Teledyne RD Instrument Rio Grande Quick Sheet

✓	DISCHARGE MEASUREMENT PROCEDURE
	1. Setup ADCP and other equipment
	a. Attach ADCP to mount or tethered boat
	b. Attach safety line to ADCP
	c. Turn on computer before connecting ADCP or data radios
	d. Turn off all automated field computer tasks/power saver settings
	e. Connect ADCP\GPS\field computer\data radios
	f. Verify communication with all devices
	g. Check and set ADCP clock time to appropriate time
	h. Measure water temperature, record, and compare to ADCP measured temperature
	2. **Configure ADCP**
	a. Locate appropriate measurement section / collect trial transect, if needed
	b. Select measurement site with uniform flow, no rapid dropoffs
	c. Minimize unmeasured area
	d. Determine maximum profiling depth
	e. Configure ADCP using automated software tools, if possible
	f. Measure salinity and if not zero, enter salinity in ADCP software
	g. Measure ADCP depth and record in software and notes (beware of pitch and roll)
	h. Fill out all field sheet with configuration and other information
	3. Prepare for discharge measurement
	a. Perform ADCP diagnostic tests and log results
	b. Perform and document compass calibration procedure (total error < 1º preferred)
	c. Record moving-bed test (stationary or loop) <u>Stationary moving bed test</u> Duration of test = 600 seconds V_{mb}= Dist Upstream / Duration Moving bed if: Anchored or tethered V_{mb}/V_w> 0.01 Not Anchored Boat V_{mb}/V_w> 0.02 GPS Referenced V_{mb}/V_w> 0.01 V_w is the mean water velocity <u>Loop test</u> Compass must be calibrated Duration at least 3 minutes Boat speed less than 1.5 * water speed V_{mb}= Dist Upstream / Duration Moving bed if: V_{mb} > 0.04 ft/s and V_{mb}/V_w> 0.01 V_w is the mean water velocity
	b. Use GPS or other appropriate technique, if a moving bed is present
	c. Establish start/stop points
	i. Need minimum of two depth cells with “good” velocity on each edge
	ii. May use buoys, pilings, poles, or other reference (avoid ferrous objects)
	3. Make discharge measurement
	a. Position boat at starting edge-of-water (two ‘good’ depth cells)
	i. Begin recording data
	ii. Measure and record distance to shore
	b. Hold position for minimum of 10 ensembles
	c. Drive boat across the river
	i. Boat speed should be less than or equal to the water speed
	ii. Be a smooth operator
	d. Approach ending shore slowly
	i. Hold position for minimum of 10 ensembles
	ii. Stop recording
	iii. Measure and record distance to shore
	iv. Collect four or more transects
	v. All transects must be within 5% of the mean discharge, except for unsteady flow conditions; if not, another set of transects should be measured and all transects collected averaged for the final discharge
	e. Evaluate data in field, looking for potential problems in the data
	f. Make temporary backups before leaving the site

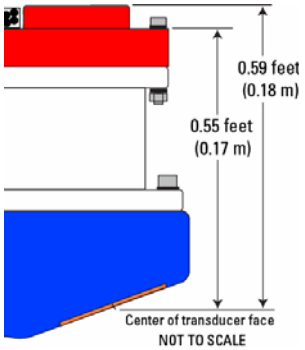
Recommendations and Limitations

Rio Grand Model >	**1200/1200ZH**	**600**
Blanking Distance (WF)		
All Modes	0.82 ft (25 cm)	0.82 ft (25 cm)
Minimum Depth Cell (Bin) Size		
Mode 1	0.82 ft (25 cm)	1.64 ft (50 cm)
Mode 5 or 11	0.16 ft (5 cm)	0.33 ft (10 cm)
Mode 12	0.16 ft (5 cm)	0.33 ft (10 cm)
Maximum Profiling Range		
Mode 1 or 12	65 ft	230 ft
Mode 5 or 11	13 ft	26 ft
Mode 5 or 11 with WZ3	22 ft	42 ft
Maximum Relative Velocity		
Mode 1 or 12	32 ft/s	32 ft/s
Mode 5 or 11	~2.3 ft/s	~3.3 ft/s
Mode 5 or 11 with WZ3	< 2.3 ft/s	< 2.3 ft/s
Approximate Velocity Standard Deviation		
Mode 1, WV175	*Bin Size: 0.82 ft* SD: 0.43 ft/s	*Bin Size: 1.64 ft* SD: 0.43 ft/s
Mode 5/11	*Bin Size: 0.16 ft* SD: < 0.03 ft/s	*Bin Size: 0.33 ft* SD: < 0.03 ft/s
Mode 12, WV175, 10 subpings	*Bin Size: 0.82 ft* SD: 0.13 ft/s	*Bin Size: 1.64 ft* SD: 0.13 ft/s
	Bin Size: 0.33 ft SD: 0.33 ft/s	*Bin Size: 0.82 ft* SD: 0.30 ft/s
	Bin Size: 0.16 ft SD: 0.16 ft/s	*Bin Size: 0.33 ft* SD: 0.49 ft/s

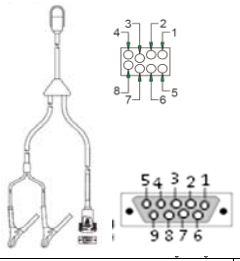
- **Modes 1, 5, and 11** should be configured for minimum bin size.
- **Mode 12** should be configured for a bin size smaller than the mode 1 bin size only as needed to measure in shallow areas. Mode 12 standard deviation will increase with a decreasing bin size.
- **Mode 12** should be configured to report data at least once per second and more often in turbulent conditions. This can be adjusted by setting the number of subpings in the WO command (WOss,tt, change the ss to a lower value). The standard deviation will increase as the number of subpings is lowered.
- **Modes 5 and 11** will not work in turbulent water or in sites with rough bottoms. If water is deep, the WZ03 can be used to extend the range, but then the turbulence and velocity must be very low. The precise velocity and turbulence limitations of modes 5 and 11 cannot be specified.

Draft Measurement

(figure adapted from Environment Canada, 2004)



Cable Diagram



ADCP	Description	Computer / Battery
1	RS-232 Receive => RS232-Transmit	3
2	RS-232 Transmit => RS232-Receive	2
3	Signal Ground	5
4	Power positive (red)	+
8	Power negative (black)	-

Missing Data

Lost Ensembles: Lost ensembles are a result of a communications problem.
Solution:

1. Disable antivirus, power management, etc.
2. Try lowering the baud rate.
3. Change serial ports or serial port adapters.

Bad Ensembles: Bad ensembles are a result of site conditions or water mode selection.
Solution:

1. Try a different cross section.
2. If using water modes 5 or 11, try water mode 12.
3. Use the bottom track tabular view to determine if bad ensembles are caused by bottom track. If so, try bottom mode 7 or a different cross section.

Baud Rates

ADCP Baud Rate: A baud rate lower than 38.4k baud will result in less data being collected. Set ADCP baud rate in BB-Talk using CB to set baud rate. 9600 – CB411, 19.2k – CB511, 38.4k – CB611, 57.6k – CB711, 115.2 – CB811. Set BB-Talk to "Send CK on Baud Rate change (CB command)".

GPS Baud Rate: The minimum acceptable GPS baud rate depends on the number of NMEA 0183 data types being output but the following are good general guidelines.

GPS Update Rate	Baud Rate
1 Hz	4800 or higher
5 Hz	19.2k or higher
10 Hz	38.4k or higher

Helpful Shortcuts

F4	Start/Stop Pinging
F5	Start/Stop Transect
F8	Toggle Bank
F9	Toggle Ensemble Header Tabular view
F11	Toggle Detailed Discharge/Composite Tabular view
F12	Toggle Discharge Summary Tabular view
Ctrl-B	Reference - Bottom Track
Ctrl-G	Reference - GPS (GGA)
Ctrl-V	Reference – GPS (VTG)
Ctrl-N	Reference - None

(when Measurement Control window selected)

Ctrl-K	Add Note

(when Ship Track plot selected)

Ctrl-PgDn	Scale Sticks Down
Ctrl-PgUp	Scale Sticks Up