Overview

If you're a first time product designer and you're spending all your time on the product itself, you might forget just how much time and effort it can take to set up a good test jig. A test jig is essentially a contraption that allows you to test many components of a board all at once.

There are a lot of things to consider when creating a test jig, ranging from test coverage to operator fatigue, and of course throughput and reliability. In some cases, a product designer may spend even more time designing a test jig than they spend designing the product itself!

This guide will take you through the basics of soldering a generic type of electronics testing fixture and serves as an update to this original How to Make a Pogo Pin Test Jig (https://adafruit.it/INA) guide.

We've previously posted some time lapse videos showing how we create testers for the Perma Proto Pi HAT (https://adafruit.it/oje), and ADXL326 accelerometer (https://adafruit.it/rPb).

This guide provides a more in depth description of the process and how to get things right the first time.

The impact that a well-designed test jig can have on manufacturing efficiency is huge. These are extremely important for large scale manufacturing, as reputable factories will test 100% of every product shipped. It is easy to lose sight of the potential pitfalls of hardware manufacturing and the magnification of those issues at scale; if you can cut a product's testing time from 4 minutes to 1 minute the time savings will pay off exponentially as thousands of units are tested.
Materials

For this project you will need:

- Soldering iron
- Solder
- PCB
- Pogo pins
- Metro
- Rubber feet for metro
- Headers
- Through-hole LED
- Piezo buzzer
- Tweezers or needle nose pliers
- Kapton tape
- Tactile button
- Panavise or PCB holder
- Flush diagonal cutters
- Standoffs and screws
- 9V power and power switch
Pogo Pins "Spear Head" (10 pack)

$7.50
IN STOCK
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Adafruit METRO 328 Fully Assembled - Arduino IDE compatible

$17.50
IN STOCK
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Piezo Buzzer

$1.50
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Fine tip straight tweezers - ESD safe

$3.95
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Tactile Button switch (6mm) x 20 pack

$2.50  
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Diffused Green 3mm LED (25 pack)

$4.95  
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Break-away 0.1" 36-pin strip male header - Black - 10 pack

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Adafruit Proto Shield for Arduino Unassembled Kit - Stackable

$9.95  
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Heavy Stainless Steel PCB Holder

OUT OF STOCK

Panavise Jr.

$30.00
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Flush diagonal cutters

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High Temperature Polyimide Tape - 1cm wide x 33 meter roll

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Soldering iron stand

$6.00
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Adjustable 30W 110V soldering iron

$22.00
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Mini Solder spool - 60/40 lead rosin-core solder 0.031" diameter

$7.95
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Little Rubber Bumper Feet - Pack of 4

$0.95
IN STOCK
Add To Cart
Black Nylon Screw and Stand-off Set – M2.5 Thread

$16.95
IN STOCK
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9 VDC 1000mA regulated switching power adapter - UL listed

$6.95
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In-line power switch for 2.1mm barrel jack

$2.50
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"Wire Wrap" Thin Prototyping & Repair Wire - 200m 30AWG Blue

$7.50
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Making a PCB

The PCB, or Printed Circuit Board, is where all the tester bits get placed and assembled. There are a couple of different options to consider here.

Option 1: Outsource the PCB

The first option would be to order the PCB through a manufacturer like OSH Park (https://adafruit.it/e2G).

Just send them the files and they make and send you the PCB(s).

For the purposes of this guide we will be showing off mainly this method.

Option 2: Use a milling machine to mill your own PCB

Another option is use a desktop milling machine such as the Bantam Tools desktop CNC (https://adafruit.it/Cg-).
Option 3: The Proto Shield

The Arduino proto shield (https://adafruit.it/eUM) is a great option if you don't have the right files to send to a PCB manufacturer or you don't have access to a milling machine.
For mounting standoffs with this method, you will have to drill holes where you’d like the standoffs to go.
Soldering

Once you have your PCB, the next step is to place the "pogo pins".

What are these pogo pins anyway?

Pogo pins are basically spring-loaded metal sticks. They are used to test specific pins on each board.

The pogo pins in this guide are about 0.5" long and have a spear point. They also fit snugly into 'standard' 0.035" (0.9mm) drill holes so they are easy to insert and stand up straight. We carry these pogo pins in the Adafruit shop! [http://adafruit.it/394](http://adafruit.it/394) They're called "P75-LM" type, you can also pick them up on ebay. If you're building something that will be used for a long time it's probably a good idea to use socket holders.

Place pogo pins

Pogo Pins "Spear Head" (10 pack)

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Use tweezers to push pogo pins into the designated holes in the board.

The pogo pins may be skewed all over the place at this point. That's ok, we're going to fix it!
- Attach standoffs to the board.
- The screws go underneath the board and attach to the standoffs on top.

Screw down board that will be tested
Straighten pins

Repeat this process for all pogo pins
Examine your work. Pins should all now be straight!

Step 3: Solder on components
Solder on resistor.

For comfort, you may want to switch the position of your PCB to a stand.

Install LED, making sure it's oriented correctly (longer leg is the anode).

Clip off any excess from the LED with snips.
Solder piezo buzzer into place.

These little buzzers are great for adding an auditory element to any test procedure.
Step 4: Solder headers

- Break up your headers into (1x) 6 pin, (1x) 10 pin, and (2x) 8 pin headers.
- Place accordingly on Metro.
- Now place the PCB on top of the headers, pushing down the PCB into place in needed.
- Now solder the header pins to the PCB.

Solder in reset button.

This button is a handy way to re-start a test.
Give it some rubber booties!

These little adhesive rubber feet will prevent your tester from slip-sliding all over the place while you're trying to use it.
Step 5: Programming
Load your test program onto your Metro board (shown here using TinyUSB).

You're now ready to start testing!
Testing

Now the fun part! When a board is ready to test, find the right orientation and press down to make contact with the pogo pins. If all is good, it will beep and the LED will flash with a green light!
FAQ

Answers to some frequently asked questions

What elements should I include in my tester design?
You will want some easily identifiable way to tell that your board has passed test. For standalone testing jigs, including a piezo buzzer and LED light are a simple way to indicate when a test has completed successfully.

![Piezo Buzzer](image)

**Piezo Buzzer**

$1.50

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![Diffused Green 3mm LED (25 pack)](image)

**Diffused Green 3mm LED (25 pack)**

$4.95

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Do I need a clamp on my test jig?
For tests that take longer than a few seconds, adding a clamp to your tester design can greatly speed up your process by freeing up your hands to do other things while your board is undergoing test.

Adafruit carries a variety of the same clamps that we use in our own tester designs, including a variety of sizes and styles depending on the size and shape of the board being tested.

Your browser does not support the video tag.

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[https://learn.adafruit.com/how-to-build-a-testing-fixture](https://learn.adafruit.com/how-to-build-a-testing-fixture)
Should I order my PCB, mill it, or use a proto shield?

**Order PCB:** If you have the PCB design, want a longer-lasting tester, and don't mind waiting for a bit.

**Mill PCB:** If you have access to a milling machine and want to quickly and accurately create a prototype of your tester design.

**Use proto shield:** If you don't have the exact design for your PCB but have the general direction of how your tester will
What happens if some copper breaks off from my milled PCB?

- Sometimes when placing pogo pins in a milled PCB, this can happen.
- The copper film is quite delicate which can cause the copper layer to rip off sometimes. If this is the case don't fret it!
- Just grab some thin, solid core wire (https://adafruit.it/diJ).
- Next, expose some wire on each end.
- Now use some tweezers and create a small loop on one end. This end will be for the pogo pin.
- Re-place the pogo pin in the affected area going through this wire.
- Solder wire to pogo pin.
- Later when soldering pins to the pcb, make another loop with the wire, place around the adjacent pin, and solder in place.
"Wire Wrap" Thin Prototyping & Repair Wire - 200m 30AWG Blue

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