Water Channel Pressure System
Setup and Software

(SWR – 19 Dec 2013)

Note: This document supercedes portions of the posted procedure for the pressure system in the water channel. Where there are discrepancies between this setup/operation procedure and the earlier procedure, this procedure should be followed.

Overview: The pressure measurement consists of a vertical tube with pressure ports arrayed around one half the circumference of the vertical tube. Each port is connected with tubing to an input port on the pressure scanner. The pressure scanner contains electronic pressure transducers, one transducer for each pressure port. Sequential measurement of the port pressures is controlled by a LabVIEW program and a National Instruments NI-6009 data acquisition system (DAS). In operation the LabVIEW program continually scans and displays the pressure measurements. The data may be saved at any time by hitting the [Save Data] button.

In addition to the pressure ports around the cylinder there is an upstream pitot tube. The upstream-oriented stagnation pressure port of the pitot tube is connected to port 14 on the pressure scanner. The static port of the pitot tube is connected to the Reference port on the scanner. This is the reference pressure for all the other pressure ports. Thus the measurement of port 14, referred to the reference port static pressure, gives you directly the ΔP of the pitot tube for determining the flow speed of the water.

Operation: First, make a folder on the computer desktop to save your data. This is where you will save your data files. Next, click the Pressure Distribution icon to load the pressure-scanning program. Before running the water channel you need to "zero" the pressure sensors. With the water not moving in the channel, hit the [Zero] button on the program screen. The program will make 2-3 additional scans after which new offsets will be calculated and applied to the measured pressure data. Save the "zero" scan to your data file.

Once the zero scan has been completed and saved, you can go ahead and run the rest of the experiment as described in the Procedure document. The data files are plain text files which can be read by Excel or other data software for analysis and graphing. The saved data consist of the mean values for each pressure port followed by the standard deviations of those measurements.

You can either create a separate file for each scan, or you can put all the scans in one data file. If you use same file for all scans, the data will be appended on to the end of the existing data in the file. Alternately, you can specify a new filename for each scan.