

Analog Electronics



Lecture #1, by B. Bat-Otgon © 2013



Electronic Workbench



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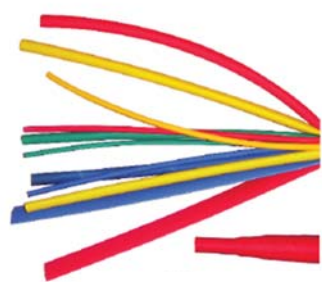


Soldering Stations

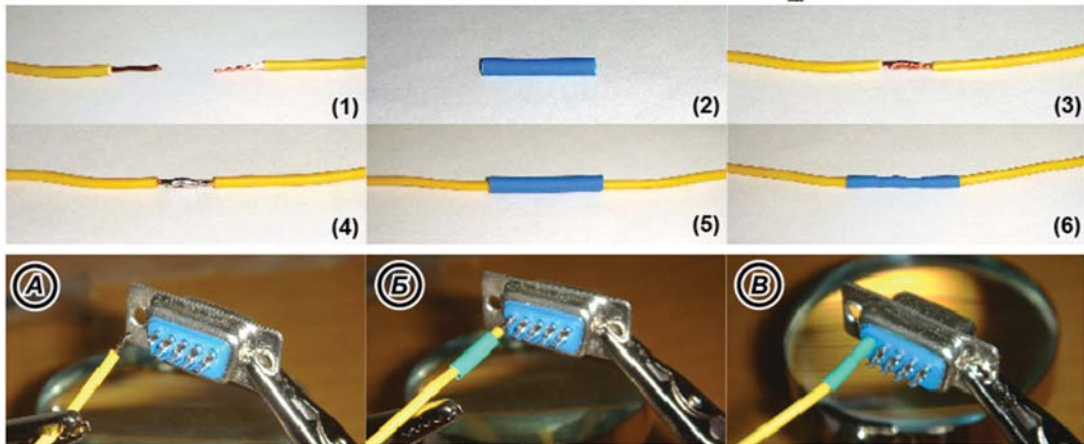


Desoldering Tools

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Heat Gun



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Mini Drill



High Speed Drill

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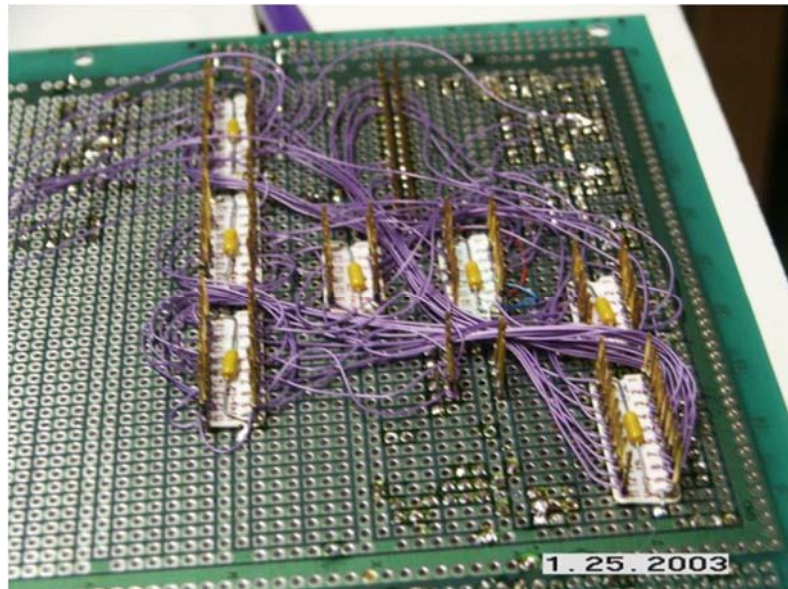
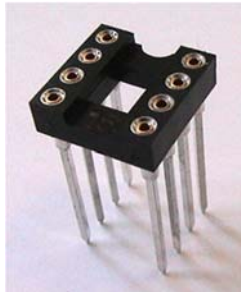
Needle Files

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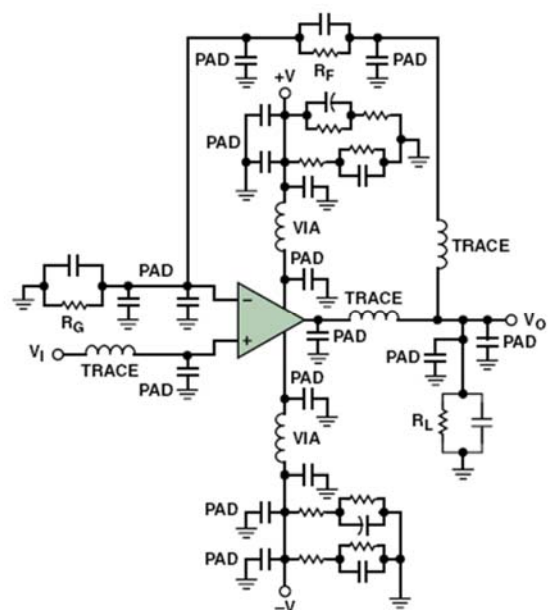
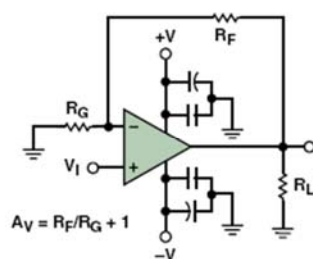
Wire Wrap Tool

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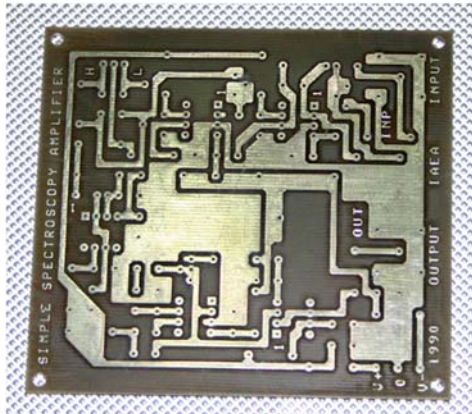
Wire Wrap Tool

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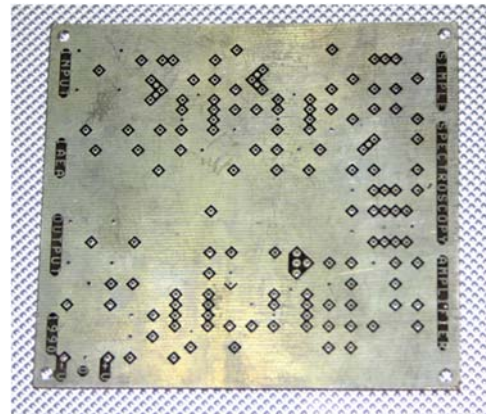


Simple circuit and its parasitic

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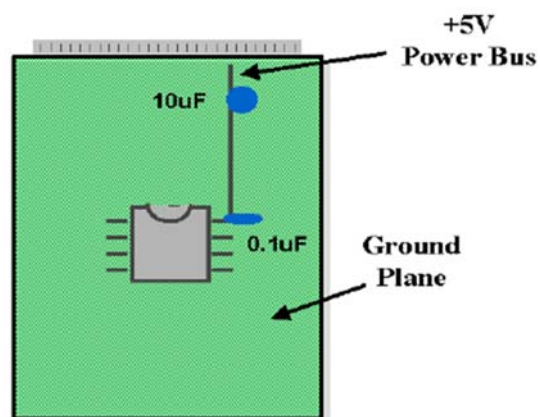
Solder side



Component side

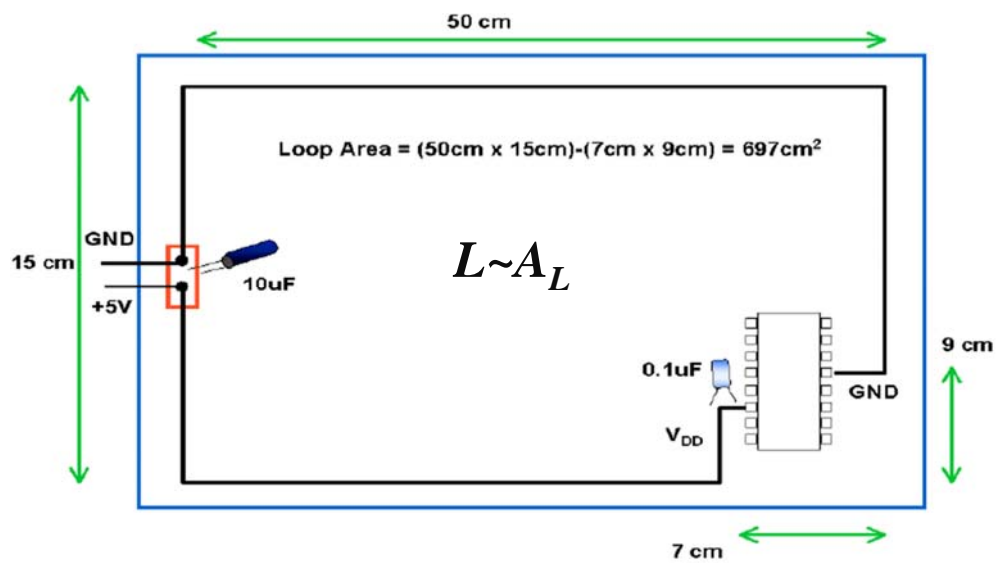
Good Analog PCB

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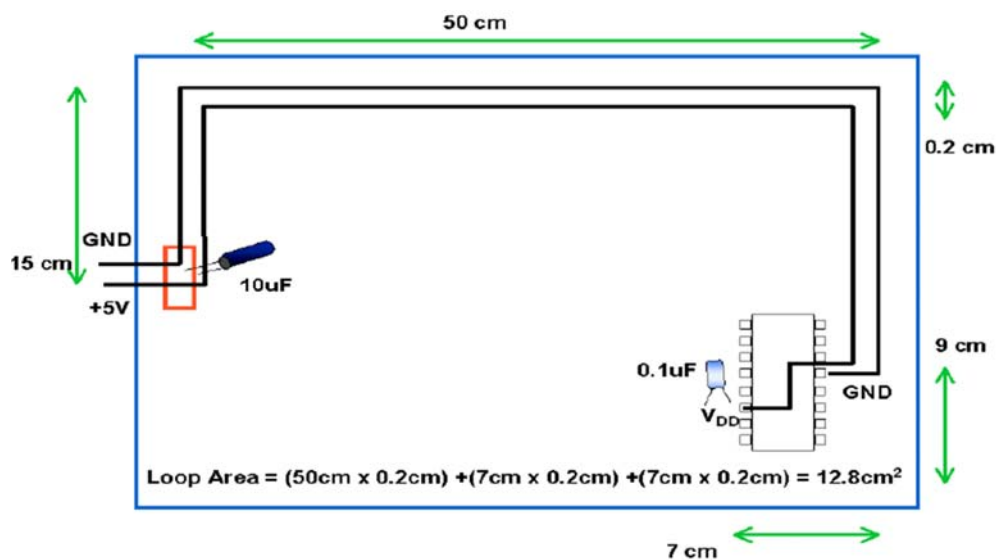


Board and IC coupling capacitors

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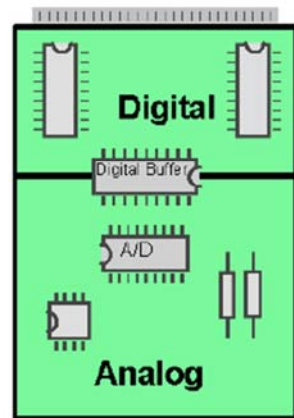


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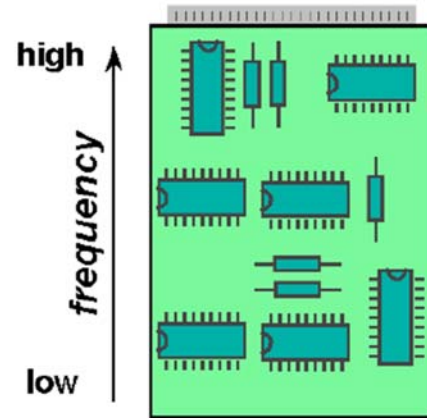


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a.) Separate the Digital and Analog Portions of the Circuit



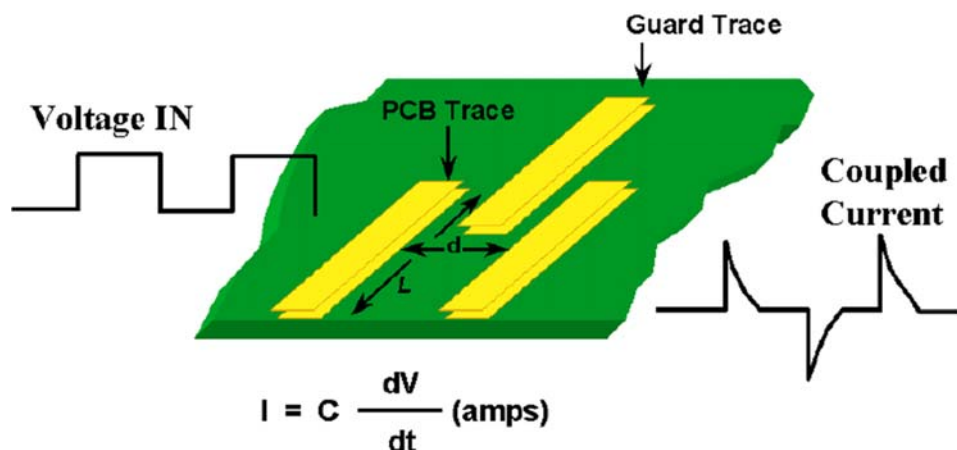
b.) High Frequency Components should be placed near the Connectors



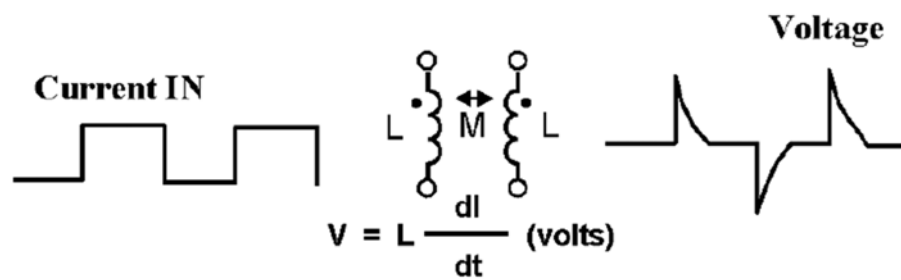
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$$C = \frac{w \cdot L \cdot \epsilon_0 \cdot \epsilon_r}{d} \text{ pF}$$

w = thickness of PCB trace
 L = length of PCB trace
 d = distance between the two PCB traces
 ϵ_0 = dielectric constant of air = 8.85×10^{-12} F/m
 ϵ_r = dielectric constant of substrate coating relative to air

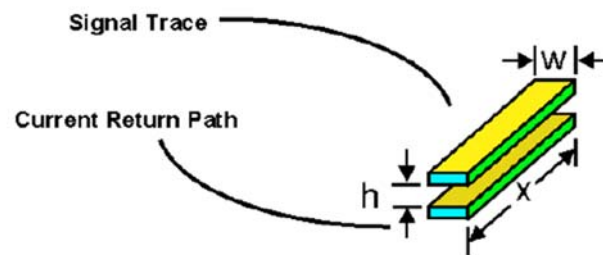


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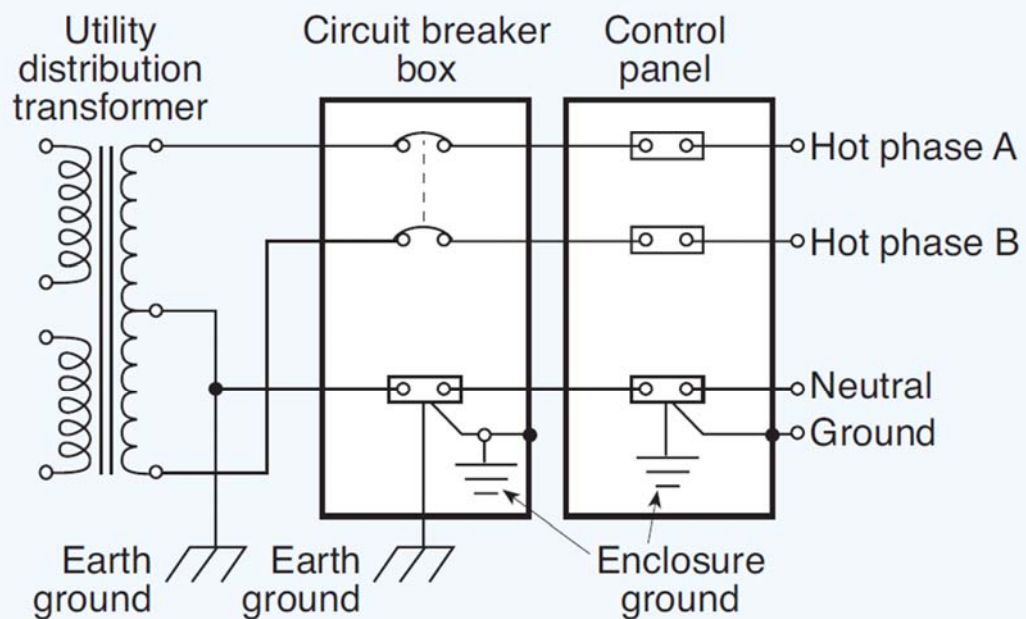
$$L = x (0.01) \ln(1+2\pi h/w) \text{ uH/in}$$

$$M = x (0.01) \ln(1+2\pi h/w) \text{ uH/in}$$



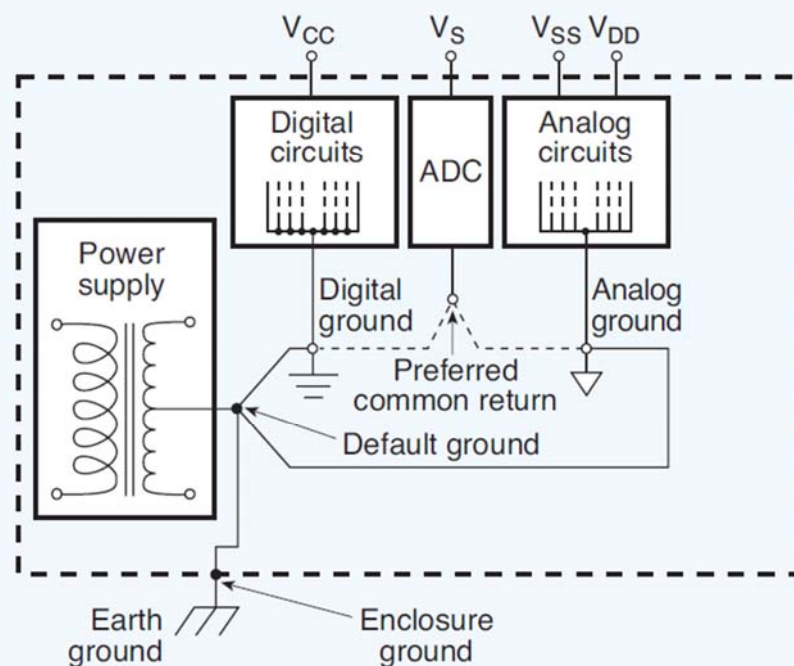
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Control Panel Grounding



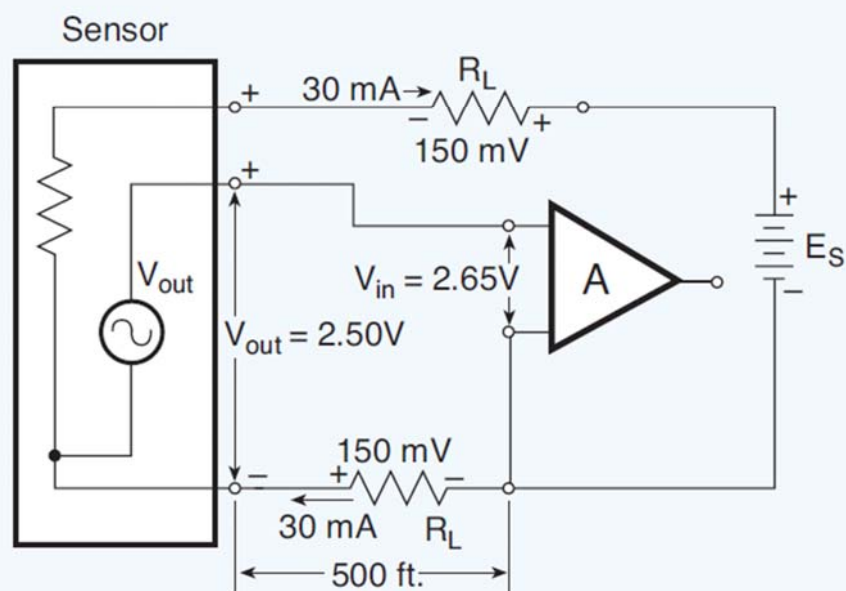
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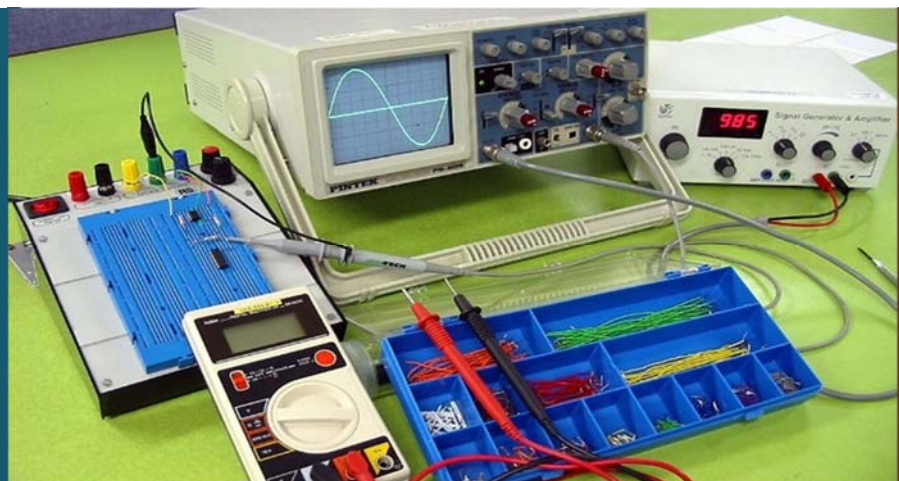
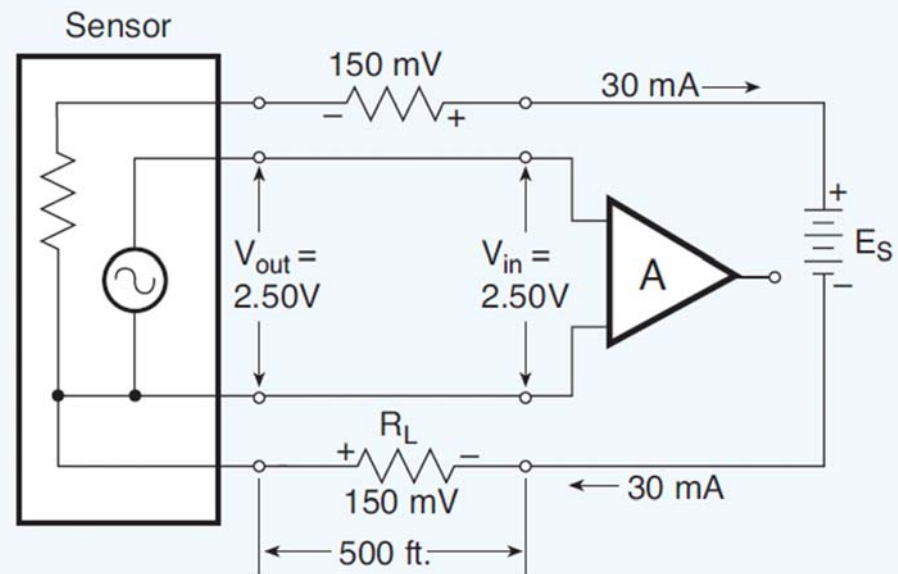
Common Grounds



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Interfering Ground loop





THANK YOU!

