StreamPro

Deployment Guide

TELEDYNE MARINE
Everywhereyoulook™

P/N 95B-6129-00 (December 2024)

https://www.teledynemarine.com

Table of Contents

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:

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Field Service – rdifs@teledyne.com	Field Service – rdiefs@teledyne.com

Client Services Administration – rdicsadmin@teledyne.com

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For all your customer service needs including our emergency 24/7 technical support, call +1 (858) 842-2700

Self-Service Customer Portal

Use our online customer portal at https://www.teledynemarine.com/support/RDI/technical-manuals to download manuals or other Teledyne RDI documentation.

Teledyne Marine Software Portal

Teledyne RD Instruments Firmware, software, and Field Service Bulletins can be accessed only via our Teledyne Marine software portal.

To register, please go to https://tm-portal.force.com/TMsoftwareportal to set up your customer support account. After your account is approved, you will receive an e-mail with a link to set up your log in credentials to access the portal (this can take up to 24 hours).

Once you have secured an account, use the Teledyne Marine software portal to access this data with your unique username and password.

If you have an urgent need, please call our Technical Support hotline at +1-858-842-2700.

Preparing the StreamPro

PREPARING THE STREAMPRO INCLUDES THE FOLLOWING STEPS:

- Checking you have all the StreamPro parts
- Installing the documentation and software
- Assembling the float

Identifying what's in the Box

Included with the StreamPro system:

Part Number	Name	Description
SPADCP-I	StreamPro system	The StreamPro system includes the transducer and electronics housing. When unpacking, use care to prevent physical damage to the transducer and connector. Use a soft pad to protect the transducer.

Included with the StreamPro Accessories Kit (SPADCP-A):

Part Number	Name	Description
1650	Shipping case	Shipping case with custom foam cutouts.
SPFLOAT	StreamPro Float	Tri-hull float and arm assembly for tethered deployments. Various GPS mounts and kits are available. For more information on GPS mounting kits, see Appendix B in the StreamPro ADCP Guide.
75BK6007-00	Solar Shield	Protects the electronics housing from the sun/overheating.
PC1500	AA batteries	16 AA batteries
95Z-6007-00	Download instructions	This sheet has instructions for downloading the software and manuals.
	WinRiver II Software	TRDI's river and coastal data acquisition software package where the primary use is for discharge calculation. Although this is its primary function, it can be used for general coastal survey applications.
	TRDI Toolz Software	Utility and testing software package that can be used to test the StreamPro.
	SxS Pro Software (optional)	Section-by-Section (SxS) Pro is a stationary ADCP discharge data collection and processing program (registration code is required to collect data).
	Q-View Software (optional)	*Q-View* is designed for customers using *WinRiver II* software to have easy access to an evaluation of the quality of collected data while they are still in the field and back in the office.
75BK6057-00	Windows Tablet (optional)	Optional Windows tablet and tablet setup card.
95B-6128-00	StreamPro Getting Started	A printed reference sheet showing how to get started with the StreamPro.
SD1000U DAT5-G01R	USB Bluetooth device	USB Bluetooth device SD1000U and Sena DAT5-G01R antenna.
75BK6003-00	Spare parts kit	See below for a list of parts included.

For instructions on using the USB Bluetooth device, see the WinRiver II Software User's Guide and the instructions included with the device.

When WinRiver II is installed, shortcuts to the WinRiver II Software User's Guide and quick reference cards are added to the Windows Start menu.

Spare Parts Kit 75BK6003-00:

Description	Part number	Where Used
O-ring, housing cover, 2-162	97Z-6033-00	Replacing the Electronic Housing O-Ring
O-ring, battery cover, 2-036	97Z-6025-00	Replacing the Battery Compartment O-Ring
Silicone Lubricant, 4-pack	5020	O-ring replacement
Battery Holder, 8 AA Cells	12BH381	Replacing Batteries
Thumb Screw, M4	81B-4018-00	Battery cover
Washer, Small OD, 8MM SST	M4WASHSMOD	Electronic chassis cover plate
Washer, Split Lock, SST	M4WASHSPL	Electronic chassis cover plate

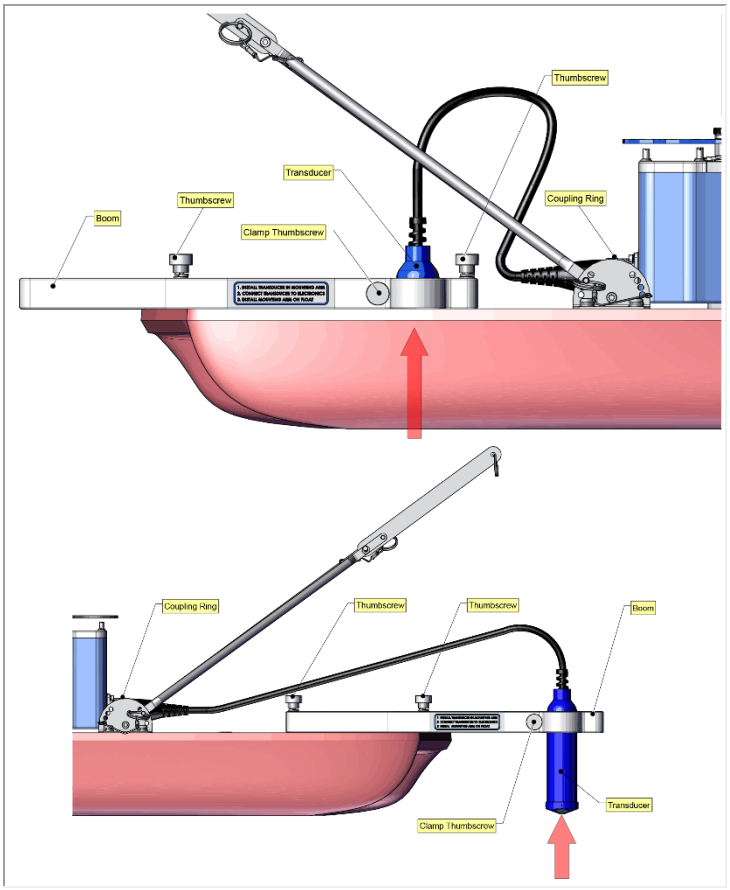
Installing Documentation and Software

The StreamPro documentation and software are downloaded.

1. Follow the instruction sheet on downloading TRDI software and manuals.
2. Software is available on https://tm-portal.force.com/TMsoftwareportal. Install *WinRiver II* and *TRDI Toolz*, *SxS Pro* (optional), and *Q-View* (optional) software. Both *WinRiver II* and *TRDI Toolz* programs are needed to test and deploy the StreamPro system.
3. Use our online customer portal at https://www.teledynemarine.com/support/RDI/technical-manuals to download manuals or other Teledyne RDI documentation. Download the StreamPro Guide. PDF versions of all StreamPro documentation are available for download.

StreamPro ADCP Guide

Assembling the Float



To attach the boom to the float:

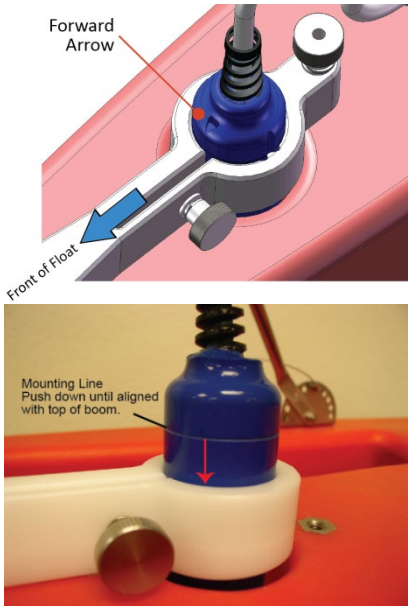
Loosen the clamp thumbscrew on the boom.

Feed the transducer cable up through the bottom of the clamp.

Attach the transducer cable to the electronics housing connector.

Do NOT turn the coupling ring on the transducer cable any further once it clicks into place. Over-tightening the coupling ring will cause the locking teeth to break.

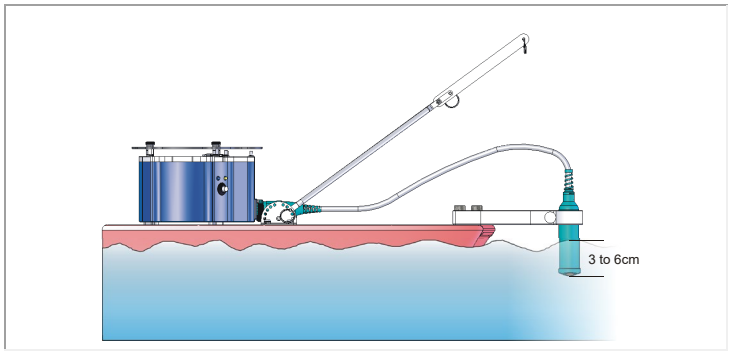
Do NOT use any tools to tighten the coupling ring. It should only be "finger tight".



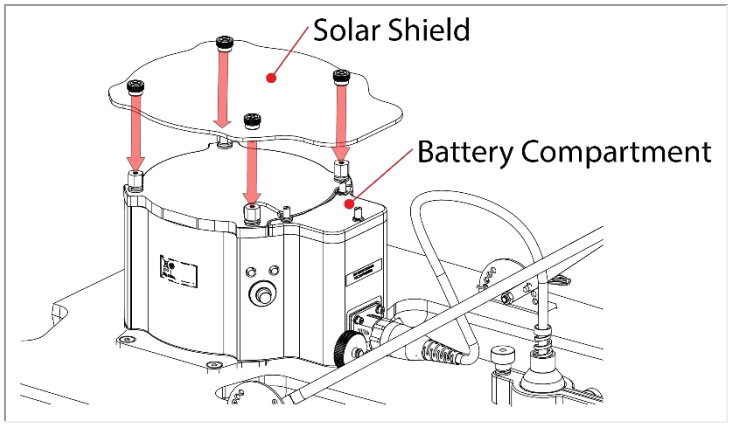
To adjust the transducer angle and depth:

Locate the embossed arrow on the top edge of the transducer and rotate the transducer so that the arrow is pointing to the front of the float.

For the in-hull position, the transducer needs to be pushed into the arm until the line is flush with the top of the boom.



For the extended position, adjust the transducer depth as shallow as possible.



To attach the solar shield:

Attach the solar shield to the standoff bolts on the electric housing cover plate using the attached thumbscrews.

Tighten the thumbscrews “finger tight”. Do not over tighten.

It is important to only gently finger tighten the sunshield screws when placing the sunshield back on the electronic housing M6 standoff bolts. Should any movement occur on the M6 standoff bolts due to over tightening the sun shield screws, the Loctite seal will be broken, and thus allowing the M6 standoff bolts to subsequently become loose.

Quick Review

Check that you have all the StreamPro parts.	If you are missing parts, contact TRDI support rdifs@teledyne.com or call +1 (858) 842-2700.
Check that the software and documentation is installed.	Install WinRiver II and TRDI Toolz.
Assemble the float	See the StreamPro ADCP Guide, chapter 2

Connecting to the StreamPro

CONNECTING TO THE STREAMPRO INCLUDES THE FOLLOWING STEPS:

- Installing a battery pack
- Connecting to the system using WinRiver II

What type of power does my system need?

The StreamPro ADCP requires a DC supply between 10.5 volts and 18 volts. Use eight AA Alkaline batteries or eight AA Rechargeable Nickel-metal hydride batteries. For the longest continuous operation time, use eight AA Lithium batteries.

To replace the batteries:

1. Turn the power switch OFF.
2. Remove the solar shield by loosening the four thumb-screws.
3. Open the battery compartment door by loosening the three thumbscrews.
4. Place the battery holder in the housing making sure the battery contacts on the holder match the two springs inside the housing
5. Close the battery compartment door and tighten the thumbscrews. Only tighten the battery cover thumbscrews finger tight.
6. Install the solar shield.

Check that the battery voltage is above 11.5 Volts DC. StreamPro ADCPs will work at 11.5 VDC with at least 400 milli amps; however, batteries with voltages below 11 VDC are at or near their end of life and are approaching uselessness.

A blinking amber LED indicates the battery level is low.

TRDI strongly recommends that users install the drivers and test communications in a location with internet access before proceeding to their measurement location.

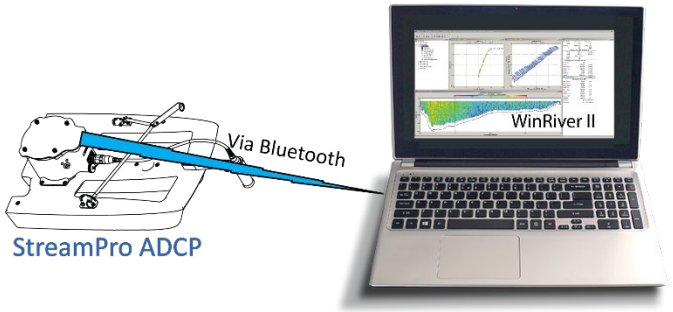


Figure 1. StreamPro Connections – Bluetooth Connection

Some Bluetooth devices may ask for a passkey, PIN code, Pair code, Pairing code, Security code, or Bluetooth code.

In all cases, the code is 0 or 0000 (zero, not the letter o).

The pin code is 0 for systems shipped prior to August 2017 and 0000 for systems shipped after August 2017. If your system is sent in for repair and the Bluetooth module is replaced, the pin code (if needed) will change from 0 to 0000.

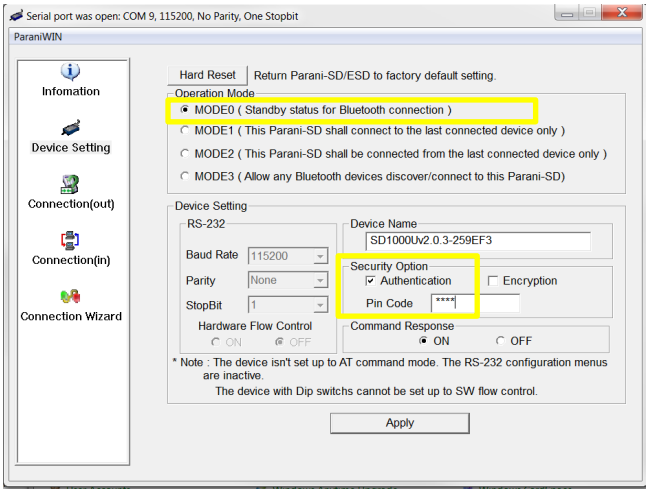
For StreamPro systems shipped after August 2017, the Microsoft® Bluetooth drivers work with *WinRiver II*. For best results, use the USB Bluetooth device with the driver supplied with the StreamPro for *WinRiver II.*

To connect to a StreamPro ADCP:

1. Attach the Transducer cable to the StreamPro Electronics chassis and install the battery pack. Turn on the StreamPro power switch.
2. Plug in the SD1000U device to a USB port and determine the Com port used.

See the WinRiver II SD1000U Bluetooth Communication Setup Card for instructions.

3. Run the *ParaniWin* program and connect to the ADCP. With the Bluetooth modules used since August 2017 (or a repaired older unit where the Bluetooth module was replaced) you may need to **Mode 0** and **Authentication** (not Encryption). The code is 0000 (four zeros) and click **Apply**.



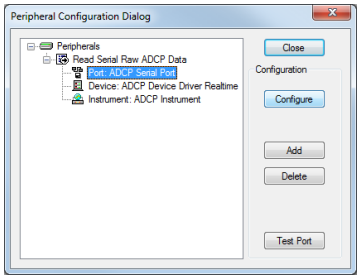
You may need to use either **Authentication** or no authentication when using *ParaniWin* with an SD100U. Try one, and if does not work try the other. Use whichever one works going forward.

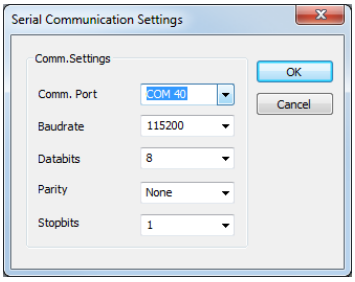
The selection of Mode 0 or Mode 1 is independent of Authentication/no Authentication:

- Mode 1 automatically reconnects to the ADCP but is otherwise identical to Mode 0.
- You must establish an outgoing connection before you can switch to Mode 1, but once in Mode 1 you can not connect to a different ADCP without switching back to Mode 0.

4. Exit the *ParaniWin* program.
5. Start *WinRiver II*.
6. On the **Configure** menu, select **Peripherals**.

7. Select **Port: ADCP Serial Port** and then click the **Configure** button.
8. Select the **Comm. Port** number as noted in step 2. The **Baudrate** must be set to 115200. Leave the **Databits**, **Parity**, and **Stopbits** as shown.
9. Click **OK** to close the Serial Communication Settings screen.





Note it may take several seconds to accept the Comm. Port selection.
In this example, the Comm. Port is set to Com Port 40.

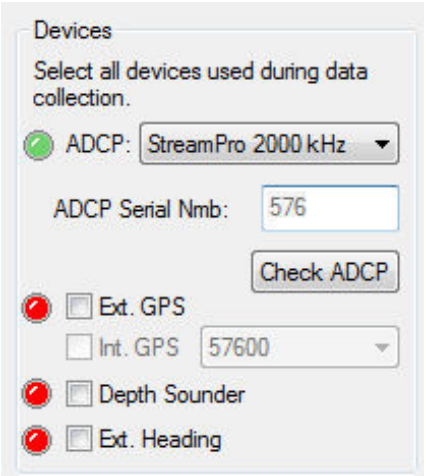
10. Click the **Test Port** button. The StreamPro banner appears.

```
>break

StreamPro ADCP
Teledyne RD Instruments (c) 2015
All rights reserved.
Firmware Version: 31.xx

>
```

11. Click the **Close** button to exit the Test Port Dialog.
12. Click the **Close** button once more to exit the Peripherals Configuration Dialog.
13. Start a new measurement in *WinRiver II*.
14. On the **Configuration Dialog**, ensure the **ADCP** type matches the StreamPro and the indicator next to the StreamPro is green. Verify the blue LED on the StreamPro ADCP is on.



Quick Review

	
Connect to the StreamPro using a Bluetooth connection	For instruction on using the SD1000U USB Bluetooth device, see Chapter 2 in the WinRiver II Software User's Guide and the instructions included with the device. See the WinRiver II SD1000U Bluetooth Communication Setup Card for instructions. A PDF copy is installed with the WinRiver II software.

Using GPS

Moving boat ADCP discharge measurements require a navigation (boat speed) reference to separate ADCP motion from the measured data to determine the true water velocity relative to earth, and to track the movement of the ADCP across the section of interest. The ADCP's bottom track data at times cannot be used for that purpose due to factors such as bottom vegetation or other conditions interfering with the bottom track measurement, or high sediment/bed loads causing bias in the bottom track data. In those cases, GPS/GNSS data is often used to track the motion of the ADCP for use in processing and discharge calculations.

GPS/GNSS units used with the StreamPro ADCP must provide their own power source and communications links. Two such units are the Geneq SX Blue II and the Juniper Systems Geode GNS3M systems. These GPS/GNSS units are commonly used as they provide acceptable accuracy (~0.6m 2d RMS where SBAS is available) in a package light and small enough to be used on the standard StreamPro float, are battery powered, and include Bluetooth comms. The Geode GNS3M is also capable of receiving Atlas corrections via satellite; an Atlas Basic (H100) activation maintains sub-meter accuracy worldwide and thus is suggested for use in regions where SBAS corrections are not available.

This guide provides instructions for using GPS with the StreamPro ADCP and the WinRiver II software. Included are instructions for mounting the Geode GNS3M on the StreamPro float and Riverboat SP. Instructions for mounting the SX Blue II are provided in documents 95B-6080-00 (Riverboat SP) and 95B-6081-00 (standard float). Other brands and models can also be used; the general setup and configuration concepts presented herein apply equally to comparable units.

GPS stands for Global Positioning System as operated by the U.S. government. GNSS stands for Global Navigation Satellite System, a more generic term that includes GPS, GLONASS (Russia), Beidou (China), Galileo (EU) and other systems. For simplicity, the term GPS will be used throughout the remainder of this document.

Mounting the Geode on a StreamPro

The Geode GNS3M is normally mounted on the sunshield assembly of the StreamPro electronics. The kit supplied by Teledyne RDI includes a modified sunshield with mounting holes for the Geode. Simply attach the Geode to the sunshield using the 2 supplied #6-32 screws with flat and lock washers, then mount the sunshield on the StreamPro electronics assembly. Orientation of the Geode on the sunshield does not matter for GPS operation, however it may be convenient to have the LEDs of the GPS facing the front of the StreamPro.

Best practice requires mounting the GPS as close to directly above the ADCP as practical to avoid parallax errors between GPS antenna and ADCP motion. The mounting position of the GPS on top of the StreamPro electronics maintains the stability and operability of the float, and the small distance between the StreamPro transducer and the GPS position minimizes potential parallax errors. WinRiver II does contain provisions for entering the GPS position offset if desired; please contact TRDI Field Service for more information if desired.

Capturing Data from a GPS

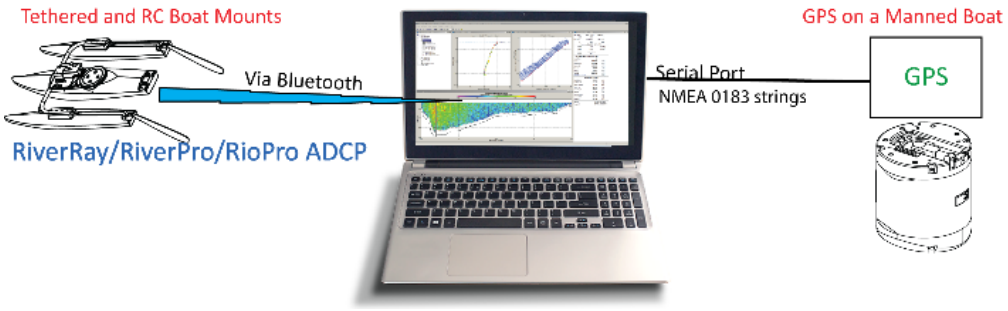
StreamPro and GPS data will typically be captured directly in the WinRiver II software using Bluetooth communications. The GPS system must output its data as NMEA 0183 strings, typically using only the GGA and VTG strings at a 1Hz rate which is consistent with the nominal StreamPro 1hz ensemble rate. The WinRiver II software requires separate Bluetooth comm ports for the StreamPro and GPS data streams.

Geode Bluetooth Connection

The Geode (and SX Blue II) GPS kits offered by Teledyne RDI include a SENA Parani SD1000U Bluetooth-USB adapter and high gain antenna. This adapter appears to the data collection computer as a USB serial port with the Bluetooth functionality embedded in the adapter. Configuration of the adapter and establishment of a Bluetooth connection is normally accomplished using the ParaniWin Software, available from the SENA Industrial web site here: Parani-SD1000U Bluetooth USB Adapter. Suggested configuration for the SD1000U is to set a fixed baud rate of 115,200 with no flow control using the DIP switches, then using ParaniWin to select Mode 1 operation with authentication and encryption unchecked, then pairing with the GPS. These settings will ensure that the SD1000U automatically reconnects with the GPS if power is cycled, or the Bluetooth connection is dropped for whatever reason.

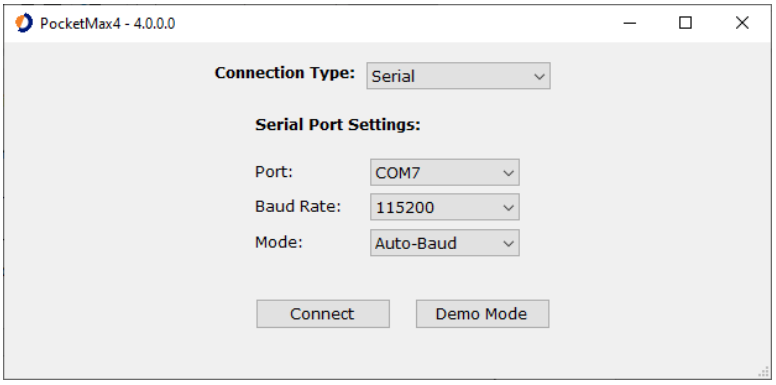
GPS System Configuration

Both the Geode and SX Blue II GPS systems use Hemisphere brand GPS modules, and configuration is normally accomplished using the Hemisphere PocketMax software and a computer. Current (Feb 2023) PocketMax version is 4.0.0.0. Software is available from the Hemisphere GNSS web site here: https://www.hemispheregnss.com/firmware-software/. Alternatively, you may using the SXBlueConfig software for the SX Blue II available from SXblue GPS, or the Geode Connect software with the Geode available from Juniper Systems, Inc.

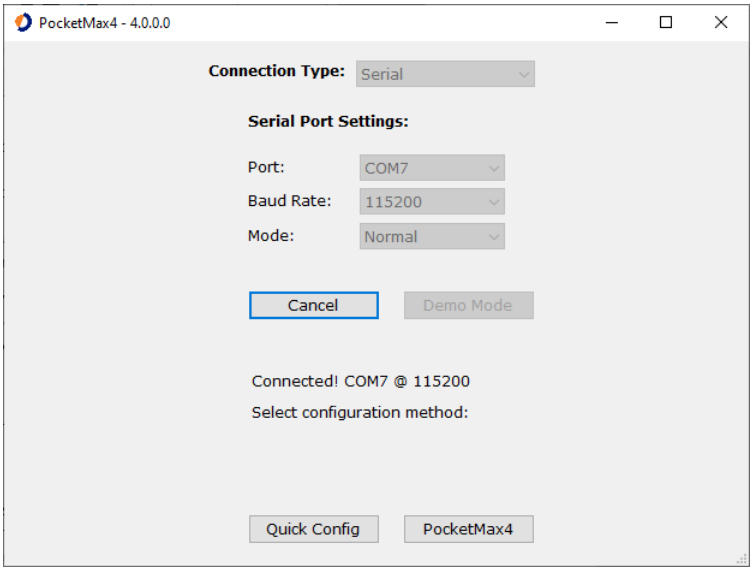


To configure the GPS for use with an ADCP and WinRiver II:

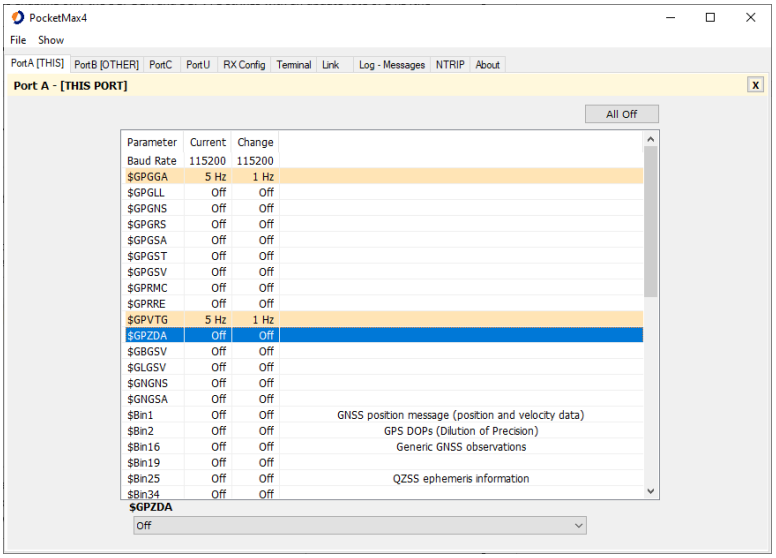
1. Install the PocketMax software on your computer.
2. Turn on the power to the GPS. Connect the computer to the GPS system using the SD1000U Bluetooth adapter and ParaniWin software as described above.
3. Run the PocketMax software. You will see a connection window similar to the one shown. Select the appropriate COM port and select the Auto-Baud mode as shown. Then click the Connect button.



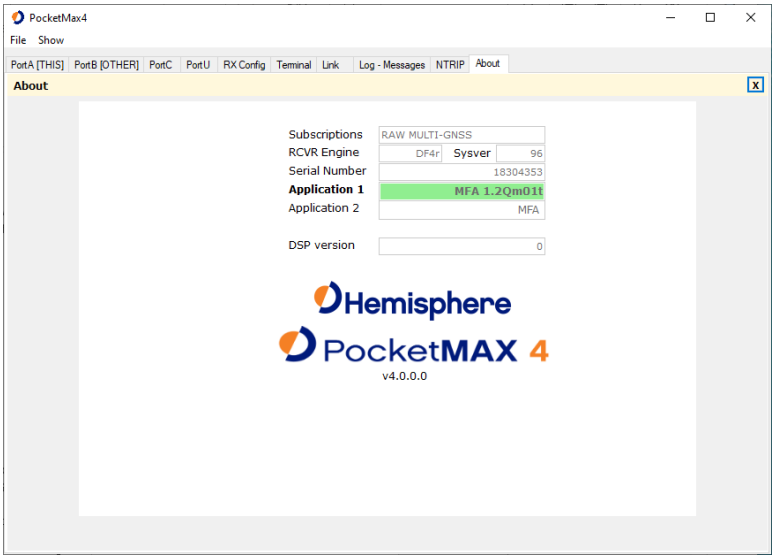
4. The software will attempt to connect to the GPS, initially using the specified port and baud rate and then at varying baud rates. If the software is not able to communicate with the GPS verify that the GPS is powered on, the Bluetooth adapter has a valid connection, and that you are using the proper serial (COM) port. The following window will be displayed once the software has established communications with the GPS. Either configuration option can be selected, but the Quick Config option is recommended unless you need to review advanced GPS operational characteristics. The GPS can be configured indoors but must be outside with a clear view of the sky if you wish to monitor GPS performance.



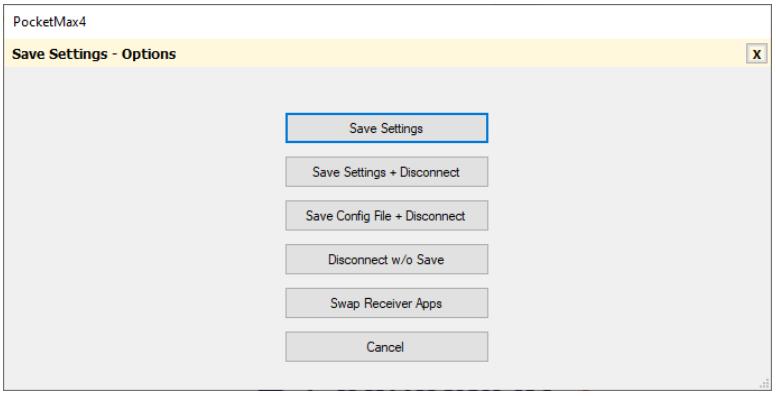
5. Select the PortA tab from the following window. DO NOT change the baud rate setting here – it will not affect the Bluetooth data transfer rate. TRDI recommends enabling only the $GPGGA and $GPVTG strings with an update rate of 1 hz (the maximum rate supported by the Geode in its default configuration) to match the StreamPro 1hz update rate, with all other strings set to OFF. Optionally, the $GPZDA string may be configured for 1hz output rather than off; this string can be used in WinRiver II to set the StreamPro time from GPS rather than from the computer's clock if desired.



6. If desired, select the About tab to confirm the application name and firmware version in use by your GPS. Updating the firmware in the Geode is normally not required.



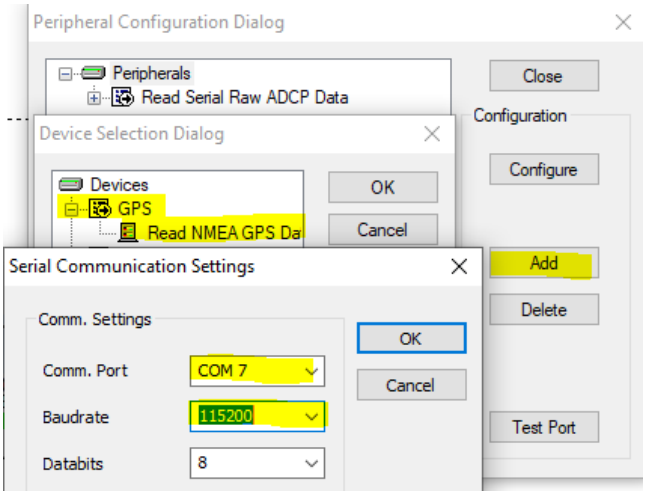
7. Save your changes by clicking on File, Exit or the red 'X' close button in the upper right corner of the program window. Select Save Settings + Disconnect from the following window. When the software finishes saving the settings, the software will return to the connection window.



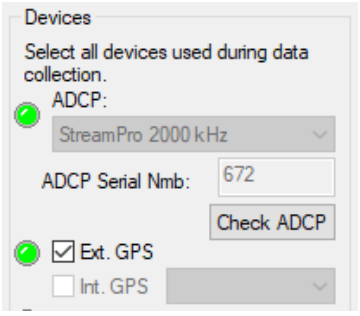
8. Re-connect to the GPS and confirm that all your changes were properly saved. If you wish to monitor the performance of the GPS, use the PocketMax3 option. You must be outdoors with a clear view of the sky if you wish to monitor the GPS performance.
9. Disconnect from the GPS again and close the PocketMax software. You are now ready to deploy the GPS with your ADCP.

Configuring WinRiver II

You will first need to configure WinRiver II with that port using the peripheral configuration dialog as shown:



Next, when creating a new measurement using the new measurement window, check the box for 'Ext. GPS' as shown:



Then continue with the measurement as you normally would, selecting the navigation (boat speed) reference as desired.

Quick Review

✔ Use the GPS Tabular 1 display	Read Chapters 3, 6, and 13 in the WinRiver II Users Guide.
✔ Use *WinRiver II* to verify that the ADCP is receiving GPS data	

Prepare for Discharge Measurement

PREPARING FOR DISCHARGE MEASUREMENT INCLUDES THE FOLLOWING STEPS:

- **RUNNING THE WINRIVER II MEASUREMENT WIZARD**
- **RUN THE BUILT-IN TESTS ON THE ADCP**
- **RUN THE COMPASS CALIBRATION ON THE ADCP**
- **RUN THE MOVING BED TEST/SET THE CLOCK**

Prepare for Discharge Measurement

The Hydrologist arrives at the site with a StreamPro and all the ancillary equipment necessary to perform a discharge measurement.

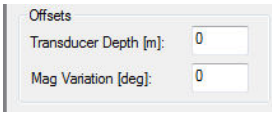
- **Tethered boat w/ tagline** – The Hydrologist sets up a tagline/pulley system for the tethered boat and then proceeds to install the StreamPro in a standard RiverRay boat. Tethered boat measurements can also be performed from a bridge or other structure across the river. This tends to provide reduced control over the tethered boat motion in the water, as the bridle/line length is longer giving the Boat more freedom to move with the water currents. Measurements taken from bridges or other structures often encounter greater turbulence in the form of jets and eddies created by the structure or bridge piers.
- **Remote Control Boat** – The StreamPro is attached to a Q/Z1250 Power Trimaran or equivalent.

If the measurement site is expected to have significant moving bed conditions, the Hydrologist may decide to connect a portable GPS module to the StreamPro.

The StreamPro AA battery pack is installed. Next, the Hydrologist powers on the laptop, opens the discharge measurement application *WinRiver II* and connects to the StreamPro with a wireless connection.

Measurement Wizard

The Hydrologist selects to start a new measurement within the *WinRiver II* application. Once the Hydrologist enters all the background information on the site where the measurement will be performed, the software will then automatically detect whether an ADCP is connected and which ADCP product it is.



Use the **Transducer Depth** field to set the depth from the water level to the center of the slant beam transducer faces.

Enter the **Magnetic Variation** for the site.

See Chapter 3 Tutorials and Chapter 7 Using the Measurement Wizard in the WinRiver II User's Guide.

Run Built-In Tests

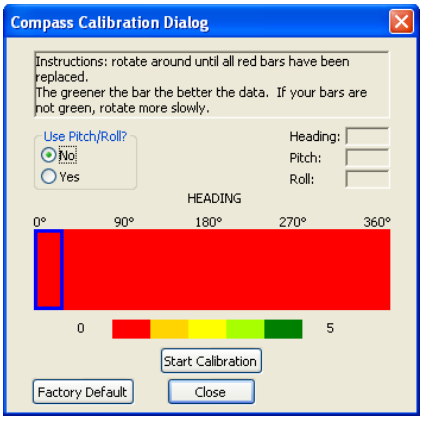
The StreamPro is commanded to perform a BIT test on power up. On the **Acquire** menu, click **Execute ADCP Test** to verify the ADCP is functioning properly.

See Chapter 3 Tutorials and Chapter 9 QA/QC in the WinRiver II User's Guide.

Compass Calibration

Next, the Hydrologist performs a compass calibration. After ensuring that the system is well away from sources of magnetic interference, the Hydrologist starts the compass calibration within the application and then either: slowly rotates the StreamPro as suggested by the application (tethered boat/SxS) or slowly drives the RC boat in a circle. During the calibration process, feedback is provided to the user as to the quality of the collected magnetic field data at each partition of the 360° of rotation.

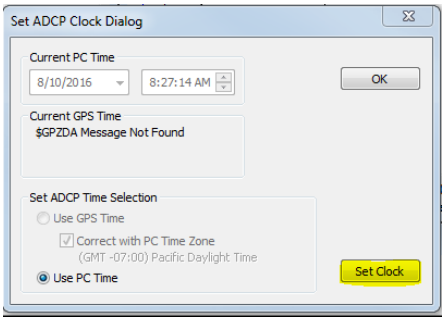
On the **Acquire** menu, click **Execute Compass Calibration**. When the calibration starts, select **No** for the **Use Pitch/Roll** selection. In normal river discharge circumstances, using the "No" Pitch and Roll selection is sufficient.



The no Pitch/Roll calibration (also called a single-tilt calibration) requires two rotations while the ADCP is on a flat, level surface.

Moving Bed Test/Set the Clock

At this point, the StreamPro should be tested, and the compass calibration completed; once those steps are complete, it is ready to start the moving bed test. The StreamPro is placed in the water, and the Hydrologist enters the command to start it pinging using the **Acquire** menu and click **Start Pinging** or use the shortcut key **F4**. If this is the first measurement taken, *WinRiver II* will prompt for the clock to be set. Click the **Set Clock** button.



On the **Acquire** menu click **Select Moving Bed Test**. Select **Stationary** or **Loop Test** and click the **Start** button.

Only clicking the **OK** button will **NOT** set the clock. The user **MUST** click the **Set Clock** button.

If the StreamPro was left in the hot sun, its temperature can quickly rise to 35° C before use. When initially placed in the water, the thermal mass of the StreamPro housing near the temperature sensor initially affects the temperature measurement. Within five minutes it reaches equilibrium, and the temperature is accurate within ± 1°C. If the temperature sensor is not allowed to sufficiently equilibrate within the body of water to be measured, it can impact Speed of Sound, velocity, and discharge-measurement accuracy.

Tethered boat – The StreamPro is moved to the center of the river, and the stationary moving bed test is started. After five minutes, the moving bed test is stopped, and the application displays the apparent moving bed velocity.

Remote Control boat – The Hydrologist begins a moving bed loop-test with the boat starting near the riverbank. The boat is maneuvered across to the opposite bank and back again. The user stops the test, and the loop test results are displayed.

Either type of moving bed test (stationary or loop) can be performed with either deployment method (tethered boat or RC boat).

Quick Review

✔ Run the Measurement Wizard	Read Chapter 7 in the WinRiver II Users Guide. Set transducer depth and magnetic variation.
✔ Run the Built-in tests, compass calibration, and moving bed tests ✔ Set the clock	Read Chapter 9 in the WinRiver II Users Guide. Click the **Set Clock** button.

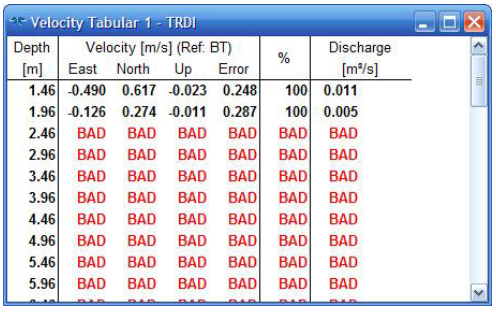
Locating the Start & Stop Positions

LOCATING THE START AND STOP POSITIONS INCLUDES THE FOLLOWING STEPS:

- Locating the Start and Stop Positions

Locating the Start and Stop Positions

While the StreamPro is pinging, the Hydrologist positions the boat until the application shows that the StreamPro is reliably collecting at least two bins of data and marks the position on the tagline for future reference. Measure the distance to the shore from the StreamPro. The StreamPro is positioned to the opposite bank where two bins of data are reliably collected. Again, the tagline is marked and the distance to the shore from the StreamPro is measured.



Depth [m]	Velocity [m/s] (Ref: BT) East	North	Up	Error	%	Discharge [m³/s]
1.46	-0.490	0.617	-0.023	0.248	100	0.011
1.96	-0.126	0.274	-0.011	0.287	100	0.005
2.46	BAD	BAD	BAD	BAD	BAD	BAD
2.96	BAD	BAD	BAD	BAD	BAD	BAD
3.46	BAD	BAD	BAD	BAD	BAD	BAD
3.96	BAD	BAD	BAD	BAD	BAD	BAD
4.46	BAD	BAD	BAD	BAD	BAD	BAD
4.96	BAD	BAD	BAD	BAD	BAD	BAD
5.46	BAD	BAD	BAD	BAD	BAD	BAD
5.96	BAD	BAD	BAD	BAD	BAD	BAD

See Chapter 3 Tutorials and Chapter 10 Acquiring Discharge Data in the WinRiver II User's Guide.

Quick Review

✔ Locate the Start and Stop Positions	Read Chapter 3 and Chapter 10 in the WinRiver II Users Guide. Start/Stop distances from the center of the transducer to the shore should be measured as accurately as possible - at least to the nearest Deci-meter.

Discharge Measurements

Before starting a discharge measurement with a StreamPro ADCP using *WinRiver II*, the Hydrologist has:

1. Prepared the StreamPro, Boat or RC boat, and any external sensors being used
2. Configured the computer, communications link(s), and *WinRiver II* software for data collection using the StreamPro and any external sensors
3. Created a measurement file for the site
4. Ran the StreamPro Built-In tests
5. Performed the compass calibration procedure
6. Performed a moving bed test

The Hydrologist is now ready to start making the measurement.

Discharge Measurement

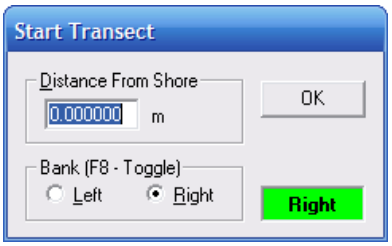
A proper moving boat discharge measurement consists of multiple transects – passes across the measurement location from one bank to the other, collecting data continuously as they cross. For each transect, the Hydrologist must maneuver the StreamPro to the marked position at one bank of the measurement location (see Locating the Start and Stop Positions) and hold that position while they measure the distance to the shore from the StreamPro. Then, start a measurement transect and enter the starting edge bank and distance into the *WinRiver II* software. After collecting the required number of edge ensembles, the Hydrologist maneuvers the StreamPro towards the opposite bank of the measurement location in a smooth and steady manner, collecting data continuously as they travel across the river, and monitoring for data loss and quality issues. When the Hydrologist reaches the marked position at the other bank of the measurement location, they hold that position while they collect the required number of edge ensembles, measure the distance to the bank, end the transect, and enter the ending edge distance in the *WinRiver II* software. After completing each transect, the Hydrologist performs a cursory review of the results and prepares to start the next transect.

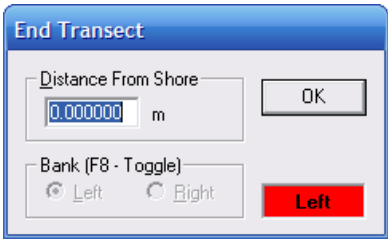
The best practice for a moving boat discharge measurement is to collect discharge transects in reciprocal pairs (one transect in each direction across the measurement location) with some minimum number of total transects and/or minimum cumulative total duration for all transects. For locations with steady-state flow conditions, at least four transect that agree with each other within 5% of the mean of all the samples, and additional transects and/or cumulative transect duration may be required if that criteria is not met. The Hydrologist must make sure that the maximum permissible relative residual (MPRR) is met before leaving the site. A minimum of two good water profile bins above the sidelobe cutoff are desired for all ensembles in a transect to enable extrapolation of flow in the unmeasured top and bottom regions of the profile.

Once at least four transect that agree with each other within 5% of the mean of all the samples have been collected, the Hydrologist/team will perform a QA/QC review of the data. Primary indicators of high StreamPro data quality include a minimum loss of Bottom Track depth and velocity data, minimum loss of ensemble and individual bin water profile data, maximization of the measured Q as a percent of total Q, and consistency of the water velocity profile data between bins (vertically) and ensembles (horizontally) across the transect.

Step by Step Data Collection

1. Open or create a measurement file.
2. Press **F4** to start pinging.
3. At the start/stop position, press **F5** to start the transect.
4. Enter the starting distance from the shore.
5. Select Left or Right bank.
6. Wait for 10 shore ensembles.
7. Move across the river.
8. At the stop/start position, wait for 10 shore ensembles.
9. Press **F5** to end the transect.
10. Enter the ending distance from the shore.
11. Repeat steps 3 through 10 to collect at least four transect that agree with each other within 5% of the mean of all the samples. The ADCP operator must make sure that the maximum permissible relative residual (MPRR) is met before leaving the site.





See Dynamic Residual Analysis, Chapter 6 in the WinRiver II User's Guide.

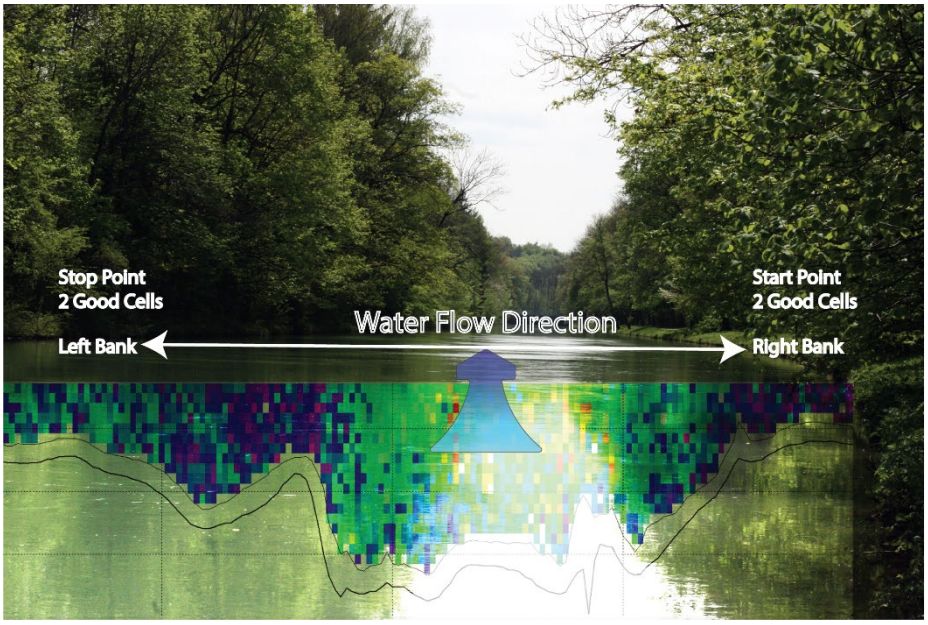


Figure 2. Overview of Data Collection

Data Collections Tips

- Locate the point where a solid two-depth cell measurement can be measured on both banks. Stake or otherwise mark these locations. They represent the starting and stopping points for the transects.
- Accurately measure and enter the **Distance from Shore** when prompted.
- Minimize the ADCP movement while Shore Ensembles are recorded.
- When departing from the edge, slowly accelerate the boat away from the edge and when approaching the other edge slowly reduce the speed such that the boat decelerates and does not overshoot the edge. The goal is to go from edge to edge and not overshoot at either edge. Doing so will allow you to obtain the most accurate measurements, in particular the area measurements.
- Move the ADCP at a slow steady pace in the water during transects.
- Collect a minimum of four transects that agree with each other to within 5% of the mean of all the samples. The ADCP operator must make sure that the maximum permissible relative residual (MPRR) is met before leaving the site (see Dynamic Residual Analysis, Chapter 6 in the WinRiver II User's Guide).

Quick Review

	
Collect at least four transect that agree with each other within 5% of the mean of all the samples.	Read Chapter 3 and Chapter 10 in the WinRiver II Users Guide.
Verify the data before leaving the site.	See Dynamic Residual Analysis, Chapter 6 in the WinRiver II User's Guide.

Glossary of Common Terms

Actors:

- Field hydrologist/Technician
- Data Analyst Expert (DAE)

Data Collection Terminology:

- Left/Right Bank – The Left bank is defined as the bank that would be on your left side if you were looking downstream.
- Transect – Data collection across the width of the river either from the Left bank to the Right bank or vice versa. (Sometimes referred to as a "Pass" across the river)
- Measurement – A collection (even number) of four or more Transects made of up of an equal number of Transects from Left to Right as Right to Left.
- Measured Discharge – The average of the discharges from the four (or more) transects.

Site/Measurement Conditions:

- Moving Bed/Moving Bottom – Movement downstream (typically) of near bed sediment. Moving Bed conditions will bias bottom-track velocities, which assume the streambed is stationary.
- Directional bias – This occurs when the discharges measured for transects from the left bank to the right bank are consistently either greater than or less than discharges measured for transects made from the right bank to the left bank.

Conclusion

Congratulations! You have completed the StreamPro Deployment Guide. Read the following manuals for more detailed information.

StreamPro ADCP Guide

This manual contains all the details of StreamPro maintenance, testing, trouble-shooting, commands, and data format description.

WinRiver II Software User's Guide

WinRiver II is TRDI's river and coastal data acquisition software package, where the primary use is for discharge calculation. Although this is its primary function, it can be used for general coastal survey applications.

WinRiver II Bluetooth Communications Setup Card

Quick reference card that shows instruction on using the SD1000U USB Bluetooth device.

SxSPro Software User's Guide

SxS Pro is a stationary ADCP discharge data collection and processing program for Teledyne RD Instrument's (TRDI) Rio Grande, StreamPro, RiverRay, and RiverPro/RioPro ADCP models. This program creates a measurement file, sends commands to the ADCP, lets the user collect data, visually displays the data, post-processes the data, and generates reports.

SxS Pro needs a Registration Code to enable data collection; however, data playback does not require a code. Please refer to the SxS Pro Quick Start Guide, Registration section for further details. Contact rdi.sales@teledyne.com to purchase an SxSPro license.

Q-View Software User's Guide

Q-View is Quality Assurance and Quality Control software for Water Resources discharge measurements using TRDI ADCP instrumentation. Q-View provides users with real-time feedback during ADCP data collection, or it can be implemented back in the lab during data review and analysis.

PDDecoder Library in C language

The Teledyne Marine PDDecoder library is an open-source library written in C language to decode the PD0 data formats that are commonly output by Teledyne Marine/Teledyne RD Instruments ADCPs. The definition and details of the PD0 format can be found in the StreamPro ADCP Guide, Commands and Output Data Format chapter.

Available for download from the Teledyne software portal: https://tm-portal.force.com/TMsoftwareportal