

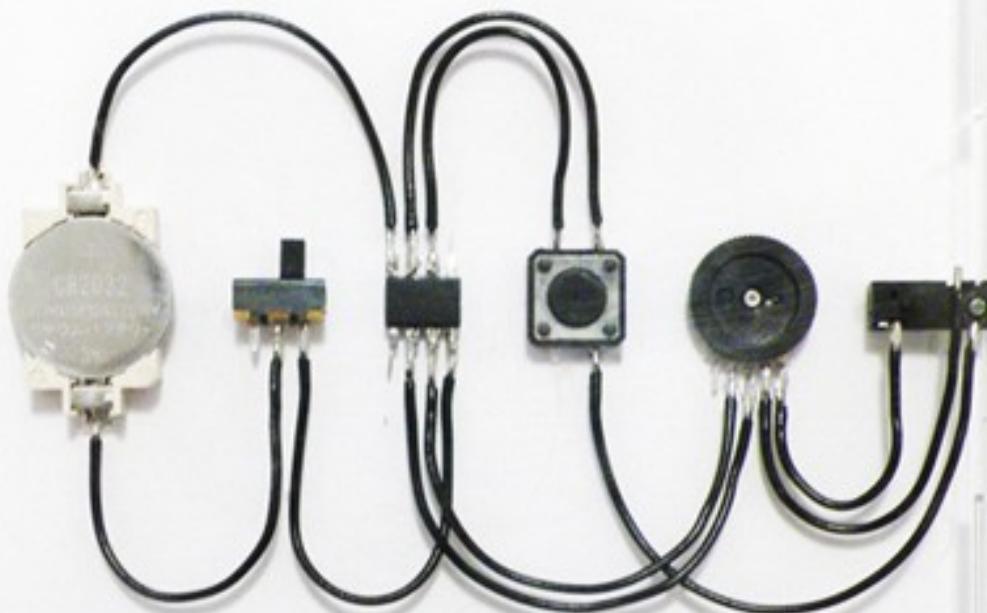
# **Electronics Enclosure Design**

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**April 12, 2014**

# Found Object Enclosures

TRISTAN PERICH 1-BIT SYMPHONY





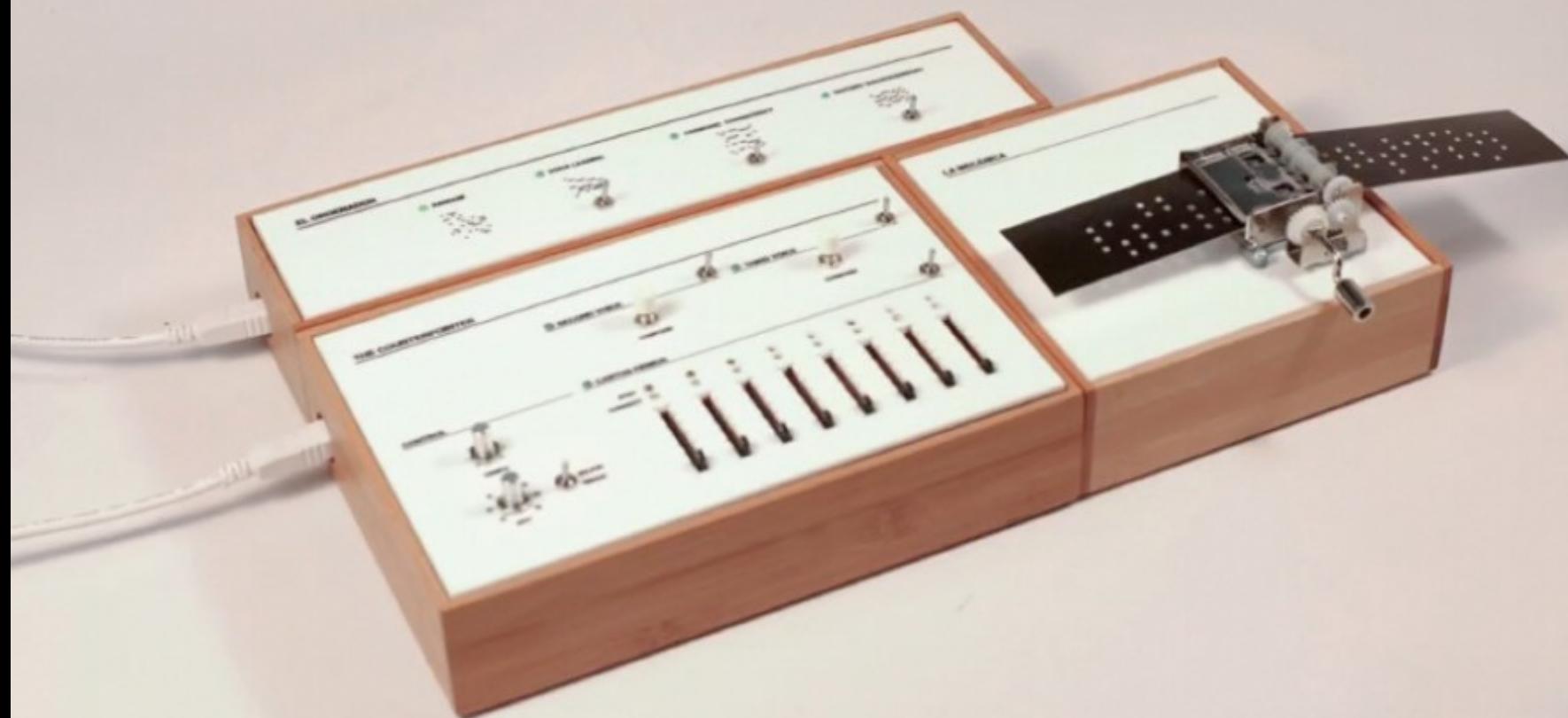


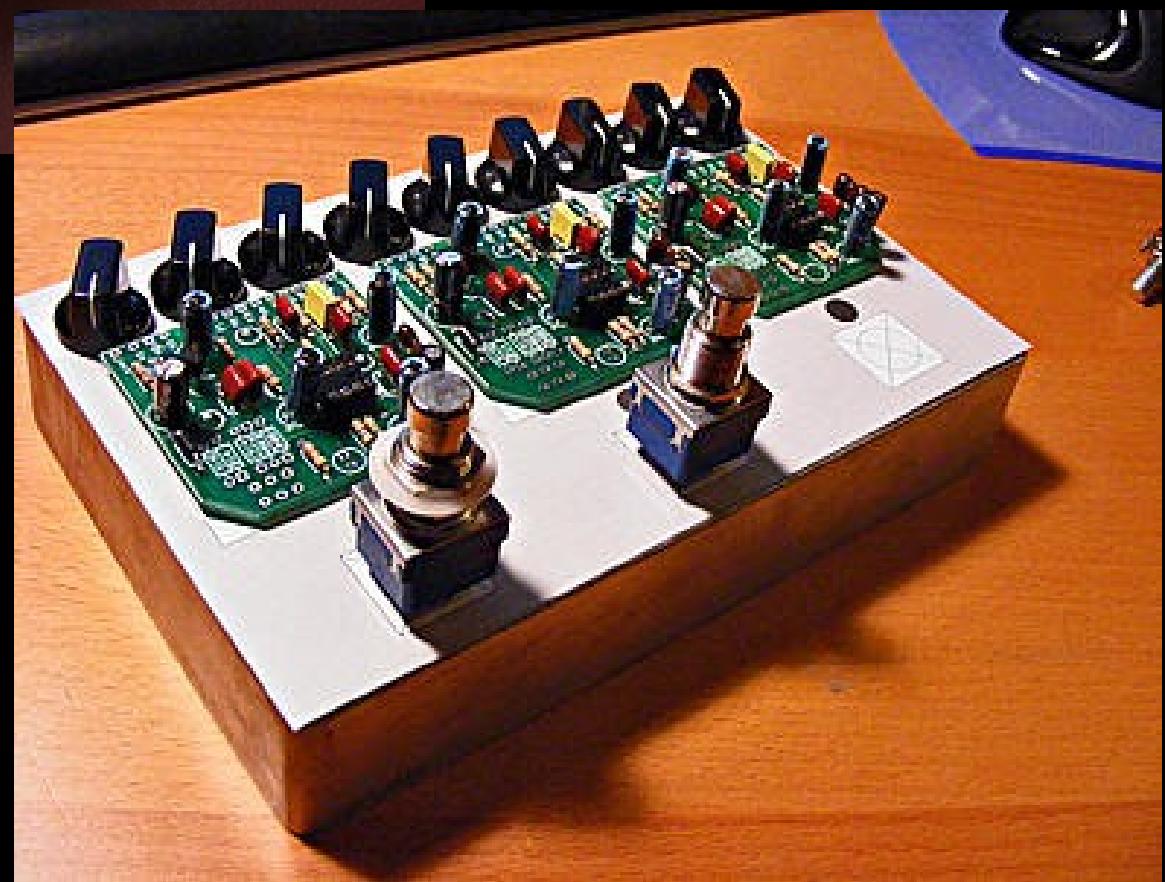






## THE WELL-SEQUENCED SYNTHESIZER





# Laser Cut Enclosures

# WEIRD SOUND GENERATOR by MFOS project



# Electronic Components and Hardware

- Connectors
- Switches
- Potentiometers
- Knobs
- LEDs
- Hardware

# Connectors (Audio)



- Used for...
  - Audio connection to amplifier/recording
  - Expensive Patching



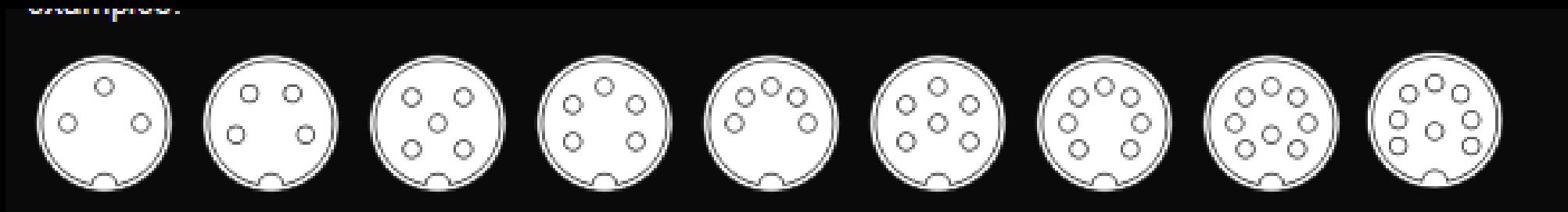
# Connectors (POWER)

- **2.1mm DC Barrel**
- Two parts...
  - Center pin
  - Shield/ring
- If making guitar electronics
  - Negative center pin
- If making anything else
  - Positive center pin
  - Arduino has positive center pin



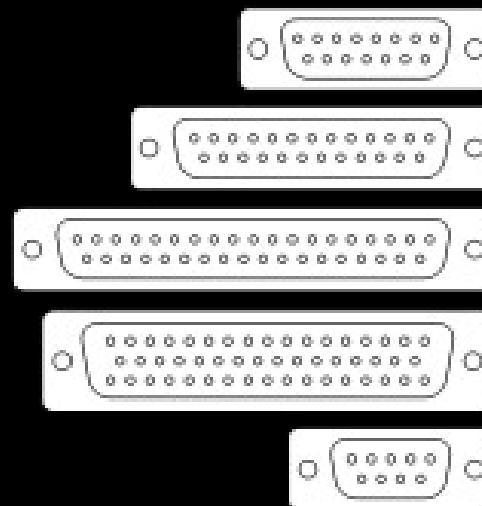
# DIN Connector

- Multiconductor cable
  - 3-8 pins
  - Widely available
  - MIDI (music)
  - DMX (lighting)
  - Arbitrary pin mapping
- Also consider Ethernet Cable



# D Subminiature Connector

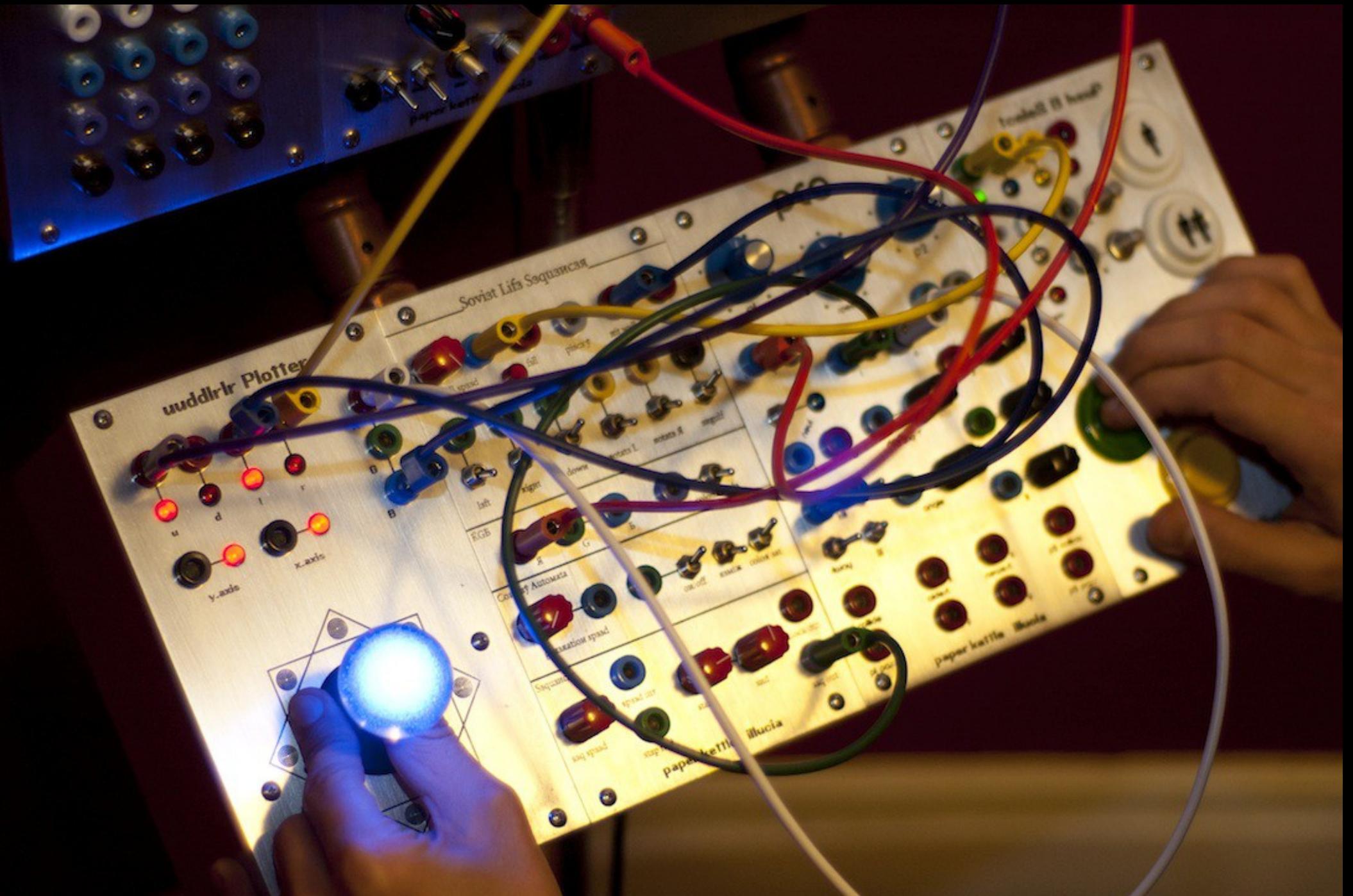
- Pre-USB computer cables
- 9-50 Conductors
- Great for circuit-bending or creating Breakout Boxes



# Banana Jack

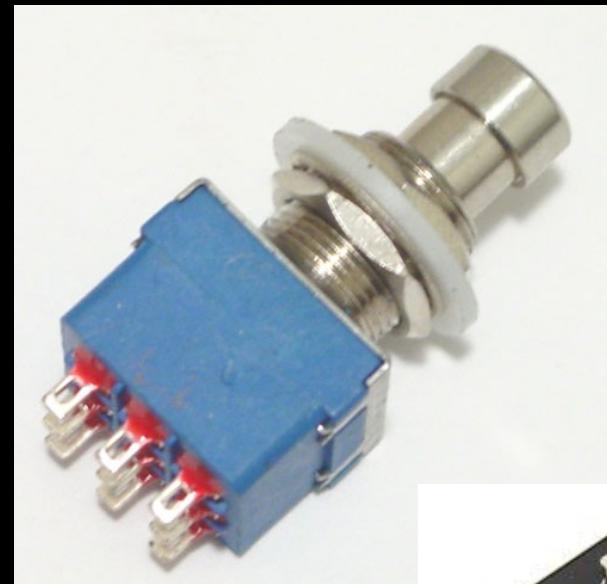
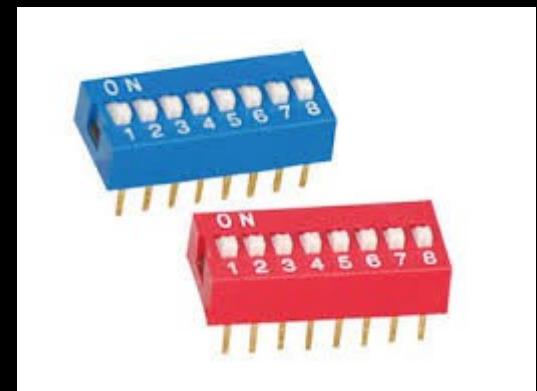
- Only one conductor. Good for projects that allow for various kinds of connections that share the same ground.





# Switches

- Switches can be incredibly complex.
- Types of Switches
  - Toggle
  - Pushbutton
  - Foot/Stomp Switch
  - Relay, Photorelay, and reed relay
  - DIP switches
  - Rotary switch



# Potentiometers

- Two sizes of potentiometers
  - 16mm / 24mm

Three types of shafts...

- 24mm



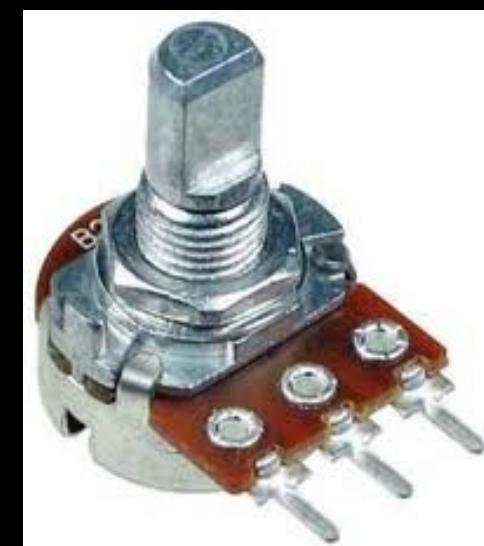
- 16mm



- Knurled



- Smooth



- D Shaft

# +'s and -'s

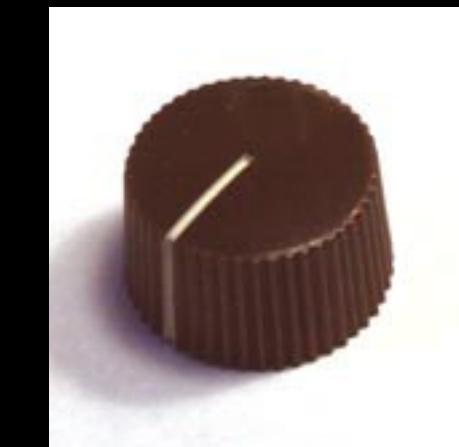
- Knurled
  - Easy to use, common, lots of knobs, changeable orientation
- Smooth
  - SO MANY KNOBS, used for guitar pedals, common
  - Bad: have to screw all the knobs on
- D Shaft
  - Fast and easy assembly, best for PCB mounted potentiometers. Set orientation. Few knobs available

# Watch out for...

- Shaft length. When ordering some pots could have shafts up to a few inches long and this might not be included in the photo
- Detented. Some pots have a dented center point used for audio controls like pan.

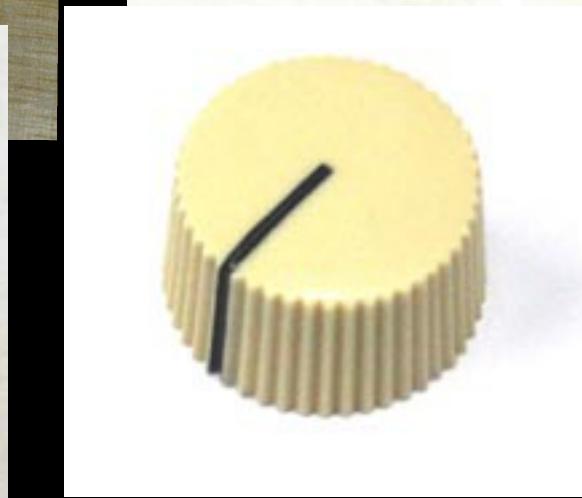
# KNOBS!

- Take note of...
  - Mounting style
    - **T18 (18 teeth)** fits knurled shafts
    - **SLOTTED D / D SHAFT** fit D shaft Potentiometers
    - **SET SCREW** fits smooth shafts









# LED Colors and Sizes

- COMMON
  - Red
  - Blue
  - Green
  - Orange
  - Yellow
  - White
- UNCOMMON
  - Pink
  - Purple
  - Aquamarine
  - Ultraviolet
  - Infra**red**
- SIZES
  - 3mm
  - 5mm
  - 10mm
  - 12mm

# Waterclear vs Diffused



- Waterclear
  - Angled beam of light. Used in flashlights and car lights. Burn your eyes out. Good for photoresistor projects
- Diffused
  - Softer. Used as indicator
  - Super awesome!
- Use 400 grit sandpaper on WC LED to diffuse it. **BAD!**

# Other kinds of LEDs

- Bi-color – good for sequencer/programming
- RGB – rainbows!
- Pre-programmed – WOW! You're one crazy hacker!

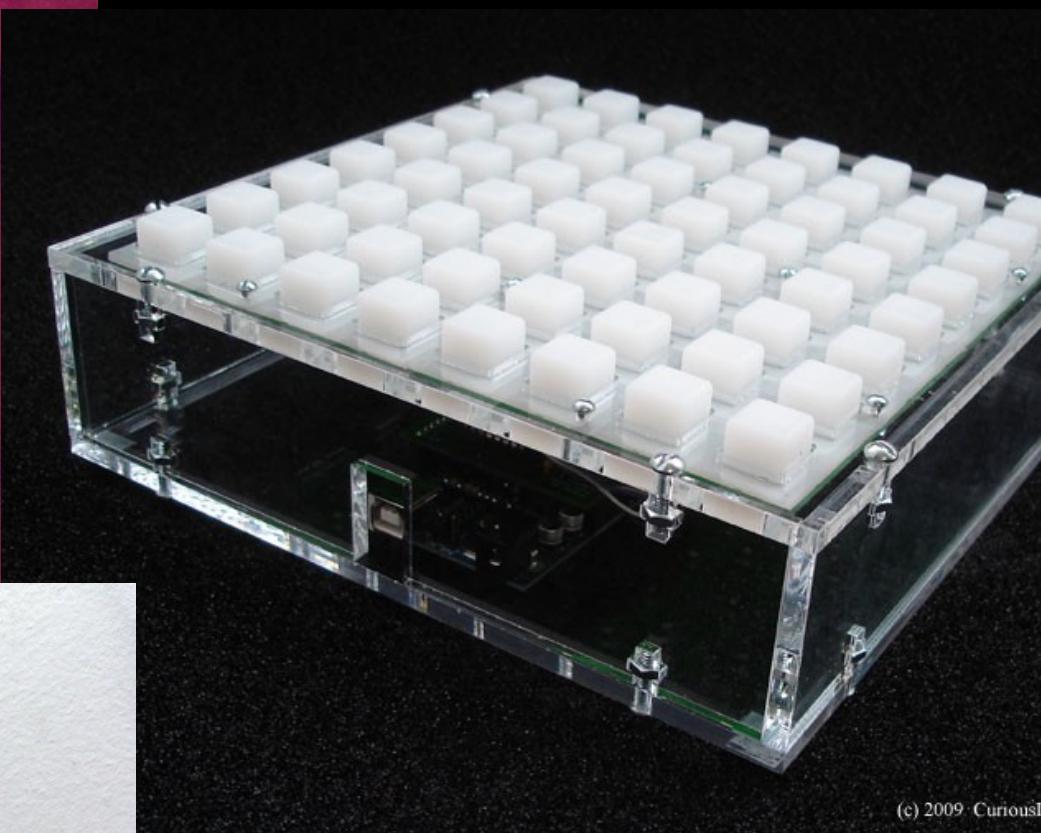


# Enclosure Construction

- Open Acrylic
- Boxed Acrylic
- Wood-sides + Acrylic
- Aluminum Shielded

# Open Acrylic





(c) 2009 Curious

# Boxed Acrylic



Wood-sided

# Aluminum Enclosures



- Laser Cutter Electronics Library
- <https://github.com/brendan-byrne/LCEL>