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# CCTA Test 7: Pressure Sensor Calibration (Pre-Amplification)

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## Objective

To verify the accuracy and consistency of the raw pressure signal output from the pressure transducer by comparing it against a reference manometer. This test ensures that the pressure sensor output before amplification reliably reflects applied pressures, serving as the foundation for the final calibration curve.

## Equipment Needed

Table 1: Test apparatus

|  |  |
| --- | --- |
| Item | Purpose |
| Pressure transducer | Device under test |
| Manual syringe (air-filled) | Apply controlled pressure manually |
| Reference manometer | Ground truth pressure measurement |
| Multimeter or oscilloscope | Record voltage signal from transducer |
| Tubing and fittings | To ensure leak-proof sealed connection |

## Test Procedure

1. **System Setup**
   1. Connect the air-filled syringe to the pressure transducer through leak-proof tubing.
   2. T-join a reference manometer into the circuit to monitor the applied pressure.
   3. Ensure the tubing is airtight to minimize any signal error due to air leakage.
2. **Data Collection**
   1. Apply increasing pressure in steps: 25, 50, 75, 100, 125, and 150 mmHg using the syringe.
   2. At each step, record the voltage output from the transducer using a multimeter or oscilloscope.
   3. Repeat each pressure step 3 times and average the results to account for minor fluctuations.
3. **Data Analysis**
   1. Theoretical transducer output:
   2. Compare measured values to theoretical output.
   3. Use the results to adjust the calibration model and quantify any drift.

## Test Data

Table 2: Pressure Calibration Results

|  |  |  |
| --- | --- | --- |
| Pressure (mmHg) | Theoretical Output (mV) | Measured Output (mV) |
| 25 | 0.625 | 0.61 |
| 50 | 1.25 | 1.23 |
| 75 | 1.875 | 1.85 |
| 100 | 2.5 | 2.48 |
| 125 | 3.125 | 3.08 |
| 150 | 3.75 | 3.69 |

## Discussion

The raw transducer output closely aligns with theoretical expectations, showing a nearly linear trend with applied pressure. Small deviations may be attributed to minor air leakage or inherent drift in sensor characteristics. These measurements validate the sensor’s baseline behavior and will inform the gain requirements for the subsequent amplifier stage. This dataset will also be integrated into the final pressure calibration model.