

Indian Institute Of Technology Kanpur

AE 351A

Experiments in Aerospace Engineering 2020-21
Semester II

Experiment No. 6A

Calibration of Pressure scanner

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1. Objective

To study the calibration procedure of pressure scanner

2. Apparatus

- Electronically Scanned Pressure sensor
- Multiplexer Unit
- Digital Interface and Line Driver (DILD) unit for ESP Scanners
- Data Acquisition Board
- Pressure Data Acquisition and Analysis Software
- Digital manometer
- Calibration Setup

3. Precaution

- Ensure that the maximum pressure at any port should be within the range of the sensor.
- While calibrating, sufficient time should be given for the pressure to stabilize.
- Make sure that there are no blockages or leakage in the tubes.
- The excitation voltage given to the scanner must be within the range of 5V.
- There should not be any obstacle near the entry or exit of wind tunnel flow causing disturbance in the freestream flow.

4. Procedure

Calibration of Pressure scanner

- Connected pressure scanner reference port of run mode and digital manometer to hand pump via T-joint pressure tube.
- Applied multiple pressure using hand pump.
- Saved voltage output of scanner and pressure output from digital manometer.
- Plotted voltage vs pressure to obtain slope and fits equation of sensors.

5. Result and Discussion

pressure scanner 9749

channel 7

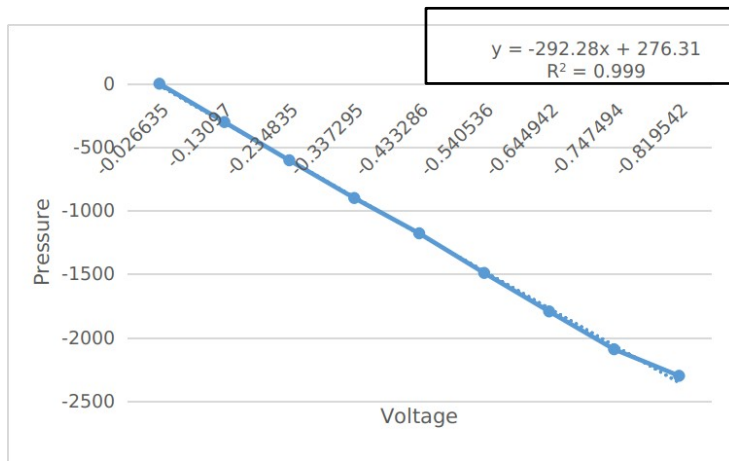


Figure 1

**pressure scanner 0818
channel 13**

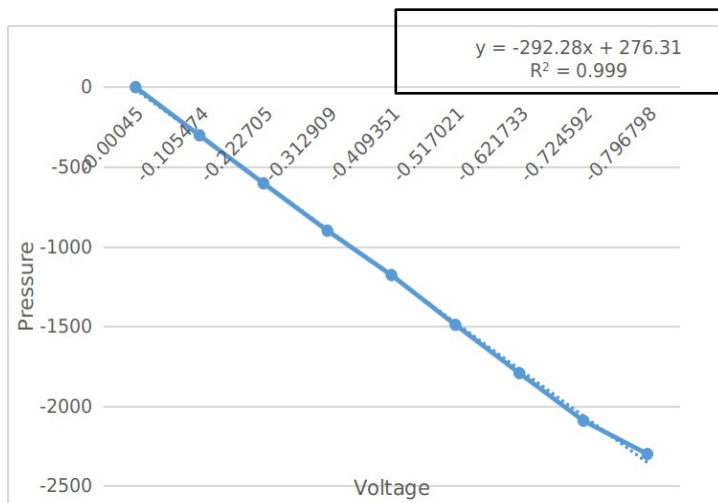


Figure 2

**pressure scanner 0916
channel 16**

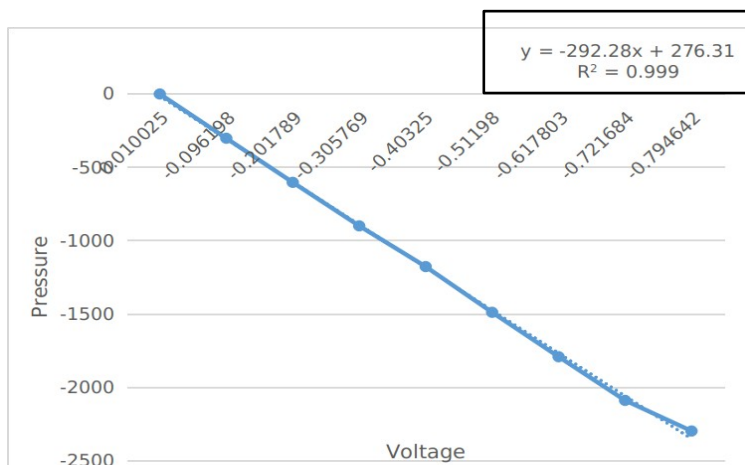


Figure 3

6. Error Analysis

a) Systematic Error: These arise due to improper calibration of instruments or some other unknown reasons. They can be eliminated by proper calibration of instruments or rectifying the fault. This defines the accuracy of the measurement made. The lesser the bias, the higher the accuracy. These are biased in nature.

b) Random Error: These occur due to the natural disturbances that occur during the measurement process. These cannot be eliminated. This defines the precision of the measurement made. These are statistical in nature.

7. References

Channel N	Pressure	Voltage
16	-1	0.010025
16	-303	-0.0962
16	-604	-0.20179
16	-901	-0.30577
16	-1179	-0.40325
16	-1491	-0.51198
16	-1794	-0.6178
16	-2092	-0.72168
16	-2301	-0.79464

Figure 4 *pressure scanner 9749*

Channel N	Pressure	Voltage
7	-1	-0.02664
7	-303	-0.13097
7	-604	-0.23484
7	-901	-0.3373
7	-1179	-0.43329
7	-1491	-0.54054
7	-1794	-0.64494
7	-2092	-0.74749
7	-2301	-0.81954

Figure 5 *pressure scanner 0818*

Channel N	Pressure	Voltage
13	-1	-0.00045
13	-303	-0.10547
13	-604	-0.22271
13	-901	-0.31291
13	-1179	-0.40935
13	-1491	-0.51702
13	-1794	-0.62173
13	-2092	-0.72459
13	-2301	-0.7968

Figure 6 *pressure scanner 0916*

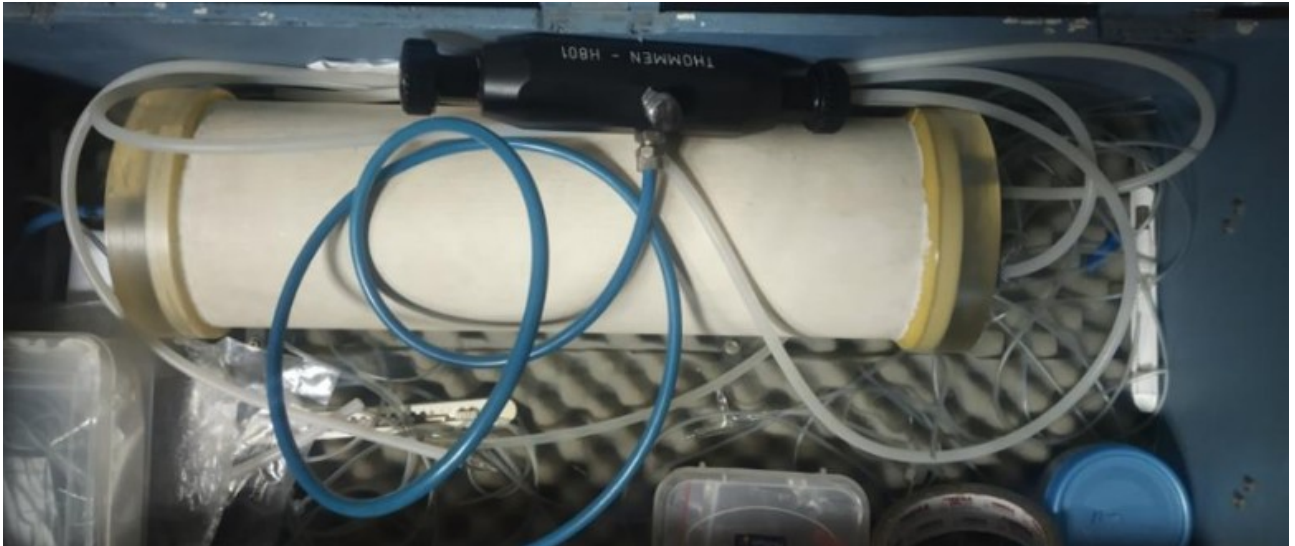


Figure 7: Hand Pump



Figure 8: Digital Manometer