Tools

- Soldering iron
- Solder sucker
- Solder wick
- Bench vise
- Wire strippers
- Side cutters
- Needle-nose pliers
  - Spring-loaded
- Hemostat
- Scissors
- Utility knife
- Tweaker / screw driver
  - Flat
  - Phillips
- Awl

Wire

Types of Wire
- Solid
- Stranded
- Shielded
- Unshielded (jumper)
- Magnet
- Solder
- Jumpers
  - MM / FF / MF
- Cable ties
- Heat shrink tubing

Handling Wire
- Stripping
  - Shielded
  - Magnet
- Tinning
- Crimping
- Adding strain relief
- Insulating
  - Heat shrink
- Organizing
  - Cable ties
Connectors & Connections

Connectors
• Banana Plug (M/F)
  – 2mm / 4mm
  – Adapter
• Alligator Clip
• Header Strip (M/F)
  – 1 / 2 rows
  – Square / round
• Terminal block
• Crimp pin
• Db 9/15/25 (M/F)
• Power jack
• Phone jack

Connections
• Wire / Cable
  – Solder pot
  – Crimp
  – Screw
    • Banana plug
  – Scissor clamp
    • Ribbon cable
• Buzzing out

Components

Passive
• Resistor
  – 1/4W, 3W, 10W
• Potentiometer
  – Trimmer
  – Knurled shaft
• Capacitor
  – Electrolytic
  – Monolithic
• Switches
  – Push button
  – Rocker
  – DIP
  – Limit

Connections
• Permanent
  – solder
• Temporary
  – DIP socket
• Test point
• Heat sink
  – Paste
Components

**Active / Sensors**
- H-bridge
- Hysteresis
  - Not / Buffer
- Current Driver
- Slot detector
- Strain gauge
- Instrument Amp

**Packaging**
- TO220
- Multiwatt 15
- DIP
  - Dual inline pin
- Surface mount
  - Evaluation board
- Daughter boards
- Stand-offs

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**Resistor in Tension / Compression**

\[ R = \frac{\rho L}{A} \]
Strain Gauge

Tension: \( R \uparrow \)

Compression: \( R \downarrow \)

Cantilever Configuration

\[ F \]

\[ >5V \quad <5V \]
T/C Configuration

\[ V_1 - V_2 \neq 0V \]

Balanced Bridge
Instrument Amplifier – INA126

Mounting a Strain Gauge

- Clean / sand surface.
- Place S/G (SHINY TERMINALS UP).
- Put tape on S/G & place on load cell (part).
- Peel up tape so that it makes a little hinge.
- Apply 1 drop glue to S/G.
- IMMEDIATELY fold S/G down, press & hold for 10+ seconds.
- Solder on wires.
- Tape wires into position with a double strain relief.
- Test resistance of wires using Ohmmeter.
- Crazy Glue is good for gluing strain gauges
- Crazy Glue is also good for gluing skin so be careful not to glue your hand to your part!
Remember

• Scope and Signal generator references internally connected to GND
• Do not limit both V and I on power supply
• An unsoldered connection cannot be trusted
• Intermittent problems are usually caused by a floating ground.