

SynShop Soldering Buildup

Presented by Charley Jones, PMP aka Dataman





SynShop

Soldering Buildup

Safety First!



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1

**Wear
safety
goggles at
all times.**

**Molten
solder
may fly
and cause
permanent
blindness!**





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2

Be Safe

**Soldering
tip is 700
degrees.**

**NEVER
grab a tip,
even when
off. Parts
and joints
are also
700
degrees!**





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How to Solder!



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1

700

degrees F

A temper-
ature
controlled
iron is
best.





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2

Clean
Tip

Clean tip
by twirling
in brass
tip
cleaner.

Removes
carbon
and
residue.





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3

Wet Tip

Immediately prime the tip by adding a little bit of solder. A dry tip will not conduct heat.





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4

Proper Angle

Hold the iron at 45 degrees. Don't use the point of the tip, but the whole side of the tip.





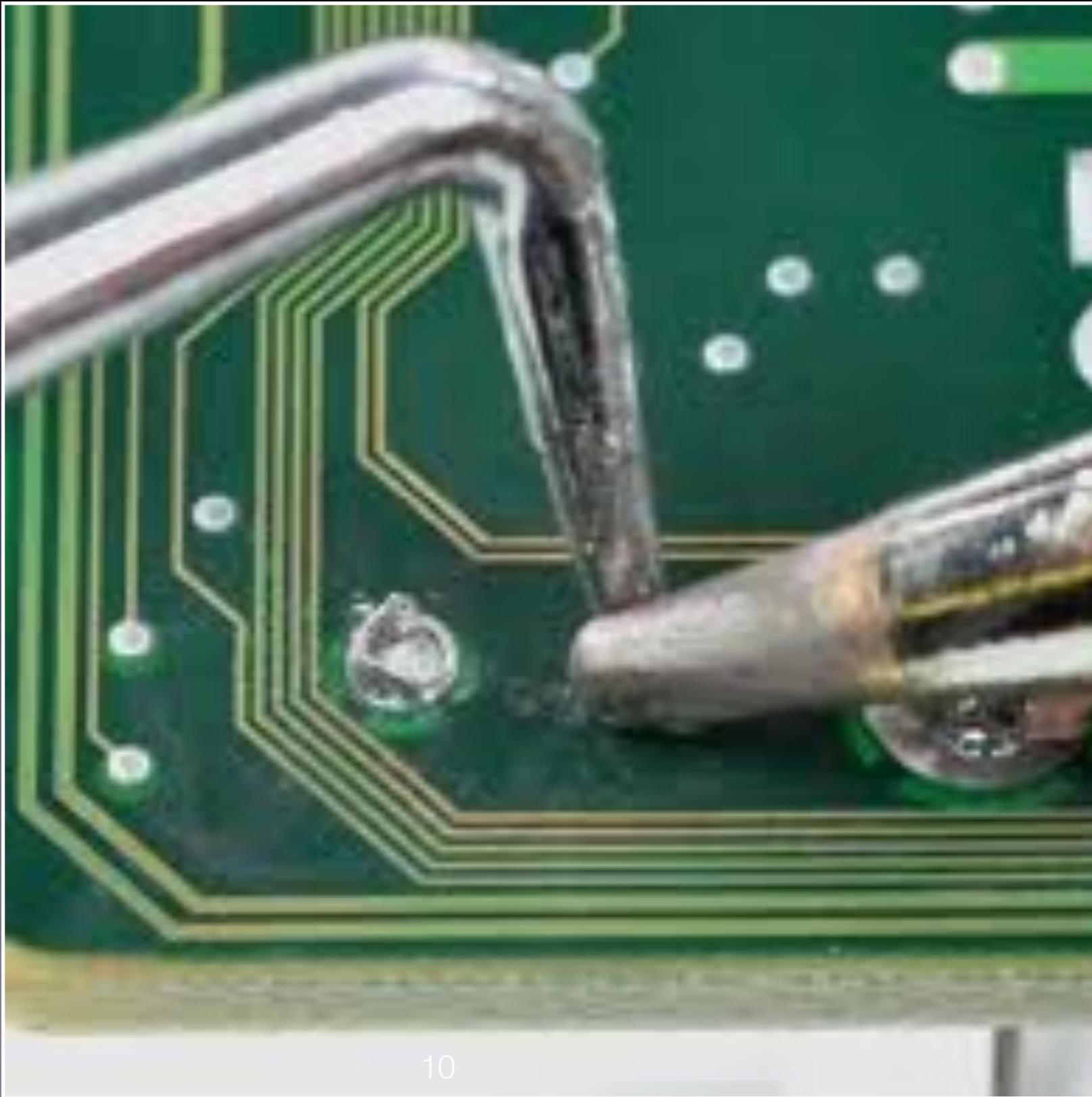
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5

Heat part

The part will heat quickly.
Too much heat will destroy the part.
Heat for 1/2-1 second.





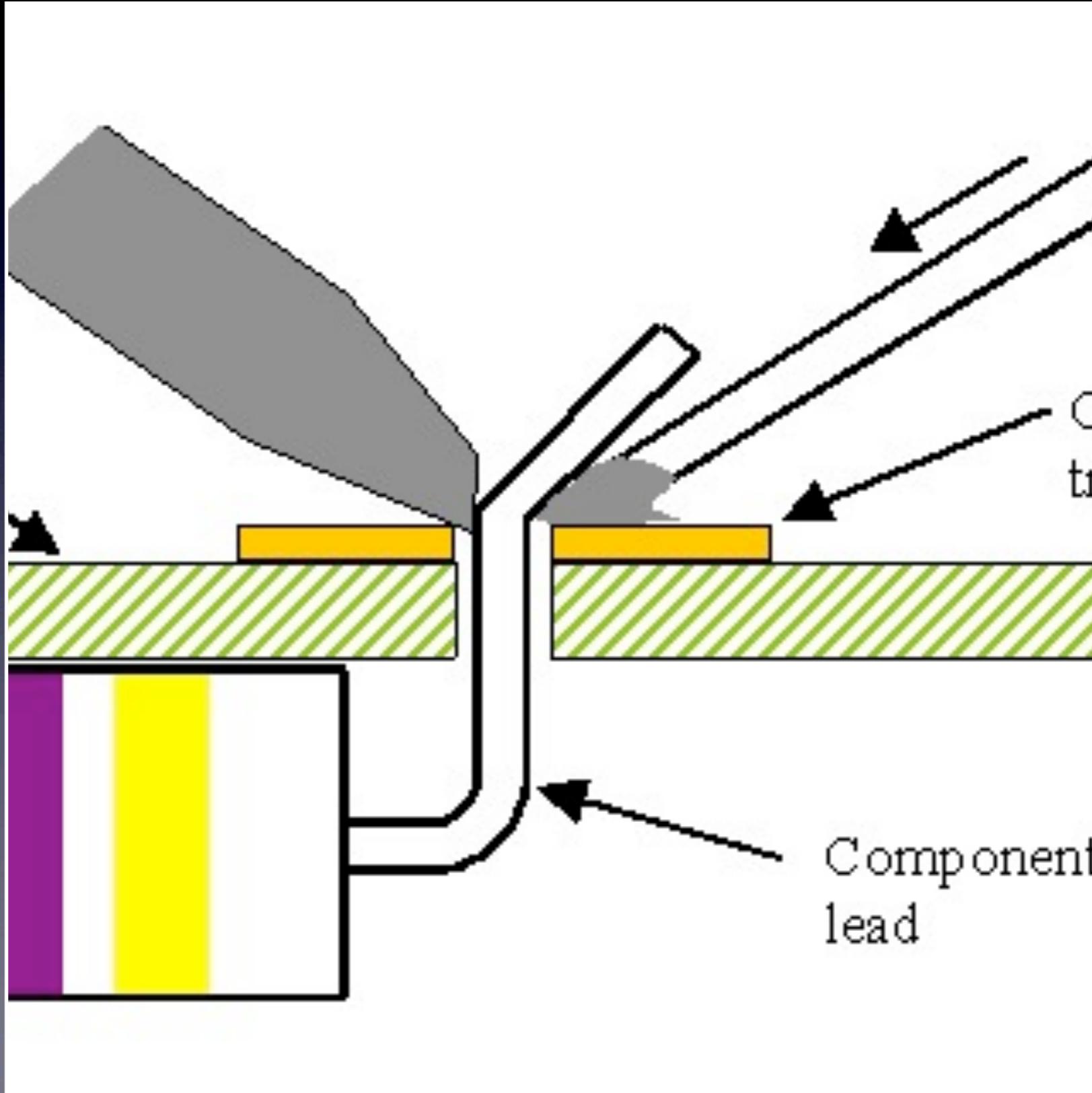
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6

Apply Solder

Add solder from the opposite side of the tip. The part will draw in the solder.





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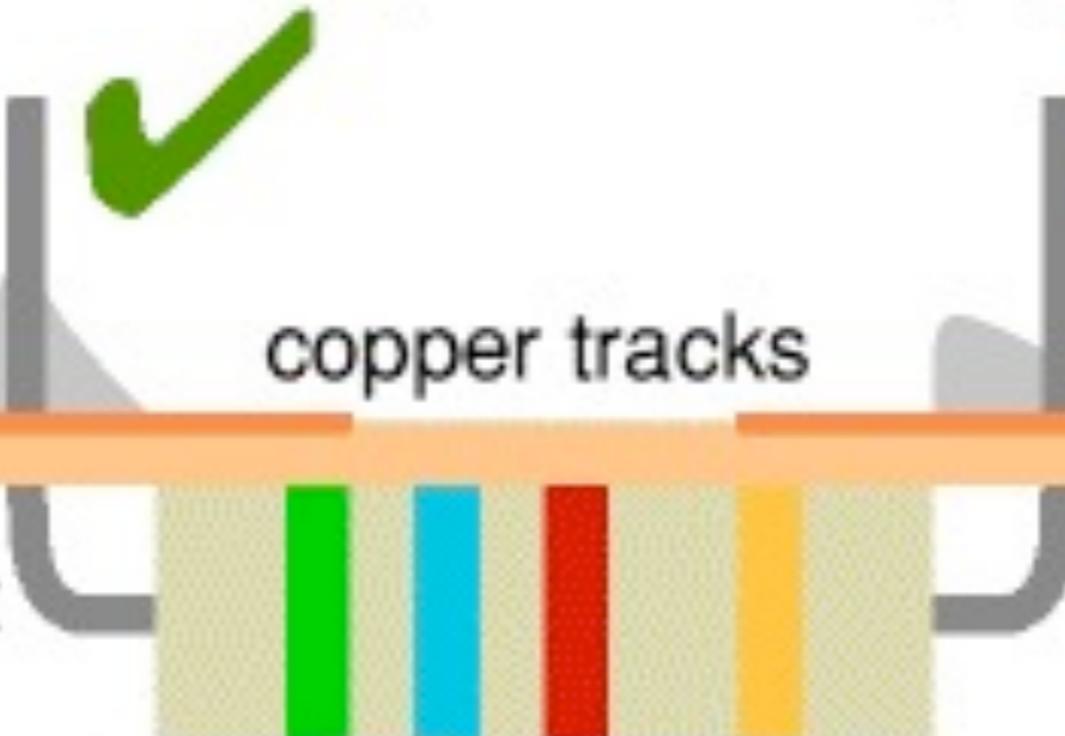
7

Dome

We are looking for nice dome shapes. If it isn't a dome, reheat, add more solder if needed.

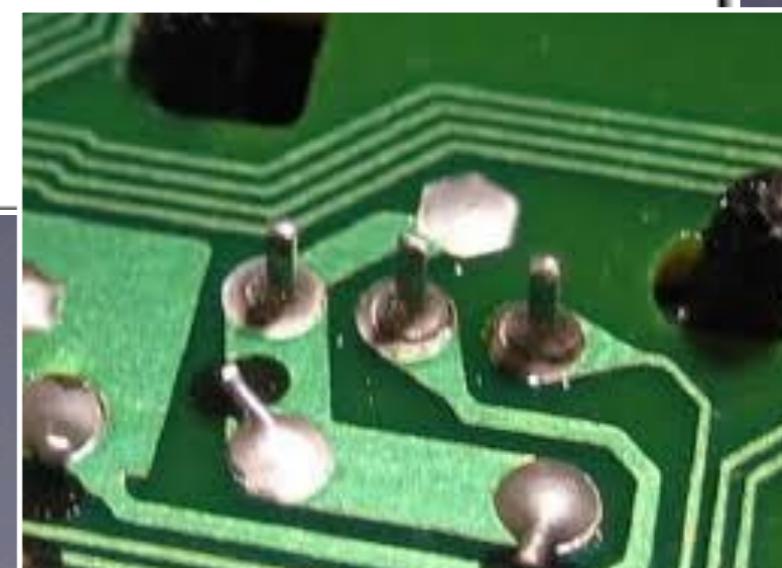
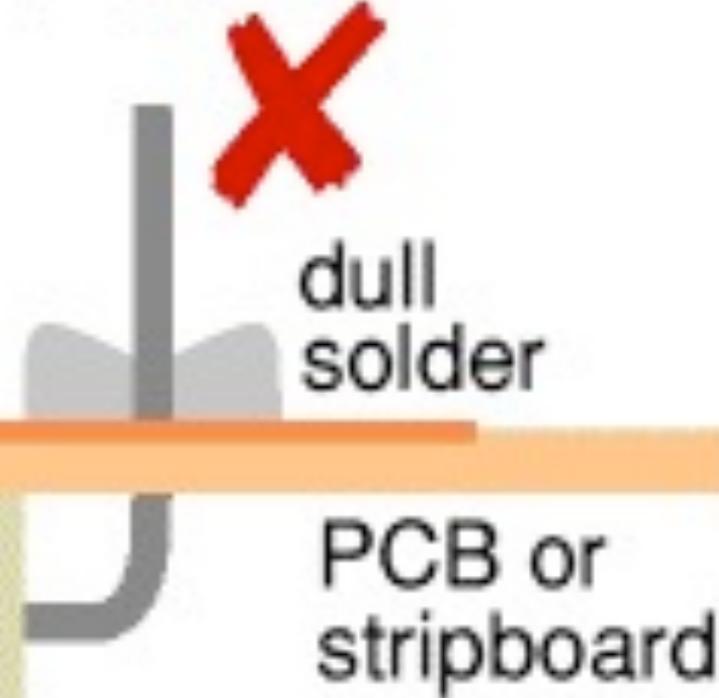
GOOD JOINT

(volcano shape)



BAD JOINT

(dry joint)





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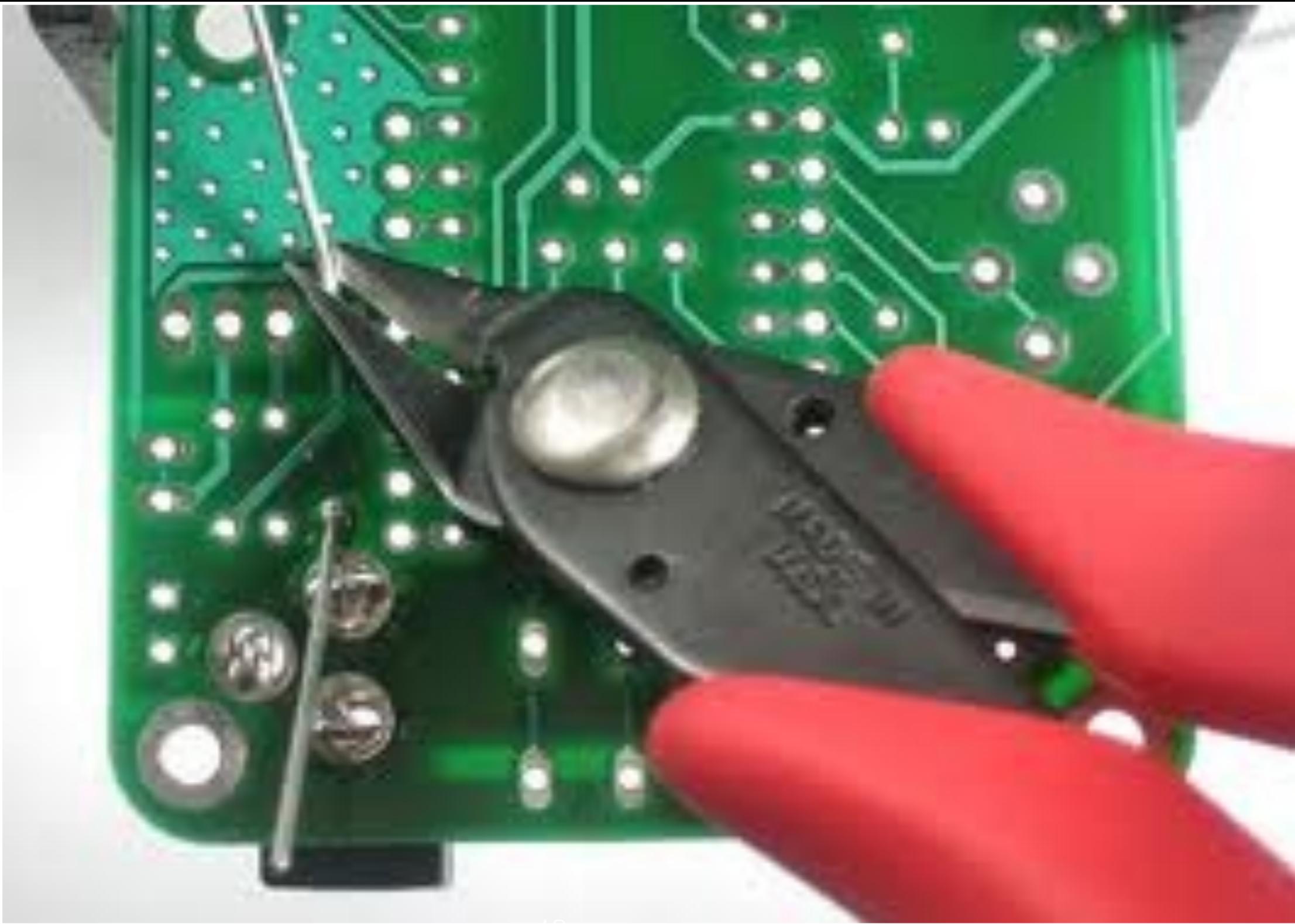
8

Clip

**Lastly clip
the lead
just above
the joint.**

**Do not
clip
through
solder.**

**Hold lead,
don't let it
fly.**





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9

**Keep Tip
Clean**

**Carbon
will
naturally
form on
the tip,
prevents
solder
from
adhering.**





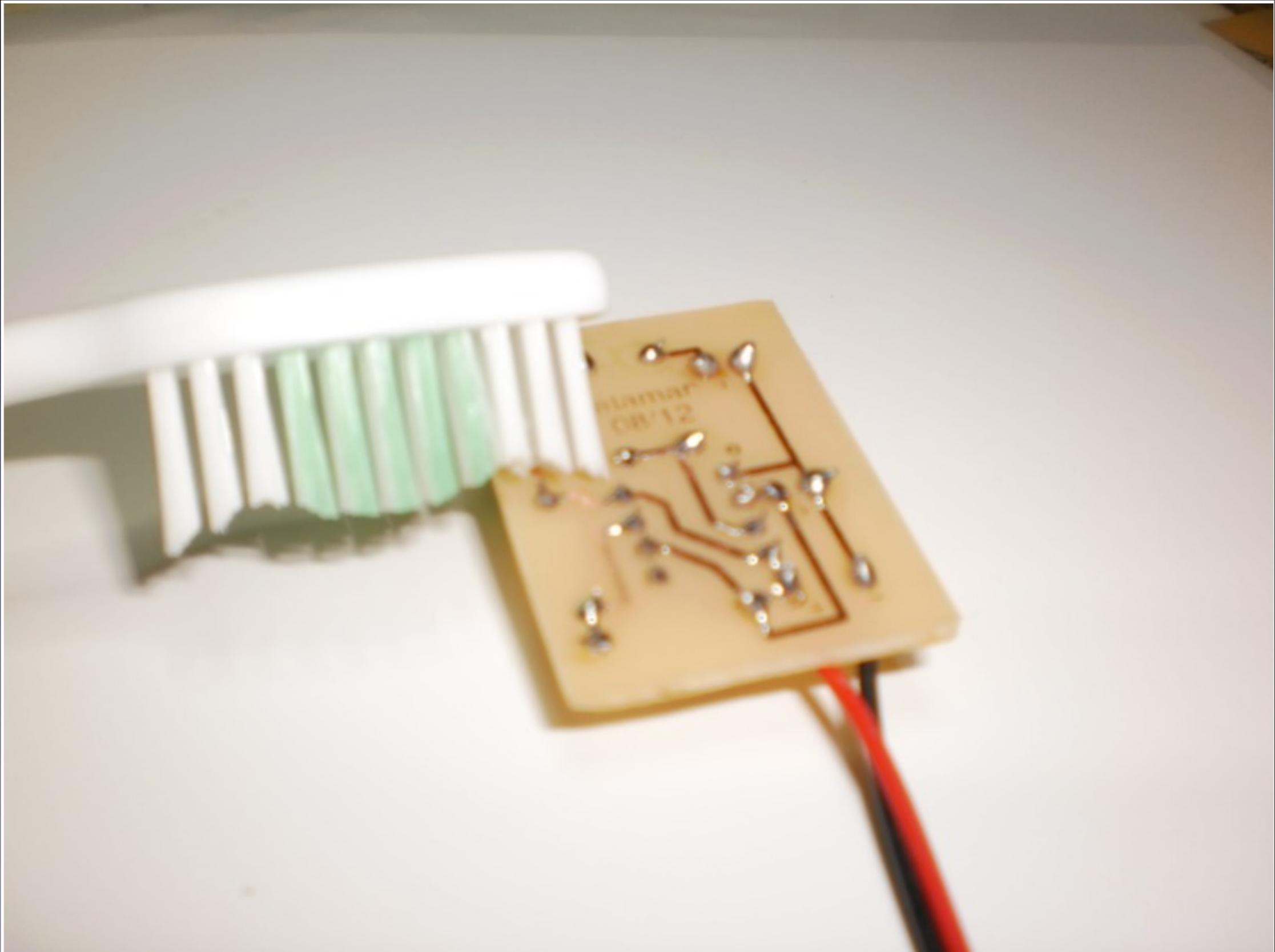
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10

**Alcohol
wash the
board.**

**Flux will
continue
to eat til
removed.**





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Steps to a good solder joint.

- 1) Safety Goggles**
- 2) Be safe**
- 3) 700 degrees F**
- 4) Clean tip**
- 5) Wet tip**
- 6) Proper angle**
- 7) Heat part and joint**
- 8) Solder joint not the tip**
- 9) Make a dome**
- 10) Clip above joint**
- 11) Clean tip**
- 12) Alcohol wash**

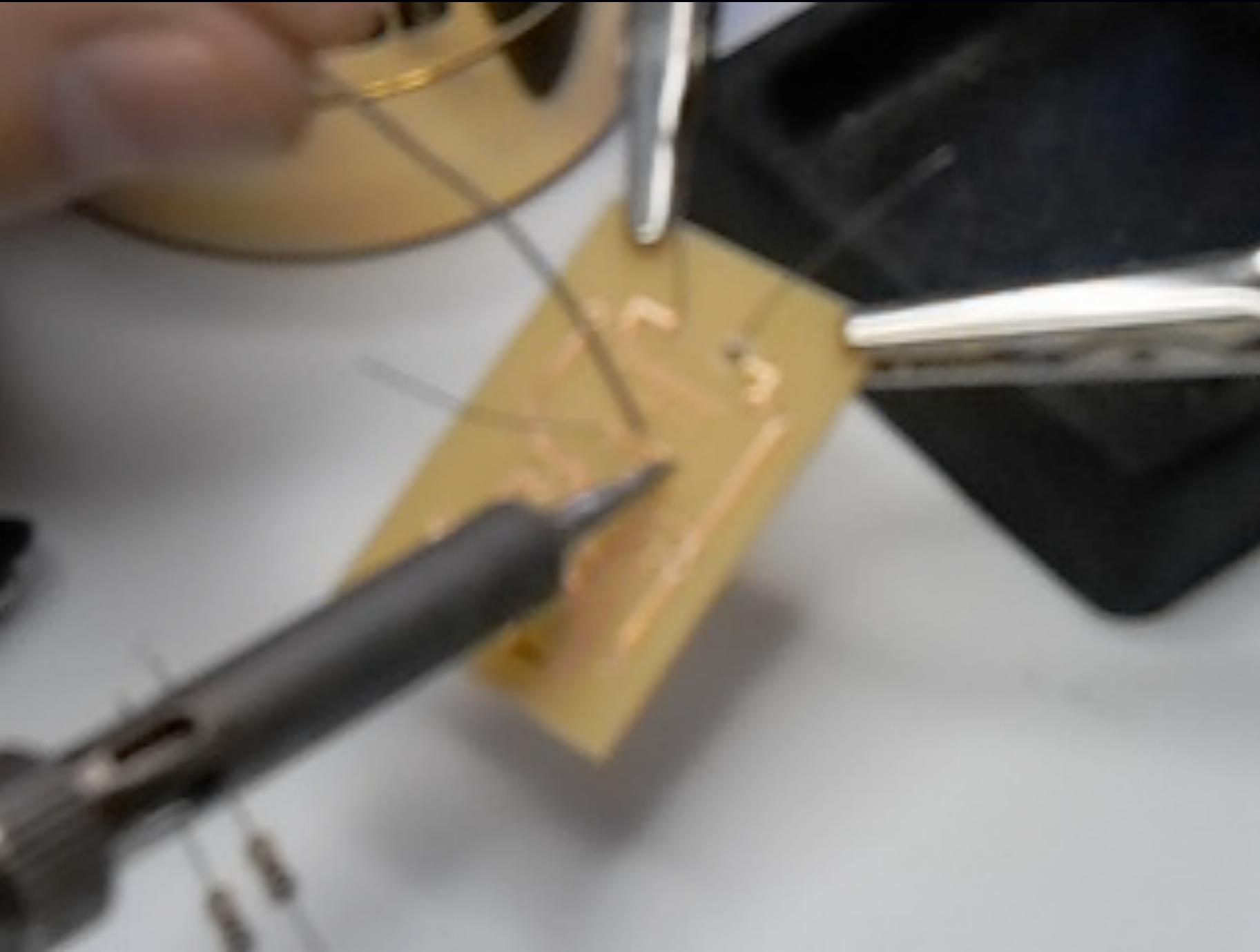




SynShop

Prototyping

Let's see that in action





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Soldering Buildup

Beta testing For SYNshop

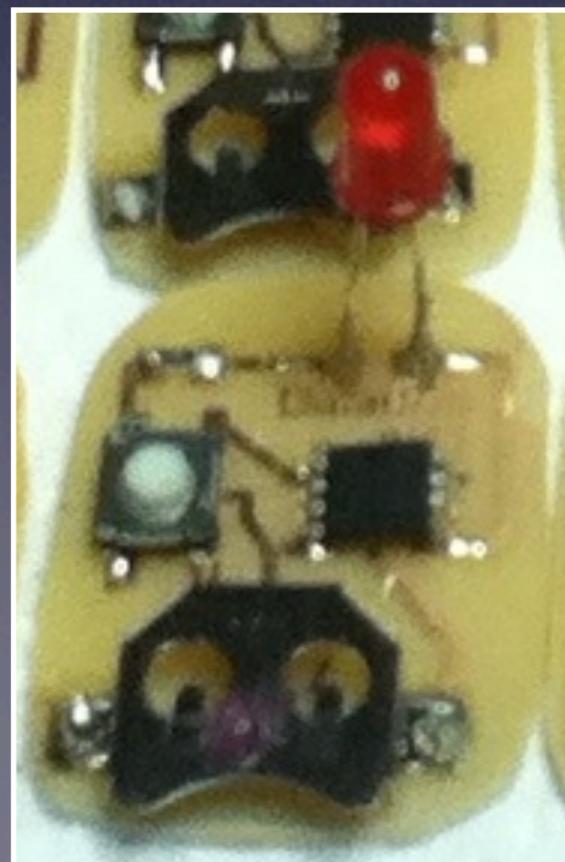


SynShop
Prototyping

SynShop Guinea Pig

You have been recruited as a guinea pig for the Buildup Timer.

Click at start of step.
Perform step.
Click at end of step.

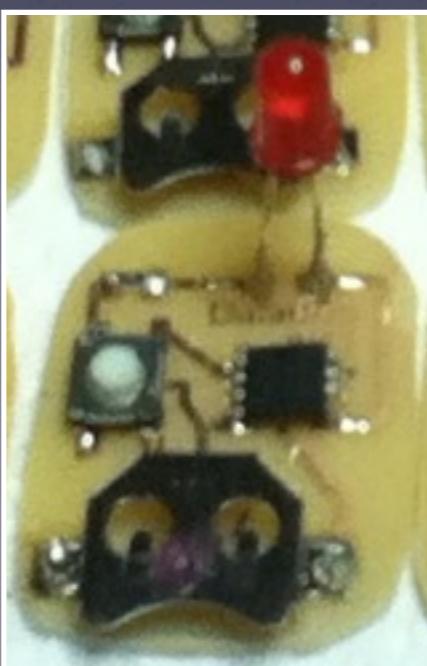




SynShop
Prototyping

SynShop Guinea Pig

Builder Timer blinks faster each minute. Let's us know who's having trouble. It's not a race!





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LED Tester!



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Soldering Buildup

Led Tester

To practice what we've leaned we are going to solder a very simple project with 3 main components.

Go slow and don't glop!



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Soldering Buildup

1

**Start with
proto-
board
copper
part facing
table.**



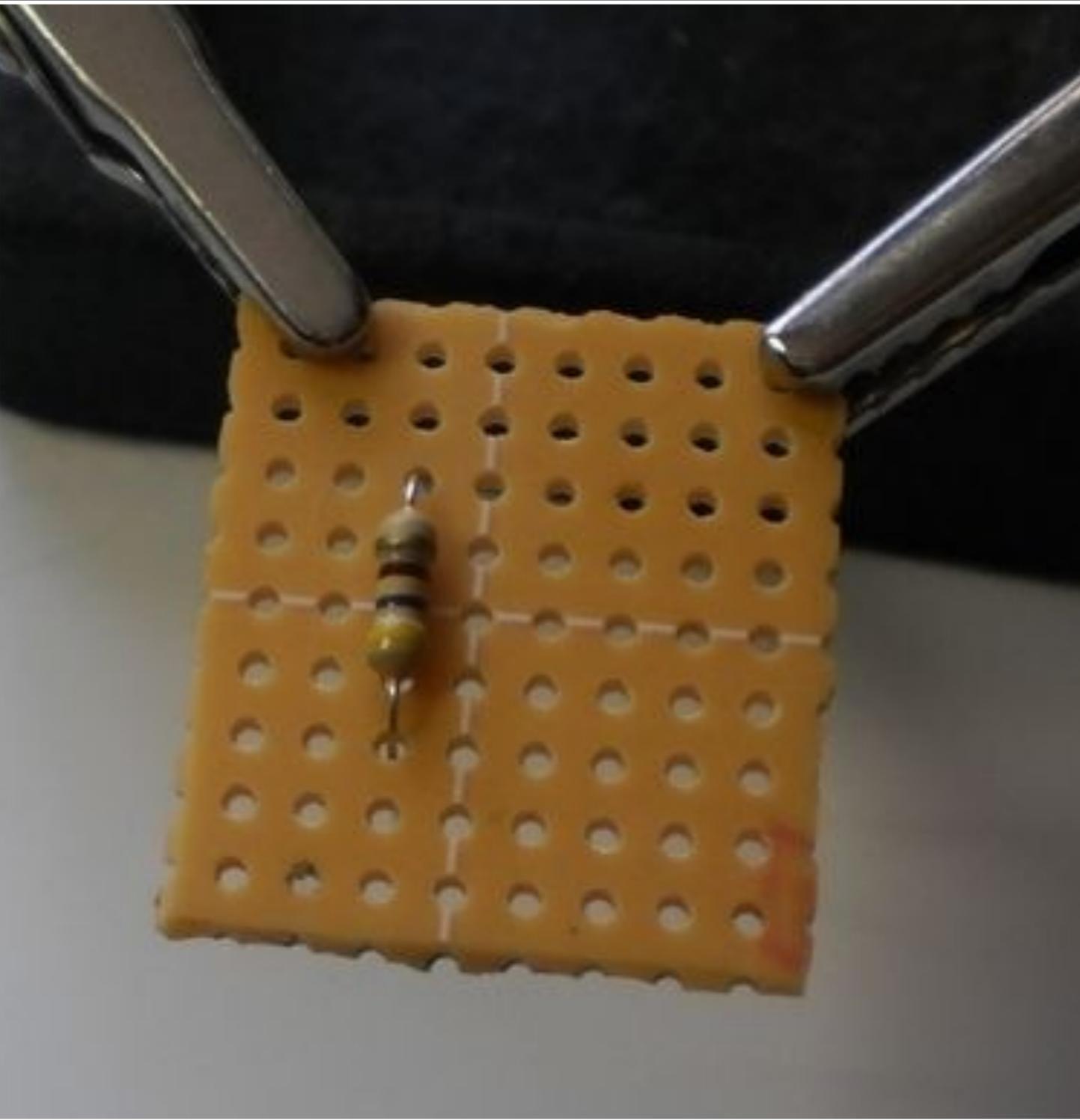


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2

**Place
resistor as
shown. Do
not clip
leads.**



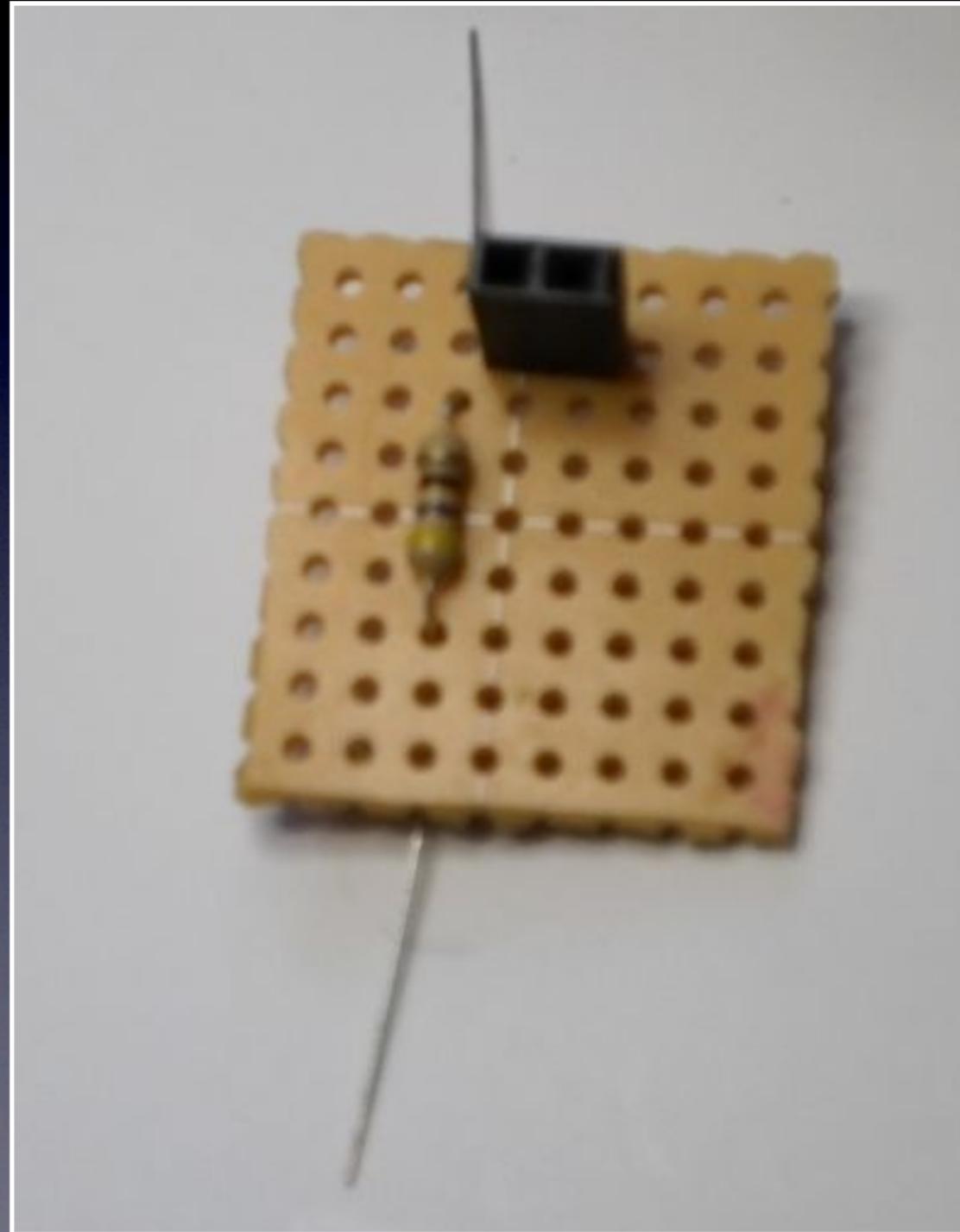


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3

**Place and
solder 2
pin female
header as
shown.**



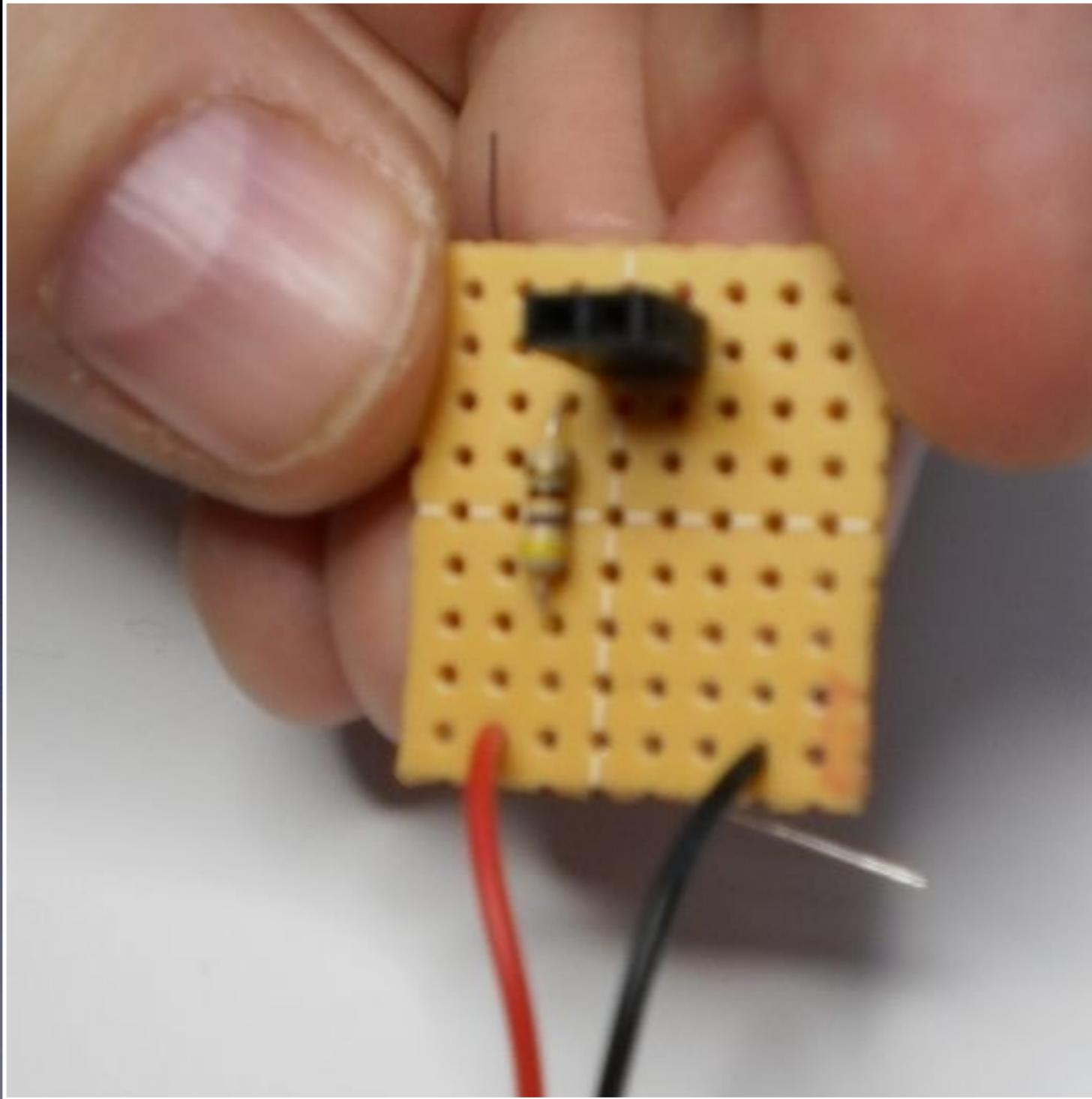


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4

**Place and
solder
battery
clip as
shown.**



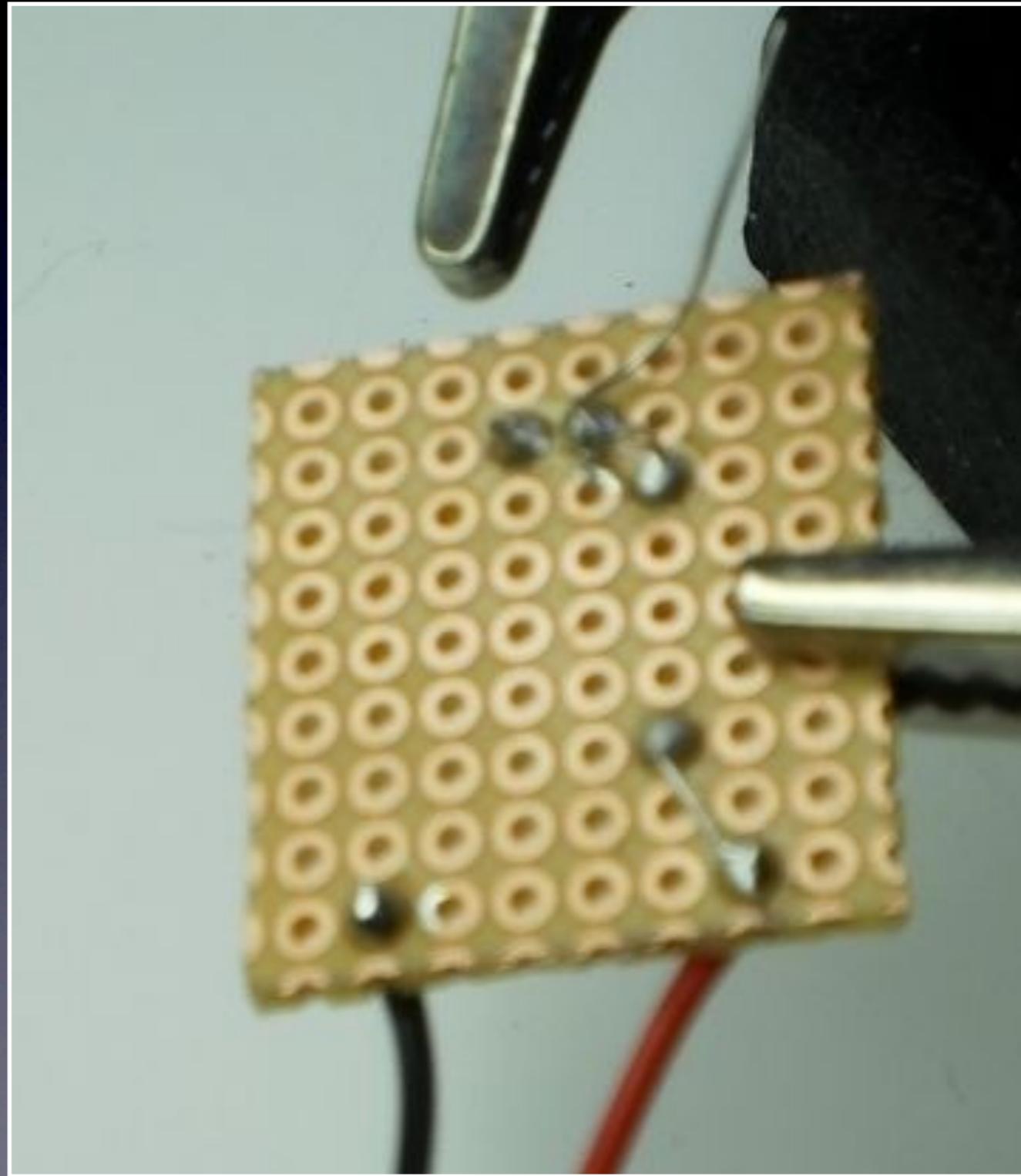


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5

**Working
from the
bottom
side now,
extend
resistor
legs to
positive
lead and
solder.**



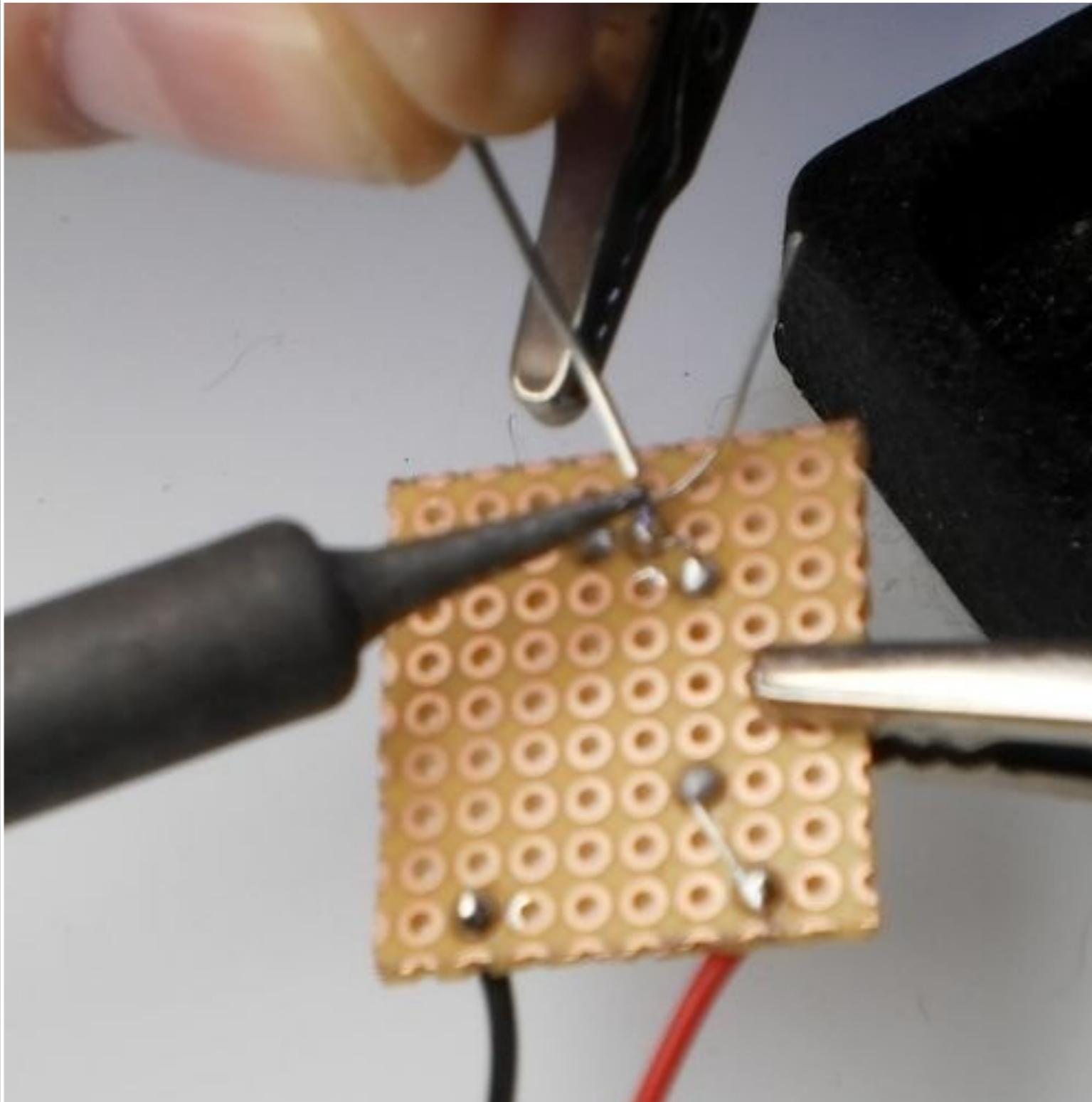


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6

**Solder
remaining
lead to
one side
of two pin
header.**



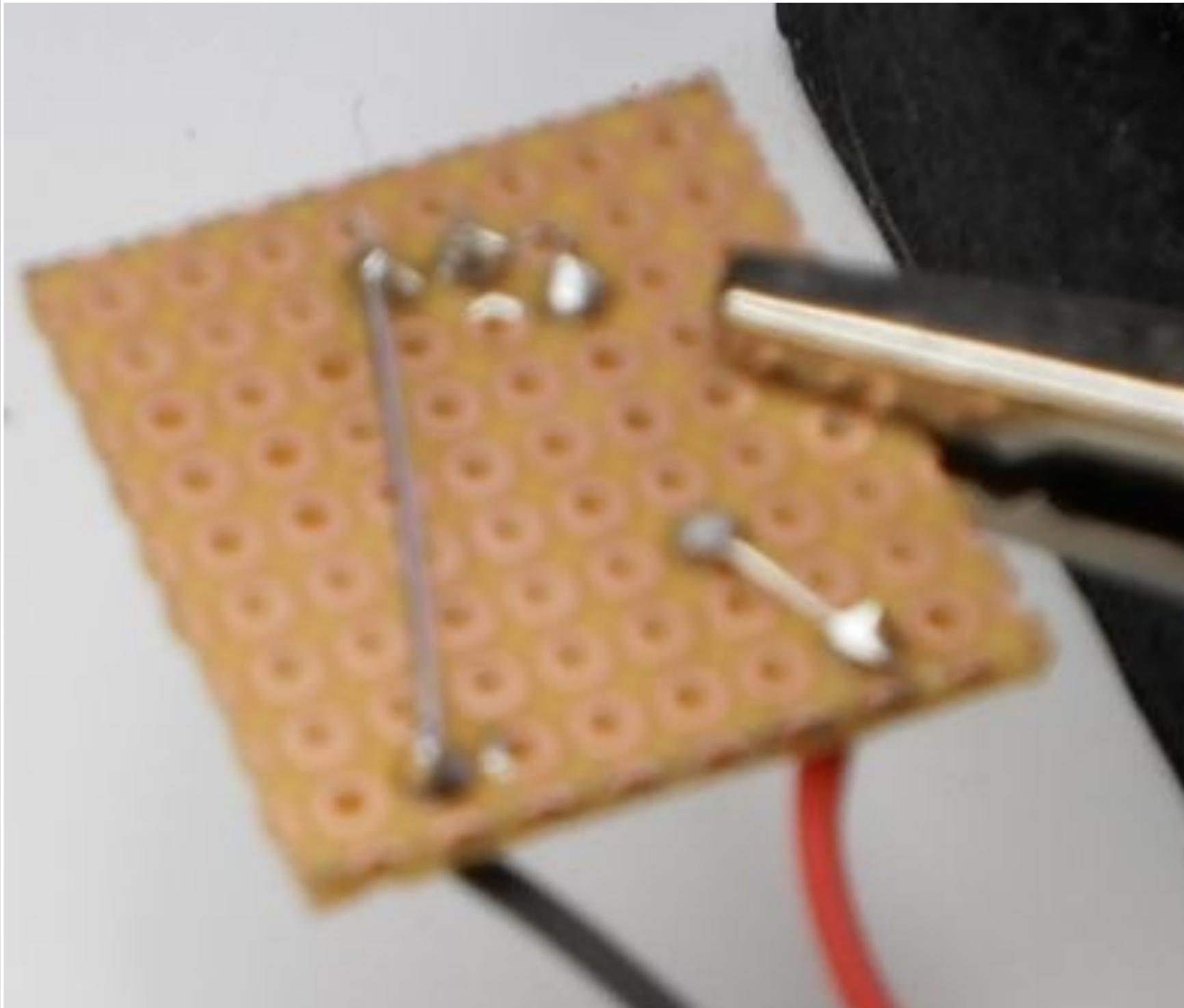


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7

**Solder
jumper
from two
pin header
to positive
lead.**



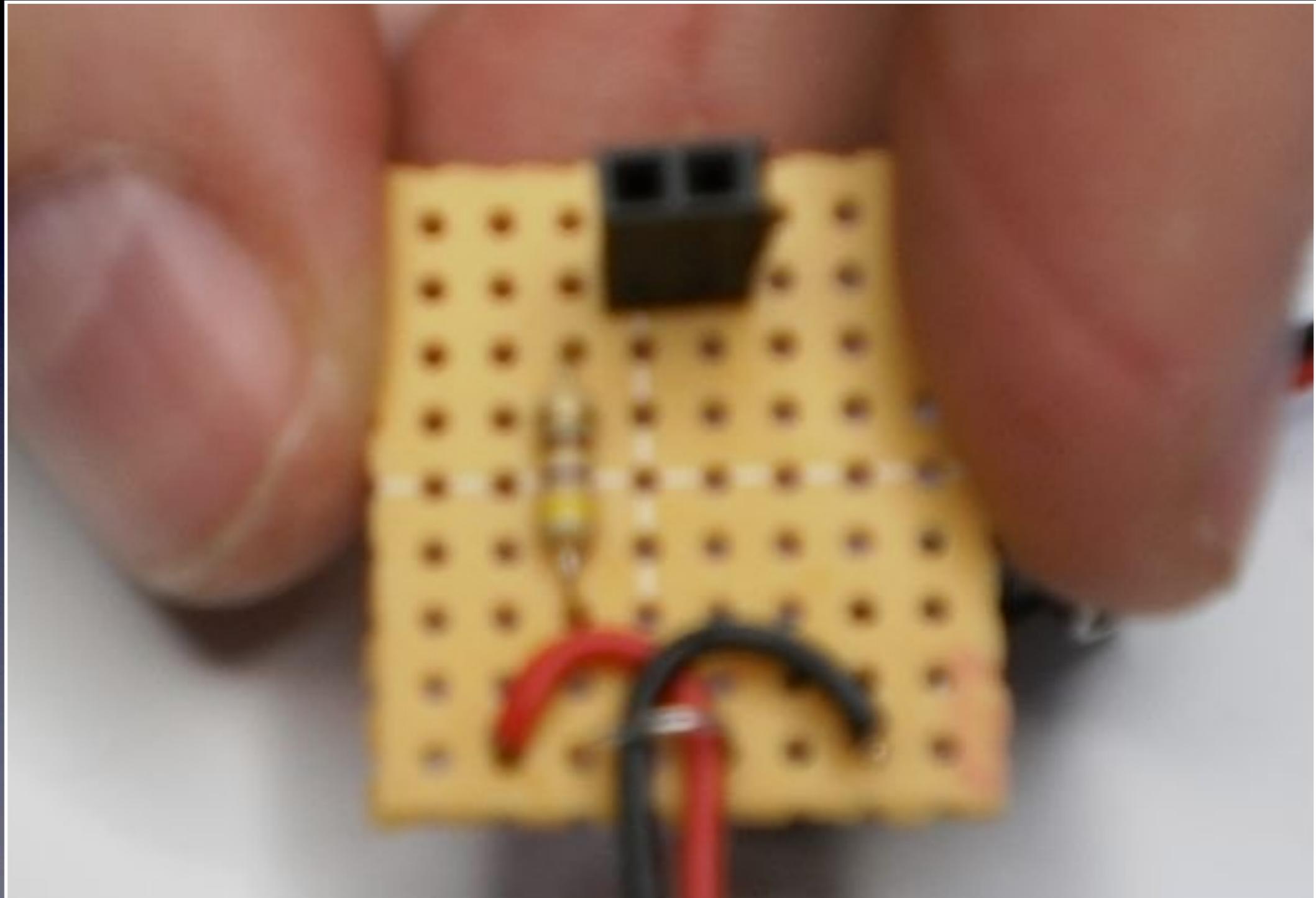


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8

**Add strain
relief as
shown.
Solder in
place.**





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9

Connect
battery
and place
led long
leg into
the right
hole, short
leg into
left hole.

Led
should
light.



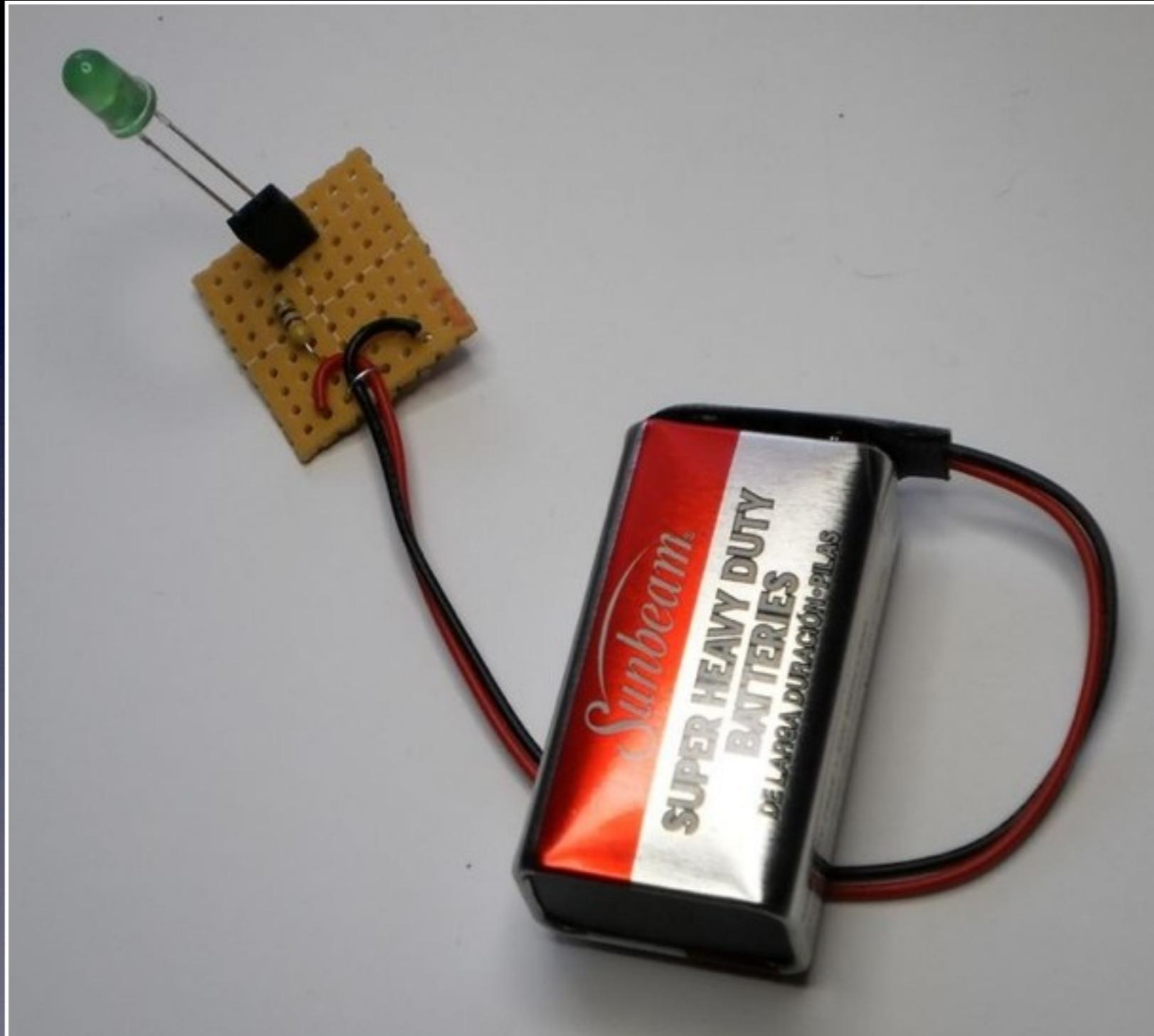


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10

Reverse
the LED.
LED
should
turn off.





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You now have an
**excellent LED
tester.**



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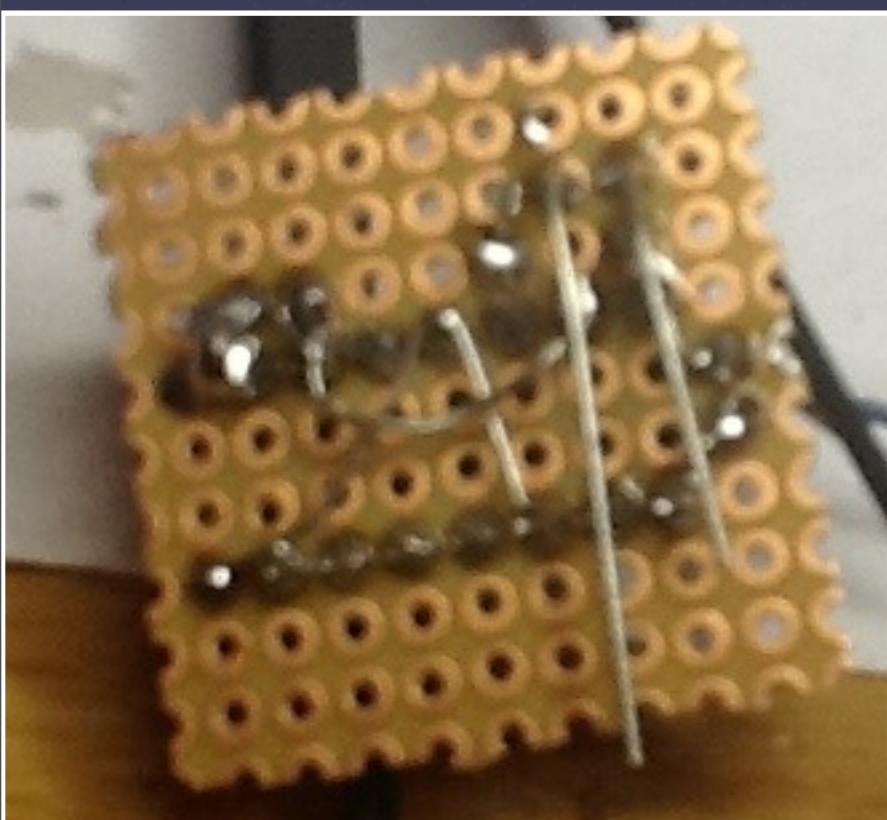
Remove battery.



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Protoboards are great for one of a kind proof of concepts, but quickly get messy.

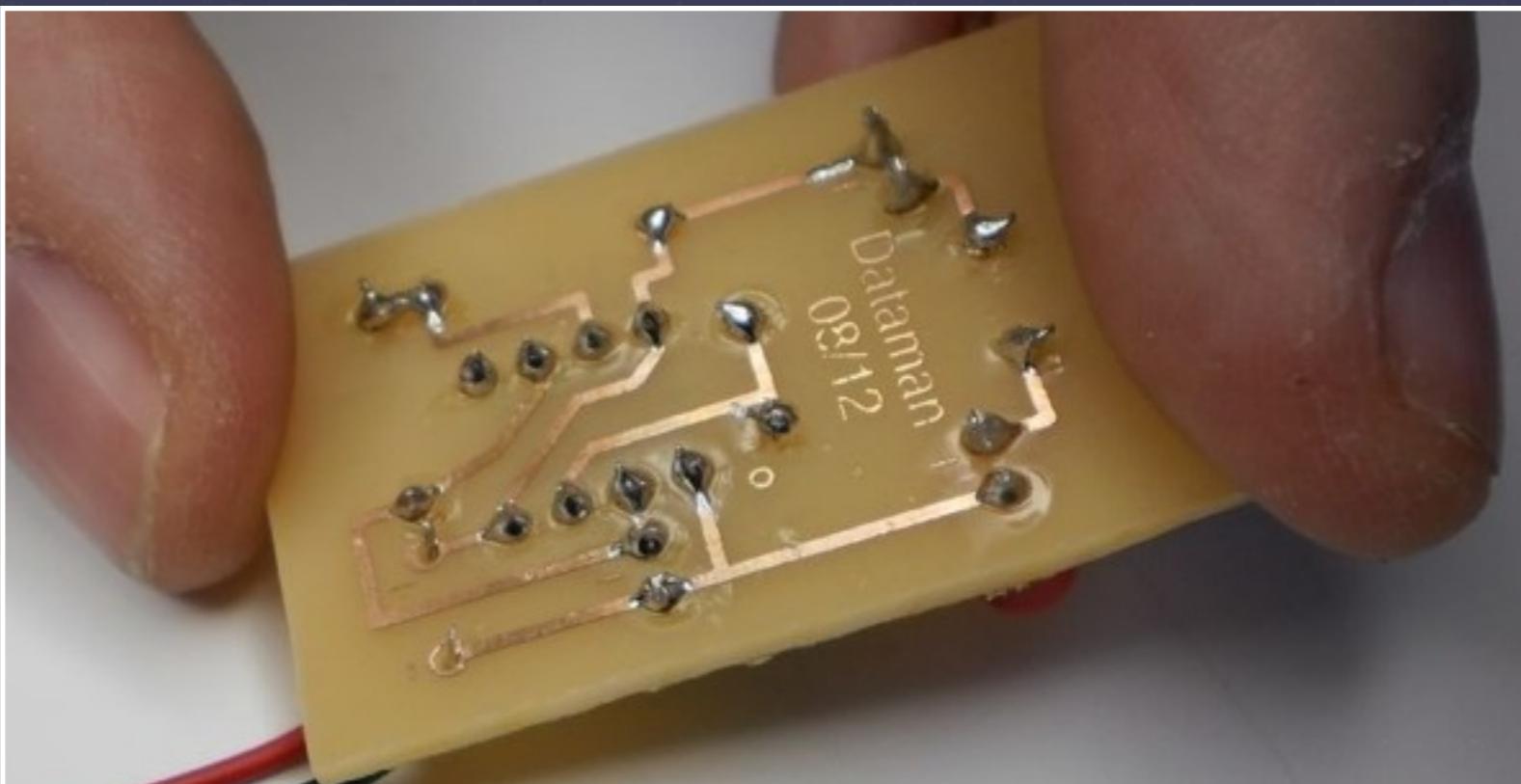




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The next logical step is PCBs. All the connections are already made.

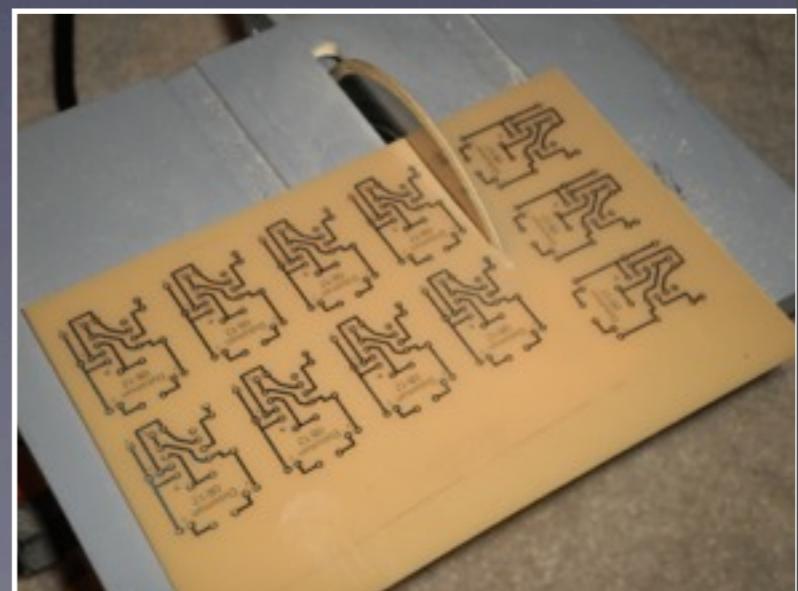
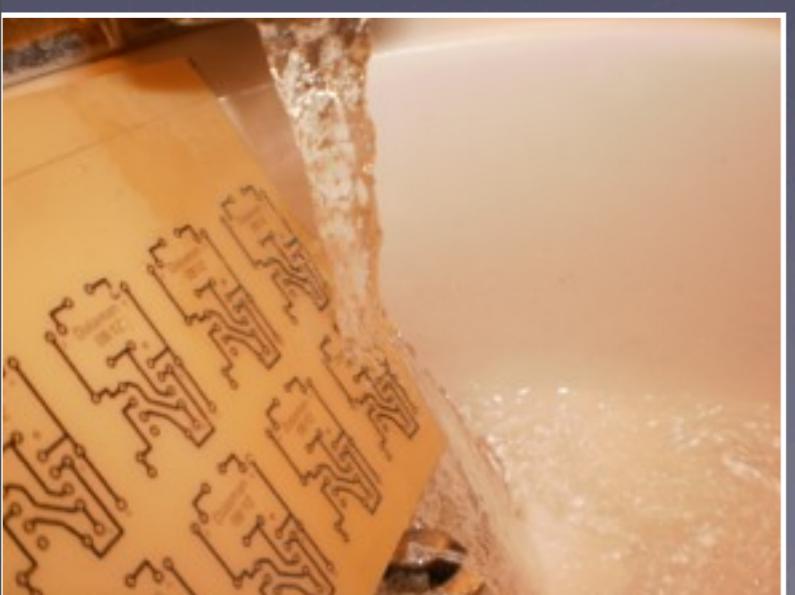




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I learned how to make PCBs at home 3 years ago. It's cheap and simple.





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Soldering Buildup

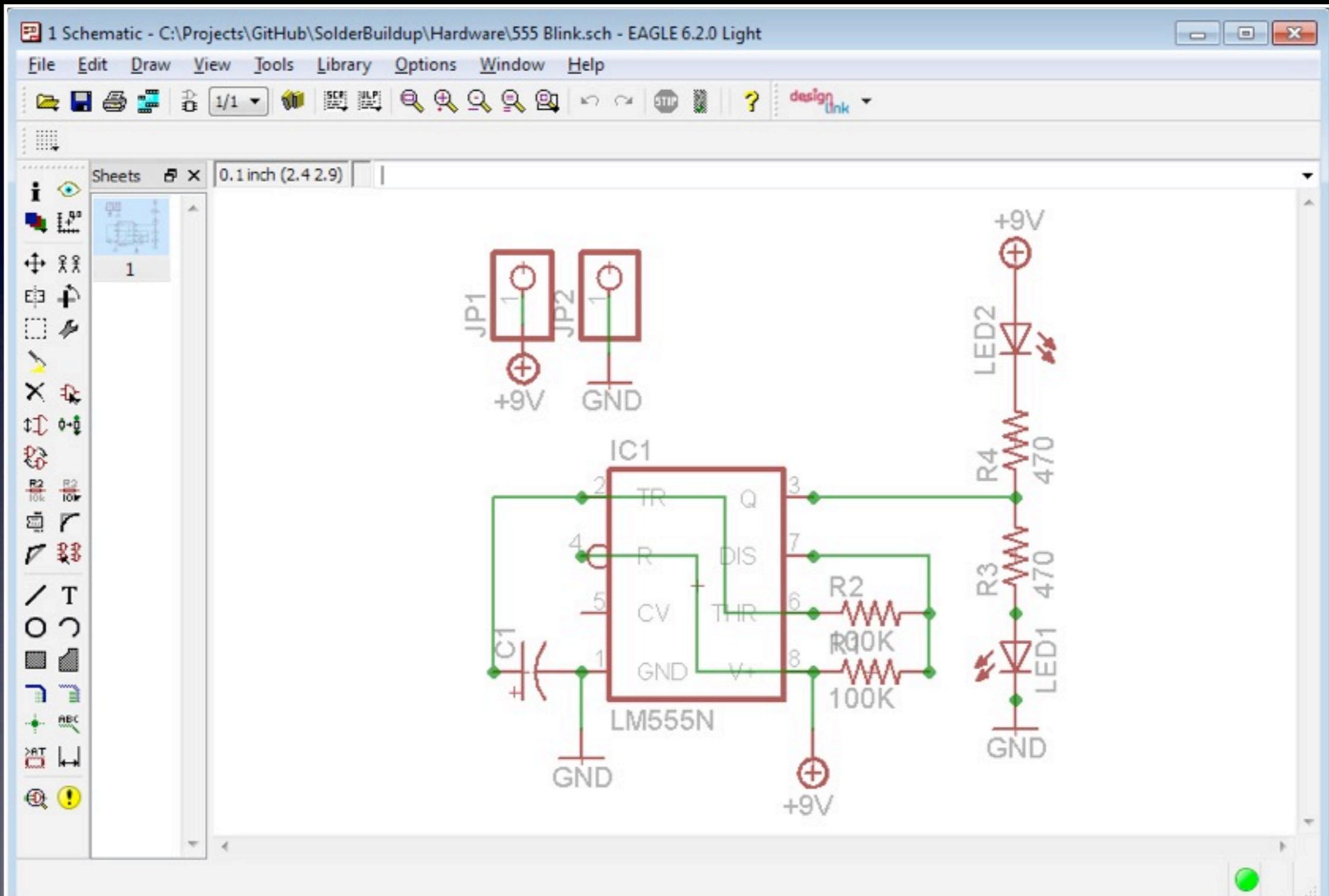
How to make PCBs!



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1

Design the
schematic
in
EagleCad.



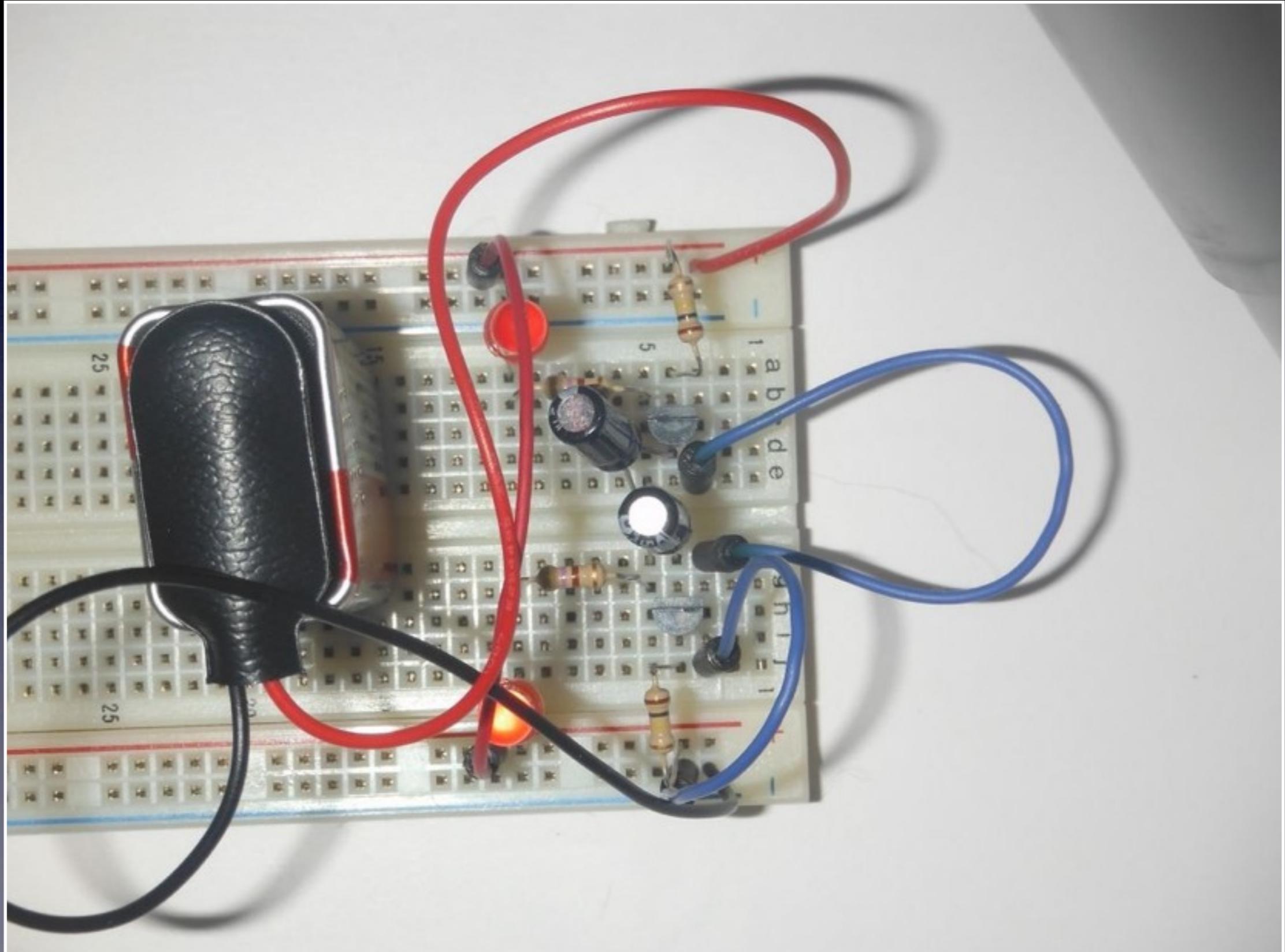


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Soldering Buildup

2

Test the circuit using a breadboard.

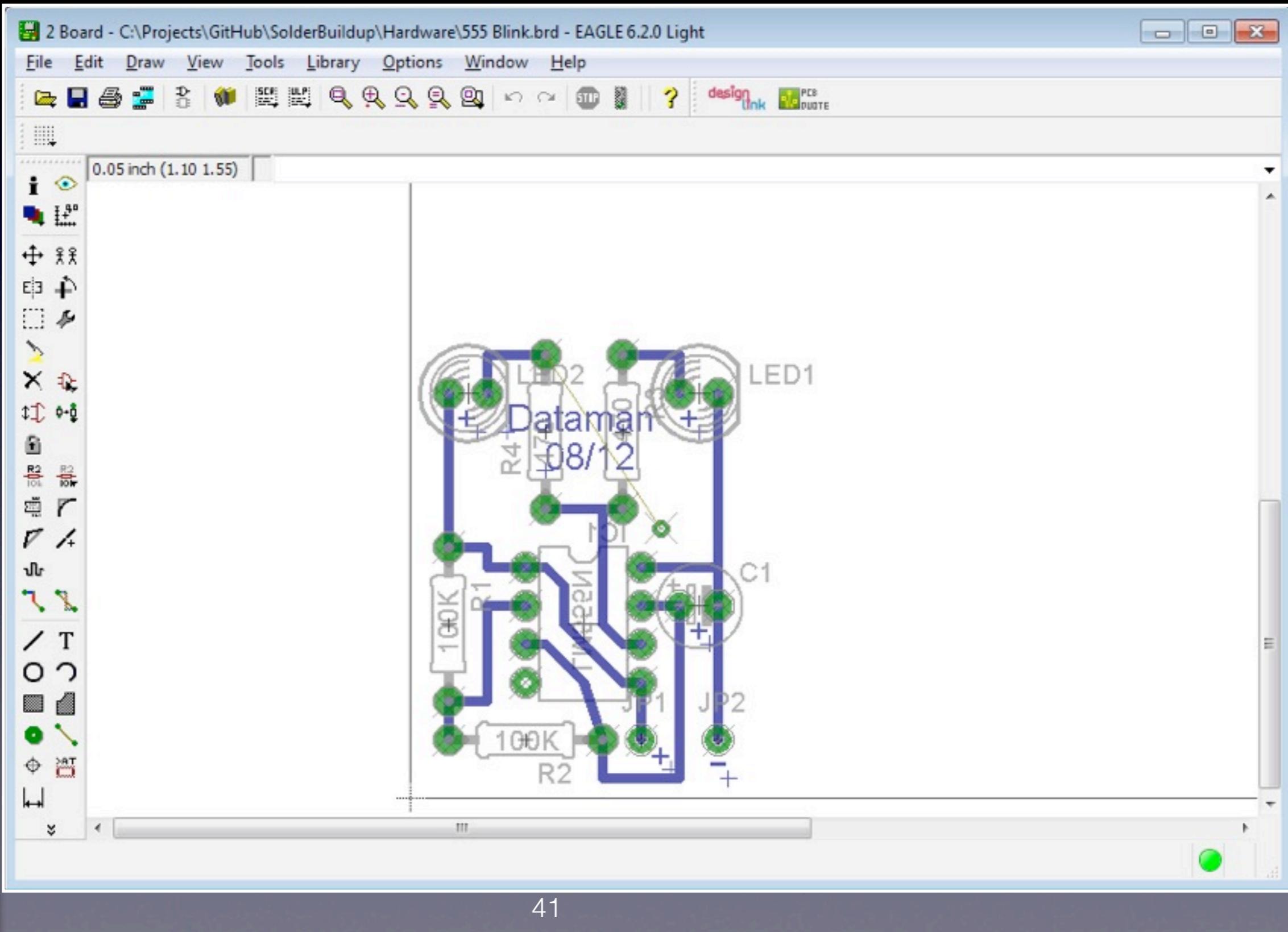




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3

Layout board



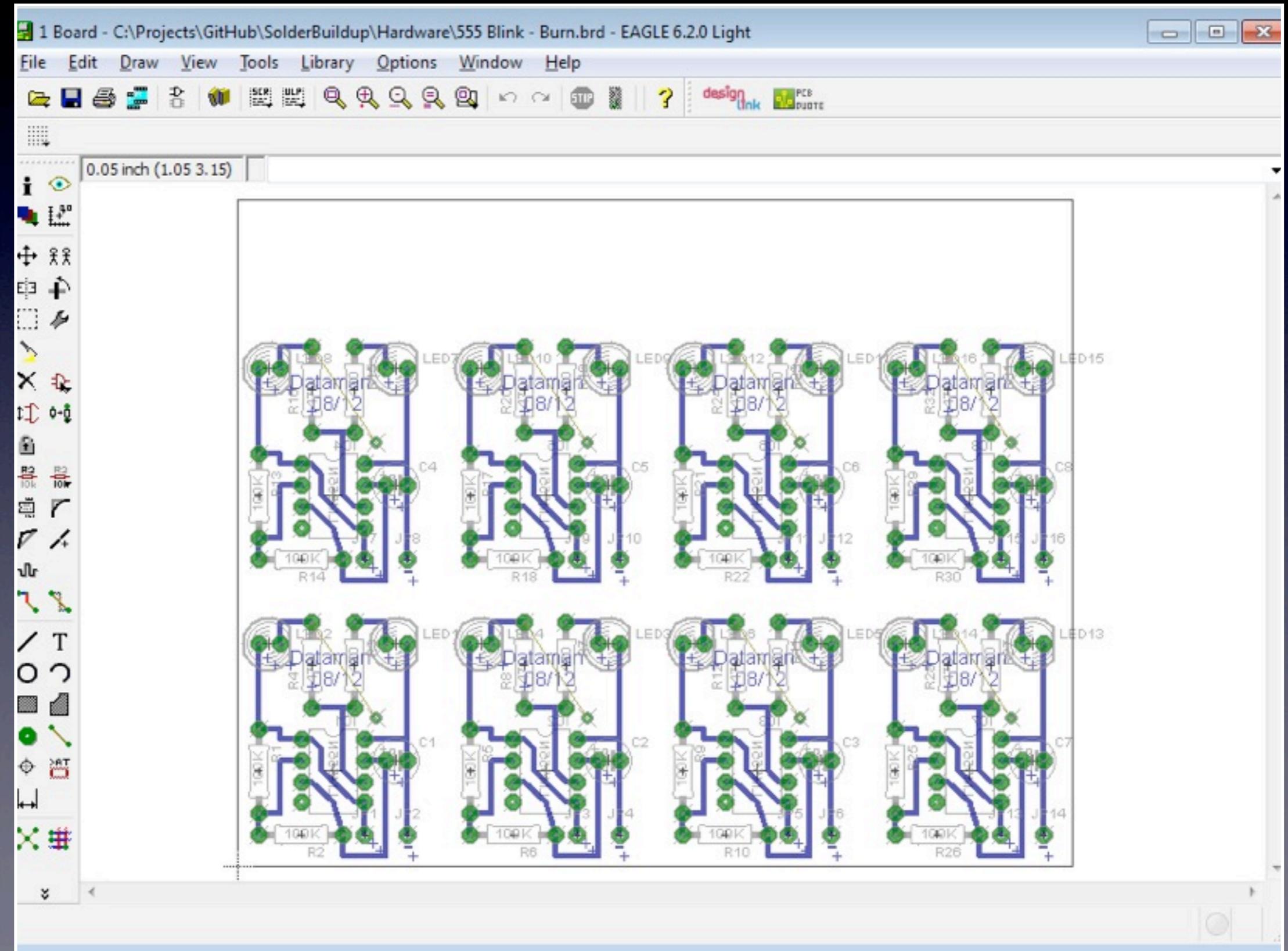


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Soldering Buildup

4

Replicate
the design
into a
burn
layout.



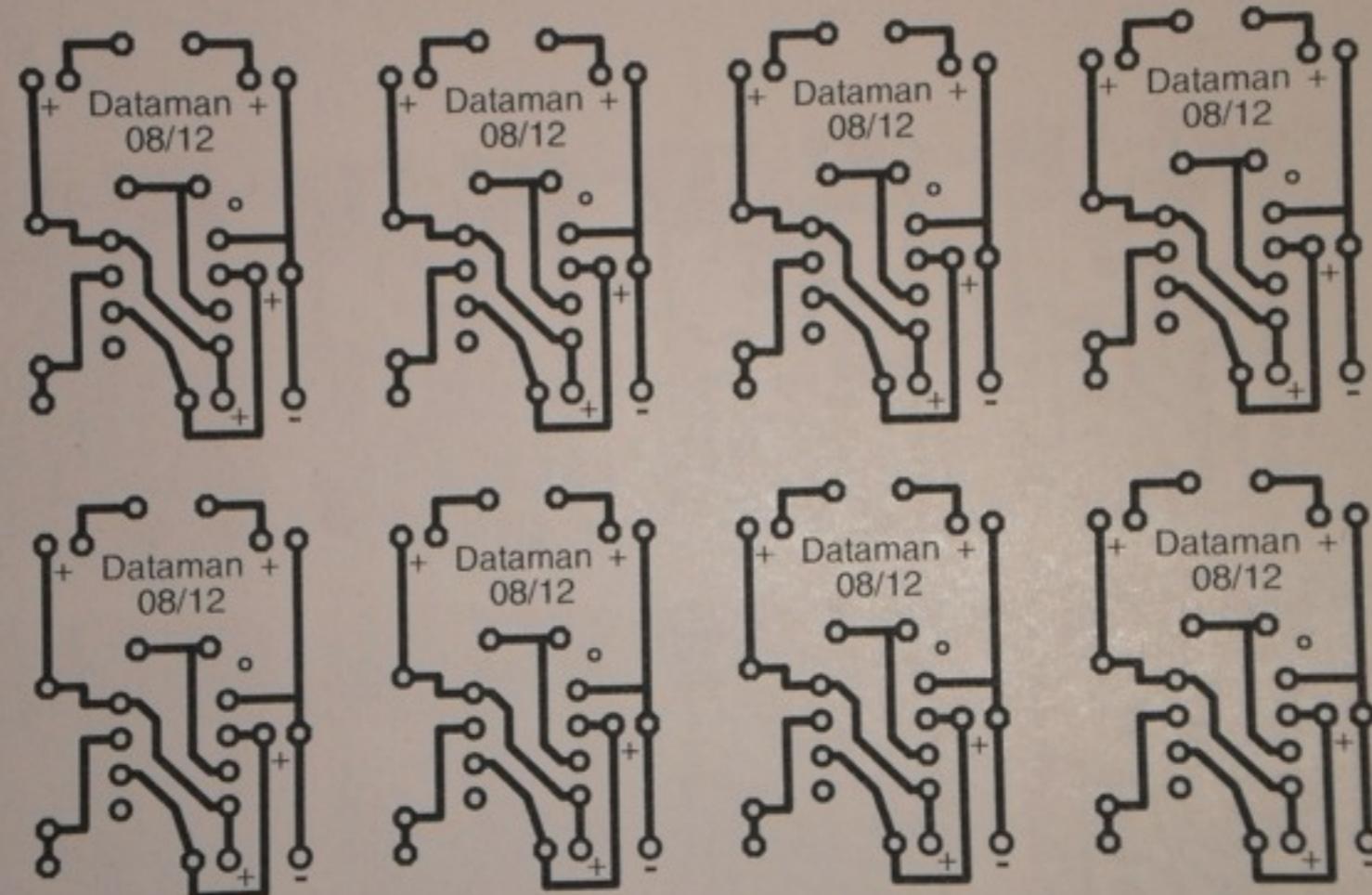


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5

**Print tops,
bottoms,
pads, vias
onto
trans-
parency.**



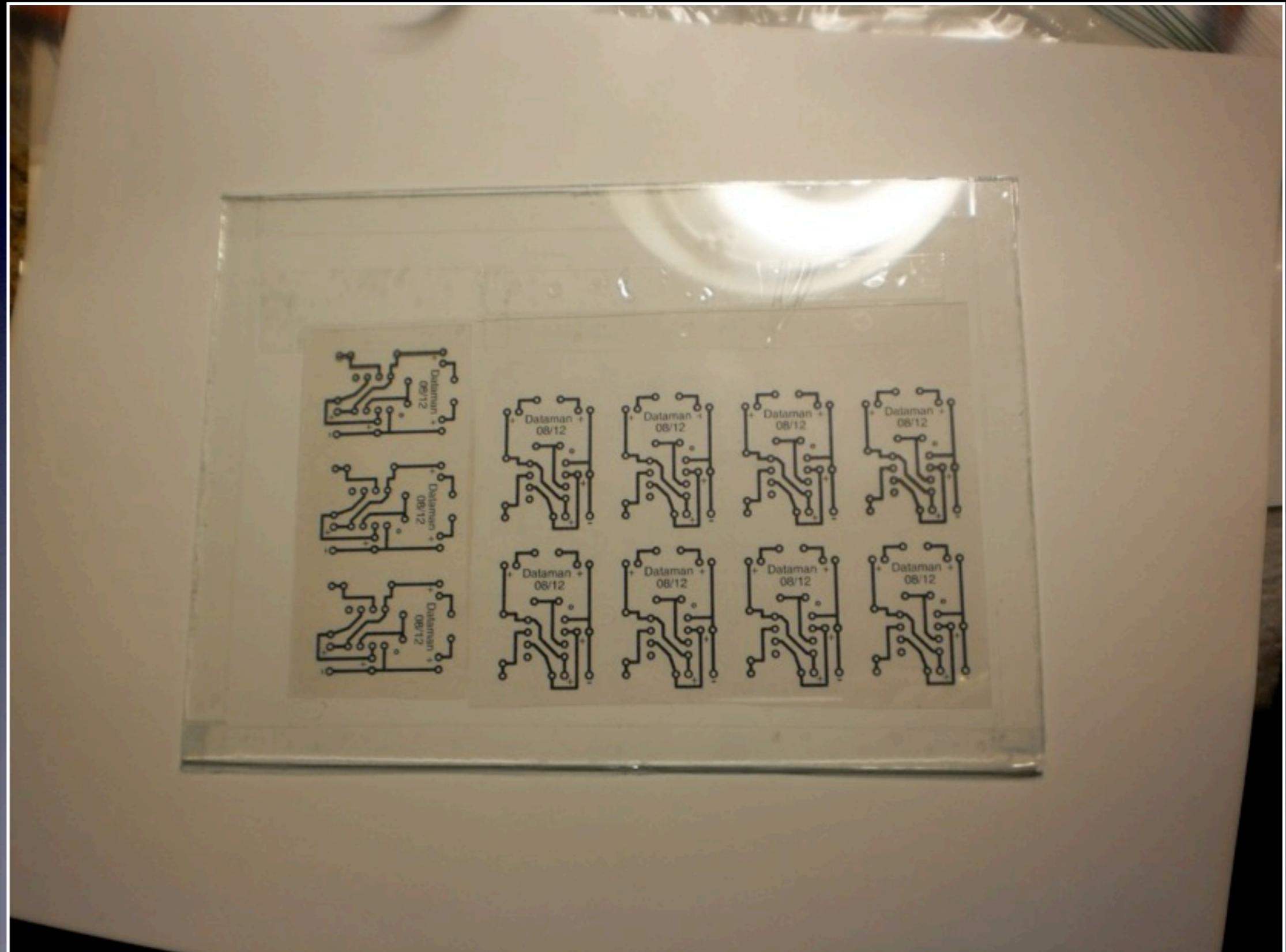


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Soldering Buildup

6

Layout
trans-
parency
on board.



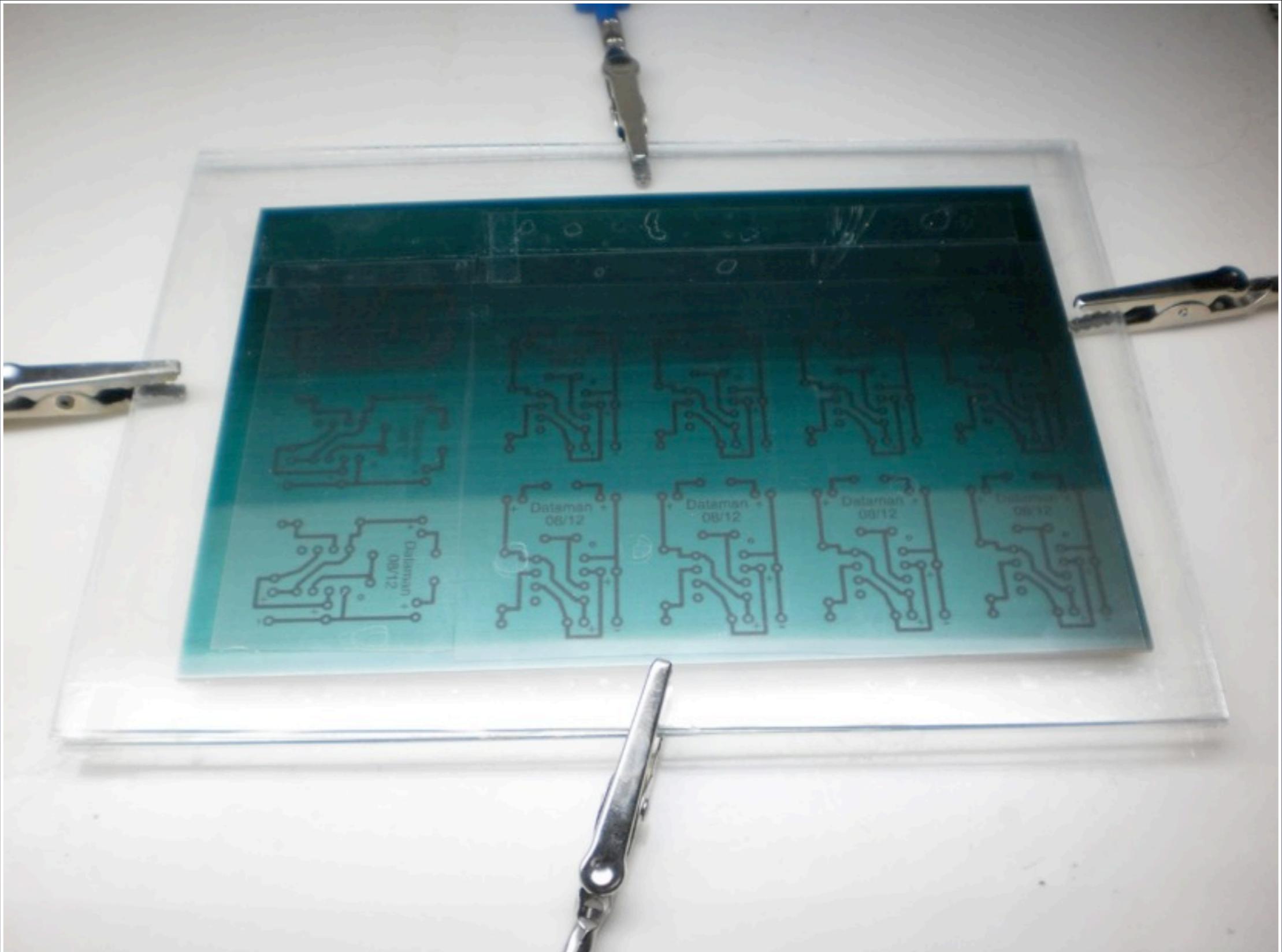


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7

**Remove
protective
layer and
expose for
12
minutes.**



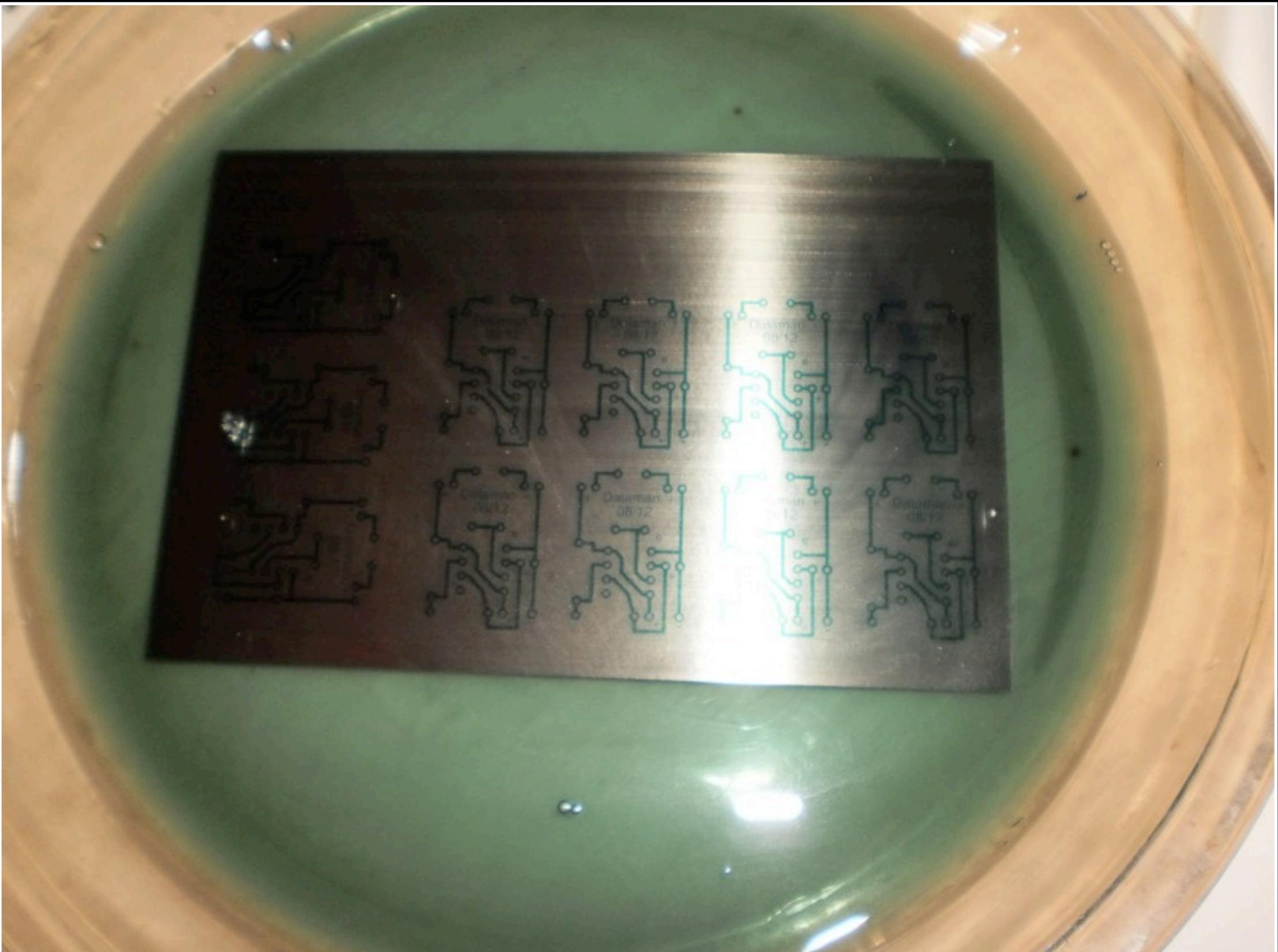


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8

Develop.
Green dye
is
removed,
copper is
exposed.



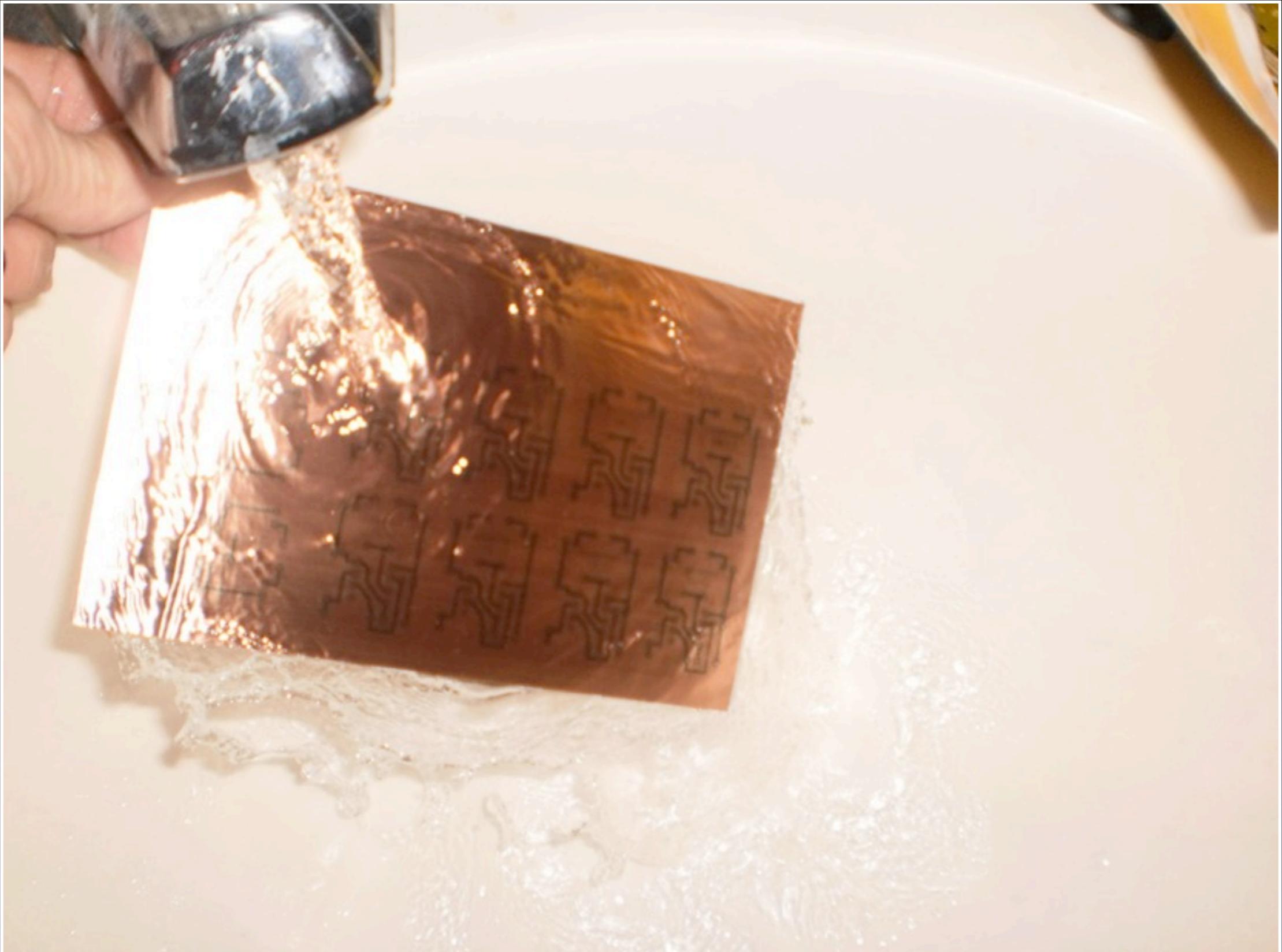


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9

**Fix in cold
water.**



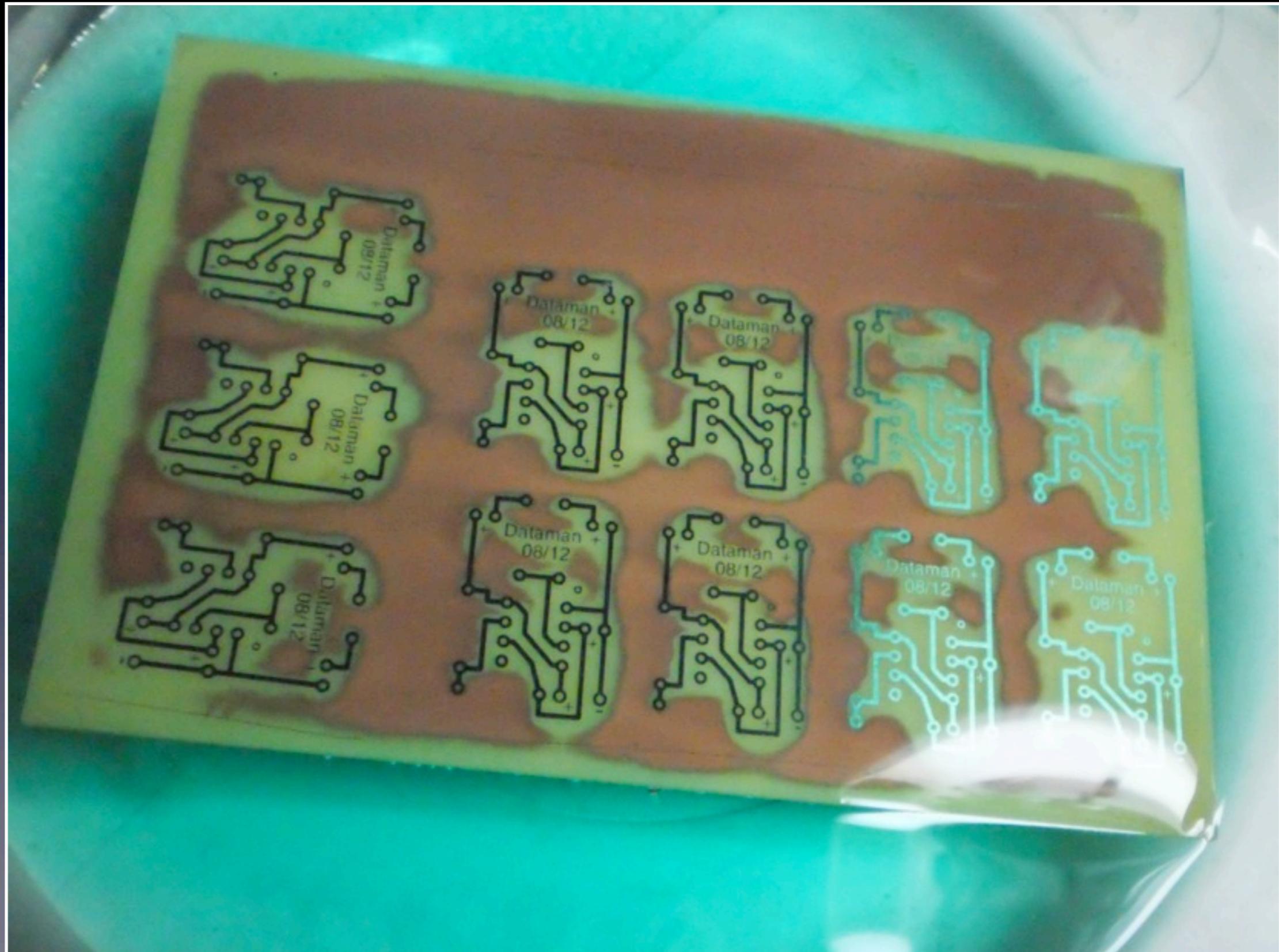


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10

Etch in
hydro-
chloric
acid.





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10

Rinse and
dry.



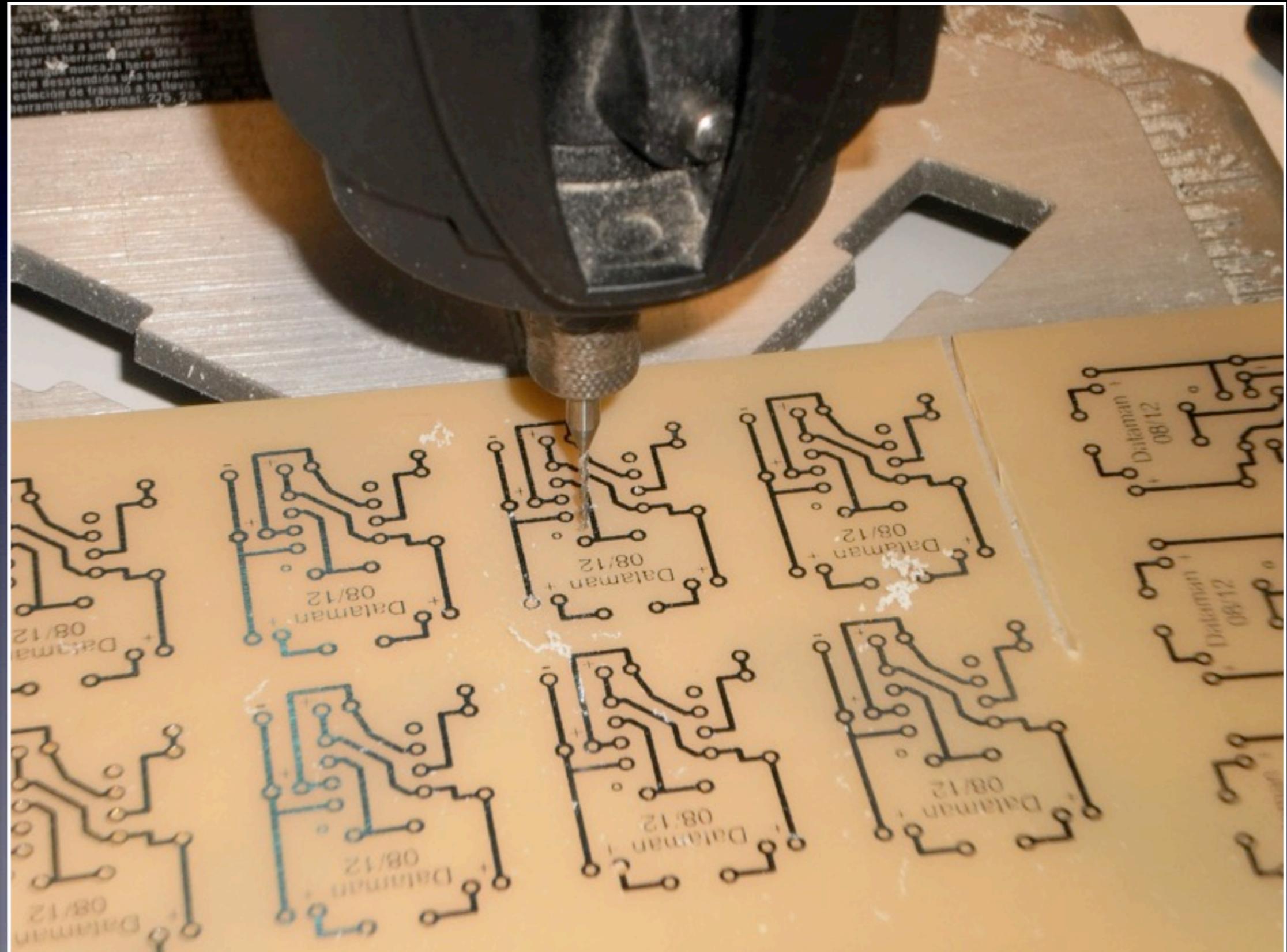


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10

Drill



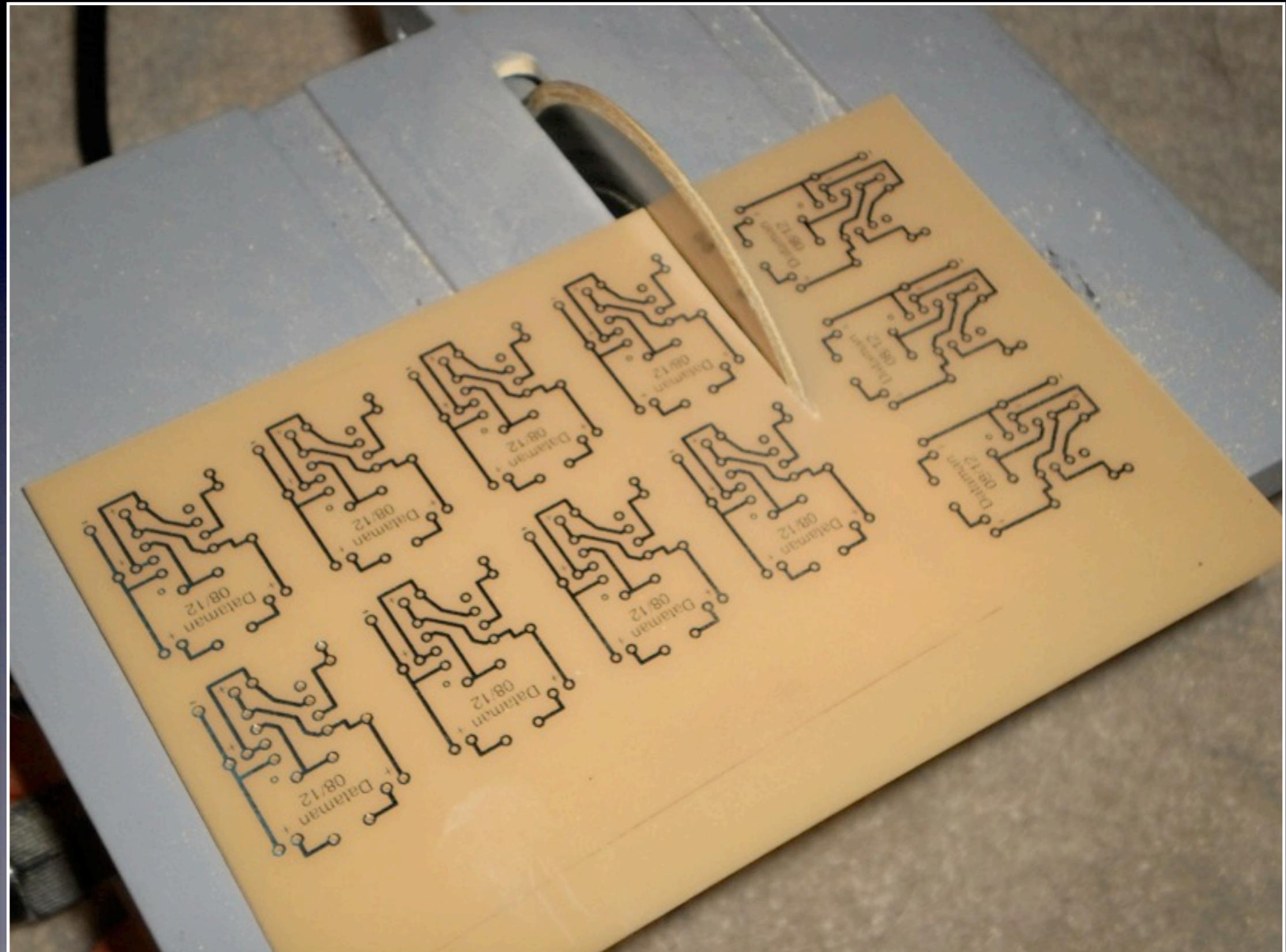


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10

Cut





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10
Shape.



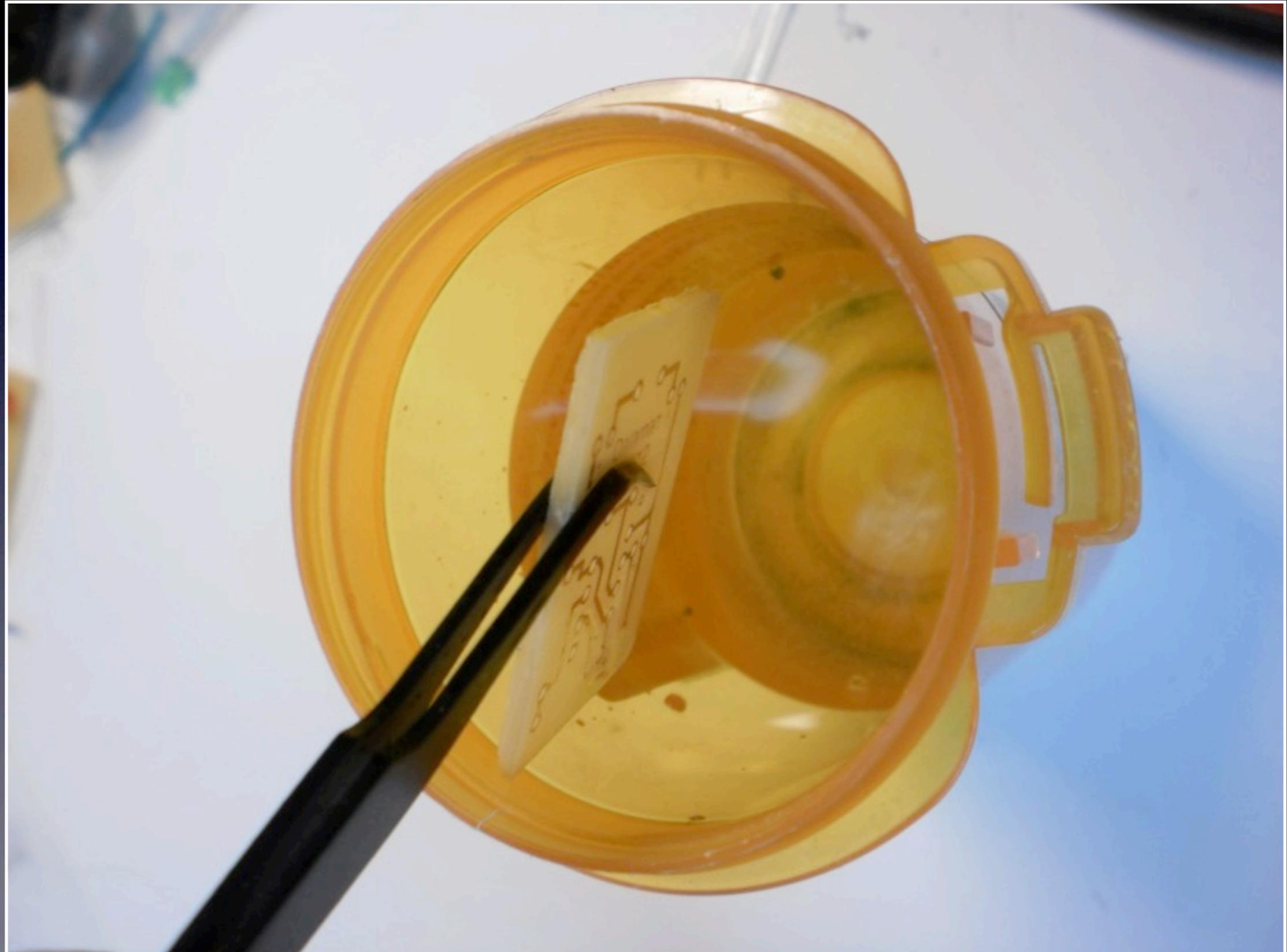


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10

Clean. Dip
in acetate.



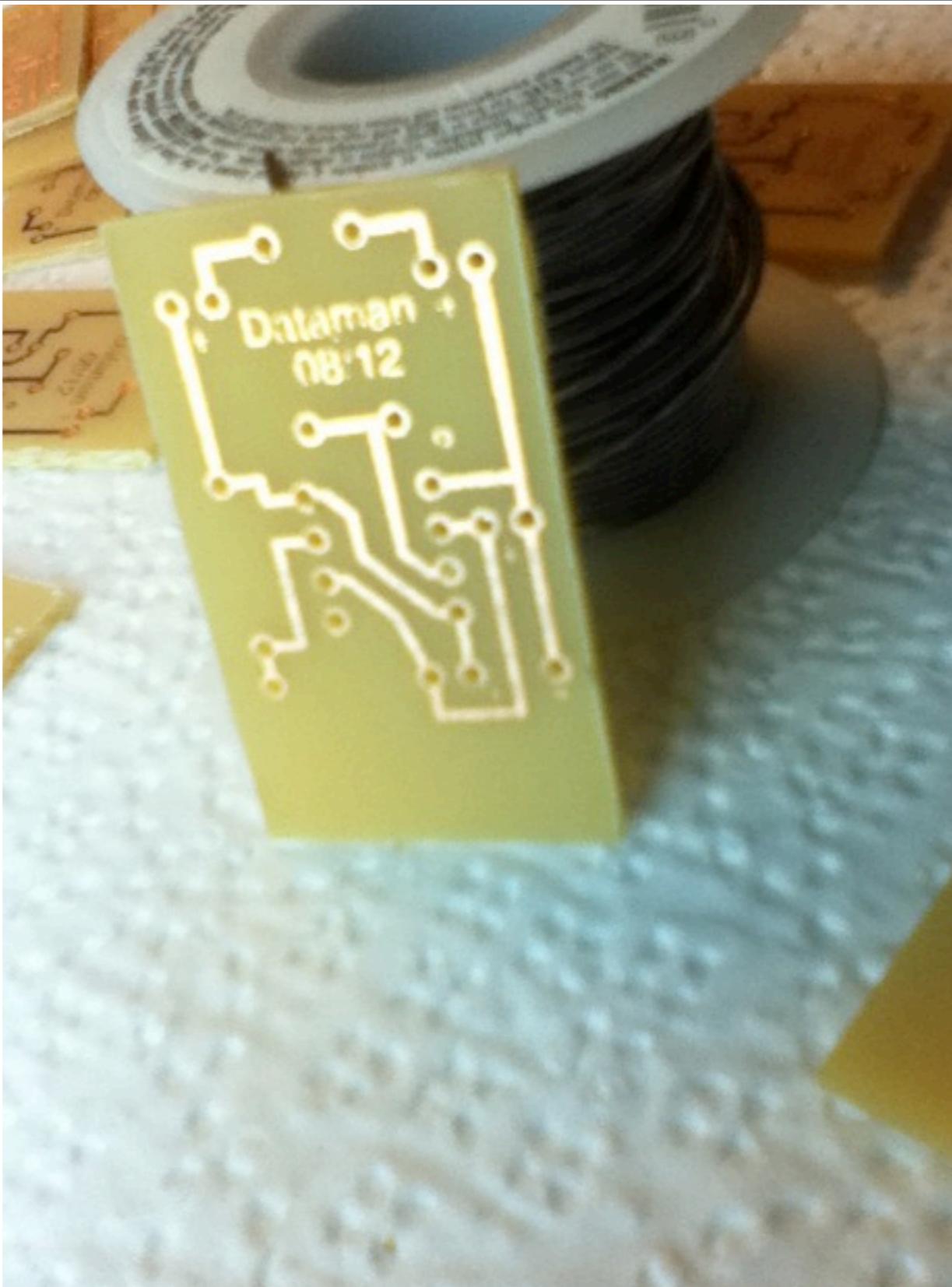


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10

Complete.





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Stop and Go 555 PCB Build

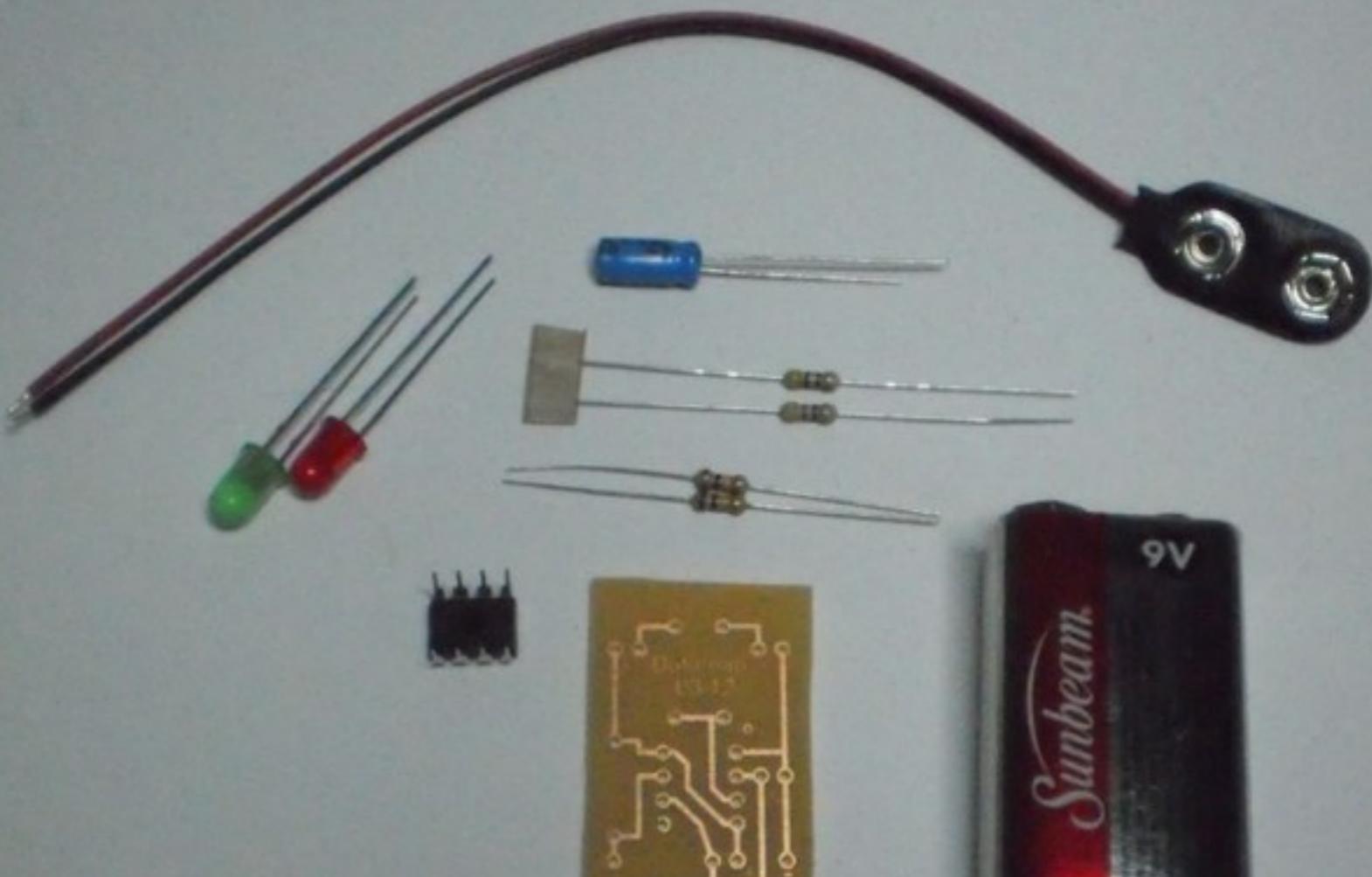


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1

Parts for
the build.



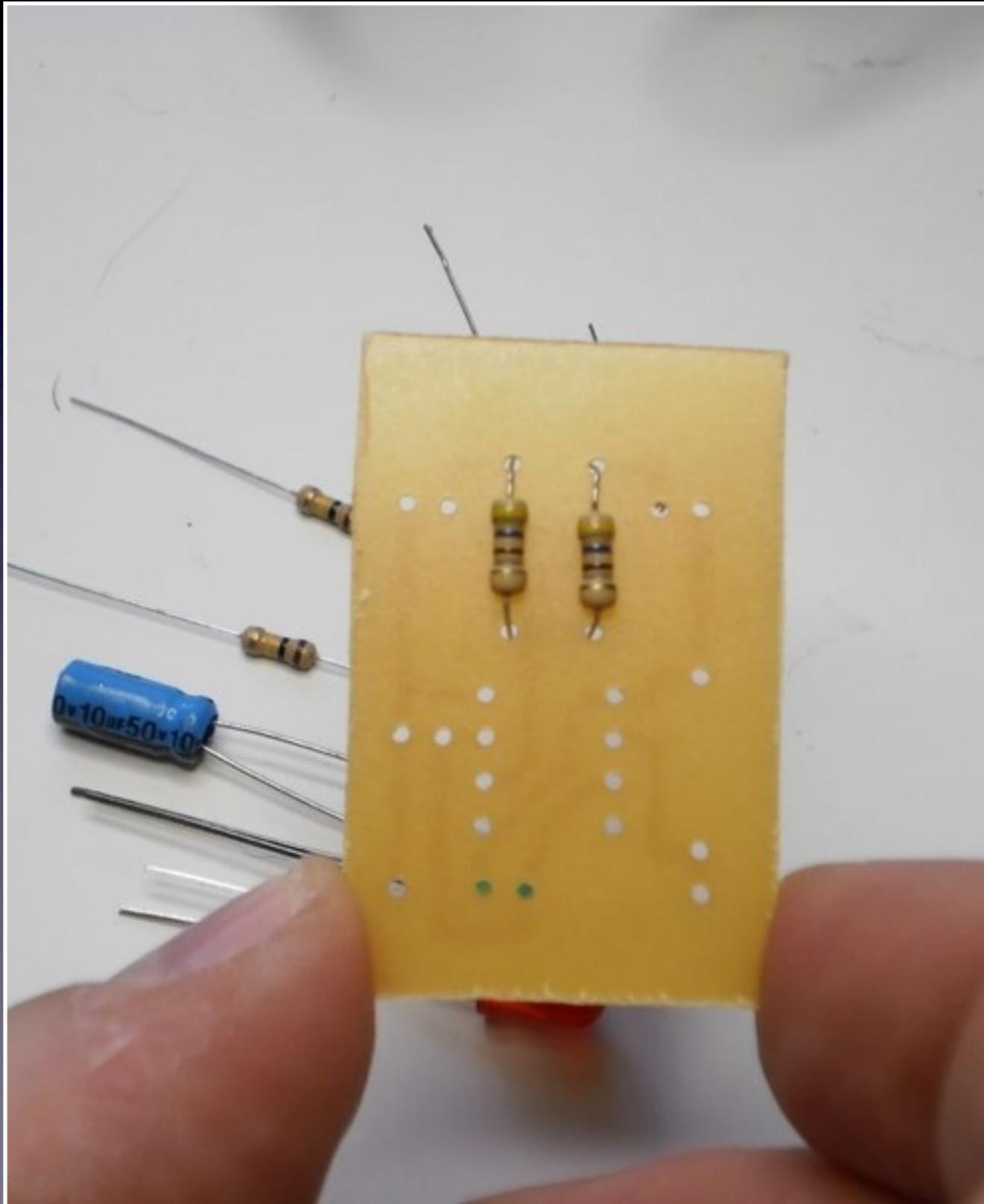


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2

**Solder the
two 470
resistors,
yellow,
violet,
brown.
Orient-
ation is
not
important.**



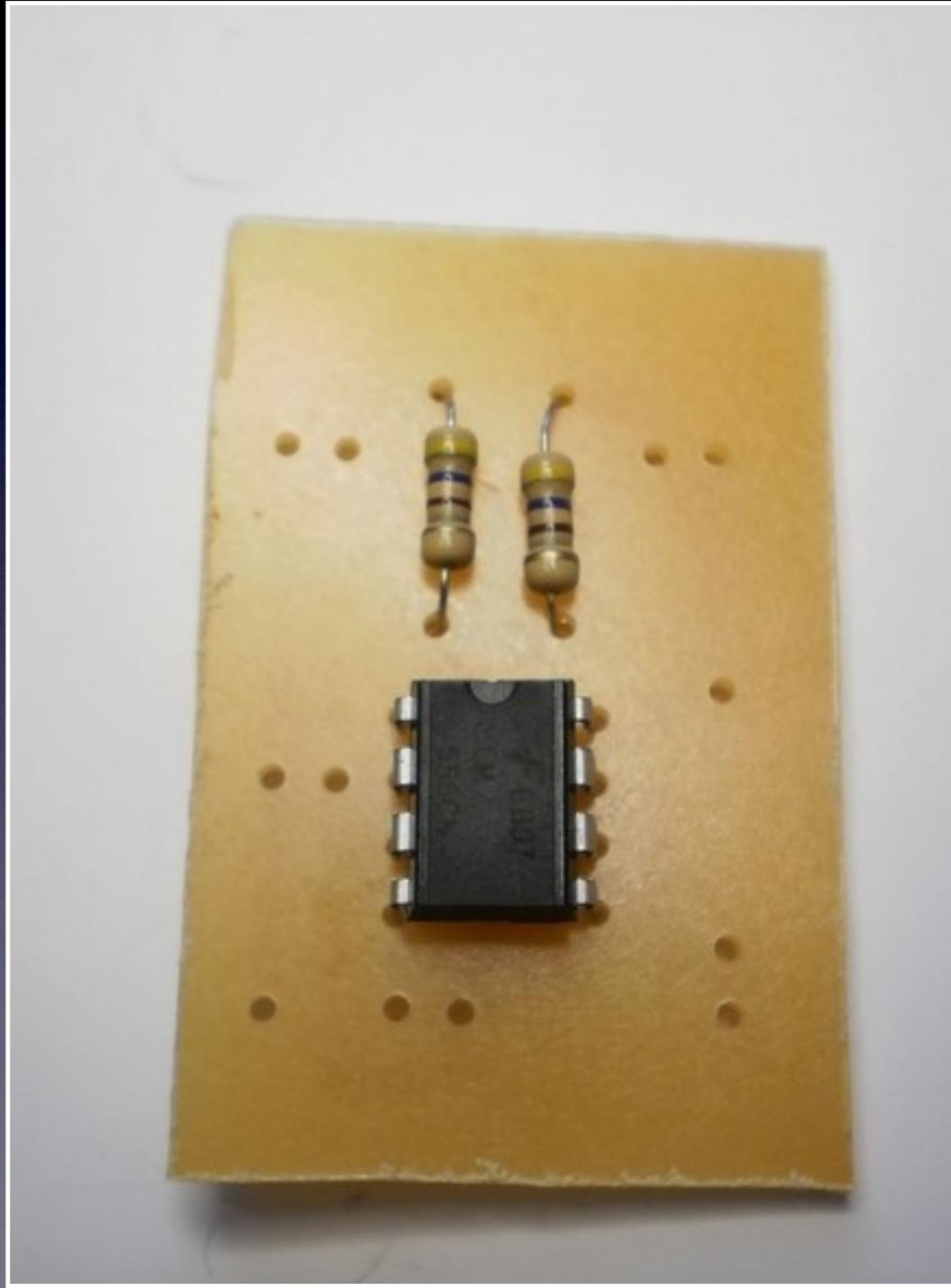


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3

Solder the chip. Note that notch faces up towards the 470 ohm resistors.



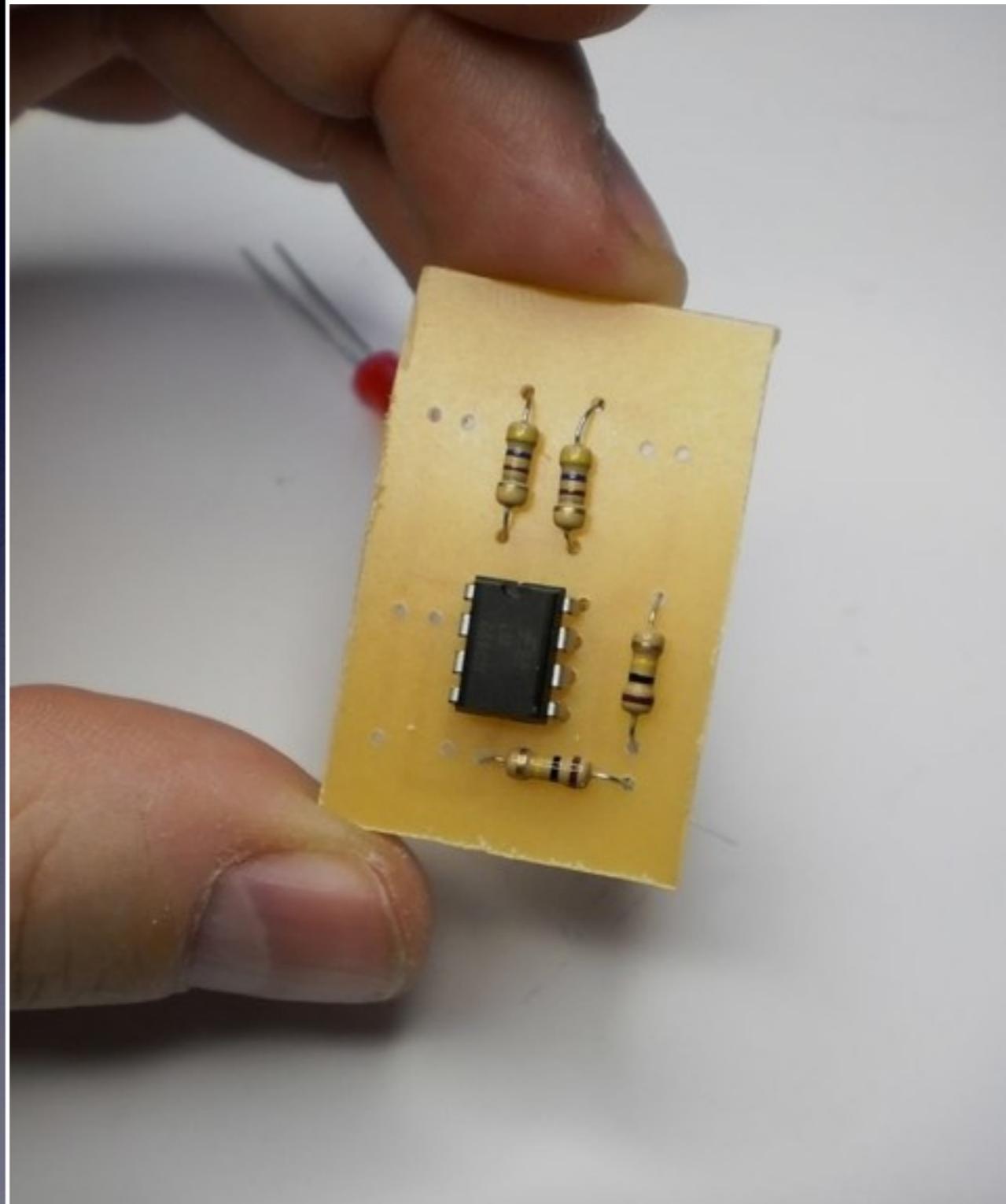


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4

**Next,
solder the
two 100k
resistors,
brown,
black,
yellow.
Orient-
ation is
not
important.**



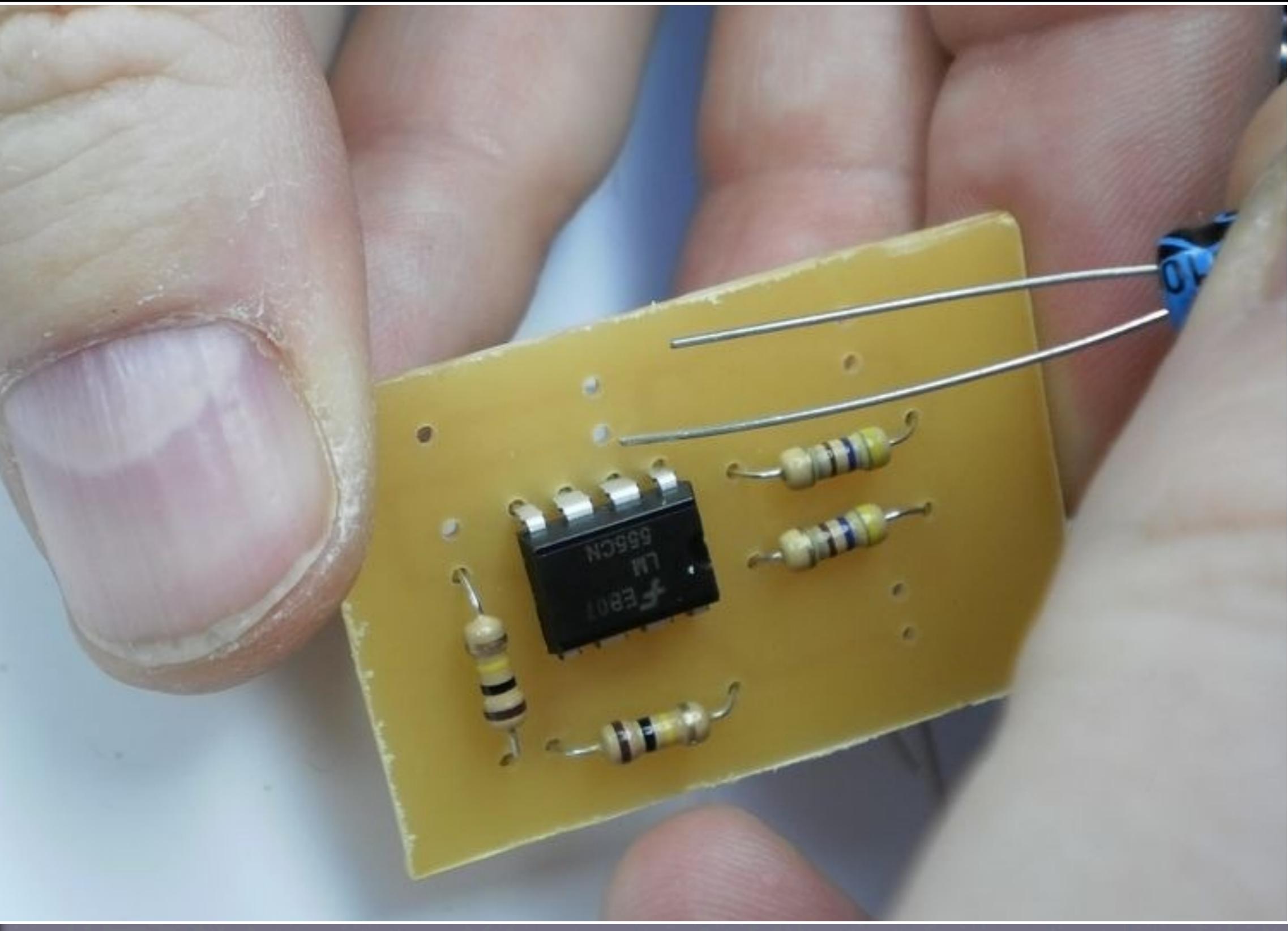


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5

**Next,
place the
capacitor.
Long leg
to the
right. You
may lay
capacitor
flat.
Double
check
before
solder.**

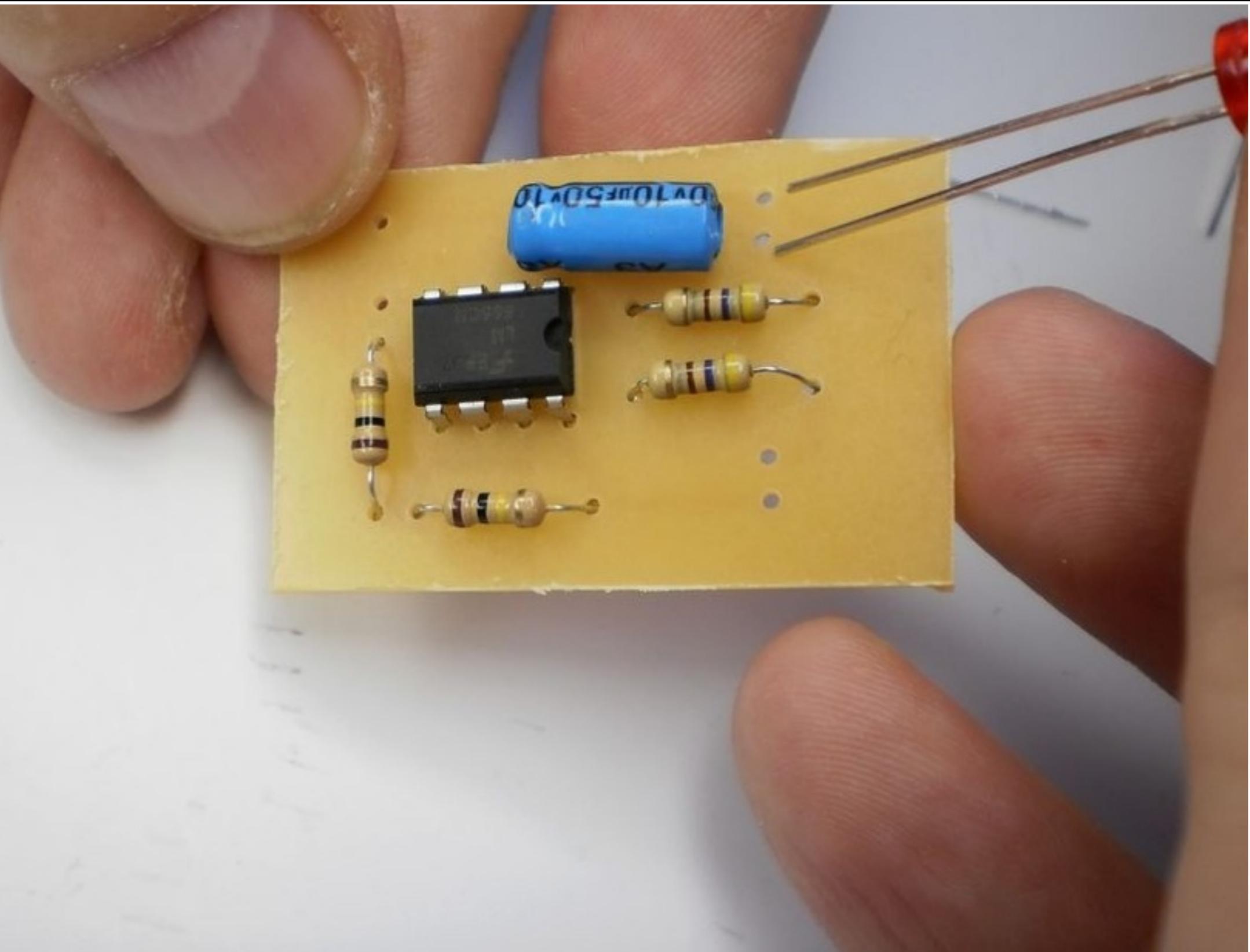




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6
Next,
solder the
two LEDs.
Long leg
goes into
the right
hole.
Color is
not
important.
Double
check
before
solder.



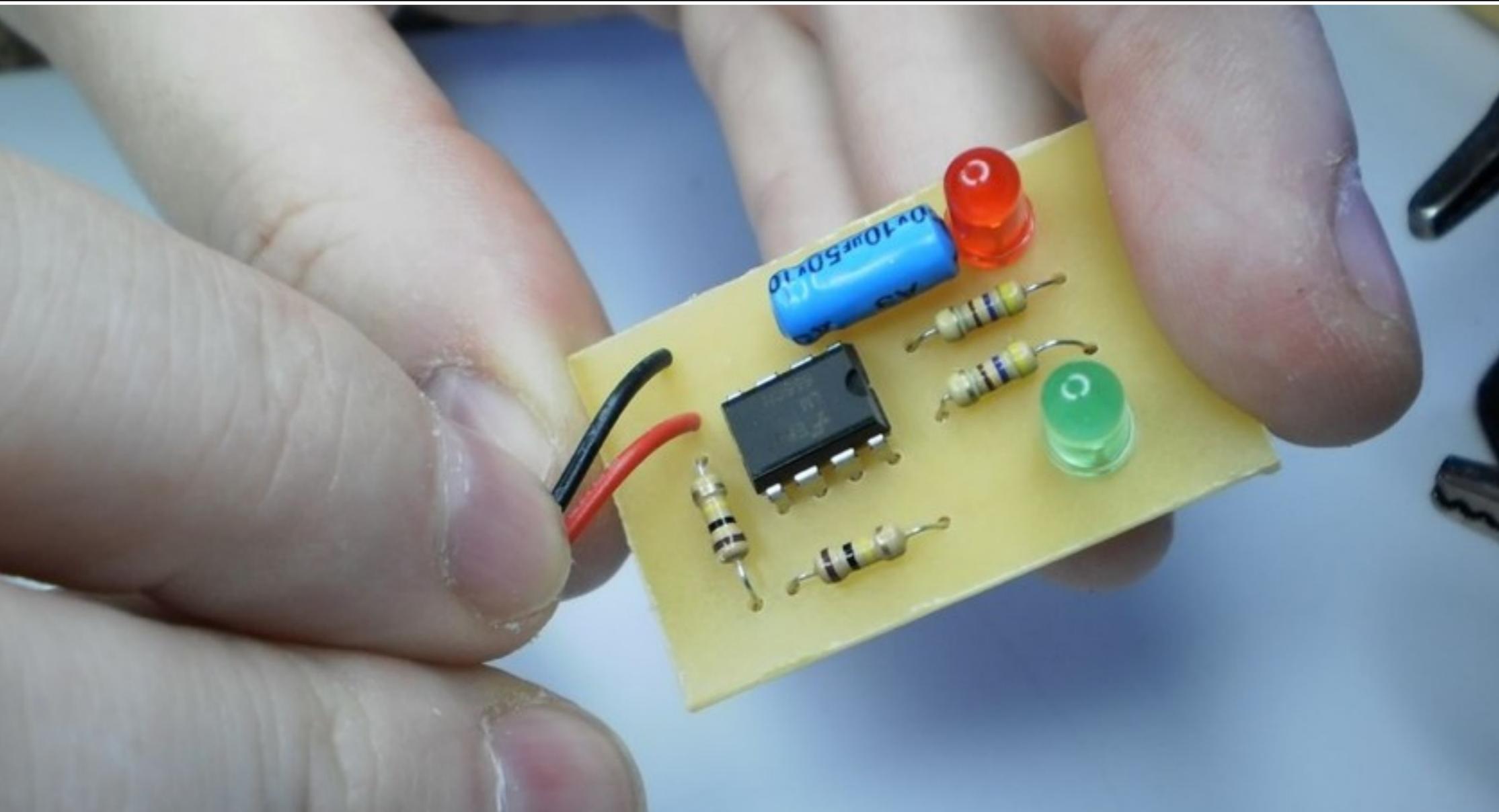


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7

**Solder
battery
clip. Note
the + for
red wire,
top, and -
for
negative
wire
bottom.**





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8

**Attach
battery.
Should
immed-
iately start
blinking.**





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**That was a fun
build!**



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Soldering Buildup

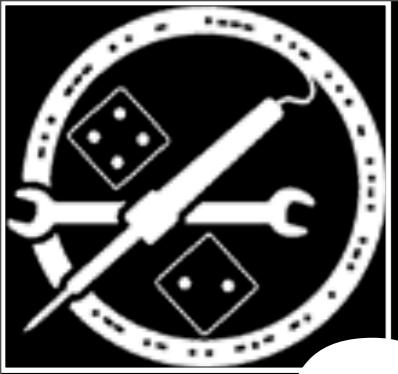
**Where can I find
more easy to build
kits?**



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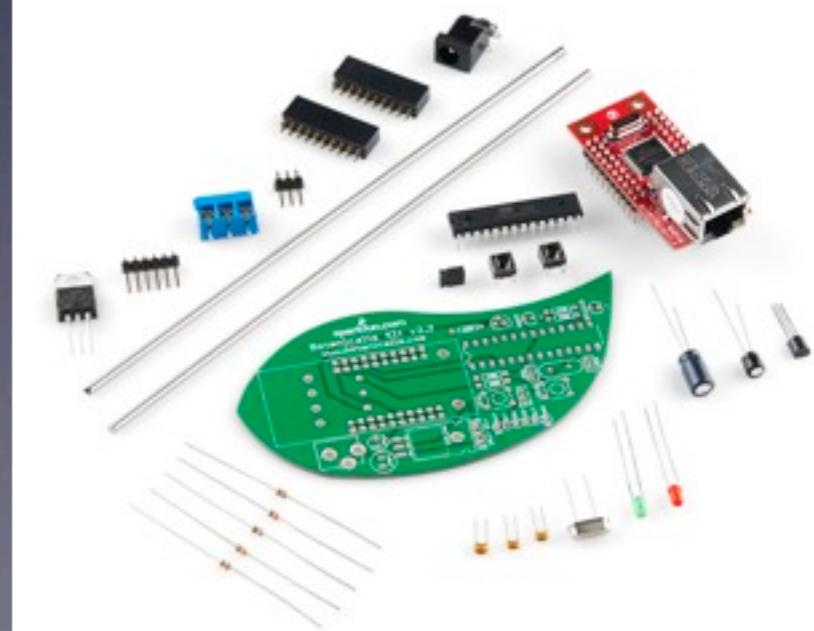
Lady Ada has lots
of great stuff at
AdaFruit.Com





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SparkFun.Com
has lots of cool
stuff





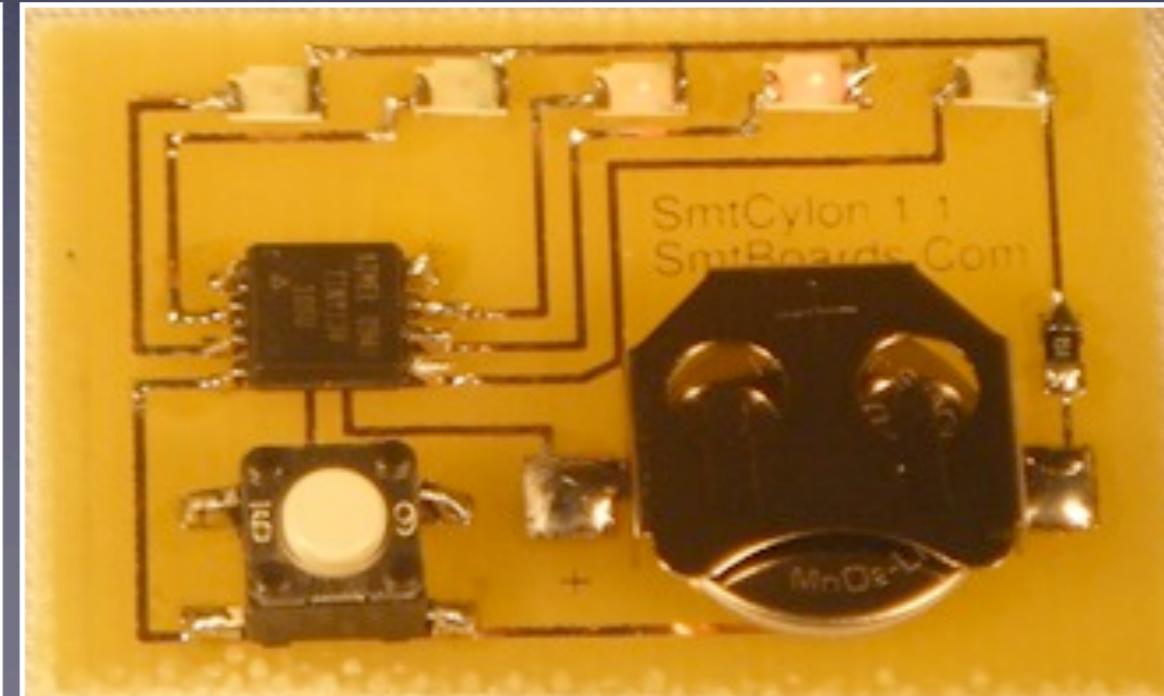
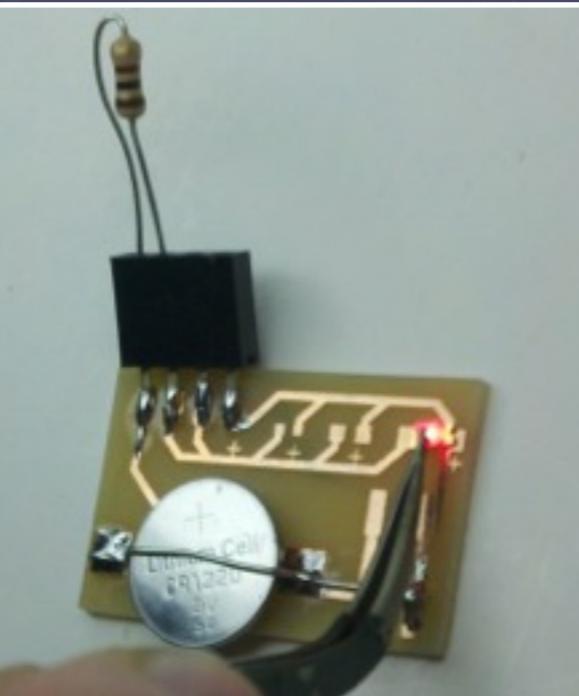
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Soldering Buildup

And even I have designed kits for **SMTboards.com**

The screenshot shows the SMTboards.com website with the 'Projects' tab selected. It displays three main projects:

- SMTCylon**: A micro-sized (1 1/4" x 1") tinyCylon! Our first kit! 14 different modes of operation. 11 parts, about a 20 minutes build. Design Docs, Code, Instructions, Kits, Parts available [here](#).
- SMTtinyISP**: Or, how did I program all those SMTCytons? This teeny timer board measures 3/4" x 1", But oh what power in such a small package. This board adds a temporary ISP port to a Tiny13. Great for programming batches of CPUs. Design Docs, Code, Instructions, Kits, Parts available [here](#).
- SMTTester**: Or, are you really sure about that SMT LED's polarity?





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**And that's the
class!**



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This entire course is published
github.com/Dataman/SolderingBuildup

Or simply go to
github.com/dataman





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Thank You!