

USGS ADCP users:

The purpose of this email is to (1) inform you about the availability of two utility programs that can be used with RD Instrument's (RDI) ADCP's and WinRiver 10.05 and (2) to discuss the use of built-in pressure sensors in ADCP's (both SonTek and RDI). References below to ADCP's (Acoustic Doppler Current Profilers) or ADP's (Acoustic Doppler Profilers) are generic and do not necessarily refer to a particular brand of profiler, unless otherwise indicated.

Utility programs

The *RGTest* and *PSCal* programs were written by Mike Rehmel (USGS, Indiana District) to assist users of RDI ADCP's in conducting routine diagnostic tests of the ADCP and calibrations of a built-in pressure sensor in RDI ADCP's. For more information on these programs, go to <http://hydroacoustics.usgs.gov/software/RGTestPSCal.html>. The programs can be downloaded from the USGS Hydroacoustics software page <http://hydroacoustics.usgs.gov/software/index.html>. Please note that access to some of the files listed on the software page is restricted. However, access to *RGTest* and *PSCal* is not restricted.

RGTest

The Office of Surface Water (OSW) suggests that USGS personnel owning RDI ADCP's should use the *RGTest* program and discontinue use of the *ADCPTest* script written for use with the program BBTalk. While this is NOT mandatory, use of *RGTest* offers significant advantages as compared to the use of the *ADCPTest* script. These advantages include the following:

1. *RGTest* keeps a running tally of the number of diagnostic tests passed and failed. The user is immediately aware if one or more of the diagnostic tests failed and can then look to see which one it was. This is perhaps the most important advantage.
2. A log of the diagnostic tests is automatically created and stored in the WinRiver data directory.
3. *RGTest* automatically names the file, using the serial number of the ADCP and the date and time of the test.

Please read the documentation regarding *RGTest* at <http://hydroacoustics.usgs.gov/software/RGTestPSCal.html>.

PSCal

The *PSCal* program can be used to calibrate the built-in pressure sensor installed in RDI ADCP's, and to obtain an average ADCP transducer depth. For information on how to set up *PSCal* for use with WinRiver, go to <http://hydroacoustics.usgs.gov/software/RGTestPSCal.html>.

Guidelines on the use of Built-in Pressure Sensors in ADCP's

SonTek and RD Instruments both sell ADCP's equipped with a built-in pressure sensor. Many USGS users have expressed interest in this option. However, relatively few RDI ADCP's in use in the USGS are equipped with a pressure sensor. Some SonTek ADP's are also equipped with built-in pressure sensors and guidelines for their use are also provided below.

USGS personnel who make use of an ADCP/ADP equipped with a pressure sensor should follow the guidelines outlined below. OSW suggests that USGS users of RDI ADCP's make use of the *PSCal* program. SonTek users should make use of the features in the RiverSurveyor software which allow the user to calibrate and read ADP's equipped with a pressure sensor.

1. Pressure sensors mounted in ADCP's **SHOULD NOT** be used to obtain real-time ADCP transducer depth readings during a discharge measurement. In most measurement situations, water flowing past the pressure transducer will cause a biased depth reading.
2. Prior to a discharge measurement, zero the pressure sensor by removing it from the water and selecting the appropriate option in the software you are using.
 - a. *PSCal* users should select the "Zero Pressure Sensor" option.
 - b. SonTek users should use the RiverSurveyor menu "User Setup" under "ADP Configuration" and select "Calibrate Pressure Sensor". Click "Start" and wait 20 seconds or longer for the mean reading to become steady. Click "Stop" and then click "Set Pressure Offset"
3. For routine discharge measurements, place the ADCP/ADP in the water alongside (or in front of the boat). Make sure that both gear and personnel in the boat are in the position they will be in during the discharge measurement (i.e. so that pitch and roll are approximately the same as that during the measurement). If you are in flowing water allow the boat to float with the current so there is effectively no flow past the pressure sensor.
 - a. For *PSCal* users, then select the "Read Pressure Sensor" option.
 - b. For SonTek users, select "Calibrate Pressure Sensor" as in 2b above. However, this time when you have finished making the reading, record the value displayed by the software and click "Cancel".
4. The resulting mean depth reading can then be used in WinRiver or RiverSurveyor as a manually-entered ADCP depth. However, please exercise appropriate caution when using these values. If the measured depth appears unrealistic, you should consider repeating the ADCP depth measurement and checking it using some other technique. We also suggest that users routinely compare pressure sensor readings to manual depth readings, though not necessarily for every depth measurement. Please exercise good judgment in the use of depth readings from these pressure sensors. For example, if you know the depth is approximately 0.3 -

- 0.4 and the pressure sensor says the depth is .33, you might accept the reading. However if the pressure sensor says the depth is 0.15, you should check the ADCP/ADP depth manually and then re-read the pressure sensor in order to try to determine the cause for the error.
5. Finally, please note that the accuracy of the RDI pressure sensors in use is relatively low because the installed pressure sensors have rather large ranges (10 meter, for example) in the ADCP. In part, this is a matter of convenience for RDI and in part it is because a pressure sensor with a small range could burst if the ADCP were submerged deeper than the range of pressure sensor, flooding the ADCP. The SonTek pressure sensors, in preliminary testing, have shown to be more accurate but have about a 0.06 ft offset that is unaccounted for in RiverSurveyor 3.4.

If you have questions about this note, please contact Kevin Oberg (kaoberg@usgs.gov) or send email to the USGS Hydroacoustics Work Group (hawg@simon.er.usgs.gov).

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