

Appendix B

Pressure Transducers

Introduction	B1
Solinst Pressure Transducers	B1
Downloading Procedure for the Solinst Levelloggers	B2
INW Pressure Transducer	B3
Downloading Procedure for the INW Pressure Transducer.....	B4

Figures and Tables

Figure B.1: Solinst Levellogger Data from P4	B2
--	----

Introduction: Appendix B

Three pressure transducers are located at the site. The pressure transducers record water levels versus time and are located in wells MW6, P4, and P6. The pressure transducers in P4 and P6 (data collection began 6/15/99) are manufactured by Solinst and the pressure transducer in MW6 (data collection began 8/16/99) is manufactured by Instruments Northwest, Inc. (INW).

Solinst Pressure Transducers

The two Solinst pressure transducers are F30 Levelloggers, Model 3001. The instruments are self contained and fit inside the one-inch diameter piezometers suspended from the well cap by a cable. The device stores all data, which is then downloaded onto a computer during site visits. These instruments measure total pressure (water pressure + air pressure). Because of the total pressure measurement, the data must be corrected for barometric pressure changes that are recorded by the weather station to obtain only water table fluctuations.

The levelloggers read pressure in feet of water. When an input reference level of 0.00 is used (as is done at Oneida), a submerged levellogger will read the height of water above the device plus the barometric pressure greater than 31.17 ft of water. The 31.17 ft reading is used as the “lowest likely reading possible for atmospheric pressure at sea level” (pg. 6 of manual).

Air pressure is typically recorded in inches of mercury (in Hg). Suppose that the air pressure reading at Oneida is 30.00 in Hg. To determine what the air pressure correction is for a water level reading, one must first convert inches of Hg to feet of water:

$$30.00 \text{ in Hg} \cdot \frac{1 \text{ foot}}{12 \text{ inches}} \cdot \frac{26.3 \text{ slugs / ft}^3 \text{ Hg}}{1.94 \text{ slugs / ft}^3 \text{ water}} = 33.89 \text{ feet of water}$$

After converting to feet of water, one must subtract out the 31.17 ft baseline:

$$33.89 \text{ feet} - 31.17 \text{ feet} = 2.72 \text{ feet of water}$$

The 2.72 feet of water is the pressure due to atmospheric pressure. Thus, a reading of 10.00 feet by the levelogger would be 7.28 feet due to water and 2.72 feet due to air pressure. Air pressure must be carefully subtracted out of the data compiled by the leveloggers to give a true water level and this correction must be adjusted since barometric pressure constantly changes. As shown in Figure B.1, barometric pressure changes cause significant errors to the actual data.

An elevation correction is applied for locations above sea level. One foot of water is subtracted to the 31.17 ft baseline for every 1000 feet of elevation above sea level. This is done because as elevation increases the lowest possible atmospheric pressure reading decreases which allows the levelogger to have the greatest amount of fluctuation (without hitting its maximums

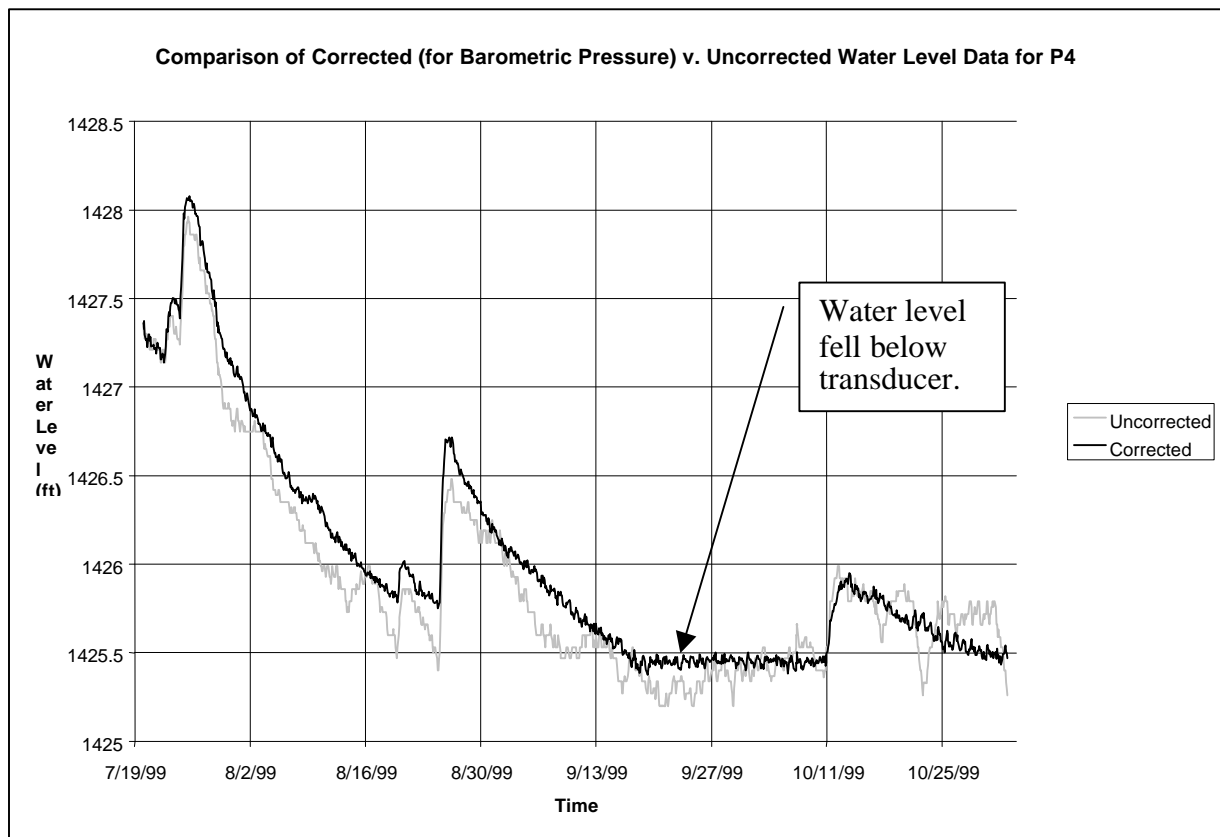


Figure B.1 – Solinst Levelogger Data from P4

and minimums). The Oneida site is at an elevation of approximately 1430 feet. Elevation is automatically corrected by the device after programming the elevation into the Levelogger.

The Solinst pressure transducers can record up to 16,000 data points. Because of the weather station data limitation (2-hour intervals), the Solinst pressure transducers also record data at 2-hour intervals to be able to match and correct water level readings with barometric pressure data. At this 2-hour interval, the Solinst pressure transducers can store over 3.5 years of data.

Downloading Procedure for the Solinst Leveloggers

1. In MS-DOS locate the folder that the logger program is in (usually “Logger”)
2. Type in “logger” to start program (if it doesn’t work, try “logger1”)
3. Hit F10 to highlight menu bar
4. With levelogger attached to computer by optical cable, highlight “read memory” and hit enter
5. The computer will download data to a .dat file
6. It is a good idea to view output file so highlight “output”
7. Select “other” and find .skp file that was created when .dat file was made and create a .txt file
8. To correct any programmed info, highlight “program” and change any information needed (i.e. interval)
9. Don’t forget to start program while in the “program” menu

INW Pressure Transducer

The INW pressure transducer is a PS9104 Passive mV Transducer. The transducer sends data from the probe in the well via a cable to the Campbell Scientific, Inc., CR10 measurement and control module where the data is stored. This information can then be downloaded onto a computer during site visits. Because the cable to which the probe is attached is also a vent tube, the device does not need to be corrected for changes in barometric pressure. Data is recorded in 15-minute intervals at the Oneida site allowing for approximately 8-weeks of data storage.

Downloading Procedure for the INW Pressure Transducer

1. In MS-DOS locate the PC208 folder and type “GT” to begin the program with the computer attached to the Campbell Scientific data logger
2. Type “inw-mw6” for station
3. Type “U” to download uncollected data