

Week 8 Demo

(Wind Vanes and Anemometers)

Harrison Chapter 8
Brock Chapter 7 and 8.3

Tim Chui

Learning Goals (from Monday)

	By the end of today's class, you should be able to:
1	List 5 or more types of anemometers and describe how they work and how you use them.
2	Calculate and plot the anemometer and wind-vane response (voltage, resistance, size, temperature) vs. wind speed.
3	Describe the advantages, disadvantages, and typical errors of each type of anemometer and wind vane.
4	Select the appropriate anemometer and/or wind vane and associated infrastructure for any measurement program.
5	Convert between different wind speed units, and between true and magnetic directions.
6	Describe WMO-8 standards for siting, averaging, and gust determination.

Demo Worksheet

Demo - Comparison of wind sensors

Worksheet by Tim Chui

Date of demo: 4 March 2020

	Instrument	What is it made of?	Principle	What does it measure?	Details
1	Wind vane	Various; can be plastic, fabric, metal	Drag force of wind causes rotation; switch/contacts around shaft or potentiometer (resistance changes based on angle)	Wind direction (°)	
2	Cup anemometer	Plastic	Drag force of wind causes rotation; magnet in shaft closes circuit when reed switch passed (pulse counter)		Rotation rate proportional to wind speed
3	Propeller anemometer	Plastic		Wind speed	Suffers from over-speeding, not as much from cosine-response error Faster response than cup
4	Pitot-Static anemometer	Metal tube	Airflow deceleration on object causes stagnation; temp and pressure increase	Wind speed	Use static port to get base-state pressure; pitot tube to get dynamic pressure
5	Sonic anemometer	Aluminum	Speed of sound through air; return time of acoustic signal between transducers	Wind speed	

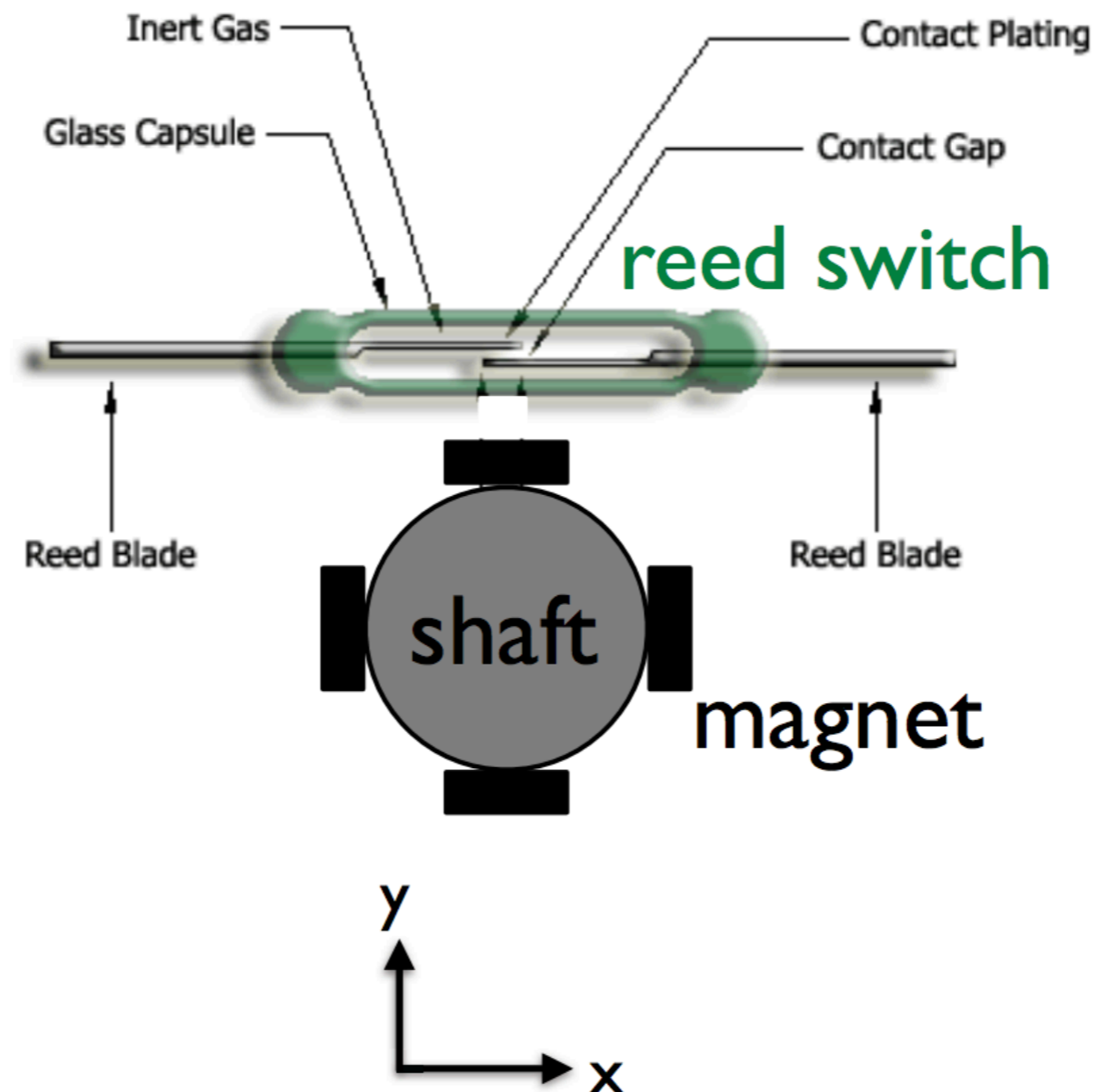
Wind Vane



Wind Vane

Mechanical switch wind vane

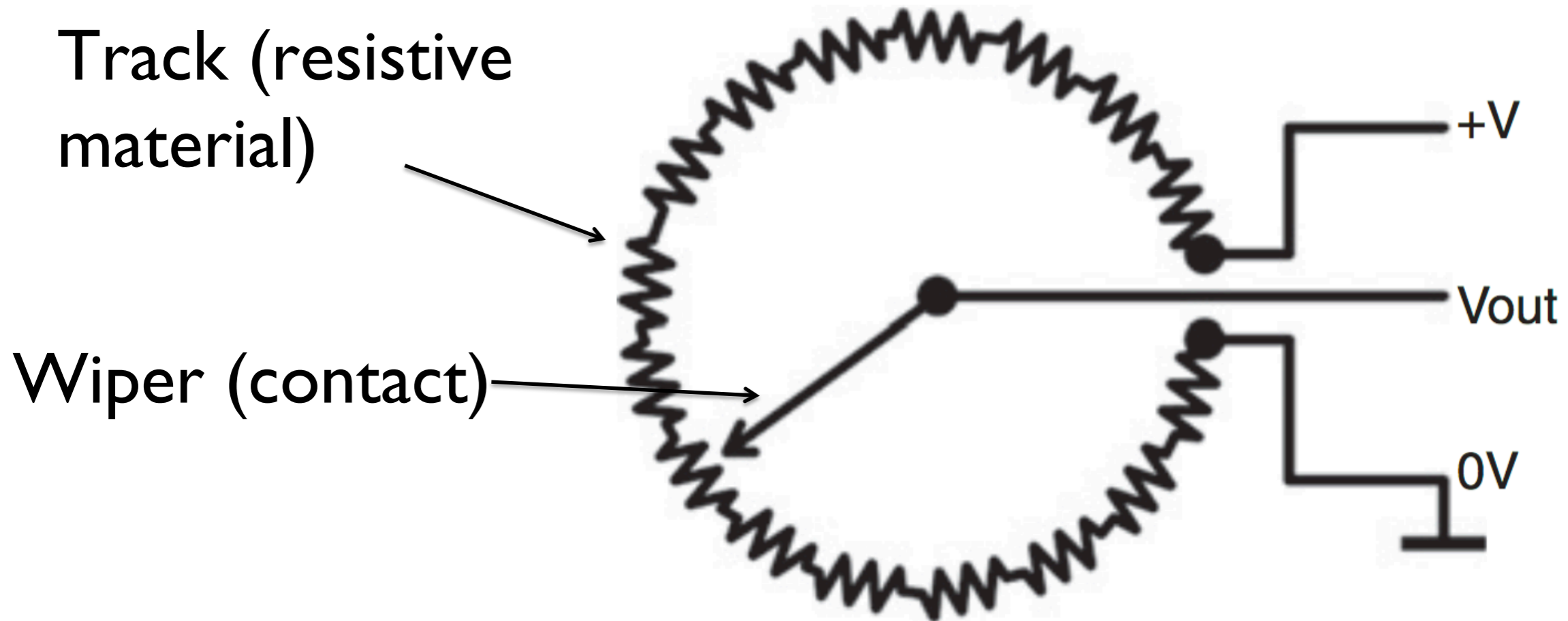
Zoomed view of shaft:



Wind Vane

Potentiometer wind vane

High voltage in these directions



Low voltage in these directions

Cup Anemometer

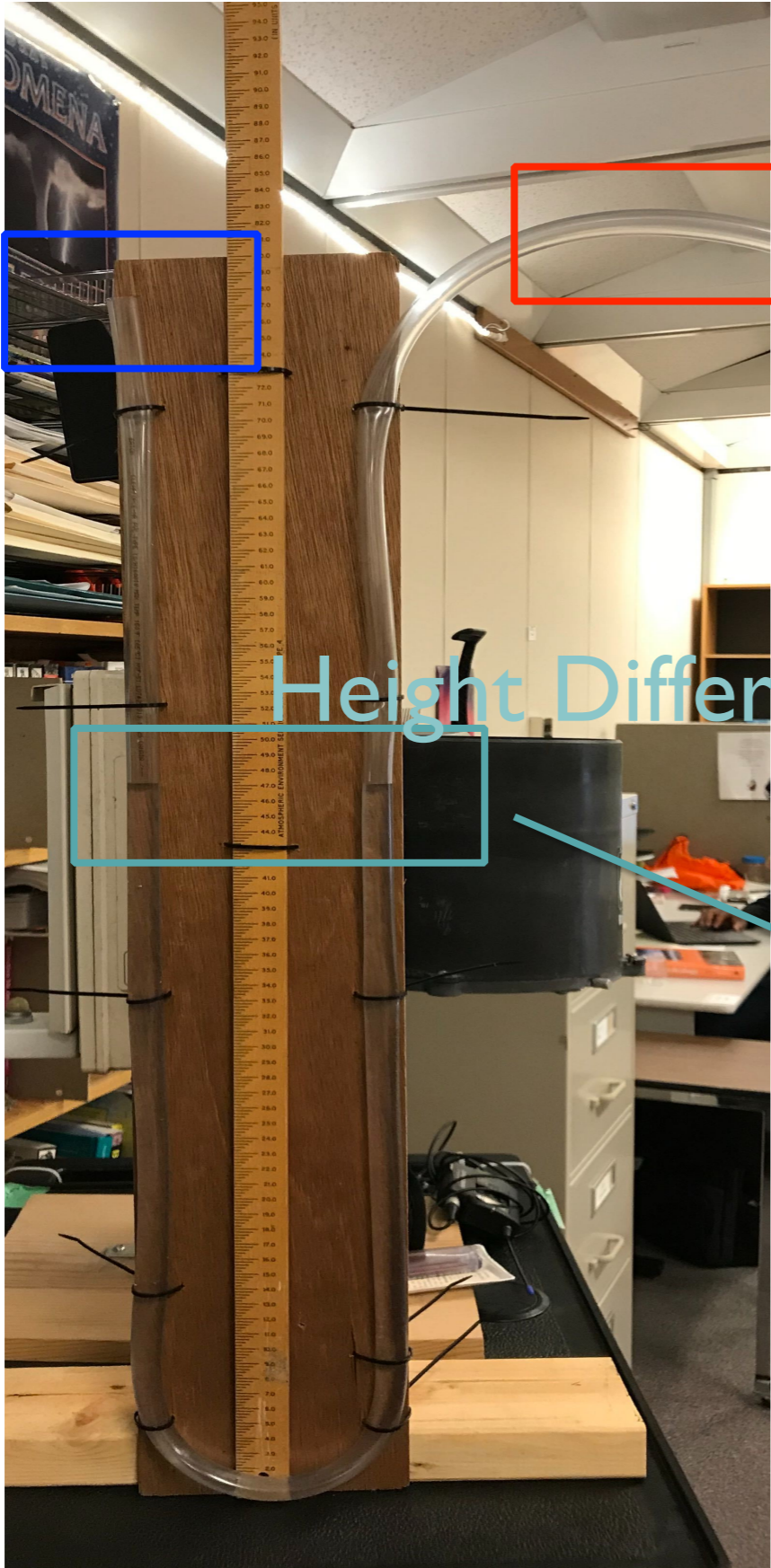


Propeller Anemometer



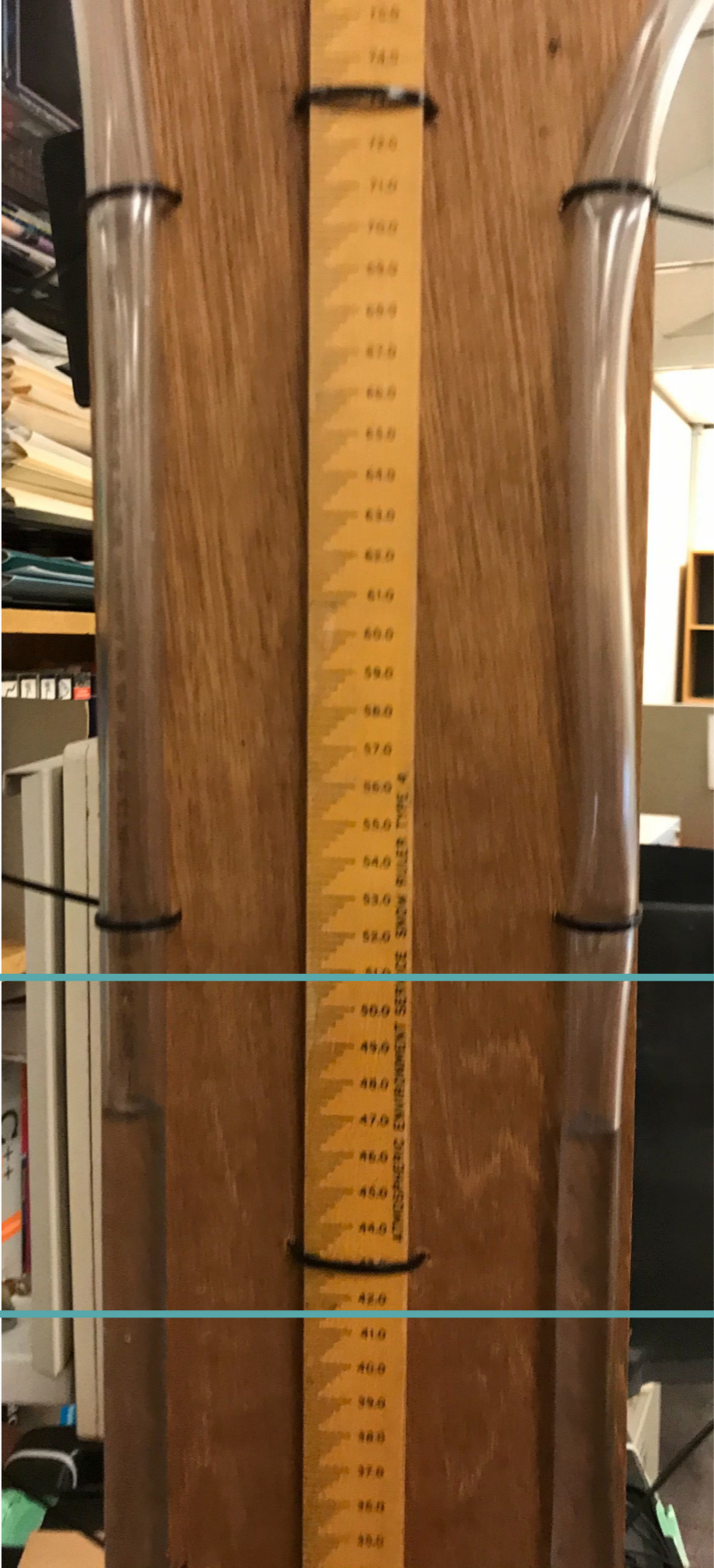
Pitot Tube

Static



Pitot

Height Difference



Sonic Anemometer

