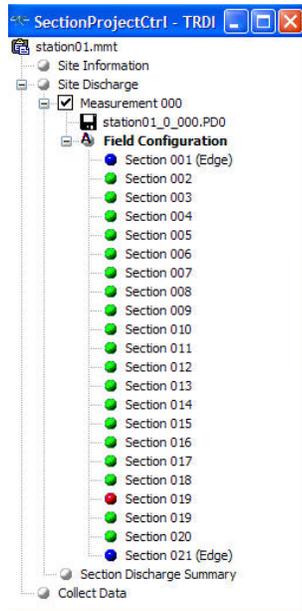
Figure 10.   Measurement Control Window

5.1 Measurement File Name

Right-click on the **measurement file** name to display the following menu. If a measurement file is not already open, only the **New Measurement**, **Create Measurement from Data Files**, and **Open Measurement** menu items are available.
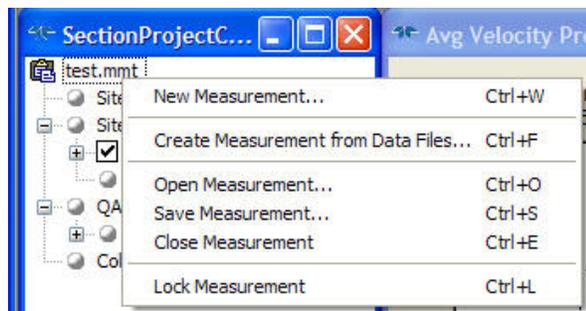
Figure 11.   Measurement Control - Measurement Menu

5.1.1 New Measurement

Select **New Measurement** to start the Measurement Wizard (see "Using the Measurement Wizard," page 29). If a measurement is already open, you will be prompted to save the current measurement.

5.1.2 Create Measurement from Data Files

Use **Create Measurement from Data Files** and select one data file to create a measurement. The file must have been collected with the *StreamPro* software with the *Section-By-Section* feature enabled.

5.1.3 Save Measurement

Use the Measurement Wizard to setup *WinRiver II SxS* (see "Using the Measurement Wizard," page 29). Once the Measurement Wizard is completed, on the **File** menu, select **Save Measurement**. Enter the **File name** and select **Save**. *WinRiver II SxS* will automatically add the file extension **.mmt*.

> **NOTE.** *WinRiver II SxS* automatically saves the measurement file each time you start/stop a section.

5.1.4 Open Measurement

To open a measurement file, on the **File** menu, select **Open Measurement**. On the **Select Measurement File** dialog, select the measurement file and click **Open**.

5.1.5 Close Measurement

To close a measurement file, on the **File** menu, select **Close Measurement**. On the **Close Measurement Confirmation** dialog, select **Yes** to close the measurement file.

5.1.6 Lock Measurement

Use **Lock Measurement** to write protect the measurement file. If a measurement file is locked, any changes made to the playback configuration nodes will not be saved unless the measurement file is first "unlocked". This prevents accidental saving of changes made to configuration nodes while "experimenting" with different settings. To lock a measurement file, right-click on the **measurement file name** and select **Lock Measurement**. To unlock a measurement file, right-click on the **measurement file name** and select **Unlock Measurement**. The icon next to the measurement file name will change from a lock to a clipboard to let you see if it is locked or not.

5.2 Site Information

Right-click on **Site Information** and select **Site Wizard;** this opens the wizard and allows changes to the **Site Information** (see "Site Information," page 17) page of the wizard. If changes are made, save the measurement file (see "Save Measurement," page 16).
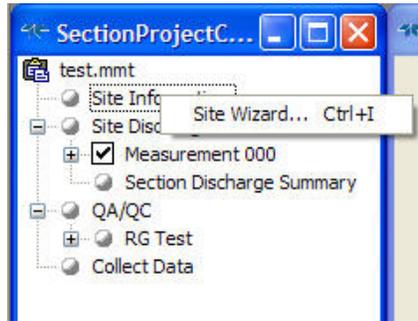
Figure 12.   Measurement Control - Site Information Menu

5.3 Measurement

Right-clicking on **Measurement** will display the following menu.
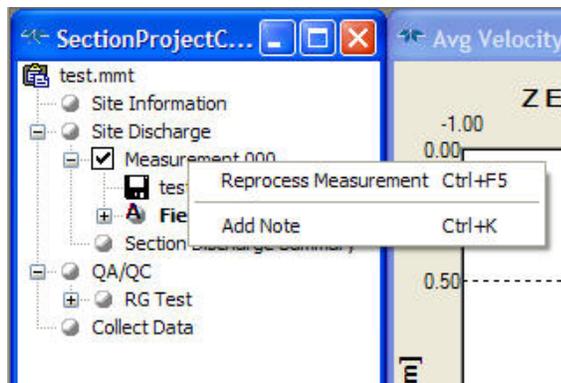
Figure 13.   Measurement Control – Transect

5.3.1 Reprocess Measurement

Use this function to reprocess the measurement file.

5.3.2 Add Note

Use this function to add a note to the measurement file for the selected transect. For example, you may want to record a note about the instrument setup or factors such as wind conditions, the passage of other vessels, and any other noteworthy events that occur during your transect of the channel.

5.3.3   Data File

Right-clicking on a data file and selecting **Properties** will display the **Raw Data File Properties** box.
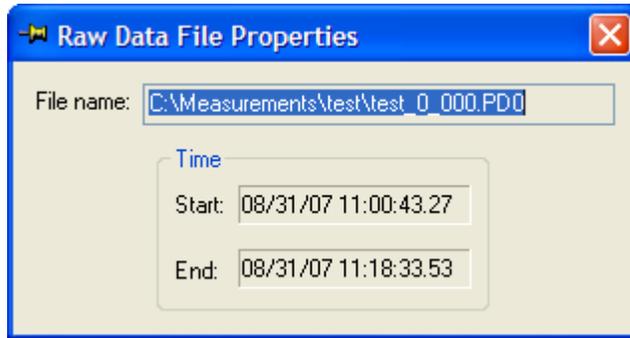
Figure 14.   Measurement Control - Raw Data File Properties

5.4 Field and Playback Configuration Nodes

Once you reprocess a transect (see "Reprocess Measurement ," page 17) or duplicate the **Field Configuration** node, *WinRiver II SxS* creates a **Playback Configuration** node. The **Playback Configuration** is a copy of the **Field Configuration** information used to collect the data. Any editing changes made to the **Playback Configuration** are saved to the measurement file. **Playback Configuration** nodes can be **Duplicated**, **Deleted**, and **Renamed** as needed.

5.4.1 Configuration Node Menu Options

Right-clicking on a **Field Configuration** or **Playback Configuration** node will display the following menu.
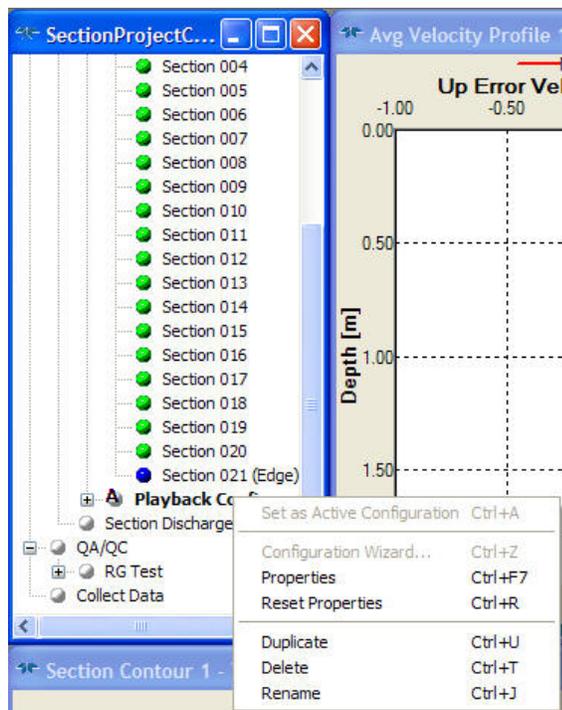
Figure 15.   Managing Configuration Nodes

5.4.2 Set as Active Configuration

The active configuration node is in bold. Right-click the on the configuration node name and select **Set as Active Configuration** to change between configuration nodes. Only one configuration node may be active at a time.

5.4.3   Configuration Wizard

This option is only available in the Acquire mode and only if no measurements have been collected.

a. On the **Acquire** menu, select **Stop Pinging**.

b. Right-click on the **Field Configuration** node and select **Configuration Wizard**; This will restart the Measurement Wizard (see "Configuration Dialog," page 30).

c. Make your adjustments.

d. To restart, click the **Acquire** menu and select **Start Pinging**.

> **NOTE.** Once a measurement has started, the field configuration node can no longer be changed.

5.4.4   Properties

Use this function to view the configuration settings (see "Configuration Node Properties," page 39). Changes to the settings are only allowed on **Playback Configuration** nodes or if data collection for the transect has not started. You can view what settings were used for the **Field Configuration**.

5.4.5   Reset Properties

This resets the playback configuration node back to the same parameters as the field configuration node.

5.4.6   Duplicate

Use this function to duplicate the configuration node. If the Field Configuration node is duplicated, it will create a new Playback Configuration node.

5.4.7   Delete

Use this function to delete the configuration node. The Field Configuration node can not be deleted.

5.4.8   Rename

Use this function to rename the configuration node. The Field Configuration node can not be renamed.

5.5 Show Summary

Right-click on the **Section Discharge Summary** field and select **Show Summary** to display the discharge summary (see "Section Discharge Summary," page 26).
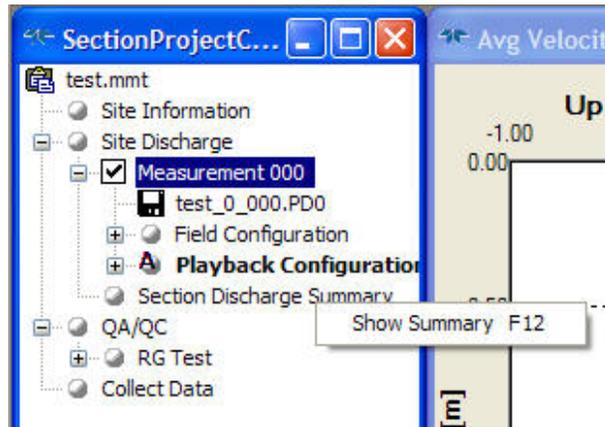
Figure 16.   Measurement Control - Discharge Summary

6 Available Displays

Use the **View** menu to select what graphs and tabular data to display. *WinRiver II SxS* can use the following screens.

- Measurement Control Window (see)

- Contour Graphs

- Profile Graphs

- Tabular Displays

6.1 Contour Graphs

The **View, Graphs, Contour, Velocity** menu lets you select the type of velocity contour graph to display.

> **NOTE.** To change the graph scale, right-click on the graph and select **Properties**.
>
> To change what data is displayed, right-click on the graph and select **Data Selection**.

The available velocity contour graphs are the four earth-referenced velocity components (East, North, Up, Error, Magnitude, and Direction).
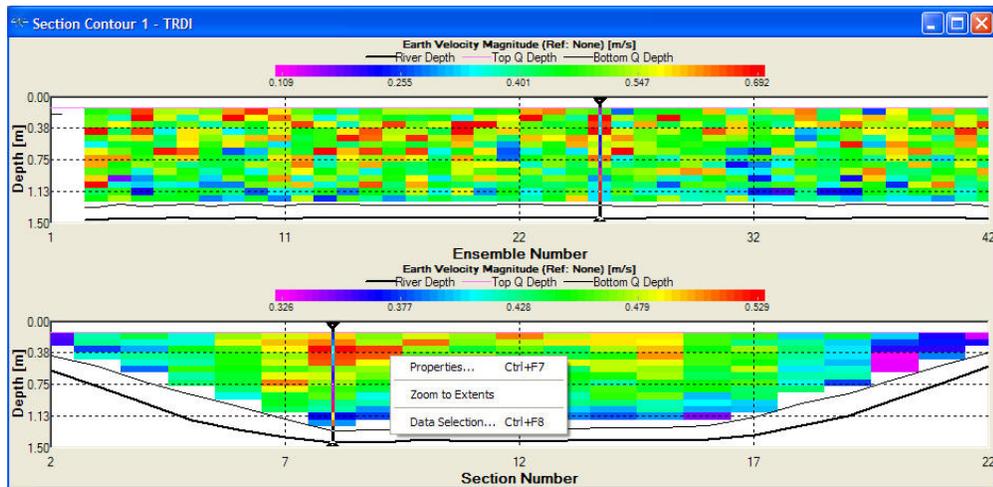
Figure 17.   Velocity Contour Graph

The following are the velocity contour graph options.
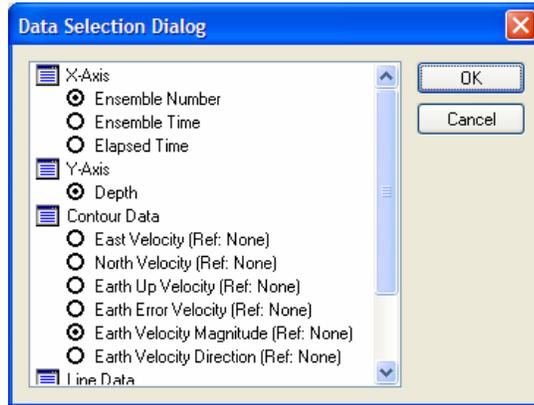
- **East Velocity** – East is positive (west is negative).

- **North Velocity** – North is positive (south is negative).

- **Up Velocity** – Up is positive (down is negative).

- **Error Velocity** – This velocity component is a measure of "data reasonableness." There is no velocity reference for this value. The error velocity calculation depends on transducer orientation and beam pattern. See the ADCP Technical Manual for details of the velocity processing algorithm.

- **Velocity Magnitude/Direction –** The velocity magnitude and direction are clockwise with respect to North.

Click **View**, **Graphs**, **Contour**, **Intensity** to select the echo intensity contour graph.
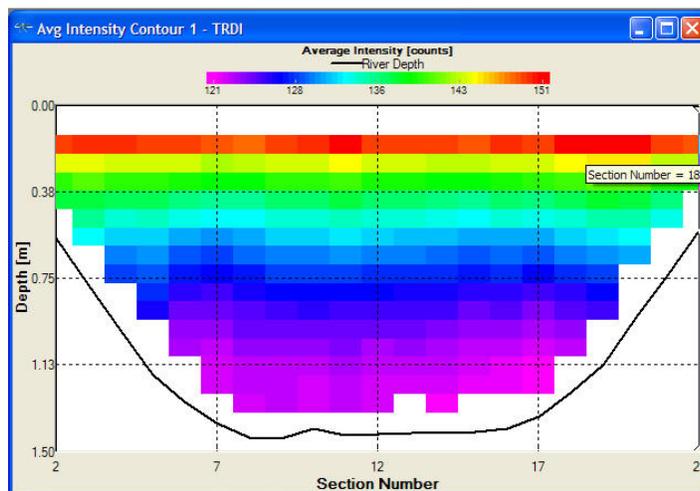
Figure 18.   Intensity Contour Graph

To change what data is displayed, right-click on the graph and select **Data Selection**. The five intensity graphs are: **Beam 1**, **Beam 2**, **Beam 3**, **Beam 4**, and **Average.**
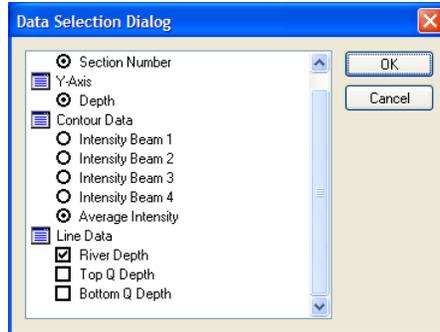
6.2   Profile Graphs

A profile graph is a line graph of a selected parameter versus depth. The **View, Graphs, Profile** menu lets you select the type of profile graph to display.

> **NOTE.** To change the graph scale, right-click on the graph and select **Properties**.
>
> To change what data is displayed, right-click on the graph and select **Data Selection**.
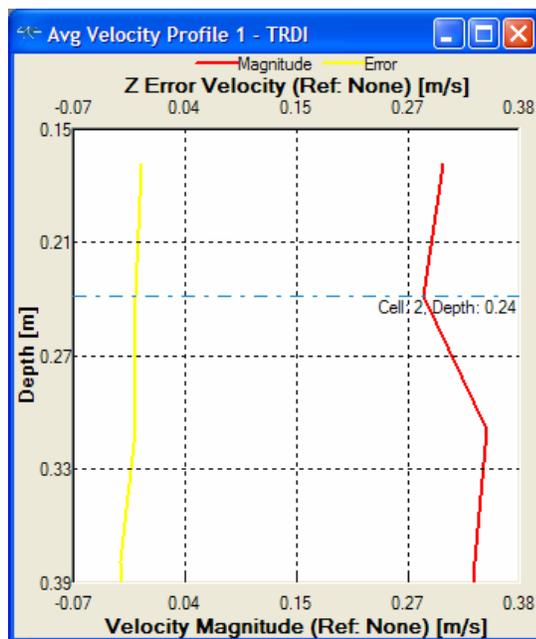
Figure 19.   Velocity Profile Graph

The following profile graphs are available.

- **Intensity Profile –** *WinRiver II SxS* displays the intensity profiles for all four ADCP beams. The echo intensity units are in counts. Use the Intensity minimum/maximum scaling values to define the horizontal axes of the graph.

- **Velocity Profile –** The velocity profiles show the earth-coordinate section average velocity components (East, North, Up, and Error). The velocity units can be in either m/s (SI) or ft/s (English). Scaling for the top horizontal axis on the graph (Up Error Velocity) uses the minimum/maximum scale values of the Up Velocity or Error Velocity. Similarly, the bottom horizontal axis (East North Velocity) uses either the East Velocity or North Velocity scale values.

- **Backscatter Profile –** *WinRiver II SxS* displays the backscatter profiles for all four ADCP beams. Backscatter data is range and absorption normalized and the units are in decibels (dB). Data are obtained from the receiver's Received Signal Strength Indicator (RSSI) circuit. The default of **Calculate for each Ping** is used (similar to *WinRiver II*), but in *SxS* it can not be changed at this time.

- **Correlation Profile –** *WinRiver II SxS* displays the correlation profiles for all four ADCP beams. Correlation is a measure of data quality, and its output is scaled in units such that the expected correlation (given high signal/noise ratio, S/N) is 128 for Mode 1.

6.3   XY Graphs

Discharge over Distance – This XY graph displays the horizontal measured discharge and corresponding power fit versus depth.
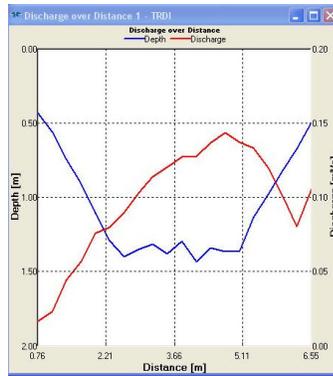
Figure 20.   Discharge over Distance Graph

6.4 Tabular Displays

The Tabular displays show the data for the last ensemble in tabular form. *WinRiver II SxS* displays as Bad the data flagged bad by the ADCP.

Table 1: Available Tabular Displays

Display	Description
Ensemble Header	The Ensemble Header display shows information about the ADCP setup.
Composite	The Composite display lists information about the currently displayed ADCP data ensemble, and discharge information.
Bottom Track	The Bottom Track display lists information about the beam depths and bottom track velocities.
Velocity	Displays the earth-referenced velocity components (East, North, Up, Error) percent good pings for the bin, and discharge. *WinRiver II SxS* displays as bad the data flagged bad by the ADCP.
Earth Velocity Magnitude & Direction	Displays the earth-referenced velocity components (Magnitude, Direction, Up, Error) percent good pings for the bin, and discharge.
Intensity	Displays the echo intensities for all four beams.
Backscatter	Displays the echo intensities for all four beams.
Correlation	Displays the correlation magnitudes for all four beams.

> **NOTE.** During data collection, the text color will change to blue when the file is no longer being updated.

6.5 Section Discharge Summary

Select **View**, **Section Discharge Summary** to display the Section Discharge Summary. This screen displays detailed information and statistics about each section.

| Measurement	Q [m³/s]	% Total Q	Accum Q [m³/s]	% Diff. Rating	% Rated Q	Avg. Velocity [m/s]	Coeff. Var [%]	Width [m]	Distance [m]	Depth [m]	Area [m²]	Flow Angle Coeff.
Measurement ...	1.938			340.34		0.255		7.438			7.600	
Section 001	0.000	0.00%	0.000		0.00	0.000	0.00	0.366	0.030	0.000	0.000	1.000
Section 002	0.017	0.86%	0.017		3.77	0.059	60.13	0.518	0.762	0.546	0.283	1.000
Section 003	0.023	1.20%	0.040		5.26	0.099	43.69	0.305	1.067	0.764	0.233	1.000
Section 004	0.044	2.30%	0.084		10.11	0.153	29.57	0.304	1.372	0.957	0.291	1.000
Section 005	0.057	2.94%	0.141		12.95	0.161	25.36	0.304	1.676	1.159	0.353	1.000
Section 006	0.076	3.91%	0.217		17.24	0.196	22.89	0.305	1.981	1.271	0.388	1.000
Section 007	0.080	4.14%	0.297		18.23	0.193	20.57	0.305	2.286	1.360	0.415	1.000
Section 008	0.090	4.65%	0.387		20.46	0.209	18.21	0.305	2.591	1.415	0.431	1.000
Section 009	0.103	5.34%	0.491		23.51	0.239	11.96	0.304	2.896	1.423	0.433	1.000
Section 010	0.114	5.89%	0.605		25.92	0.263	17.19	0.304	3.200	1.422	0.433	1.000
Section 011	0.120	6.21%	0.725		27.36	0.277	13.99	0.305	3.505	1.425	0.434	1.000
Section 012	0.127	6.57%	0.852		28.91	0.291	10.76	0.305	3.810	1.433	0.437	1.000
Section 013	0.128	6.59%	0.980		29.03	0.290	11.66	0.305	4.115	1.444	0.440	1.000
Section 014	0.137	7.06%	1.117		31.08	0.310	10.12	0.304	4.420	1.447	0.441	1.000
Section 015	0.144	7.42%	1.261		32.66	0.327	12.24	0.304	4.724	1.442	0.439	1.000
Section 016	0.137	7.08%	1.398		31.19	0.320	9.86	0.305	5.029	1.406	0.429	1.000
Section 017	0.133	6.88%	1.531		30.31	0.333	11.48	0.305	5.334	1.311	0.400	1.000
Section 018	0.120	6.18%	1.651		27.22	0.321	10.04	0.305	5.639	1.224	0.373	1.000
Section 019	0.101	5.21%	1.752		22.94	0.319	15.30	0.304	5.944	1.038	0.316	1.000
Section 020	0.081	4.17%	1.833		18.34	0.321	15.86	0.304	6.248	0.826	0.251	1.000
Section 021	0.105	5.41%	1.938		23.83	0.277	20.58	0.610	6.553	0.620	0.378	1.000
Section 022	0.000	0.00%	1.938		0.00	0.000	0.00	0.457	7.468	0.000	0.000	1.000

Figure 21. Discharge Summary Screen

6.6 Acquire Control Window

Select **View**, **Acquire Data** to display the Section Acquire Control window. This screen gives you a quick view to see if the ADCP is recording or pinging.

Figure 22.   Section Acquire Control Window

6.7 Adding Customized Graphs to the Menu

Please note that not all available graphs are shown on the menu. For example, the profile graph **Velocity Magnitude and Direction** is not predefined graph. On the **View** menu, select **Graphs**, **Profile**, **Velocity**. Right-click on the velocity profile graph and select **Data Selection**. Select **Earth Velocity Magnitude** and **Earth Velocity Direction** and than click **OK**.
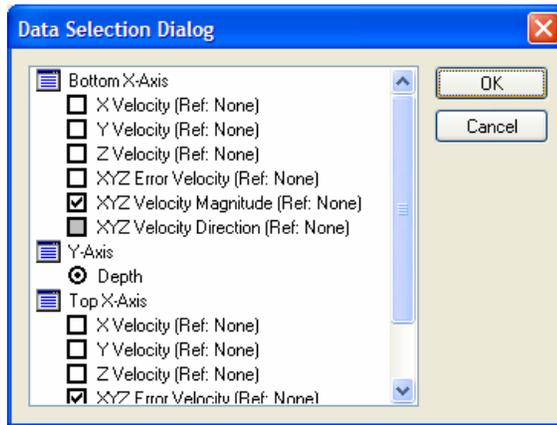
Figure 23.   Data Selection Dialog

Once you have selected a graph and selected the data you want to see, right-click on the graph and select **Add to Menu**. Name the graph and click **OK**. The graph will now be available on the menu for future use with a click of the mouse button. If you want to always see the graph when *WinRiver II SxS* starts, make sure to save the workspace by clicking **File**, **Save Workspace As**.

Figure 24.   Adding a Graph to the Menu

> **NOTE.** There is no method to remove a graph once added to the menu except by re-installing *WinRiver II SxS*.

7 Using the Measurement Wizard

WinRiver II SxS is setup to collect data using the **Measurement Wizard**. The **Measurement Wizard** gives the user the ability to create a Field Configuration node and enter the information needed for data collection and correct data display during data collection. Once setup, the measurement file can be saved and than later retrieved.

a. On the **File** menu, click **New Measurement**.

b. After each page information has been entered, click **Next**.

c. After reviewing the **Summary** page, click the **Finish** button to complete the wizard.

7.1 Site Information

On the **Site Information** screen, enter the **Station Data**, **Agency Data** and **Field Party Data** information. Each of these fields will be included on the Q measurement summary file (see "Using the Q Measurement Summary," page 60).

Enter the Station Data **Stage (m)** and **Rated Q (m³/s)** information.

> **NOTE.** If a **Station Name** is entered, it will be used in the **Filename Prefix** box on the **Output Filename Options** page of the wizard (see "Output Filename Options," page 34).
>
> Enter a **Measurement Number** (alphanumeric). This can be added to the file name on the **Output Filename Options** page of the wizard.

7.2 Configuration Dialog
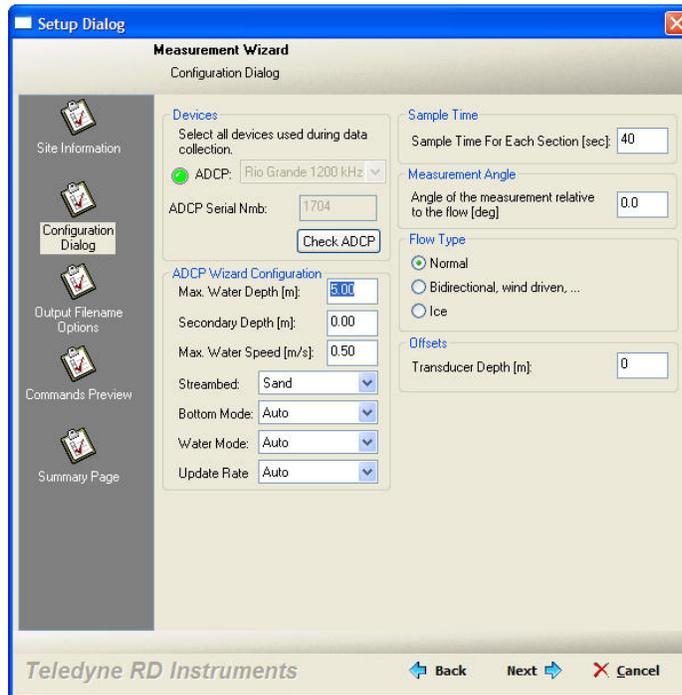
7.2.1 Devices

WinRiver II SxS will attempt to connect to the ADCP when this page opens or the **Check ADCP** button is clicked. If the ADCP is not available or communications with the ADCP have not been setup, you will see the following dialog box.
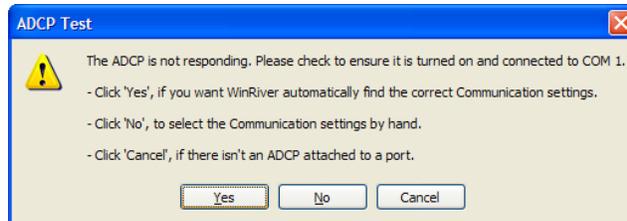
Click **Cancel** to continue with the wizard, click **Yes** to have *WinRiver II SxS* automatically detect the ADCP, or click **No** to setup the communications yourself.

If you see the following message box, this means *WinRiver II SxS* is not sure what type ADCP you are using. Click **OK** to continue.
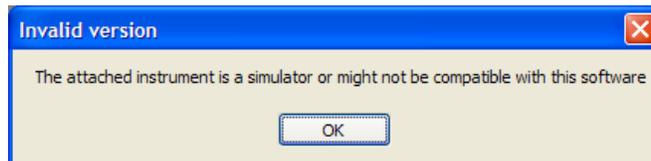
If you are using a Rio Grande ADCP, *WinRiver II SxS* will automatically detect the ADCP and enter the **ADCP Serial Number**, otherwise, enter the serial number. The ADCP serial number will be added to the Q Measurement Summary (see "Using the Q Measurement Summary," page 60).

7.2.2 ADCP Wizard Configuration

Enter your choices for the **ADCP Wizard Configuration** section. Based on the entered information, the wizard will enter commands on the "Commands Page," page 39. *WinRiver II SxS* will give warning messages if the settings are not recommended. Click the **Close** button on the message box or continue making choices.
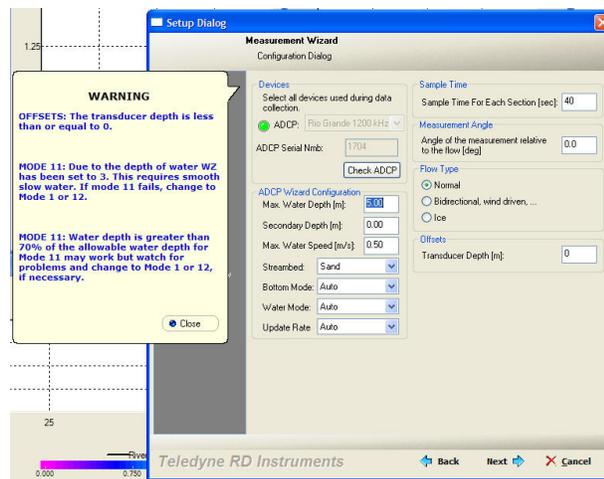
Figure 25.   Warning Message

Max. Water Depth – Enter the expected maximum depth of the stream.

Secondary Depth – Enter a secondary depth (optional). For example, enter the minimum depth at the edge.

Max. Water Speed – Enter the expected maximum speed of the stream.

Max. Boat Speed – Enter the expected maximum speed of the boat.

Streambed – Enter the expected streambed material.

Bottom Mode – Enter the bottom mode (**Mode 5**, **Mode 7**, or **Auto**).

> 💡 **Recommended Setting.** Use the **Auto** mode.

Water Mode – Enter the water mode (**Mode 1**, **Mode 5**, **Mode 8**, **Mode 11**, **Mode 12 Auto**, **Mode 12 Custom**, or **Auto**).

> 💡 **Recommended Setting.** Use the **Auto** mode.

If you select **Mode 12 Custom**, the following screen appears.

Figure 26.   Water Mode 12 Options

Bin Size (meters) – Set the desired bin size. This will add the WK command to the Wizard section of the command page.

Update Rate (seconds) – Increasing the **Update Rate** will increase the number of subpings.

Time Between Subpings (100th seconds) – This set the time between subpings in hundredths of a second and sets the second parameter of the WO command. In the above example, the WO command would be set to WO13,5.

Click the **Compute** button to see the **Optimized Configuration** consequences. Click **Done** to return to the **Configuration Dialog** screen.

> **NOTE.** Your ADCP must have the High Rate Ping feature enabled in order to use Mode 12.

7.2.3   Sample Time

The default **Sample Time** is 40 seconds. You may increase this if desired. In slow, shallow flow increasing this value will reduce the uncertainty of the measured velocity.

> **Recommended Setting.** Leave the Sample Time at 40 seconds.

7.2.4   Measurement Angle

If the measurement line is not perpendicular to the flow, then enter the angle of deviation from perpendicular in the **Measurement Angle** box. This will

reduce the discharge to compensate for the fact that each panel is wider than would be the case if the measurement line were perpendicular.

7.2.5   Flow Type

Normal is selected by default for the **Flow Type**. *SxS* will use power extrapolation at the surface and power extrapolation to the bottom.

If the velocity profile is expected to be non-classical, wind driven at the surface for example, then selecting the **Bidirectional, wind driven** box will use 3-point extrapolation at the surface and no-slip extrapolation to the bottom.

If you are measuring below ice cover, check the **Ice** box and enter the **Transducer Depth** from bottom of the ice cover to the center of the ADCP transducer faces. *SxS* will use no-slip extrapolation at the surface and no-slip extrapolation to the bottom.

> **NOTE.** For a full description of the methods used to estimate discharge in the unmeasured top/bottom parts of the velocity profile, see the WinRiver II User's Guide (Appendix B - Discharge Measurement Basics).
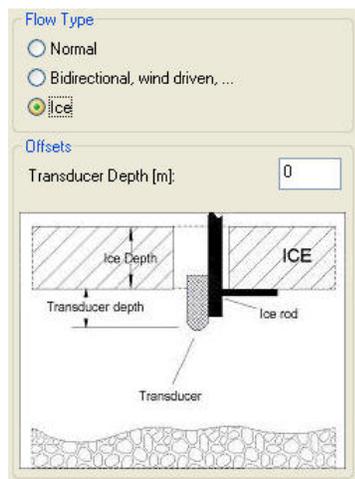
Figure 27.   Ice

7.2.6   Offsets

Enter your choices for the **Offsets** section. For more information on these settings, see the .

Transducer Depth – Enter the depth from the water surface to the ADCP transducer faces.

7.3 Output Filename Options
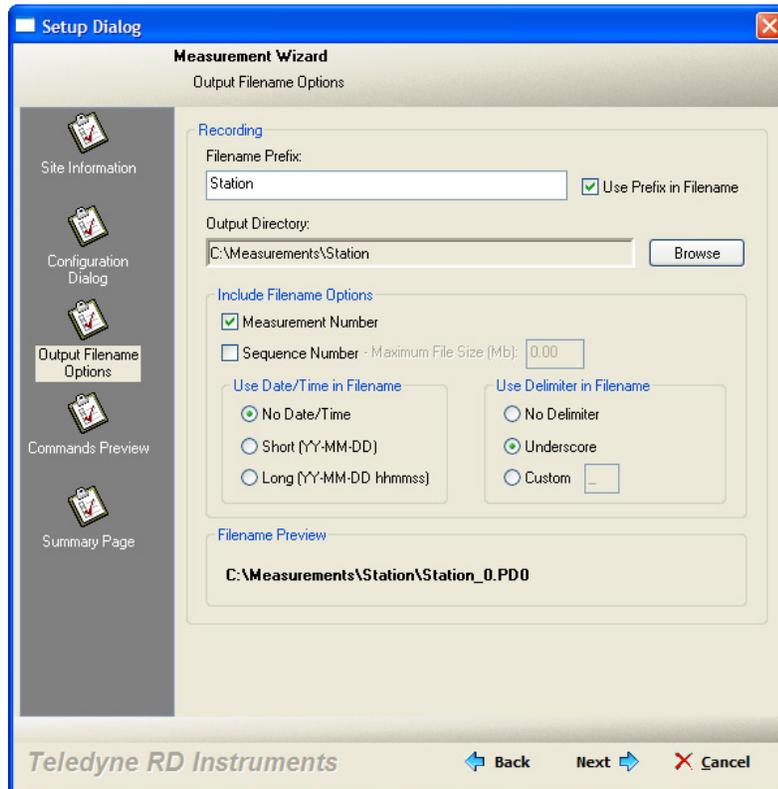
Enter your choices for the **Output Filename Options**. The **Filename Prefix** and **Output Directory** are part of the **Recording** page (see "Recording Page," page 43).

Recording

Enter a **Filename Prefix** if you did not enter one on the **Site Information** page of the measurement wizard. The **Output Directory** will default to C:\Measurements\Station. Click the **Browse** button to change the output directory.

> **NOTE.** The **Output Directory** can not already exist – You will be prompted to change the Output Directory or Filename Prefix.

Include Filename Options

- Check the **Measurement Number** box to add it to the file name.

- Check the **Sequence Number** box and enter a **Max File Size** if you want to limit the size of the data file. Once the file size has been reached, the sequence number will increment.

- To add the Date/Time to the filename, check the **Short (YY-MM-DD)** or **Long (YY-MM-DD hhmmss)** button. Select **No Data/Time** to remove the Date/Time from the filename.

- Select what type delimiter to use in the filename by selecting **No Delimiter**, **Underscore**, or **Custom**. If **Custom** is selected, enter the delimiter in the box.

Review how the filename appears in the **Filename Preview** section.

In the following example, the filename prefix is CheckPoint, the measurement number is 13, the transect number is 003, the sequence number box, measurement number, and short date/time buttons were selected.

```
C:\Measurements\CheckPoint\CheckPoint_13_003_000_07-04-09.PDO.
                          |              |   |   |   |
                          |              |   |   |   |   Short Data/Time
                          |              |   |   |   Sequence Number
                          |              |   |   Transect Number
                          |              |   Measurement Number
                          |              Filename Prefix
                  Output Directory
```

7.4   Commands Preview

You can directly control the profiling parameters sent to the ADCP using the **User Commands** box.

> ⚠ **CAUTION.** Do not enter any commands in the **User** section unless you are fully aware of what the command does.

> 📝 **NOTE.** For more information on ADCP commands, see the WorkHorse Commands and Output Data Format Guide.

7.5 Summary Page

Review the **summary page;** use the **Back** button to return to previous pages and make any necessary changes. If a red X appears next to the communication settings, it means the communications were not configured yet. A green ✓ next to the WM12 and BM7 means that the ADCP is capable of using these modes, not that the mode is selected.

Click the **Finish** button to complete the wizard.

> **NOTE.** The summary does not include consequences caused by entering any **User** commands.

Measurement Characteristics

Minimum Profile Depth (1 cell) – Shows the minimum profiling depth for one cell. This depth includes the blanking distance and transducer depth.

Minimum Profile Depth (2 cells) – Shows the minimum profiling depth for two cells. This depth includes the size of bins 1 and 2, blanking distance, and the transducer depth.

Maximum Profile Depth (meters) – Shows the maximum profiling depth for the settings used.

Horizontal Velocity Standard Deviation (Meters/second) – Not implemented at this time.

Estimated Discharge COV (1 pass) – Not implemented at this time.

Estimated Discharge COV (4 passes) – Not implemented at this time.

> **NOTE.** Coefficient of Variation for *WinRiver II SxS* is defined as (Standard Deviation of the average velocity for each ping)/(average velocity of all pings).
>
> Where the average velocity is the average of all good cells in the profile.

8 Configuration Node Properties

This section has detailed explanations of each of the settings contained in the configuration node. There are seven pages that configure different portions of the configuration node.

To view the field or playback configuration node settings, right-click on the configuration node on the **Measurement Control** window, and than select **Properties** (see "Using the Measurement Control Window," page 15). The configuration node presently in use will be in bold text.

> **NOTE.** Changes to the **Field Configuration** node can only be made when not pinging. If you make any changes, you must change the **Filename Prefix** or **Output Directory** to create a new measurement file.

When creating configuration nodes for data collection, the most important parts in a configuration node are the **Commands** and **Recording** tabs. Set them to the desired parameters. The rest of the parameters can be changed during playback and do not influence data collection.

For correct data display while acquiring data you can enter the following values.

- On the **Offsets** page set the **ADCP Transducer Depth** (part of the Measurement Wizard).

- On the **Discharge** page, if the velocity profile is expected to be non-classical, wind driven at the surface for example, then selecting the **Bidirectional, wind driven** box will use 3-point extrapolation at the surface and no-slip extrapolation to the bottom.

8.1 Commands Page

You can directly control the profiling parameters sent to the ADCP using the **User Commands** box. The ADCP Technical Manual explains all direct commands in detail. The **Fixed Commands** box lets you view the direct commands that will always be sent to the ADCP. The Measurement Wizard will enter the **Wizard Commands** based on information entered in the Measurement Wizard (see "Using the Measurement Wizard," page 29).

> **CAUTION**. The fixed commands are sent before any user commands. Sending a **User Command** will OVERRIDE the **Fixed** and **Wizard Commands**.

When the data collection is first started, the commands in the **Fixed Commands** box are sent by *WinRiver II SxS* to the ADCP to set its profiling parameters. The **Wizard Commands** are sent next and will *override* some of the **Fixed Commands**. Refer to the WorkHorse Commands and Output Data Format guide for more detailed information about each command.
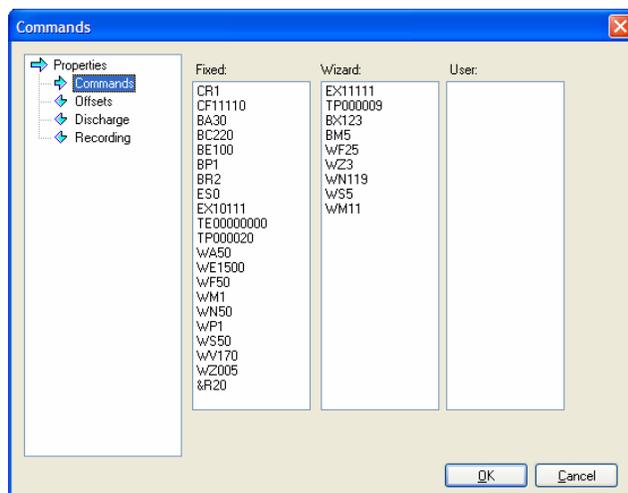
Figure 28.   Commands Page

Table 2:   Fixed Commands

Command	Choices	Description
CR1	Sets factory defaults	This is the first command sent to the ADCP to place it in a "known" state.
CF11110	Flow control	CF11110 selects automatic ensemble cycling, automatic ping cycling, binary data output, enables serial output, and disables data recording.
BA30	Evaluation Amplitude Minimum	Sets the minimum value for valid bottom detection to 30 counts.
BC220	Correlation Magnitude Minimum	Sets minimum correlation magnitude for valid bottom track velocity data to 220 counts.
BE100	Bottom Track Error Velocity Maximum	Sets maximum error velocity for good bottom-track water-current data to 100mm/s.
BP1	Bottom track pings	The ADCP will ping 1 bottom track ping per ensemble.
ES0	Salinity	Salinity of water is set to 0 (freshwater).
EX10111	Coordinate transformations	Sets Ship coordinates, use tilts, allow three-beam solutions, and allow bin mapping to ON.
TE00:00:00.00	Time per ensemble	Ensemble interval is set to zero.
TP00:00.20	Time between pings	Sets the time between pings to 0.2 seconds.
WA50	False Target Threshold Maximum	Sets a false target (fish) filter to 50 counts.
WE1500	Water Track Error Velocity Threshold	Sets the maximum error velocity for good water-current data to 1500mm/s.
WF50	Blank after transmit	Moves the location of the first depth cell 50 cm away from the transducer head (see Table 3, page 41).
WM1	Water mode	Sets the ADCP to Water Track mode 1.
WN50	Number of depth cells	Number of bins is set to 50 (see Table 3, page 41).
WP1	Pings per ensemble	The ADCP will ping 1 water track ping per ensemble.
WS50	Depth cell size	Bin size is set to 0.5 meters (see Table 3, page 41).
WV170	Ambiguity velocity	Sets the maximum relative radial velocity between water-current speed and WorkHorse speed to 170 cm/s.
WZ005	Mode 5 Ambiguity Velocity	Sets the minimum radial ambiguity for profiling Mode 5 (WM5) and Mode 8 (WM8) Ambiguity Velocity to 5 cm/s.
&R20	Bottom Illumination	The &R command is used to set the "Bottom Illumination". This value determines the size of the Bottom Track transmit pulse in relation to the Depth. &R is entered in percent. If you were bottom tracking in 100m of water and had &R=20, the Bottom Track transmit pulse would be 20% of 100m, or 20m. If &R=30, then the transmit pulse would be 30m.

NOTE. The above commands are shown for example only. They are valid for a 1200 kHz Rio Grande ADCP using the default settings for the wizard.

Table 3:   Wizard Commands

Command	Choices	Description
EX11111	Coordinate transformations	Sets Earth coordinates, use tilts, allow three-beam solutions, and allow bin mapping to ON.
TPxx:xx.xx	Time between pings	Sets the time between pings.
BXxxx	Maximum Bottom Search	Limits how far the ADCP will search for the bottom
BMx	Bottom Mode	Sets the Bottom Mode
WFxx	Blank after transmit	Moves the location of the first depth cell away from the transducer head.
WZx	Mode 5 Ambiguity Velocity	Sets the minimum radial ambiguity for profiling Mode 5 (WM5) and Mode 8 (WM8) Ambiguity Velocity.
WNxxx	Depth cell number	Based on the maximum water depth entered in the Configuration Wizard, WinRiver II SxS will set the depth cell size and number of depth cells.
WSxxx	Depth cell size	Sets the depth cell size
WMx	Water Mode	Sets the Water Mode

> **NOTE.** The values for the **Wizard Commands** are based on information entered in the **Measurement Wizard** (see "Using the Measurement Wizard," page 29).

8.2   Offsets Page

The Offsets page lets you set system alignment offsets that only affect the displays, **not** the raw data files. *WinRiver II SxS* saves these settings in the configuration node.
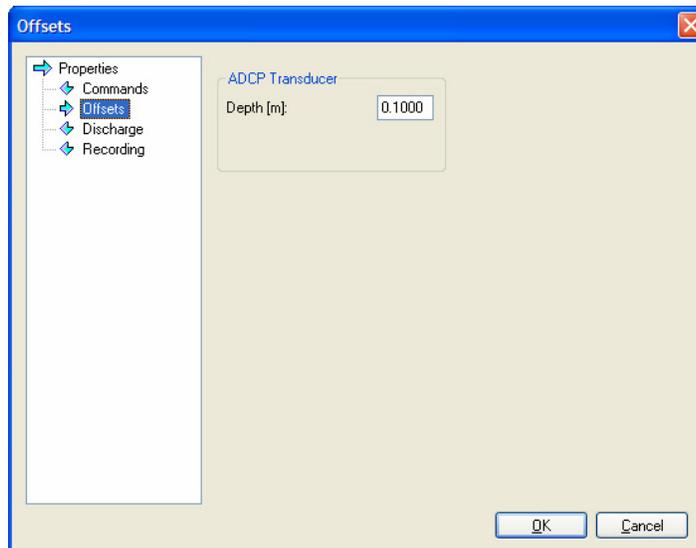
Figure 29.   Offsets Page

Use the **ADCP Transducer Depth** field to set the depth from the water surface to the ADCP transducer faces. *WinRiver II SxS* uses this value during data collection and post-processing to create the vertical depth scales on all displays. *WinRiver II SxS* also uses the depth value to estimate the unmeas-

ured discharge at the top part of the velocity profile. Therefore, depth affects the estimate of total discharge on the data collection and post-processing displays. The depth value does not affect raw data, so you can use different values during post-processing to refine the vertical graph scales and discharge estimates.

> **NOTE.** The ADCP's ED-command (Depth of Transducer) is used for internal ADCP speed of sound processing and is stored in the raw ADCP file leader. The ED-command has no effect on the vertical depth scales in *WinRiver II SxS*. **For normal transect work, do not add an ED-command to the Commands page** (see "Commands Page," page 39).

8.3   Discharge Page

WinRiver II SxS uses these setting to determine what formulas and calculations will be used to determine the discharge value.
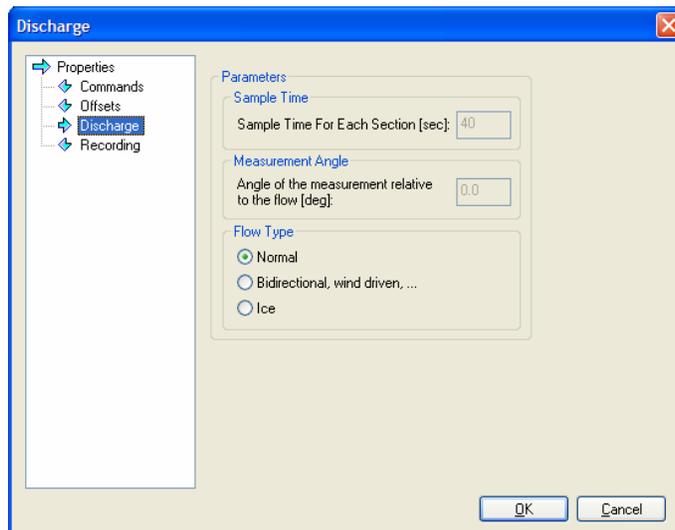

Figure 30.   Discharge Page

On the **Discharge** page, if the velocity profile is expected to be non-classical, wind driven at the surface for example, then selecting the **Bidirectional, wind driven** box will use 3-point extrapolation at the surface and no-slip extrapolation to the bottom.

8.4   Recording Page

The **Recording** page lists the parameters used to define where the data is recorded during data collection.
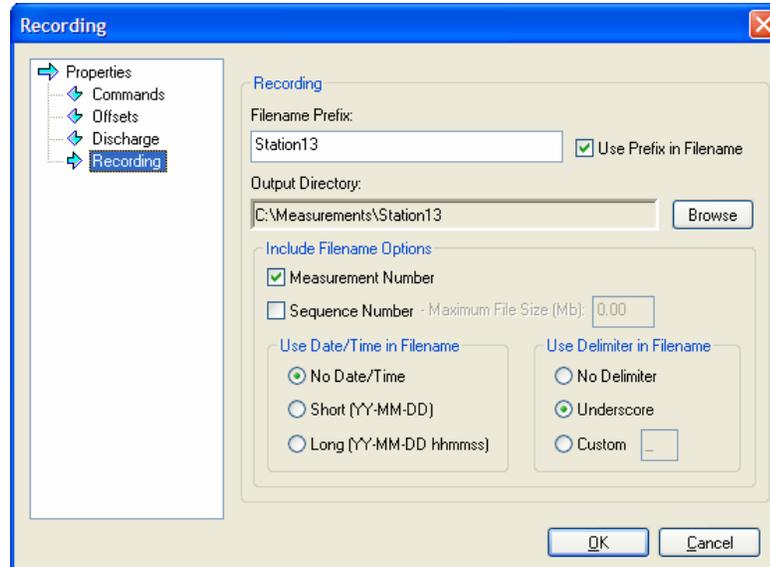

Figure 31.   Recording Page

- **Filename Prefix** – *WinRiver II SxS* uses the **Filename Prefix** to create the data file names made during data collection. Use the **Output Directory** field to select where the data file will be stored.

  During data collection, if the **Filename Prefix** is set to TEST, *WinRiver II SxS* creates data files with the prefix TEST (TEST_000_000.PD0) and stores them in the directory specified in the **Output Directory** field until the disk is full. *WinRiver II SxS* will then stop data collection and alert you to the disk space problem.

> **NOTE.** A file name can contain up to 255 characters, including spaces and the **Filename Prefix**. It cannot contain the following characters: \ / : * ? " < > |

- **Use Date/Time in Filename** – Check this box if you want the date and time stamp to be added to the file name.

- **Maximum File Size** – Select the **Sequence Number** box to use the **Maximum File Size** field to limit the size of a data file. The default for the maximum data file size is unlimited (**Sequence Number** box is not selected). If you set the Maximum File Size to 1.44, then when the size of the recorded data file reaches 1.44 MB, the **Sequence Number** increments.

9 QA/QC

Before taking measurements, check the following items.

9.1 Set the ADCP Clock

a. On the **Acquire** menu, click **Set ADCP Clock**.

b. Click the **Set Clock** button to set the ADCP's time to the GPS time (if available) or the PC's time. If necessary, set the PC's clock first.

c. Click **Close** to exit the **Set ADCP Clock** dialog.

> **NOTE.** The first time a transect is started, the **Set ADCP Clock** dialog will open. StreamPro ADCP users will notice that the blue LED will blink until the **Close** button is clicked. This is normal.
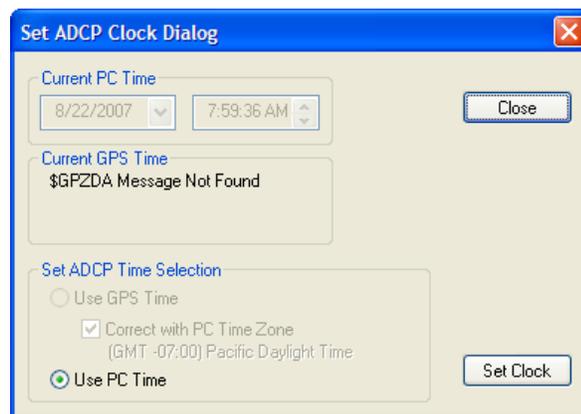
Figure 32. Set the ADCP Clock

9.2 Test the Pressure Sensor

The pressure sensor test should be done with the ADCP out of the water.

a. On the **Acquire** menu, click **Execute Pressure Sensor Test** to verify the ADCP's pressure sensor is functioning properly.

b. Click the **Zero Pressure Sensor** button to zero out the sensor.

c. Click **Close** to exit the **Pressure Sensor Calibration** dialog.

> **NOTE.** If your ADCP does not have a pressure sensor, you will see an error message.
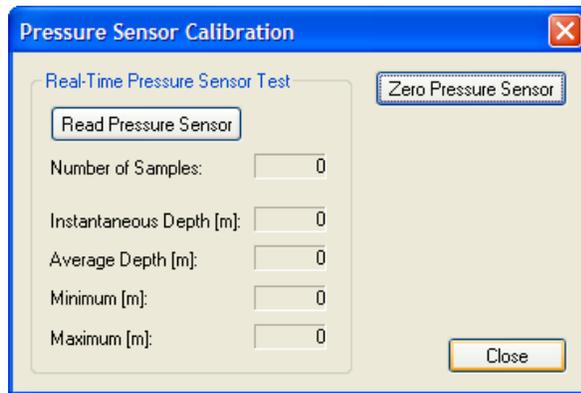
Figure 33.   Test the Pressure Sensor

9.3   Test the ADCP

a. On the **Acquire** menu, click **Execute RGTest** to verify the ADCP is functioning properly.

b. Click the **Stop PC2** button to end the PC2 test. Click **Close** to exit the **RGTest** dialog.

> **NOTE.** The tests should be run while the ADCP is in non moving water. Running the test in air will not harm the ADCP, but some tests may fail in air.
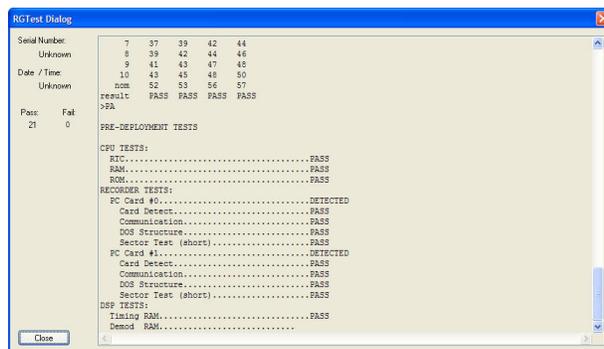

Figure 34.   Test the ADCP

9.4 Compass Calibration

Use the compass calibration to calibrate a Rio Grande ADCP or a Work-Horse Monitor/Sentinel ADCP with firmware version 16.30 or greater.

> **NOTE.** Do not use the **Compass Calibration** on a StreamPro ADCP. StreamPro systems do not have a compass.

> **NOTE.** The Rio Grande firmware has been modified to allow the correction of the one-cycle errors with the AF command. WorkHorse ADCPs with firmware versions lower than 16.30 do not have this capability.

a. Mount the Rio Grande ADCP in the boat as it will be used to acquire data.

b. On the **Configure** menu, select **Peripherals**.

c. Click the + box next to **Read Serial Raw ADCP Data** to expand the list and then select **Instrument: ADCP Instrument**.

d. Press the **Configure** button.

e. At the ">" prompt, type **AR** and press the **Return** key. Type **Y** to return the Fluxgate Calibration Matrices with the factory original values.

```
>AR
Do you really want to write over the active fluxgate calibration
   data [y or n]?Y

Fluxgate Calibration Matrices Updated with Factory Original Values.

>
```

f. Click **OK** to exit the **Advanced ADCP Configuration Dialog**, than click **Close** to exit the **Peripherals Configuration Dialog**.

g. On the **Acquire** menu, click **Execute Compass Calibration**. Click on the **Calibrate** button to begin the compass calibration.
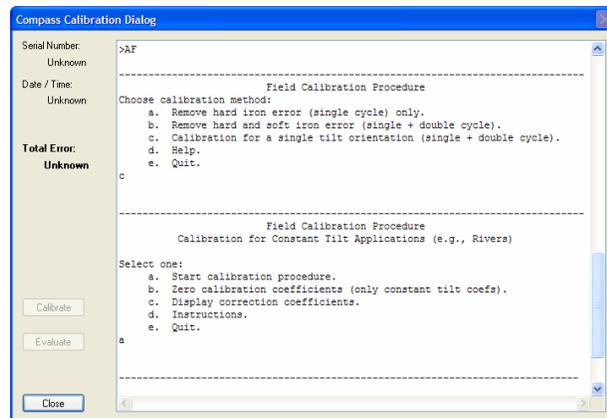

Figure 35.   Compass Calibration Screen

h. During this procedure, you will drive your boat in continuous, small circles. You can accomplish this by adjusting the throttle to just above idle and steering either hard left or hard right. You will want to reduce any pitch and roll effects during the turn (do not move about the boat, this may cause the boat to change how it sits in the water) and avoid any accelerations. If you are working on a river, you will find that you drift downstream as you perform the circles. This will not affect the correction procedure.

i. While you continue to drive the boat in circles, press any key to start the compass calibration. Follow the on screen prompts.

j. Press **D** for details.

```
HEADING ERROR ESTIMATE FOR THE CURRENT COMPASS CALIBRATION:
   OVERALL ERROR:
      Peak Double + Single Cycle Error (should be < 5ø):  ñ 1.73ø
   DETAILED ERROR SUMMARY:
      Single Cycle Error:                          ñ 1.70ø
      Double Cycle Error:                          ñ 0.42ø
      Largest Double plus Single Cycle Error:      ñ 2.12ø
      RMS of 3rd Order and Higher + Random Error:  ñ 0.77ø
      Orientation:    Down
      Average Pitch:  -0.18ø        Pitch Standard Dev:   0.37ø
      Average Roll:    0.35ø        Roll Standard Dev:    0.45ø

Successfully evaluated compass performance for the current compass calibration.

Press C to display Percent Horizontal Field Components
     Relative to Calibration or any other key to continue....
Calibration parameters have been updated in NRAM.

>
```

k. You can now use the Rio Grande with its corrected compass and a configuration that contains the magnetic variation correction to collect discharge measurement data with integrated GPS.

9.4.1   Compass Calibration Verification

Compass calibration verification is an automated built-in test that measures how well the compass is calibrated. The procedure measures compass parameters at every 5º of rotation for a full 360º rotation. When it has collected data for all required directions, the ADCP computes and displays the results.

a. On the **Acquire** menu, click **Execute Compass Calibration**. Click on the **Evaluate** button to begin the compass verification.

b. Rotate the ADCP slowly 360 degrees (approximately 5 degrees per second). Pay particular attention to the Overall Error.

c. If the overall error is less than 2°, the compass does not require alignment. You can align the compass to reduce the overall error even more (if desired).

```
HEADING ERROR ESTIMATE FOR THE CURRENT COMPASS CALIBRATION:
   OVERALL ERROR:
      Peak Double + Single Cycle Error (should be < 5():  ( 1.55(
```

```
DETAILED ERROR SUMMARY:
    Single Cycle Error:                              ( 1.54(
    Double Cycle Error:                              ( 0.07(
    Largest Double plus Single Cycle Error:          ( 1.61(
    RMS of 3rd Order and Higher + Random Error:      ( 0.31(
```

10   Acquiring Discharge Data

When data collection is started, *WinRiver II SxS* sends the direct commands from the configuration to the ADCP and controls data recording for acquisitions of individual transect discharge data. Data can be displayed in tabular, profile, or contour formats. *WinRiver II SxS* calculates discharge as it is calculated in real-time and accumulated as a section is made.

> **NOTE.** It is a good idea to test the ADCP before collecting data at a particular site to check the ADCP's operation (see "QA/QC," page 44).

a. Start *WinRiver II SxS* and load or create a measurement file (see "Using the Measurement Wizard," page 29).

b. You may want to record a note about the instrument setup or factors such as wind conditions, the passage of other vessels, and any other noteworthy events that occur during your transect of the channel. Right-click **Site Information** on the **Measurement Control** window to add a note to the measurement file (see "Add Note," page 17).

c. Press **F4** to start the ADCP pinging. The Acquire **Tabular** window will now show *ADCP PINGING*.

   SxS will send the commands generated by the configuration wizard to the ADCP.

d. Review the **Command Log** to see if any error occurs. If the command log closed before you finished reviewing the commands, click **Configure**, **Command Log…** Scroll though the log file and make sure no command generated an error message.

   In a few seconds, you will see changing values in several of the data windows. The ensemble number will update, the time displayed just below the ensemble number will change to show the ADCP time of each ensemble, the position sensors will update, and so on. And, if you have the ADCP in sufficiently deep water, you will see velocity profiles on the graph. *WinRiver II SxS* will not display meaningful data if your system is not in water.

   In general, after you have started the ADCP pinging, there is no reason to stop pinging until you are finished and ready to remove the ADCP from the water. An exception would be if you were operating off of batteries with limited capacity. Then, stop pinging to conserve power.

> **NOTE.** You can let the ADCP ping even if it is not in the water. Unlike many other acoustic devices, no damage to the ADCP will occur. It is often useful to operate the ADCP out of the water to test the configuration, practice with *WinRiver II SxS*, or perform other tests.

e. Before going forward, on the **Configure** menu, click **Reference**. Choose **None** from the list. *SxS* is assuming that the ADCP is not moving. You can always determine what velocity reference is in use by looking at the text lines just above and below the scales at the top and bottom of the graph display. At the end of each line is an indication of what reference is being used.

10.1   Measurements

Best practices encourage collecting 20 or more sections. Each section should be sized so that is has less than 5% of the total rated discharge Q. The following sequence must be repeated for each measurement.

10.1.1   Starting Edge

a. Move the ADCP to the start point of the measurement.

b. Click the **Acquire** menu and select **Start Measurement**. The shortcut key is **F5**.

c. Since this is the first measurement, it will be at an edge. Select the edge you will start from (**Left** **Edge** or **Right** **Edge**) and enter the position of the edge in the **Edge of Water** box.

d. Select the **Bank Edge Type** from one of the following. If the edge is vertical instead of sloped, enter the water depth at the edge and enter the correction factor. This will be applied to the velocity measured at the next section and used to estimate the velocity in section 1.

- **USGS/ISO –**The correction factor is equal to 1.00.

- **Triangular –** The correction factor is 0.35.

- **Square –** The correction factor is 0.91.

- **Coefficient –** The user can enter a correction factor.
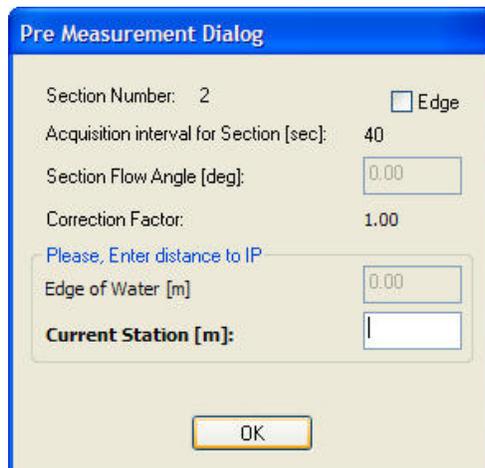
e. Click **OK** to continue.
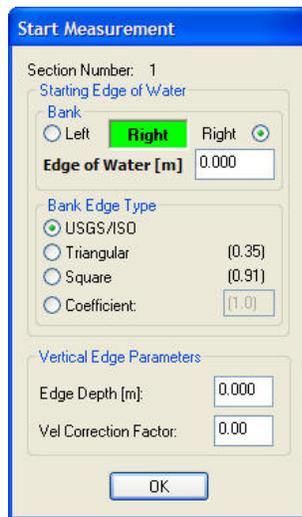
Figure 36. Start Measurement Dialog

10.1.2 Sections

a. Now move to the first vertical to be measured.

b. Enter the position of the **Current Station**.

c. Click **OK** to continue.

Figure 37. Pre Measurement Dialog

d. Now the data will be recorded. The **Duration** near the center of the **Composite Tabular 1** screen will count up to the time remaining in the measurement interval (default 40 seconds).

As the ADCP pings, the **Average Velocity** of all of the pings is displayed as well as the **Coefficient of Variation** of all of the pings to that

time. The Coefficient of Variation should slowly decrease and reach a relatively stable value. The depth of the water is also displayed along with the number of seconds that have elapsed since pinging began.

e. When the measurement interval has expired, the **Post Measurement Dialog** will appear giving a summary of the data for that station. The discharge calculated for that panel is shown followed by the percentage of the rated Q that is measured at this station.

If the discharge for the station is more than 5% of the rated Q, these values will be show in red text; otherwise, they will be shown in black text.

f. If you are satisfied with the results for this station, click **Accept Data**. If you want to repeat the station or if you want to change the position before repeating, click the **Reject and Repeat** button.
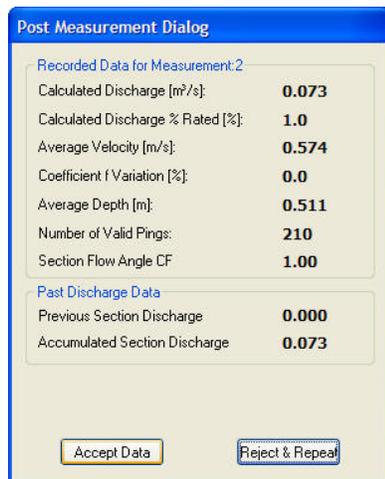
Figure 38.   Post Measurement Dialog

g. Move to the next station.

h. Press **F5** to start the measurement.

i. Wait for the data to be collected.

j. If you are satisfied with the results for this station, click **Accept Data**.

k. Repeat steps "g" through "j" and collect 20 sections.

10.1.3 Ending Edge

a. Check the **Edge** box when you reach the last measurement position.

Figure 39.   Edge Selected

b. Click **Yes** to finish the measurement.

c. The selected edge will be the opposite edge from the one you selected at the beginning.

d. Enter the position of the final edge. If this edge is a vertical wall, then also enter the depth and the appropriate correction factor.

e. Click **OK**.
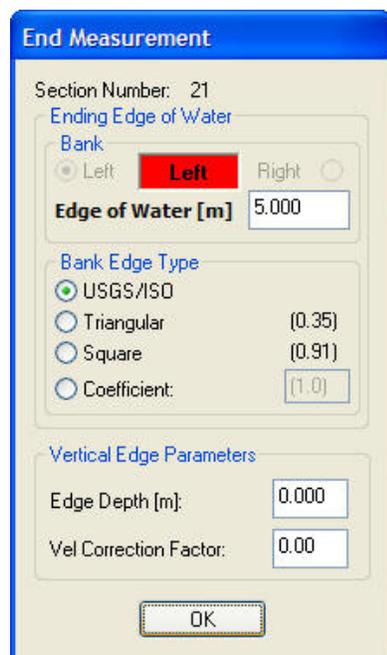
Figure 40.   End Measurement Dialog

10.2   Data Collections Tips

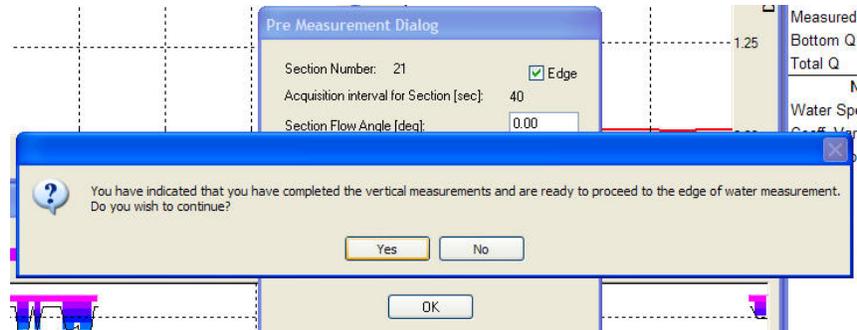- Check the **Edge** box (**Left** or **Right Edge**) for the first and last sections and enter the distance of the edge of the water. If the edge is vertical instead of sloped, enter the **Edge Depth** and enter the **Correction** factor.

- Minimize the ADCP movement while section measurements are recorded.

- Collect 20 or more sections.

- TRDI suggests doing a quick survey of the stream using the *WinRiver II* software to get a value for the rated Q, if it is not known for the site.

- Each section should be sized so that is has less than 5% of the total rated discharge Q.

- Station distances can count up (1.5 meters, next station 2.0 meters) or down (2.0 meters, next station 1.5 meters) as necessary.
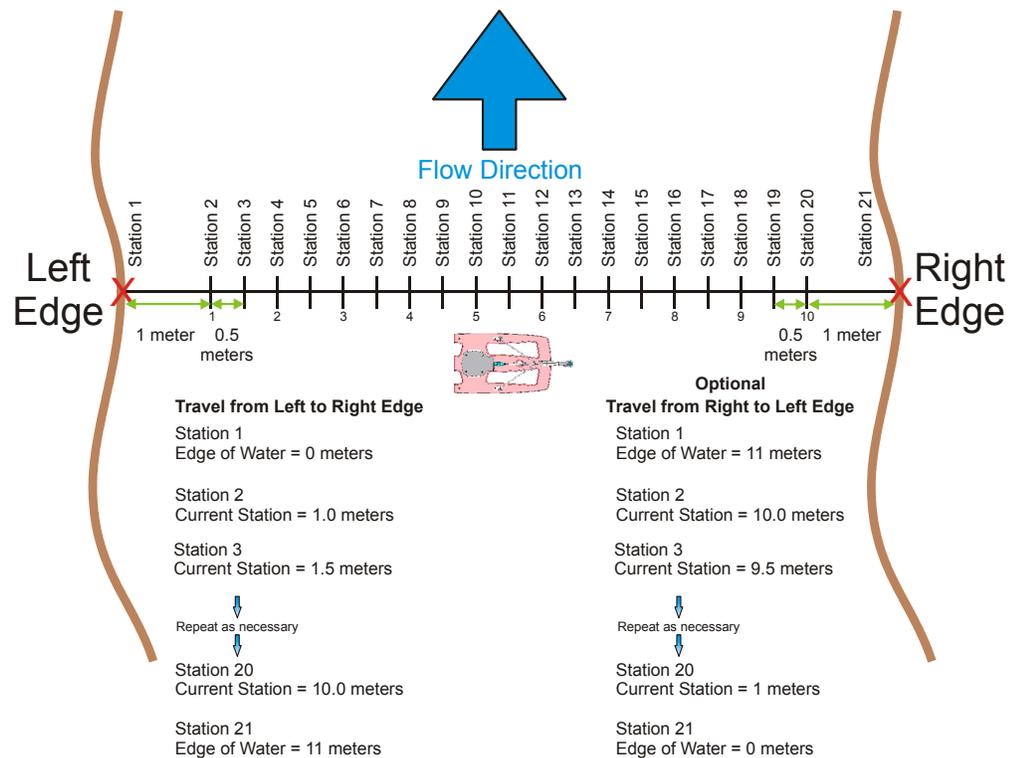
Figure 41.   Overview of Data Collection

11   Post-Processing of Discharge Data

WinRiver II SxS is used for post-processing data to get a total discharge value for the channel (see "Using the Q Measurement Summary," page 60). After collecting 20 sections on the water body, each station must be verified to be within 5% of the mean discharge calculated for the set. If any of the stations are outside of the tolerance, additional measurements should be taken.

11.1   Playback a Data File

a. Start *WinRiver II SxS*.

b. On the **File** menu click **Open Measurement**…

c. Select the measurement file (**.mmt*) to be played and click **Open**.

d. To playback a measurement file, right-click on the measurement file and select **Reprocess Measurement**. This will create a copy of the **Field Configuration node** and creates a **Playback Configuration node**. The data files will automatically play to the end of the file.

Figure 42.   Reprocess Measurement

11.2   Playback Older Data Files

Use the following procedure to playback a data file created using the StreamPro version of *SxS*.

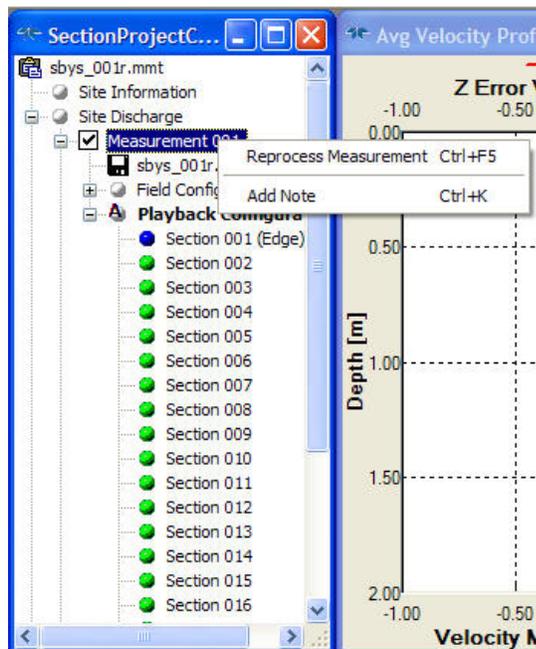a. Start *WinRiver II SxS*. On the **File** menu click **Create Measurement from Data Files** and select a data file to be played. *WinRiver II SxS* automatically reads the *.xml configuration file and create the **Field Configuration** node.

b. To open a workspace file, click **File**, **Load Workspace**.

c. On the **Measurement Control** window, right-click on the measurement file and select **Reprocess Measurement**. The playback tool bar has functions to start, stop, rewind, and go to the end of the data file.

d. Use the **Measurement Control** window to see what files are in use (see "Using the Measurement Control Window," page 15).

e. Play back the individual data files with their associated configuration nodes. After playing through the data file, press **View**, **Section Discharge Summary** or by using the shortcut key **F12** to obtain the total discharge for each measurement.

    The section discharge summary shows all recent sections that have been made and all relevant information on them. It can be used after data collection and during playback and is very effective at establishing whether a measurement is good or not.

> **NOTE.** As a standard for all ADCP users it is widely accepted that sections should be within 5% of each other assuming constant stage.

11.3   Playback Data Display Options

The Playback data display options are the same as those for data collection.

a. On the **Playback** menu, click **First Ensemble** to go to the beginning of the data file. Click **Play** to review the data. To quickly play through the data, on the **Playback** menu, select **Slider** or drag the ensemble marker on the contour graph.

b. Right-click the display and select **Properties** to change the scaling fields of the different data displays.

c. Use the toolbar to zoom in on (see "Zoom Functions," page 14).

11.4 Editing an Item During Playback

Some of the parameters in the **Playback Configuration** can be changed while playing back data. The parameters that controlled data collection (**Recording** and **Commands** pages) can not be changed.

Example – Data was collected using an ADCP depth of 0.06 meters. The correct ADCP depth was 0.0500 meters.

a. Open the measurement file.

b. On the **Measurement Control** window, right-click on the **Playback** configuration node and select **Properties**.
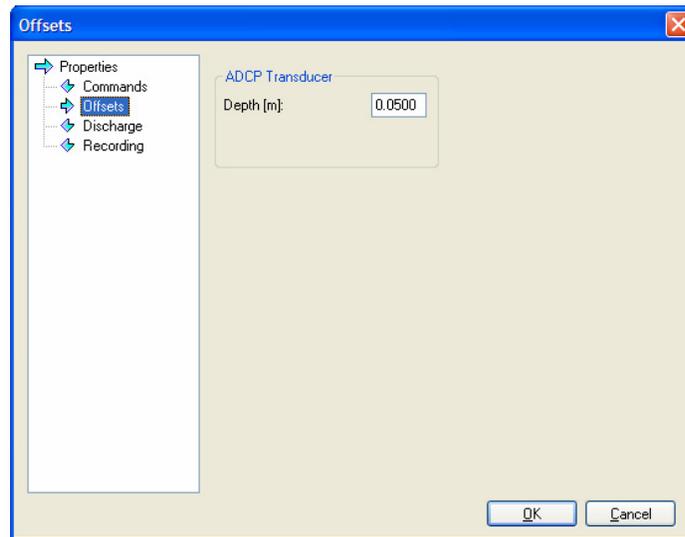
c. Select the **Offsets** page.

d. Enter the correct depth.

e. Click **OK**.

f. The data file will play automatically.

> **NOTE.** To return the all values to the parameters as collected, on the **Measurement Control** window, right-click on **Playback Configuration** and select **Reset Properties**.

Change Section Angle

a. Open the measurement file.

b. On the **Measurement Control** window, right-click on a **section** node and select **Properties**.

c. If the measurement line was not perpendicular to the flow, then enter the angle of deviation from perpendicular in the **Section Flow Angle** box (see "Measurement Angle," page 32). This needs to be done for each section.
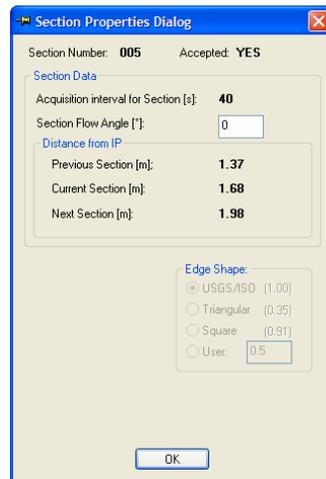
Change Edge Shape

a. Open the measurement file.

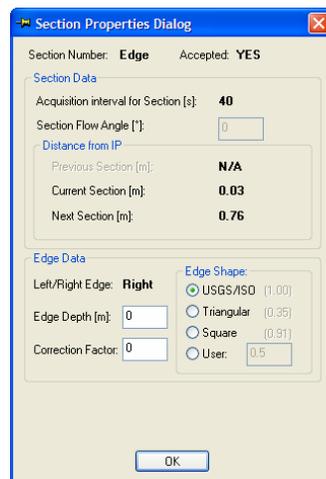b. On the **Measurement Control** window, right-click on the **edge** node and select **Properties**.

c. Select the **Bank Edge Shape** (see "Starting Edge," page 49 and "Ending Edge," page 52).

11.5   Print a Graph or Display

a.   Start *WinRiver II SxS* and open a measurement file.

b.   Click on the graph/display to be printed. The title bar will be high-
     lighted.

c.   On the **File** menu, click **Print Setup**. Select the desired setting and
     printer.

> **NOTE.** Choose **Landscape** for contour graphs.

d.   On the **File** menu click **Print Preview**. If the display is acceptable,
     click **Print**.

11.6   Capture Setup

If you would like to save a graph/display for use in other documents, do the
following.

a.   Click on the graph/display to be saved. The title bar will be highlighted.

b.   On the **Configure** menu, select **Capture Setup**. This will bring up a
     following dialog box.
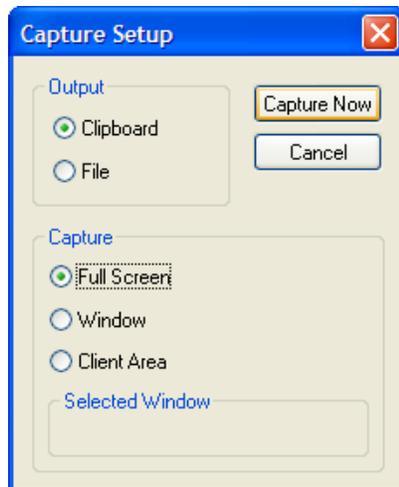
Figure 43.   Capture Setup

c.   Select **Clipboard** or **File**.

d.   Select **Full Screen**, **Window**, or **Client Area**. The **Client Area** will in-
     clude all parts of the graph/plot except the title bars.

e.   Click **Capture Now**. If you selected **File**, name the file and click **Save**.

11.7 Export Data

The **Section Discharge Summary** data can be exported.

a. Right-click the **Section Discharge Summary** display and select **Export to CSV** to export a comma delimited file able to be used in spreadsheets and other programs.

b. Select **Copy** to copy the text to the Windows® clipboard as tabular delimited text.

c. Use the **Properties** function to change the type font used for the text.

Figure 44.   Section Discharge Summary

11.8 Using the Q Measurement Summary

The Q Measurement Summary creates a summary of the measurement that can be printed.

a. Start *WinRiver II SxS* and open a measurement file.

b. Playback / Reprocess the measurement (see "Reprocess Measurement ," page 17).

c. Check/edit the Site Information by right-clicking on **Site Information** in the Section Project Control window and selecting **Site Wizard**.

d. On the **File** menu, click **Print Preview Q Measurement Summary**.

e. On the **Q Measurements** screen, click **Print** to print a copy of the discharge summary.

Teledyne RD Instruments
StreamPro Section-By-Section Discharge Summary   Date: 01/07/2005

Site Information	Measurement Information	
Site Name:	Units of Measure:	SI
	Measure No.:	0

Summary:
Width: 7.438   Area: 7.600   Velocity: 0.255   Stage: 0.020   Discharge: 1.938

Personnel & Equipment
Party:

Rating Information

Est. Uncert.:	3.496	L. Edge Type: USGS/ISO	R. Edge Type:	USGS/ISO
Num. Stations:	22	L. Edge Coeff.: 1.000	R. Edge Coeff.:	1.000
Rated Q:	0.440	Begin Shore: RIGHT		

System Information / **System Setup**

Serial Number:		ADCP Depth: 0.050	Meas. Angle: 0.000
Firmware Version:	31.03	Cell Size: 0.07	Num. Cells: 20
Software Version:	1.02.10.01		
System Frequency:	2.0 MHz		

Stn. #	Distance (m)	Depth (m)	Width (m)	Start Time	Meas. Time (s)	Percent Good	Velocity Coeff. of Variation	Velocity Average (m/s)	Velocity Adjusted (m/s)	Angular Corr. Factor	Area (m²)	Discharge (m³/s)	% of Total
1	0.030	0.000	0.366	12:59:05	38.00	97.44	0.00	0.000	0.000	1.000	0.000	0.000	0.00
2	0.762	0.546	0.518	12:59:05	38.00	97.44	60.13	0.059	0.059	1.000	0.283	0.017	0.86
3	1.067	0.764	0.305	13:01:24	40.00	87.80	43.69	0.099	0.099	1.000	0.233	0.023	1.20
4	1.372	0.957	0.304	13:02:39	41.00	92.86	29.57	0.153	0.153	1.000	0.291	0.044	2.30
5	1.676	1.159	0.304	13:04:04	40.00	95.12	25.36	0.161	0.161	1.000	0.353	0.057	2.94
6	1.981	1.271	0.305	13:05:02	40.00	95.12	22.89	0.196	0.196	1.000	0.388	0.076	3.91
7	2.286	1.360	0.305	13:06:00	40.00	95.12	20.57	0.193	0.193	1.000	0.415	0.080	4.14
8	2.591	1.415	0.305	13:06:57	40.00	95.12	18.21	0.209	0.209	1.000	0.431	0.090	4.65
9	2.896	1.423	0.304	13:08:24	40.00	95.12	11.96	0.239	0.239	1.000	0.433	0.103	5.34
10	3.200	1.422	0.304	13:09:30	40.00	92.68	17.19	0.263	0.263	1.000	0.433	0.114	5.89
11	3.505	1.425	0.305	13:10:33	40.00	95.12	13.99	0.277	0.277	1.000	0.434	0.120	6.21
12	3.810	1.433	0.305	13:11:35	40.00	90.24	10.76	0.291	0.291	1.000	0.437	0.127	6.57
13	4.115	1.444	0.305	13:13:07	40.00	95.12	11.66	0.290	0.290	1.000	0.440	0.128	6.59
14	4.420	1.447	0.304	13:14:11	40.00	92.68	10.12	0.310	0.310	1.000	0.441	0.137	7.06
15	4.724	1.442	0.304	13:15:08	40.00	92.68	12.24	0.327	0.327	1.000	0.439	0.144	7.42
16	5.029	1.406	0.305	13:16:08	39.00	95.00	9.86	0.320	0.320	1.000	0.429	0.137	7.08
17	5.334	1.311	0.305	13:17:08	39.00	92.50	11.48	0.333	0.333	1.000	0.400	0.133	6.88
18	5.639	1.224	0.305	13:18:17	40.00	95.12	10.04	0.321	0.321	1.000	0.373	0.120	6.18
19	5.944	1.038	0.304	13:19:16	40.00	95.12	15.30	0.319	0.319	1.000	0.316	0.101	5.21
20	6.248	0.826	0.304	13:20:43	40.00	95.12	15.86	0.321	0.321	1.000	0.251	0.081	4.17
21	6.553	0.620	0.610	13:22:17	38.00	97.44	20.58	0.277	0.277	1.000	0.378	0.105	5.41
22	7.468	0.000	0.457	13:22:17	38.00	97.44	0.00	0.000	0.000	1.000	0.000	0.000	0.00

Diagnostic Files
Raw File: sxs_000r.000   Config. File: sxs_000r.mmt

Field Notes:

Figure 45.   Q Measurement Summary

12   Shortcut Keys

Use the shortcut keys to quickly perform tasks.

Table 4:   *WinRiver II SxS* Shortcut Keys

Key	Description
F1	Help
F4	Start/Stop Pinging
F5	Start/Stop Measurement
F7	Properties
F8	Toggle Bank
F9	Toggle Ensemble Header Tabular view
F11	Toggle Detailed Discharge/Composite Tabular view
F12	Toggle Discharge Summary Tabular view
Ctrl-A	Set as Active Configuration (when Measurement Control window selected)
Ctrl-B	Reference - Bottom Track
Ctrl-C	Copy
Ctrl-D	Toggle Acquire Control window
Ctrl-E	Close Measurement File
Ctrl-F	Create Measurement from Data Files
Ctrl-F2	Apply to All Active Configurations
Ctrl-F3	Toggle Measurement Management window (when selected)
Ctrl-F5	Reprocess Measurement
Ctrl-F7	Properties (when window or file selected)
Ctrl-F8	Data Selection (when Profile or Contour plot selected)
Ctrl-U	Duplicate Configuration node (when Measurement Control window selected)
Ctrl-T	Delete Configuration node (when Measurement Control window selected)
Ctrl-T	Export to CVS (When Discharge Summary selected)
Ctrl-J	Rename Configuration node (when Measurement Control window selected)
Ctrl-R	Reset Configuration node Properties (when Measurement Control window selected)
Ctrl-I	Site Wizard
Ctrl-K	Add Note (when Measurement Control window selected)
Ctrl-L	Lock/Unlock Measurement File
Ctrl-M	View Command Log
Ctrl-N	Reference - None
Ctrl-O	Open measurement file
Ctrl-P	Print
Ctrl-S	Save Measurement File
Ctrl-W	New Measurement
Shift-F4	Set ADCP Clock
Shift-F8	Execute RGTest
Shift-F9	Execute Pressure Sensor Test
Shift-F10	Execute Compass Calibration
Minus	Previous Ensemble (Playback)
Space	Next Ensemble (Playback)
Ctrl-Minus	Previous Section (Playback)
Ctrl-Space	Next Section (Playback)
Home	First Ensemble (Playback)
End	Last Ensemble (Playback)

13   Software History

Version 2.00

- Initial release.

Version 2.01

- Added capability to reprocess with different section angles than the data was collected.
- Changed layout of Composite Tabular display.
- Changed behavior after re-processing so the program re-positions to ensemble/section selected by the user.
- Fixed problem with calculating mean velocity during acquire after changing IP Distance.
- Fixed problem with discharge not being updated after changing velocity reference.
- Fixed value of "Distance from IP" in CSV file.
- Fixed value of "Total_Width" in CSV file when saving file in English units.
- Fixed problem with "SxS Report" not being updated with some values from Site Information page.
- Changed resolution of "Correction Factor" on "Section Properties" dialog.
- Removed "Transect Number" from the wizard.
- Fixed problem with decoding some values from StreamPro XML file.
- Changed auto-scaling of "Section Contour" graph so section and ensemble velocity are scaled the same.
- Fixed "Bottom Q" value on section contour graph.
- On the "Section Properties" dialog added display of the "Edge Shape".
- Added pre-filling of some Acquire Wizard fields.
- Fixed problem updating Composite Tabular when Flow Type was changed.
- Fixed problem handling poor bi-directional flow type data set.
- Fixed problem in Section Properties Dialog: Acquisition interval was always 40 sec.
- Fixed problem with bad distance value in "Section Discharge Summary" if section was rejected.

<u>NOTES</u>

NOTES