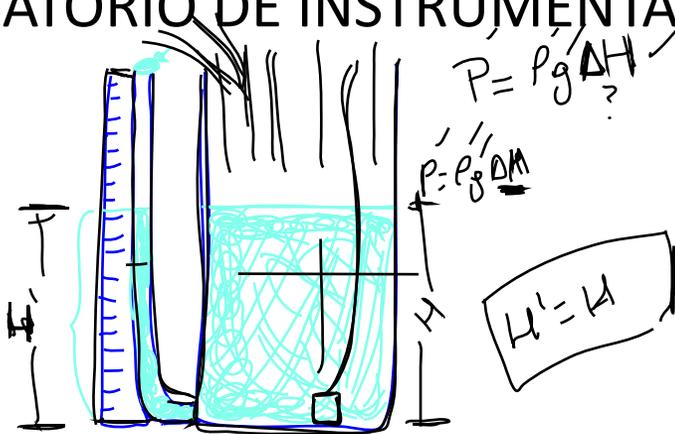


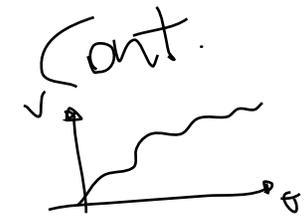
# MEDICIÓN DE NIVEL

LABORATORIO DE INSTRUMENTACIÓN



# MEDICIÓN DE NIVEL (MÉTODOS VARIOS)

$$P = \rho g H$$



Guided Wave Radar Level Transmitter

Radar Level Transmitter

Conductive Multipoint Switch

Ultrasonic Level Transmitter

Hydrostatic Level Transmitter

Ultrasonic Level Switch

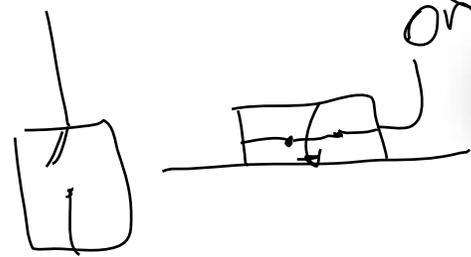
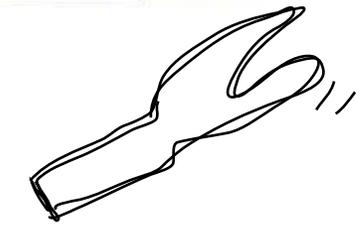
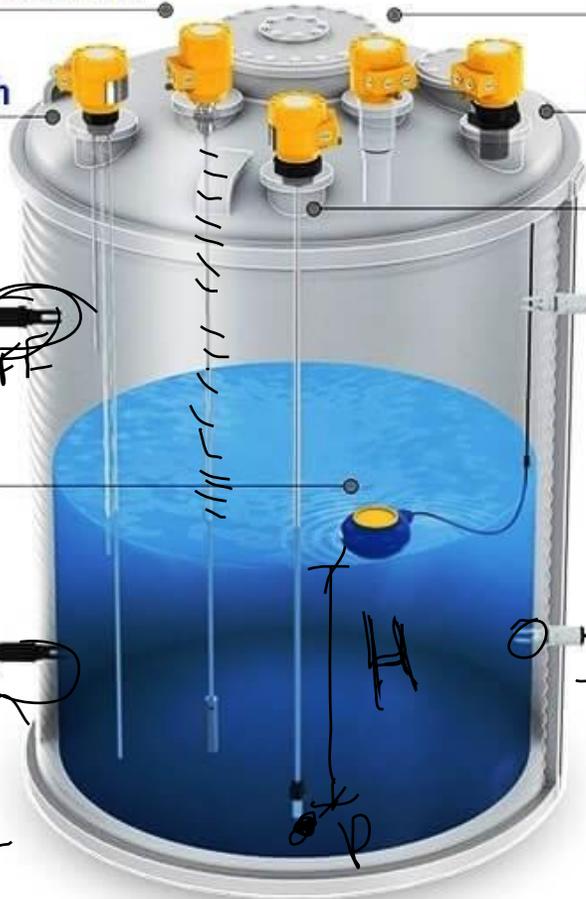
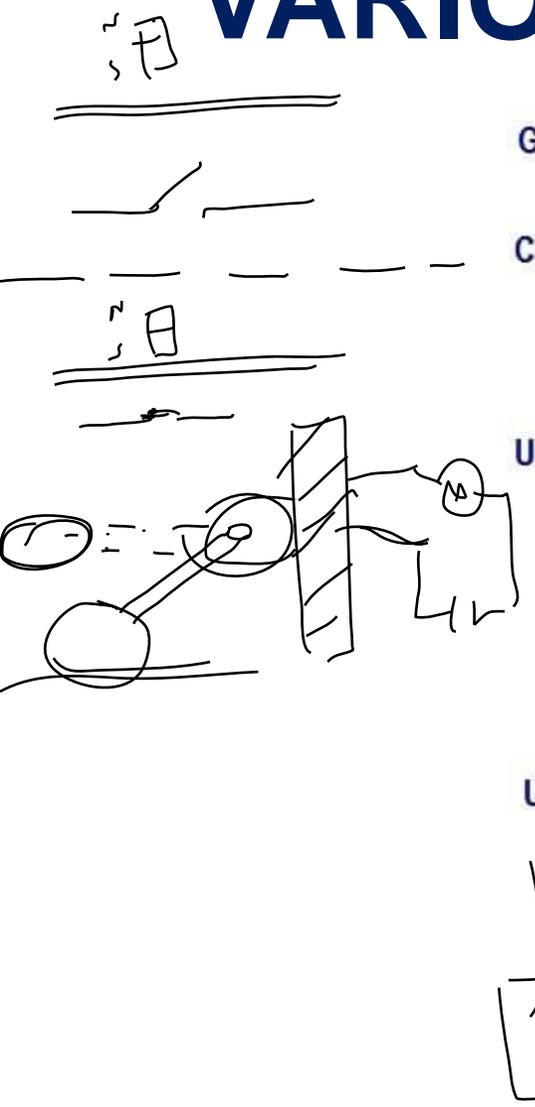
Vibration Fork Level Switch

Float Level Switch

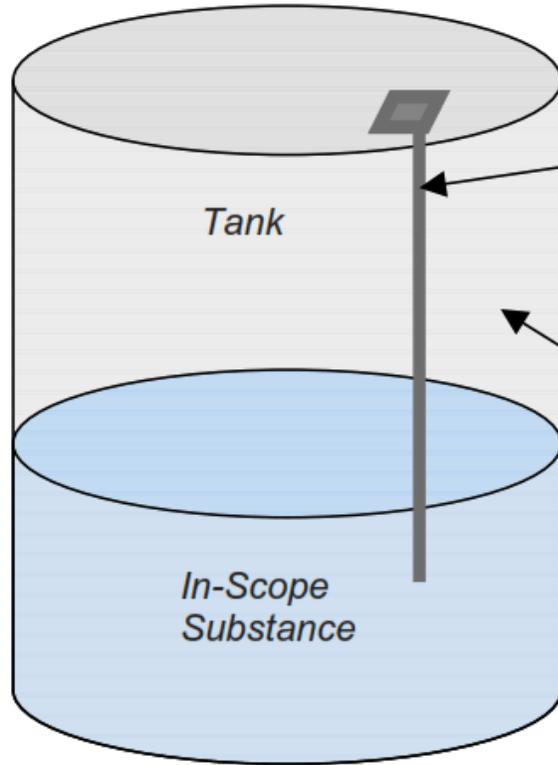
Vibration Fork Level Switch

Ultrasonic Level Switch

$$f_1(p_1) \rightarrow f_2(p_2)$$



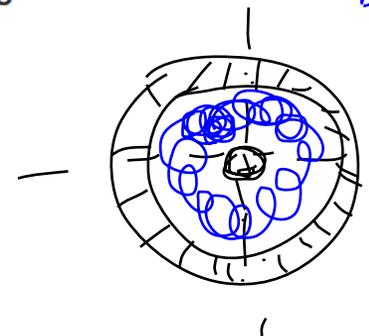
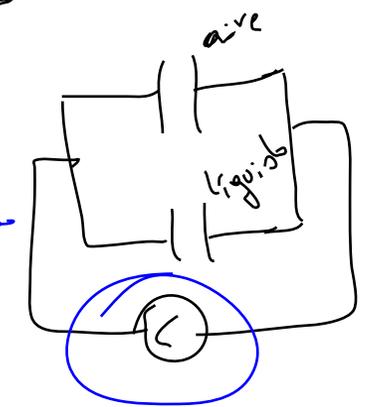
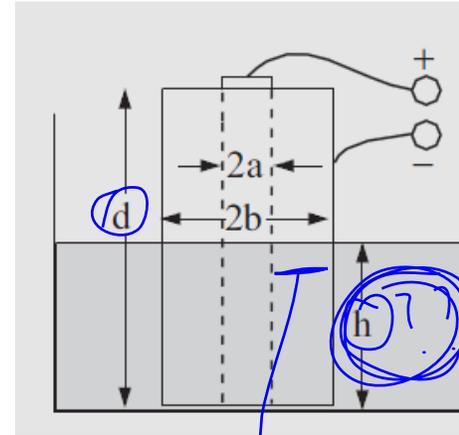
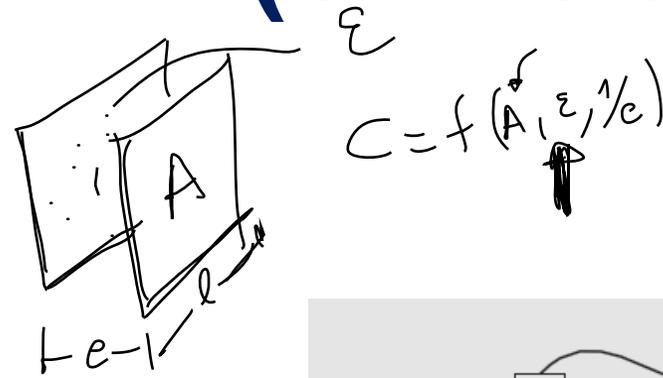
# MEDICIÓN DE NIVEL (SENSOR CAPACITIVO)



Capacitive probe (electrode)

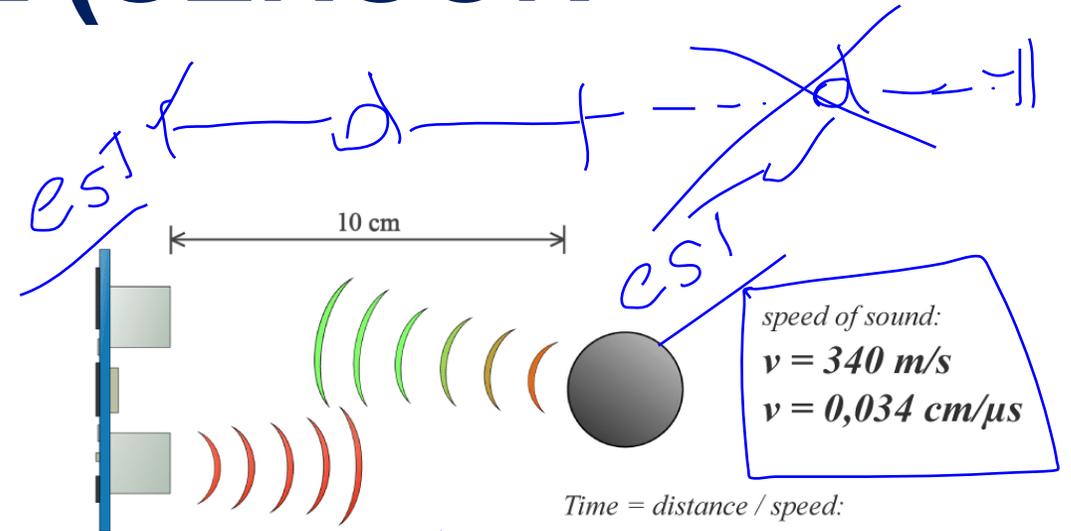
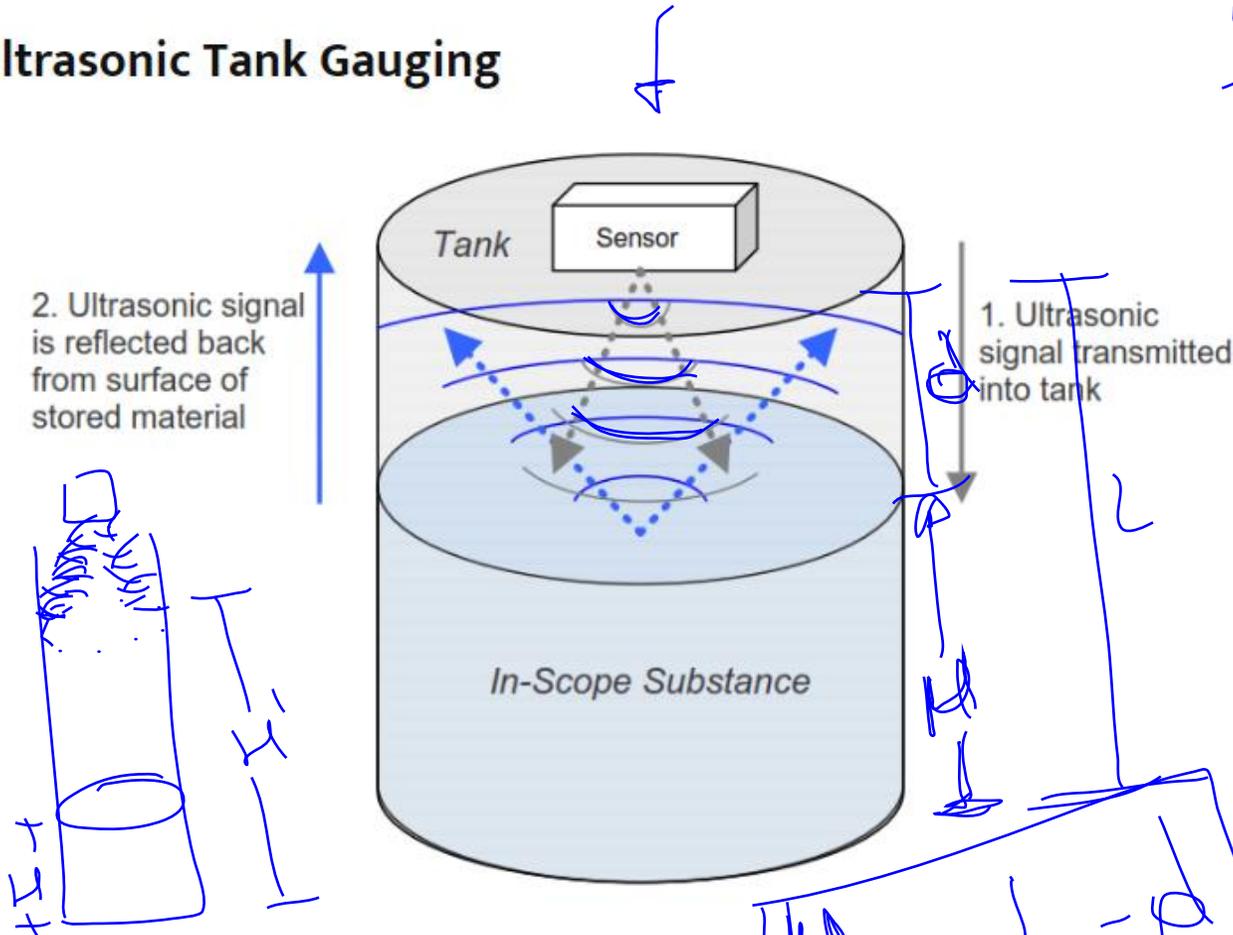
Metallic tank wall (electrode)

Gasoline/open space (dielectric material)



# MEDICIÓN DE NIVEL (SENSOR ULTRASÓNICO)

## Ultrasonic Tank Gauging



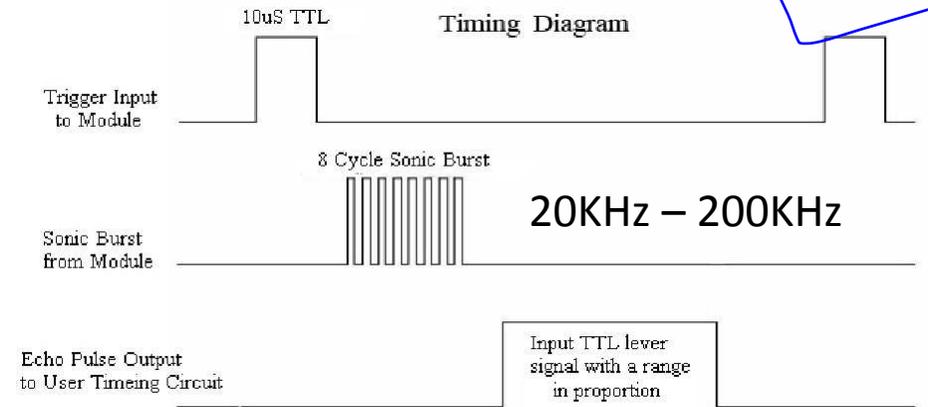
Time = distance / speed:

$$t = s / v = 10 / 0,034 = 294 \mu\text{s}$$

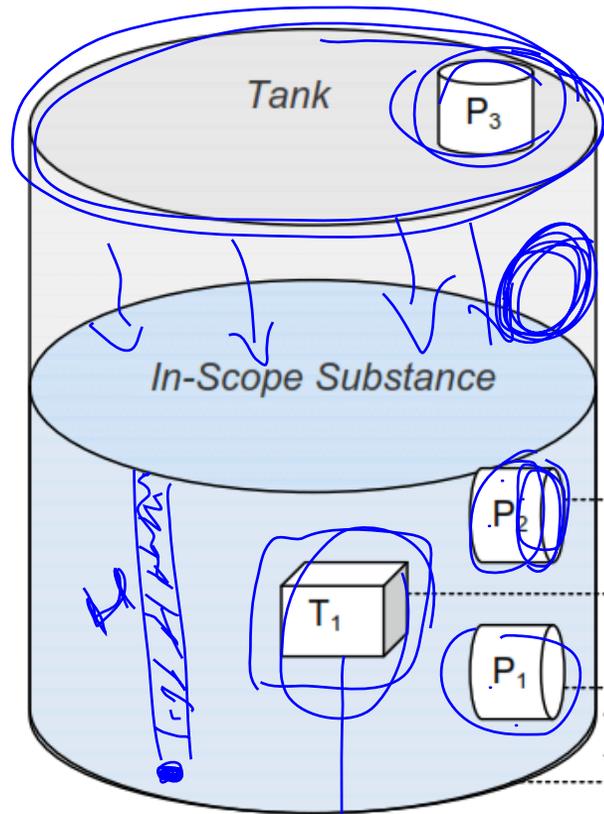
Distance:

$$s = t \cdot 0,034 / 2$$

$$d = v_{\text{son}} \cdot \frac{t}{2}$$



# MEDICIÓN DE NIVEL (SENSOR HIDROSTÁTICO)



$T_i$  Temperature transducer

$P_i$  Pressure transducer

Simplified Density Equation (D)

$$D = \frac{P1 - P2}{H}$$

where: P1 = pressure (bar) at P1

P2 = pressure (bar) at P2

H = Distance between P1 and P2 in metres

$$P = \rho g H + P_{atm}$$

$$P = \rho g H + P_{atm}$$

$$\Delta P = \rho g \Delta h$$

