Digital Conversion of a Pressure-Switching Data Acquisition System

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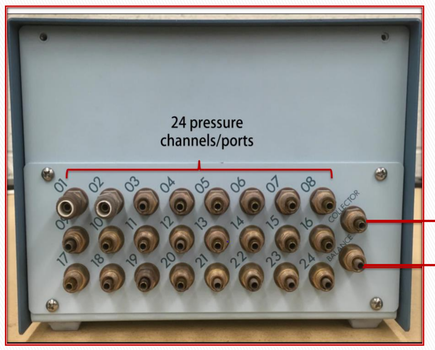
Background

A mechanical Scanivalve® fluid switch is a fluid pressure measurement device enabling an array of ports (channels) to be sampled using a single, time-shared transducer, thereby lowering the number and cost of dedicated transducers for the data system.



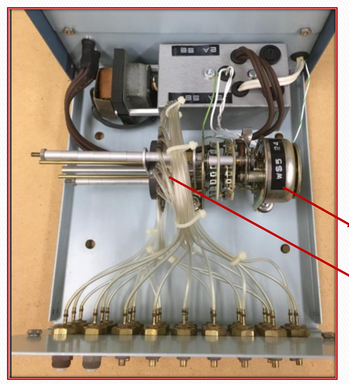
To pressure transducer

Connected to high-pressure source to balance electrical contacts on fluid switch wafer

Figure 1. Front Panel of Scanvalve® Box

The legacy switching device in the YSU Flow Physics Laboratory requires a user to manually press a button on the device to switch the pressure port to be sampled by the transducer.

Figure 2. Back of Unit



Solenoid Controller

Scanivalve® Fluid Wafer Switch

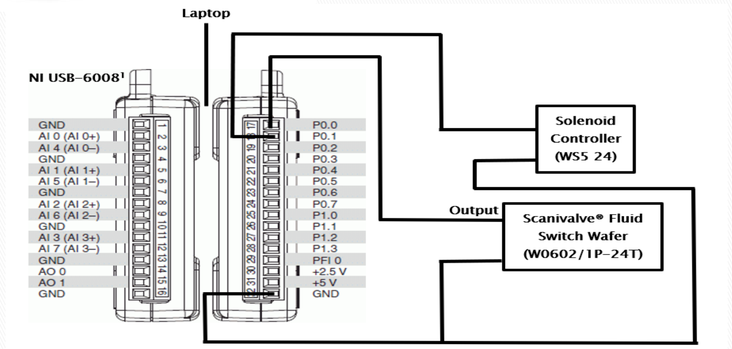
Figure 3. Inside of Scanivalve® Box

To reset the switch to the first port, the user must press a different button on the device, which is cumbersome.

Digital I/O Upgrade

The objective of this project was to upgrade the existing manually-operated unit to a computer-operated device with complete software control of the measurement system.

A National Instruments™ USB-6008 multifunction input/output (I/O) device and BNC connectors were deployed to enable remote operation of the fluid switch.



MATLAB

Custom software developed with MATLAB® Data Acquisition Toolbox™ controls communication between the USB-6008 and solenoid controller.

Significance

The control system and developed software will enable the YSU Flow Physics Laboratory to create programmable data acquisition routines for wind tunnel experiments.

Support from the Choose Ohio First Scholarship Program is gratefully acknowledged.

Software Logic