Attachment A – Description of Important Enhancements in WinRiver 10.05

In the following sections, italicized text refers to menu options or buttons in the WinRiver software.

Configuration File Locking

Configuration files for each transect can now be "Locked" and "UnLocked' in Playback mode by selecting *Lock/Unlock Configuration File* under the *File* menu, clicking the *lock/unlock* quick button on the menu bar 🔒, or by pressing Ctrl-L. If a configuration file is locked, any changes made to the configuration file while in playback mode will not be saved unless the file first is unlocked. This action prevents accidental saving of changes made to configuration files while "experimenting" with different settings or while reviewing discharge measurements. Locking also is important because the new Discharge Measurement Wizard (DMW) processes transects in the background. Locking the file ensures the configuration file is set up the way you intended for each transect when processed by the DMW. If a file is not locked when processed by the DMW a "U" is placed to the right of the corresponding transect on the printout. Configuration files should be locked for each transect after all settings have been confirmed and prior to running the DMW. A locked file signifies to checkers and reviewers that the configuration settings for these transects have been verified as correct for processing.

Discharge Measurement Wizard

The DMW is a tool that allows the user to summarize the transects that constitute a single discharge measurement. The DMW lets you enter station information (station number, station name, gage height, and other information about the measurement) and creates a summary of the measurement that can be printed and/or saved to a file.

The DMW can be run in Playback mode by selecting *Q Measurements Wizard* from the *File* menu or by pressing Control-Q. Afterwards, a dialog box similar to that shown in figure 1 will be displayed. The dialog box shown in figure 1 already contains user input. The user only needs to complete the entries in the dialog box. The diagnostic test, moving bed test, and compass calibration test files can be selected using the button to the right of the respective field.

1

Figure 1.--Discharge Measurement Wizard dialog box

When data entry on this form is complete, the user can select the rawdata files that comprise the measurement by clicking the *Select/Process Files* button at the bottom of the DMW dialog box (fig. 1). An example of file selection is shown in figure 2. All files to be used for the measurement must be selected at the same time. Multiple files may be selected by holding down the Ctrl key while clicking on the desired files.
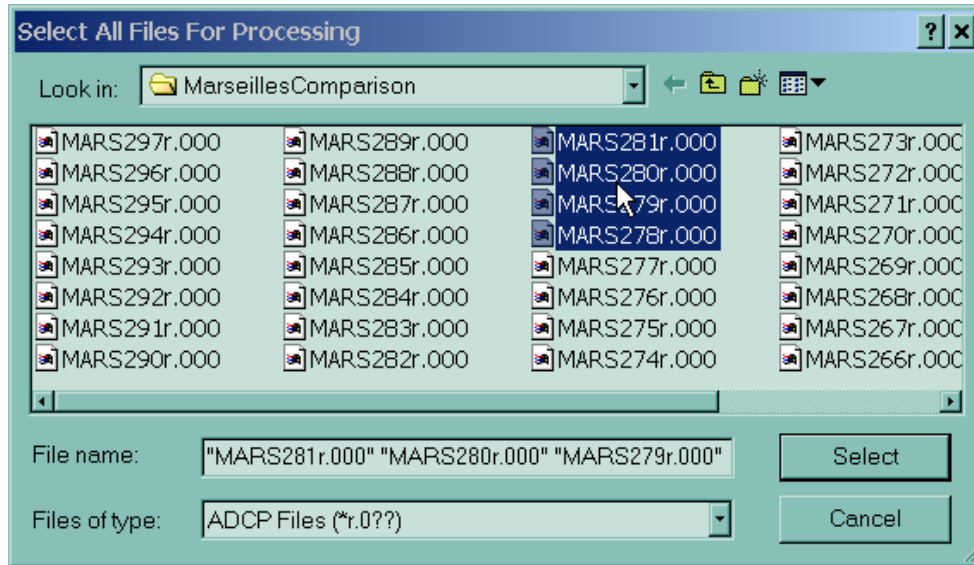
Figure 2.--File selection dialog box for the Discharge Measurement Wizard

Once the files are selected and processed, the DMW processes the files in the background. The results then can be displayed on the screen and, subsequently, printed by clicking the *Print* button from DMW dialog box. Finally, the results of the DMW can be saved by clicking the *Save As* button. It is recommended that the DMW file be saved and archived with the other measurement data files. The DMW printout can be trimmed and folded to standard measurement note size (5x8 inches).

The DMW summary includes user-entered data (shaded areas in figure 3) and values computed from the selected transects.

An example output from the DMW is shown in figure 3.

Station No.: 05543500   Meas. No: 370
Station Name: Illinois River at Marseilles, IL   Date: 07/10/2001

Party:	KAO, AMW	Width: 573 ft	Processed by: DSM/AMW
Boat/Motor:	Whaler w/ trolling motor	Area: 5,730 ft²	Mean Velocity: 1.03 ft/s
Gage Height: 2.39 ft		G.H.Change: 0.01	Discharge: 5,900 ft³/s

Area Method: Mean Flow	ADCP Depth: 0.58 ft	Index Vel.: 0.00 ft/s Rating No.:16
Nav. Method: Bottom Track	Shore Ens.: 10	Adj.Mean Vel: 0.00 ft/s Qm Rating:F
MagVar Method: On Site (0.0°)	Top Est: Power (0.1667)	Rated Area: 0.000 ft² % Diff: -3.3%
Depth Sounder: Not Used	Bottom Est: Power (0.1667)	Control: Unspecified

Screening Thresholds:

BT 3-Beam Solution: ON	Max. Vel.: 2.46 ft/s	**ADCP:**
WT 3-Beam Solution: OFF	Max. Depth: 15.6 ft	Type/Freq.: Rio Grande / 600 kHz
BT Error Vel.: 32.81 ft/s	Mean Depth: 10.0 ft	Serial #: 552 Firmware: 10.07
WT Error Vel.: 32.81 ft/s	% Meas.: 74.88%	Bin Size: 10 cm Blank: 25 cm
BT Up Vel.: 32.81 ft/s	Water Temp.: 65.0 °F	BT Mode: 5 BT Pings: 1
WT Up Vel.: 32.81 ft/s	ADCP Temp.: 84.6 °F	WT Mode:5 WT Pings: 1
		WZ:5

Diag. Test: mars0710.01   Filename Prefix: MARS
Moving Bed Test: mars-mbed-071001.txt   Software: 10.04.00
Compass Test: mars-ccal-071001.txt
Meas. Location: 0.3 miles downstream of Marseilles Lock

Tr.#		Edge D.		#Ens	Discharge						Width	Area	Time		Mean Vel.		% Bad	
		L	R		Top	Middle	Bottom	Left	Right	Total			Start	End	Boat	Water	Ens.	Bins
266	R	25	29	891	918	4502	500	14.0	32.7	5967	572	5728	10:41	10:48	1.27	1.04	1	8
267	L	25	28	914	910	4386	486	14.2	32.9	5830	574	5694	10:49	10:57	1.27	1.02	1	8
268	R	25	28	1206	931	4504	542	20.1	38.3	6035	572	5760	10:59	11:09	0.93	1.05	2	10
269	L	25	28	735	900	4375	526	13.4	33.5	5848	575	5771	11:10	11:16	1.47	1.01	6	10
270	R	26	28	910	900	4312	550	21.1	24.0	5806	571	5704	11:27	11:34	1.37	1.02	5	12
Mean		25	28	931	912	4416	521	16.6	32.3	5897	573	5731	**Total**	00:53	1.26	1.03	2	10
SDev		0	0	171	13.1	84.4	27.0	3.74	5.17	98.9	2	34			0.20	0.02		
R/M%		4	4	50.6	3.4	4.4	12.2	46.7	44.3	3.9	0.7	1.4			42.18	3.34		

Remarks: Concurrent Price AA comparison measurements were made upstream by another party.
Flow is relatively slow and not altogether uniform across the measuring section.

Figure 3.--Example output from Discharge Measurement Wizard

Configuration Wizard

The Configuration Wizard (CW) is the tool that should be used to set up an ADCP for data collection. Since this feature became available in version 10.03, the number of user errors in configuring an ADCP has been greatly reduced. Data collected when the CW has been used tends to be better quality and with many fewer mistakes. The CW is invoked in Acquire mode by selecting *Configuration Wizard* under the *Settings* menu or by pressing Shift-F6. OSW recommends that the CW be used every time a site is visited, so that the user can enter information that reflects the current site conditions. An example of the Configuration Wizard is shown below.

Figure 4.--Configuration Wizard Dialog Box

When the *Run Wizard* button is clicked, the wizard verifies that the required fields have been entered by the user and uses these values to generate a configuration file for the measurement. The appropriate direct commands are specified, based on rules supplied by the USGS to RD Instruments, including depth cell size, number of depth cells, ambiguity velocity, and water mode. Any questionable configuration settings are displayed in the *Configuration Wizard Warnings* window. The CW also scales the chart properties accordingly based upon the entered values.

Support for new water and bottom modes has been added to the CW. OSW currently does not have guidance on the use of water modes 11 and 12, or bottom mode 7; therefore care should be

exercised prior to using these water modes. Water modes 11 and 12 are never chosen when the water mode is set to *Auto*, and the CW always selects bottom mode 5 by default. OSW suggests that the Hydroacoustics Work Group (HAWG) (hawg@simon.er.usgs.gov) be contacted for guidance prior to use of these modes. It also is important to remember that these modes are not available on every ADCP.

Velocity Profile Extrapolation Techniques

As a result of suggestions by the USGS, RDI has implemented two new extrapolation methods in WinRiver 10.05 based on algorithms the USGS proposed.

3-Point Slope Method
The 3-point slope method uses the velocity cross-product for the top 3 bins to estimate a slope. This slope then is applied from the first depth cell below the water surface having valid velocity data to the surface. If there are less than 6 depth cells with valid data in the profile, a constant value or zero slope is assumed. It is believed that this method may prove useful in situations where the ADCP measurements indicate that there is bi-directional flow or wind induced shear. However, this method should be used with caution, especially in situations where the slope of the velocity cross-product is large in the top 3 depth cells.

No-Slip Method
The No-Slip method is used for extrapolation near the bed. A power curve is fit to the velocity cross-product data for depth cells having valid data in the lower 20% of the water column and assuming the power curve is zero at the bed. In the absence of valid velocity data in depth cells located in the lower 20% of the water column, the velocity cross-product for the last valid depth cell is used and the power curve is assumed to be zero at the bed. When electing to use the no-slip method, the user is specifying that a power curve does not accurately represent the entire profile.

Normally, the power curve method is used to estimate discharges for depth cells that (a) have invalid velocity data and (b) are NOT located such that they are either the first (near surface) or last (near bed) depth cell in the profile. However, if the No-Slip method is selected, discharges for depth cells with invalid or missing data are estimated by linearly interpolating between the first depth cell with valid data immediately above and the first depth cell with valid data immediately below the depth cell with missing data. In this case, the measured discharge (the discharge for that part of the water column directly measured using the ADCP and NOT including the top, bottom, left and right discharge estimates) reported by WinRiver will be different from that reported if either the Constant or Power Curve Methods are used.

Although the WinRiver software and the two methods described above have been tested thoroughly prior to the release of 10.05, the methods are new and OSW suggests that users exercise caution when applying them. Please contact either Kevin Oberg (kaoberg@usgs.gov) or David Mueller (dmueller@usgs.gov) if you have questions about the application of the software and/or methods. Users should **never** choose the *Constant* extrapolation method for the bottom.