Experiment:9

Describe the Construction and Characteristics of an Air Flow Transducer.

EQUIPMENTS

- Pressure Transducer Trainer IT-5930.
- 2mm Connecting Leads.
- Digital Multimeter.

THEORY

The Airflow Transducer:

Figure-9.1 given below shows the construction of an airflow transducer, consisting of two RTD's (Resistance Temperature Dependent) mounted in a plastic case. One of the devices has an integral heating element incorporated with it and the other is unheated.

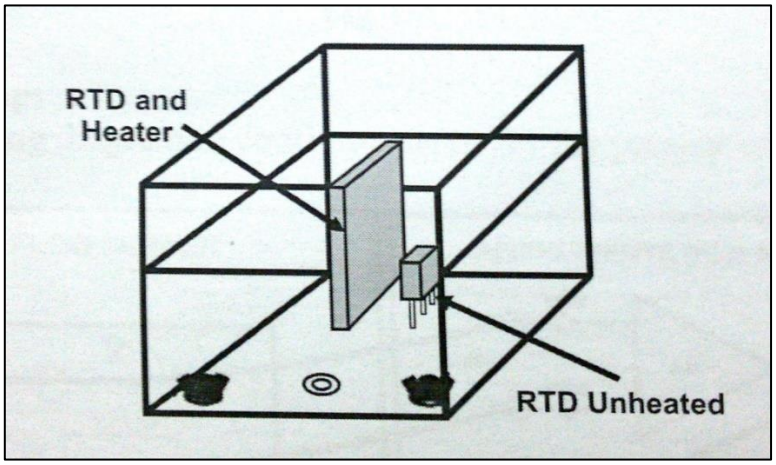

Figure 9.1 (Construction of an Air Flow Transducer)

The operation of the device uses the principle that when airflows over the RTD's, the temperature of the heated unit will fall more than that of the unheated unit. The temperature difference will be related to the airflow rate which will in turn affect the resistance of the RTD's. With the IT-5930, the transducers are enclosed in a clear plastic container and provision is made for air to be pumped over the device. Figure 9.2 shows the electrical circuit arrangement and main characteristics of the device in the IT-5930 trainer.

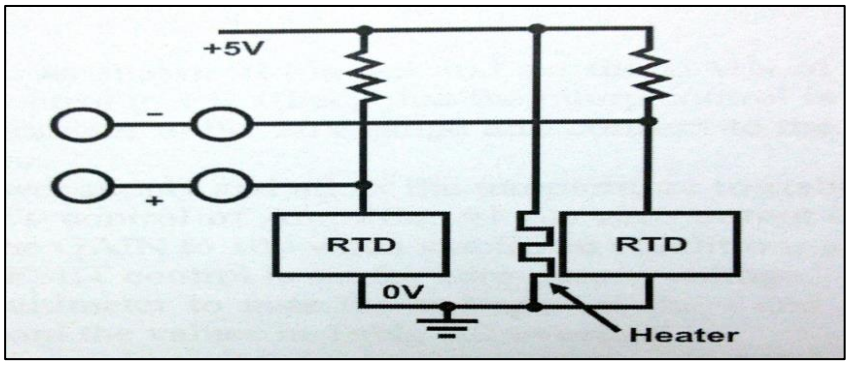

Figure 9.2 (Circuit Diagram IT-5930)

Note: RTD's have a positive temperature coefficient.

EXPERIMENT

Refer to figure 9.3 to configure setup for the present experiment.

- Connect the circuit as shown in the figure 9.3

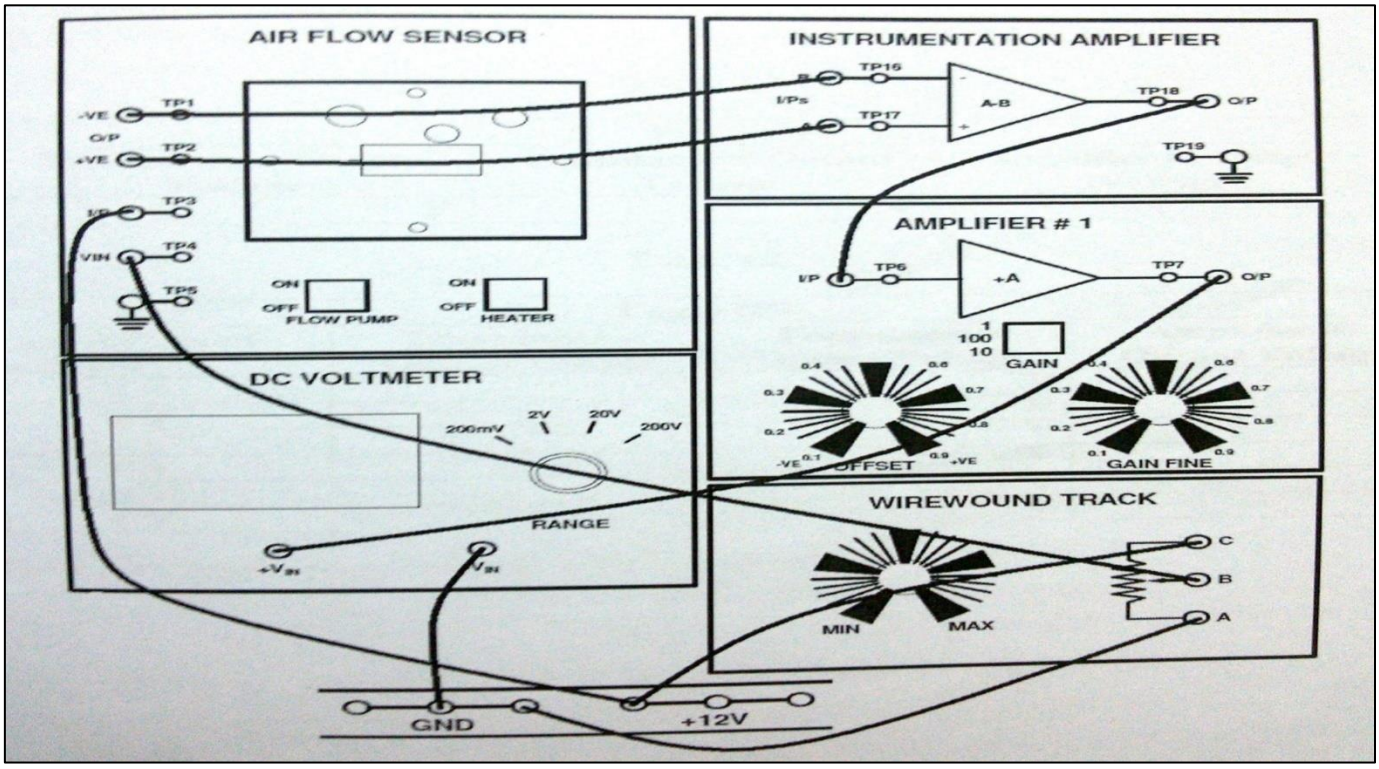

Figure 9.3 (Experimental Setup)

- After connecting the circuit according to the figure 9.3, set the GAIN of amplifier # 1 to 10 and GAIN FINE control to 1.0. Check the pump control is set to OFF.
- Set the digital multimeter to the 20V range and connect to the –VE output TP1 of the airflow sensor.
- Switch ON the power supply and allow the temperature to stabilize.
- Adjust the OFFSET control of Amplifier # 1 to zero output continuously during this time, setting the GAIN to 100 when stabilized condition is obtained.
- Check that the OFFSET control is set for zero output voltage.
- Use the digital multimeter to note the voltages at the –VE and +VE outputs from the transducer and record the value in table 9.1.
- Connect +12V supply to one end of the Wire wound track and on the other end as shown in the figure 9.3.
- Supply the variable voltages to the input of pump VIN TP 4. Turn the Wire wound in a way that it gives 1V at the output.
- Switch the pump ON and note the voltages again when conditions have stabilized.
- Record the values in table 9.2.
- Similarly repeat the steps for 2V and note the readings and so on to 6V.

RESULTS

Observation Table:

Table # 1

PUMP OFF		
Transducer – Output Voltages	**Transducer + Output Voltages**	**Amplifier # 1 Output Voltages**
(V)	**(V)**	**(V)**

Table 9.1 (Observations When Pump is OFF)

Table # 2

PUMP ON			
Input Voltage of the Pump (V)	**Transducer – Output Voltages (V)**	**Transducer + Output Voltages (V)**	**Amplifier # 1 Output Voltages (V)**
1			
2			
3			
4			
5			
6			

Table 9.2 (Observations When Pump is ON)

CONCLUSION

Instructor Signature: _____ **Date: _____**