Build a Microwave Transformer Homemade Stick/Arc Welder

by **stasterisk** on December 23, 2007

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intro: Build a Microwave Transformer Homemade Stick/Arc Welder

I had no idea making a DIY welder would be so easy to do. And, it's pretty much **FREE**!

Additionally, the stick welder you get is definitely better than anycheap commercial welder you can buy.
Why is this homemade thing **better than something you can buy**? Because when you factor in shipping and labor and the little bit of retail markup - the companies that make typical cheap buzz boxes will skimp on copper as much as possible. Whereas you can use enough copper in this to make something really juicy, and still spend less, to nothing, compared to a store-bought arc welder.

So here's what you need to build a welder:
- Two beat up old microwaves
- Some 10 gauge wire
- Wire nuts

People throw out microwaves all the time, if you keep your eyes on the curbs.
Or, you can get microwaves at the local thrift store for $10 each.
Try the warehouse that processes donations - they have to pay to get rid of tons of broken ones.

Stuff you need for welding:
- Welding helmet ($16 and up)
- Welding rods ($6)
- Vice grip or purpose-built electrode holder ($6 for either)
- C clamp for grounding clamp
- Gloves
- Thick nonflammable (leather) clothing that will cover your arms

Disclaimer: High Voltage ELECTRICITY and lots of CURRENT! Heat, electrocution, and DANGER! You could die and you could go blind.

That said, *try this at home!*

See this for a lot of welding safety tips

Here are the really good how-tos that this project is informed by:
build a 70 amp welder
the tiny tim welder by tim williams
home made welding machine (via afrigadget)

Dan Hartman's how-to is good for reference, too.

And here's the quickest way to make a DC welder with a bunch of 12 volt batteries.

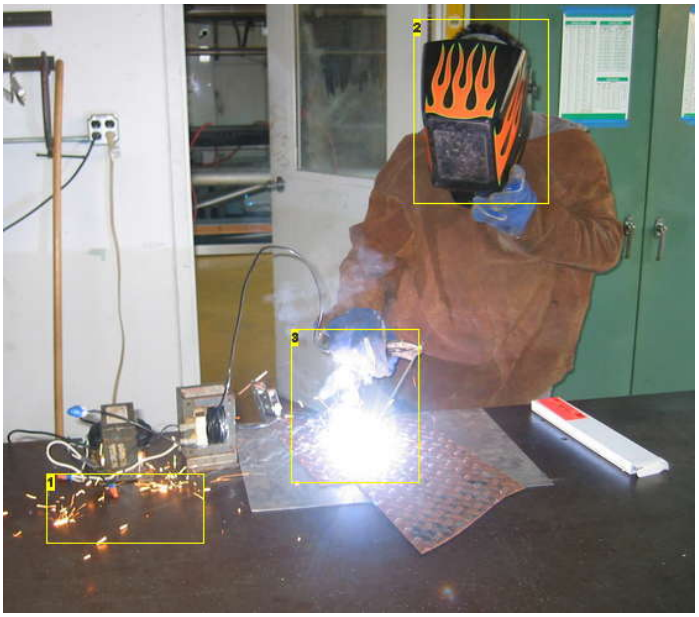


Image Notes
1. sparks! The good kind, from the weld, not the bad kind from the welder.
2. me welding
3. call me Flashdance.

step 1: Dissect the Microwaves

Invite your non-hardware oriented pals over to help help dissect your donor appliances.
They'll love it. David Grosof donated one of these microwaves under the condition that we take it apart together.

Good safety tip:
You'll find a gigantic capacitor inside the microwave. It looks like a metal can with two tabs on top.
Short it out to make sure it doesn't have any leftover charge on it, before you poke your hands anywhere near. Just put a screwdriver or something metal you aren't connected to, across the two metal terminals shown here.

Image Notes
1. microwaves are full of surprises - smelly sneaker surprise!

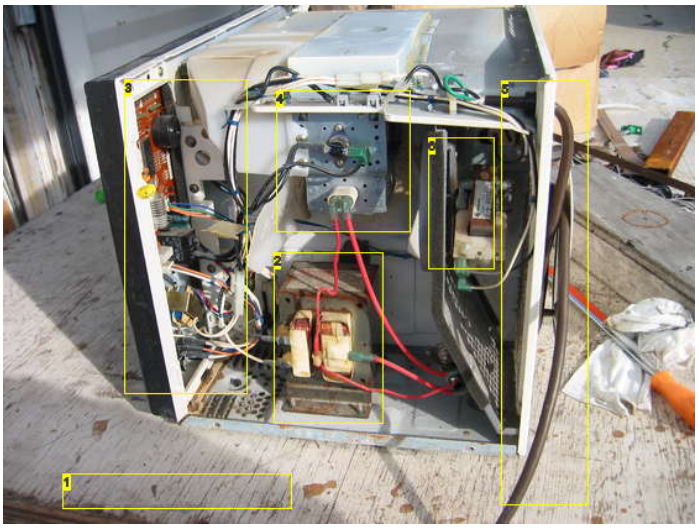


Image Notes
1. microwave guts!
2. transformer: save this and use it!
3. front panel electronics: recycle!
4. MAGNETRON: coolest name ever!
5. AC power cable: save this and use it later!
6. fan: recycle!

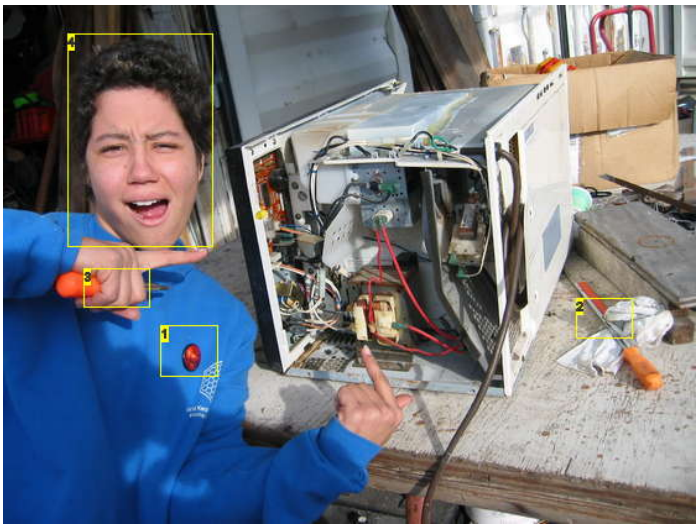


Image Notes
1. Big Cinder: earth after global warming?
2. very long screwdriver
3. five-bit switcheroo screwdriver
4. Star Simpson's dismantling-microwaves face

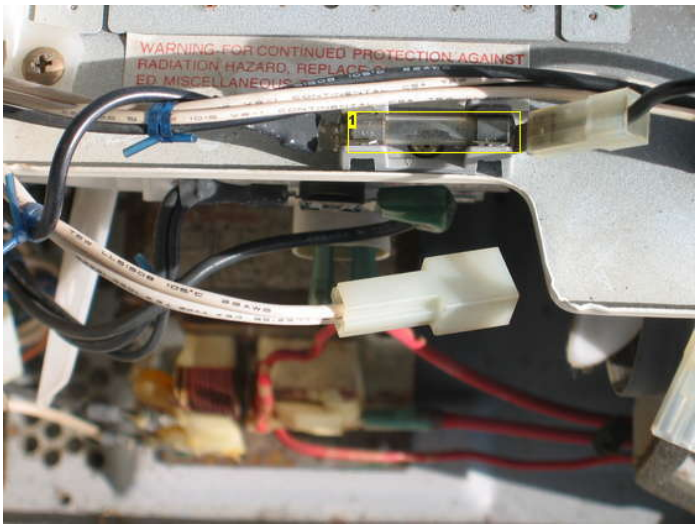


Image Notes
1. magnificent fuse

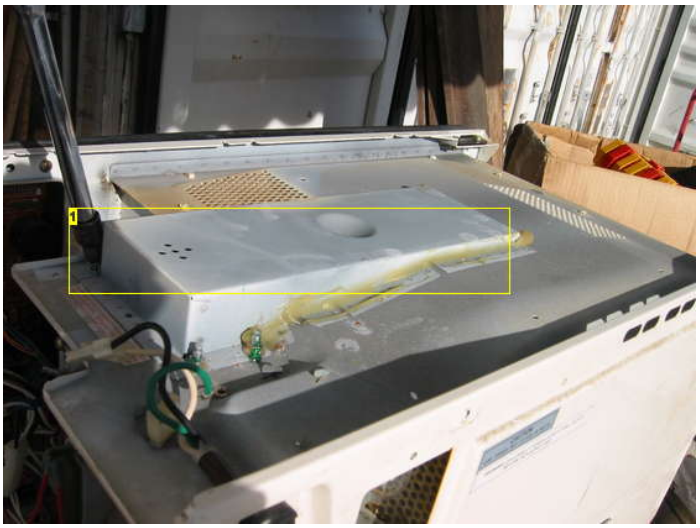


Image Notes
1. waveguide: the magnetron drools its 2.4GHz microwave rays into the oven area, through this.

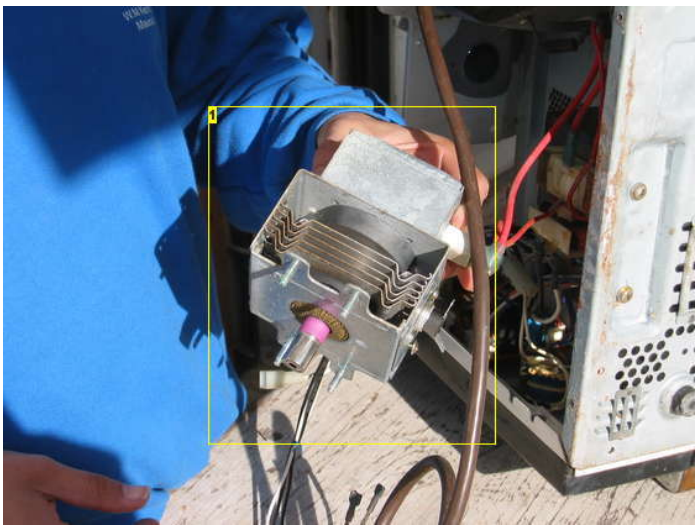


Image Notes
1. this is the magnetron. it's good for tronulizing magnetoids. by which I mean, it produces 2.4GHz radiation.

step 2: Prepare the Transformers

Chop and and knock out the secondary (thin wire) windings.
Don't nick or damage the primary windings in any way.

If you do, you could create shorts where two windings conduct to each other, allowing electricity to bypass certain parts of the coil, making effectively a smaller coil, and creating something different than what you expect at the output. Or, you might chop the connection entirely, ruining the primary. So do your best to keep it intact.

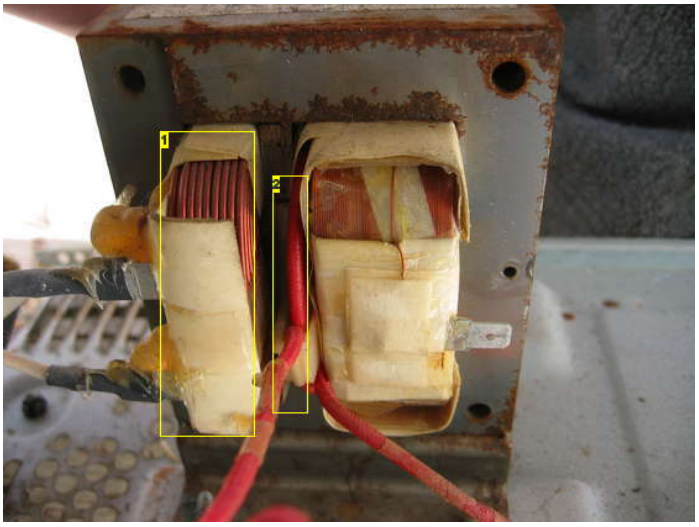
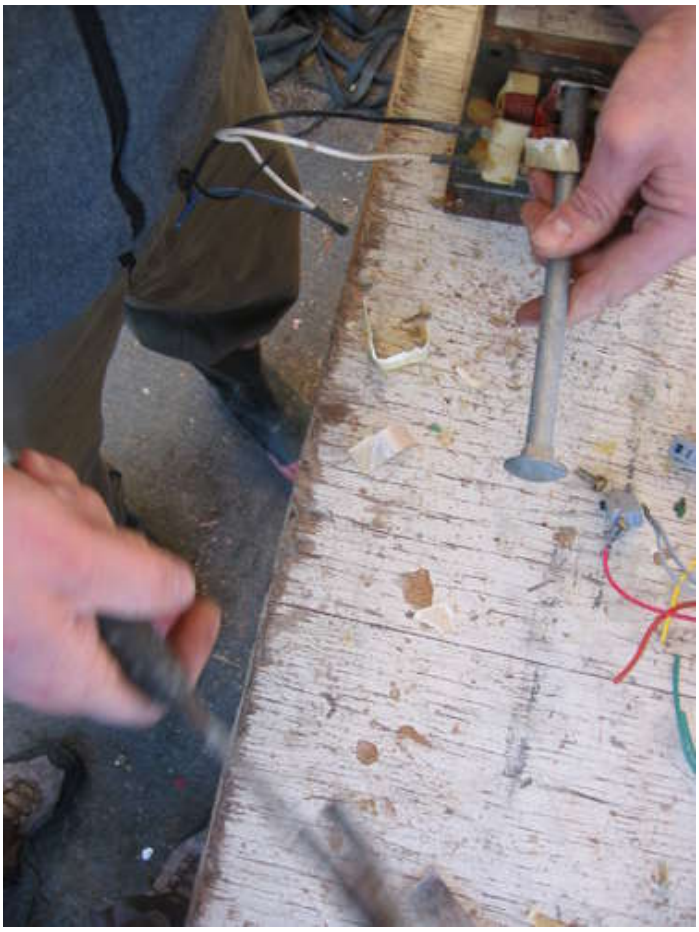


Image Notes
1. Primary windings - powered by the gods of walljuice. Don't harm these in any way.
2. Low-voltage winding for filament current or somesuch thing to feed the magnetron. Remove this.

Image Notes
1. use a sharp chisel to cut the copper winding

Image Notes
1. after chiseling, pound the wiring out. be really careful to keep the primary intact, with no nicks.



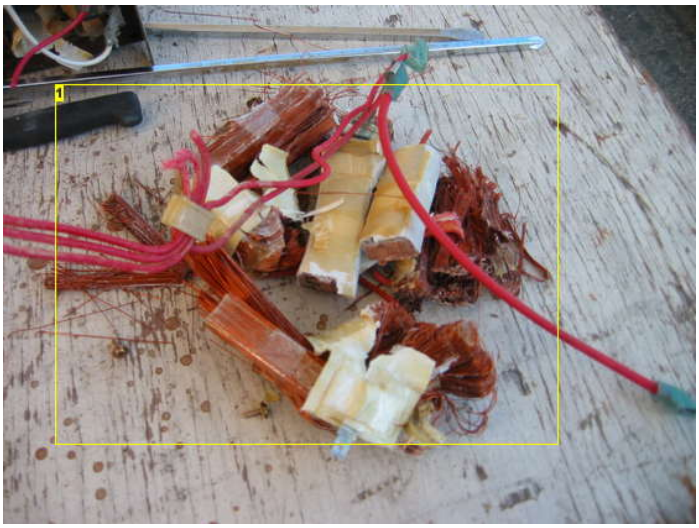


Image Notes
1. the disemboweled remains of the transformer secondary coils. This is at least a few pounds of pure copper. Sell it to the scrap yard for $4.50 a pound and take a nice trip.

step 3: Get some 24 foot chunks of ten-guage wire

We scavenged some heavy wire from an old powerboat the owner was scuttling.
We stripped the outer jacket off and separated the inner conductors to wind new secondaries on our transformers.

CLICK TO PLAY VIDEO

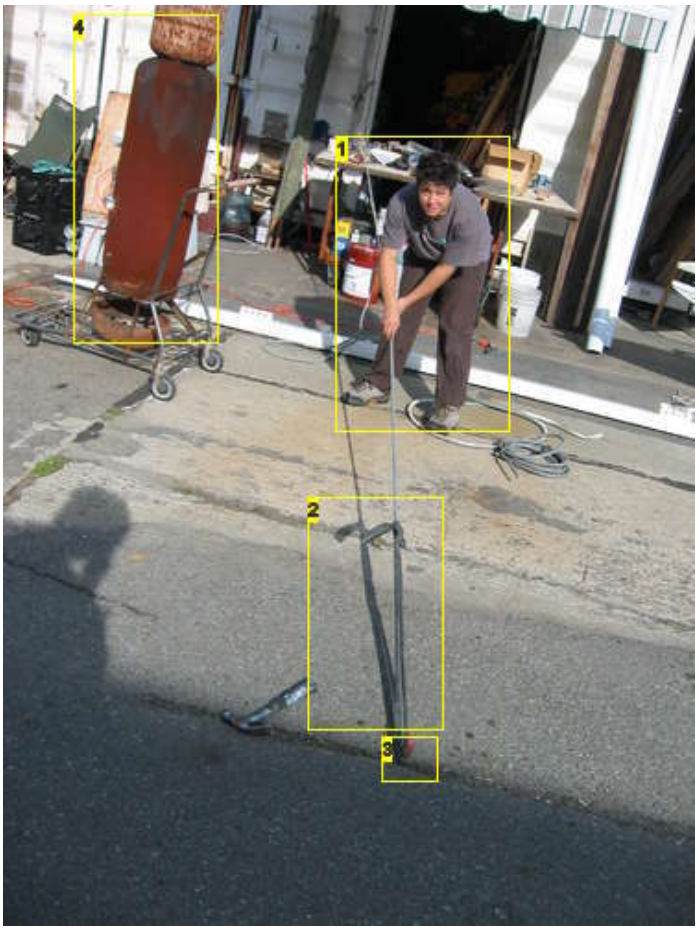
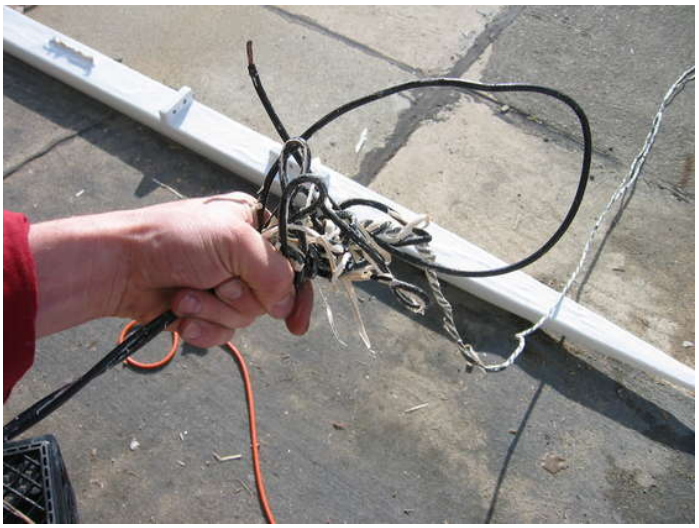


Image Notes
1. Star is skinning the 24 foot anaconda
2. this bike innertube creates tension for stripping away the wire jacket. the other end of the cable is C-clamped to the table.
3. Screwdriver pounded into the pavement temporarily.
4. Mr. Fireface is mobile now. A cozy glow whereever you're working.



step 4: Wind the new transformer secondaries

We wound 20 turns of 10-guage wire on each transformer. That's just about how much wire would fit into the available space. It took a little over 20 feet of wire each.

tip: draw tally marks on your table to keep track of the number of windings.

How does a transformer work?
The primary winding is an electromagnet connected to alternating current.
The humming magnetic field of the primary induces a current to flow in the secondary winding. If both windings have the same number of turns, the output voltage is the same as the input.
(minus a smidgin due to eddy currents, resistance, etc.)
If the secondary has more turns than the input, its output voltage is higher. That's the type of transformer you started out with.

OUTPUT VOLTAGE = INPUT VOLTAGE * (NUMBER OF SECONDARY TURNS) / (NUMBER OF PRIMARY TURNS)

Our primary has 100 turns and gets connected to 100 volts AC. We're winding 20 turns on the secondary, so we'll get about 20 volts out.

The available POWER STAYS THE SAME regardless of what the output VOLTAGE is.
POWER (WATTS) = AMPS * VOLTS

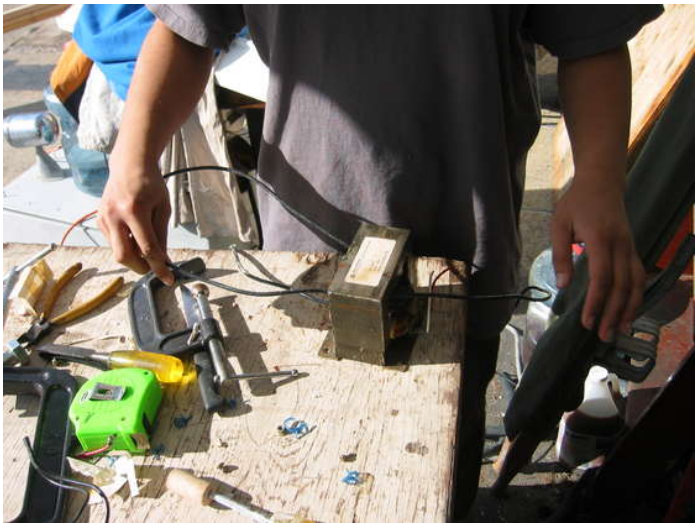
If the primary is made take 1000 watts (100 volts * 10 amps) out of the wall, we'll be able to take 1000 watts out of the secondary. With 1/5 of the windings, we can draw 50 amps out of the secondary.

That's the cartoon version with play numbers anyway.
Over here in our shed full of reality we've got two of these beasts in series and plan to short the outputs through a welding rod like Jennifer Beals.

Let's just say we're going to pull a whole lot of amps, which is why we need to wind our secondary with such thick wire.

The copper conductor in ten-guage wire happens to be 1/10" (0.1") in diameter.

Here's a table of conductor diameter, guage, and current rating.



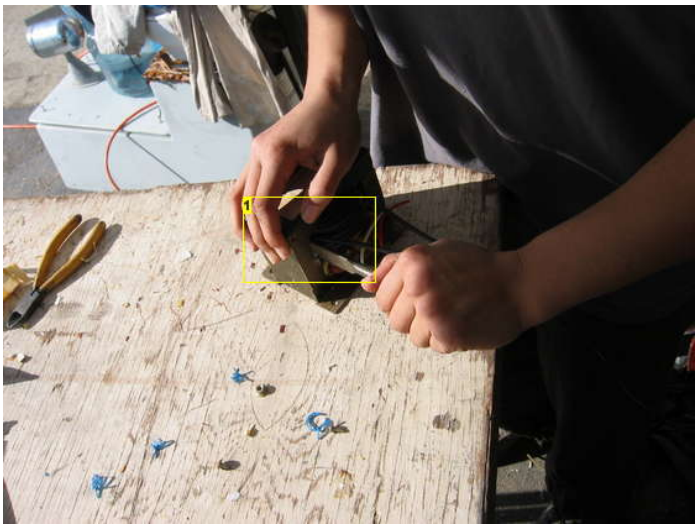


Image Notes
1. use a flat bar as a wedge to make space for more windings.

step 5: Schematic

It's a pretty simple circuit.
In fact there's nothing in it except wire!

We'll take two transformers and wind low-voltage secondary windings on them with thick wire.

We'll put the secondaries in series with our welding rod and workpiece.
We'll plug the primaries into the wall.

I really like the way aaawelder put it: "do not include yourself in this circuit"

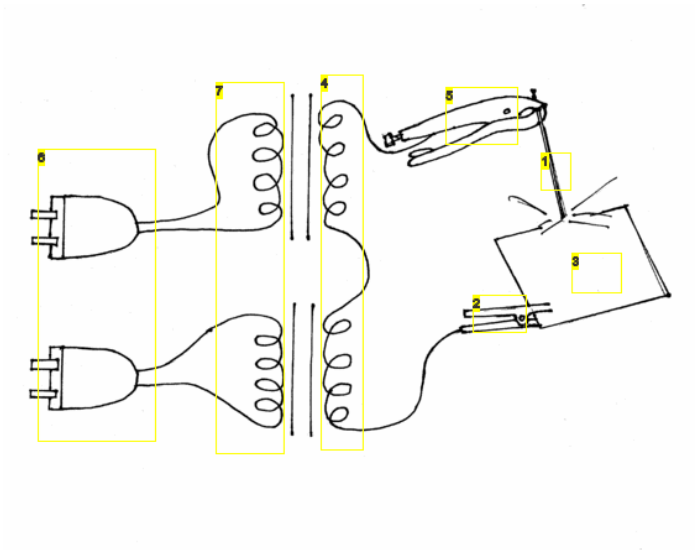
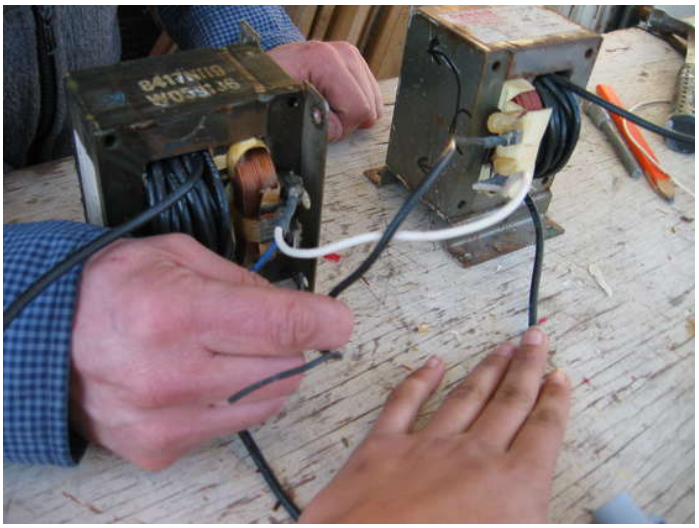


Image Notes
1. welding rod
2. ground clamp
3. workpiece
4. New 10 guage low-voltage high current secondary windings
5. electrode holder
6. To use this unit on 220 volts put the primaries in series rather than parallel as shown here
7. existing primary windings

step 6: Wire your two transformers together

Why do we use two transformers?
Just one of these isn't big enough to make a really juicy welder.
If you happen to find a big enough transformer somewhere, feel free to use that.

Here's how to hook up two transformers.
First we wire both primary windings in parallel to the wall cord.
Then we wire the thick secondaries in series so they both"Push and pull" in the same direction.



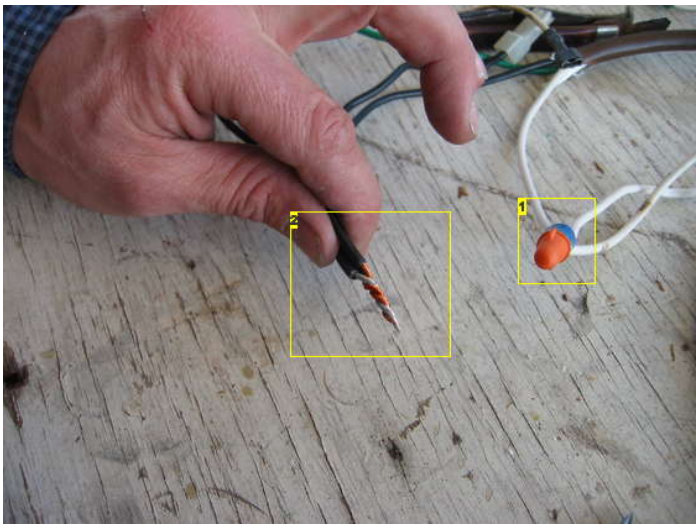


Image Notes
1. Wire Nut
2. Three wires twisted together

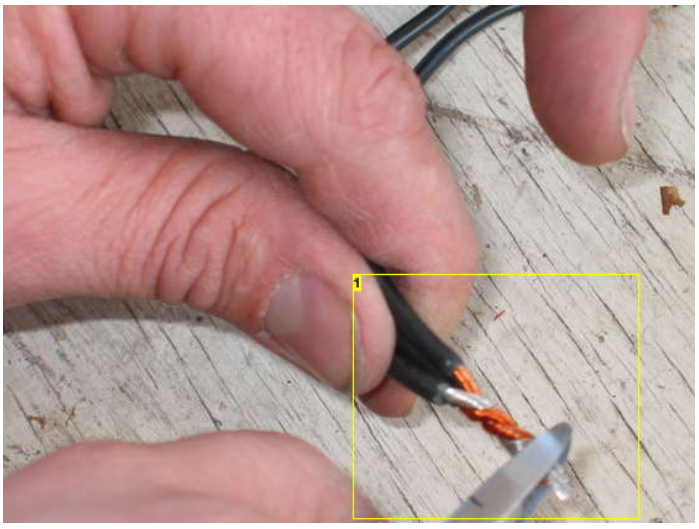


Image Notes
1. If the bare part is too long the wire nut won't cover it. If the end is too pointy the threads inside the wire nut might not grip it well. Cut it square if you're concerned.

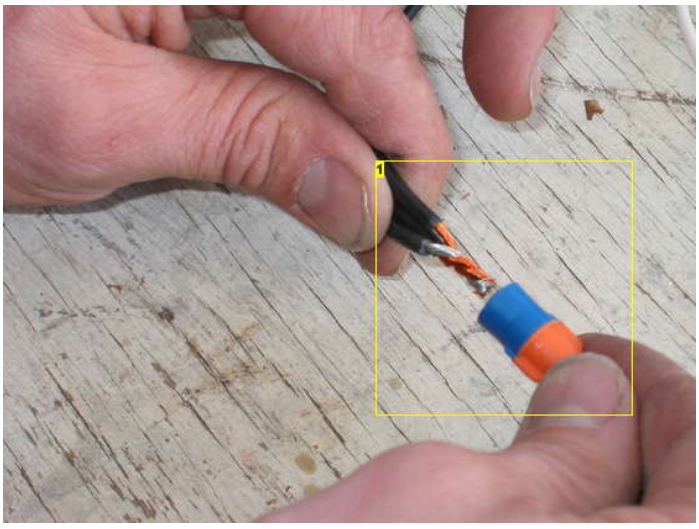
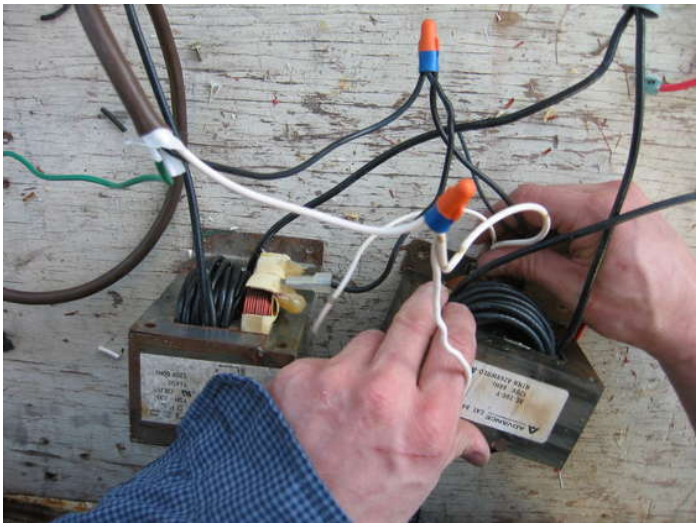
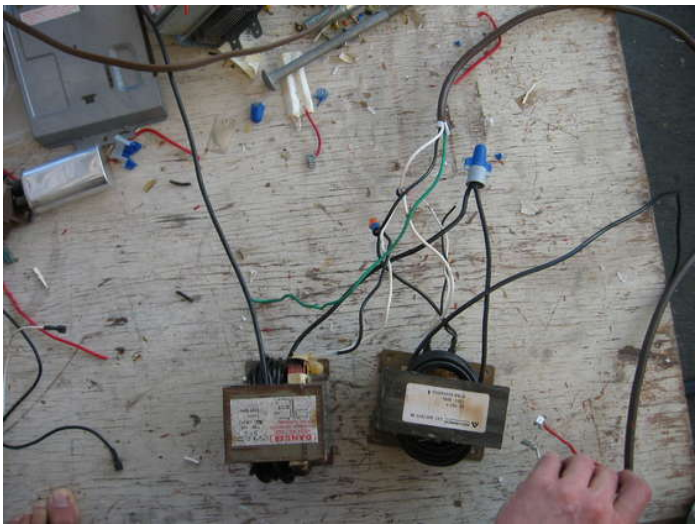
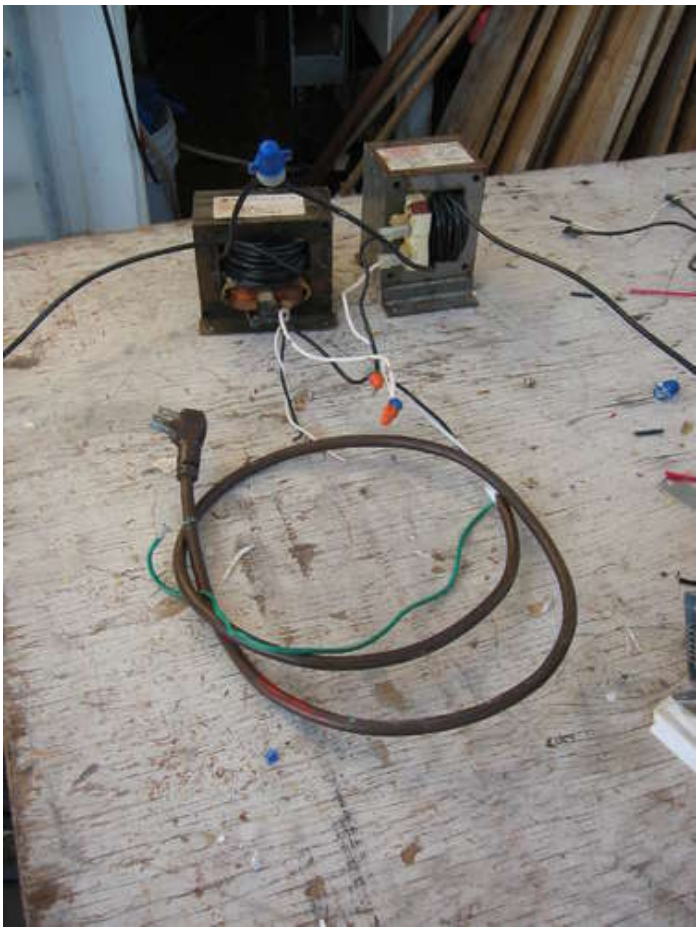


Image Notes
1. To everything turn turn turn there is a season turn turn turn and a wirenut for every purpose such as cover twisted wire ends and shoot through conduit-compressed-air guns at rats.







step 7: Test

Get out yer voltmeter:

Here's the test to make sure the secondaries are both pushing the same direction.
Our two secondaries in series produce 38volts AC with no load. That seems about right.
If they'd phased wrong it could have been fixed by reversing the wiring to any winding.

Where Tim says "out of phase" in the video, he means "in phase". That is, the center tap **should** be less than the outer two leads, and if things weren't that way, the transformers would be fighting each other, or phased wrong.

CLICK TO PLAY VIDEO

Image Notes
1. Non conducting shoes. Not standing in a puddle of water.

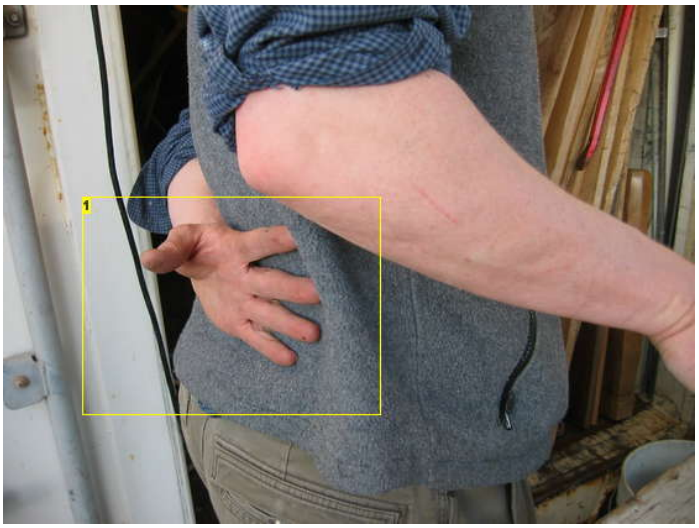


Image Notes
1. Electrical safety - keep one hand behind your back or in pocket so you don't accidentally short across your heart by carelessly grabbing two wires.

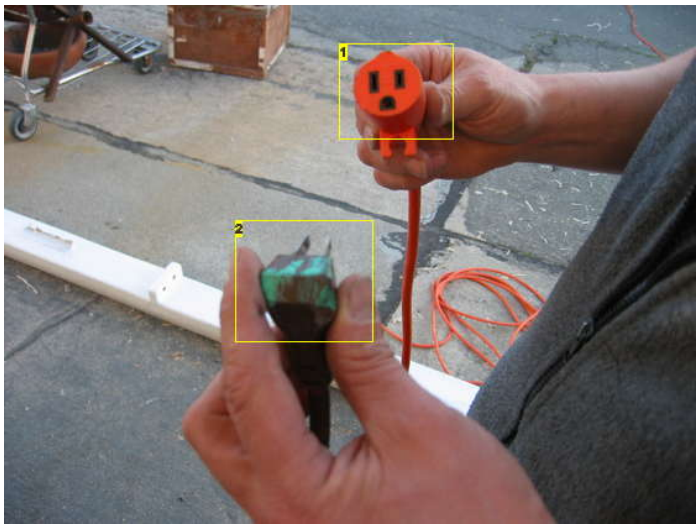


Image Notes
1. Hi! I'm MR. Baby tongue fun toy!
2. Come here often?

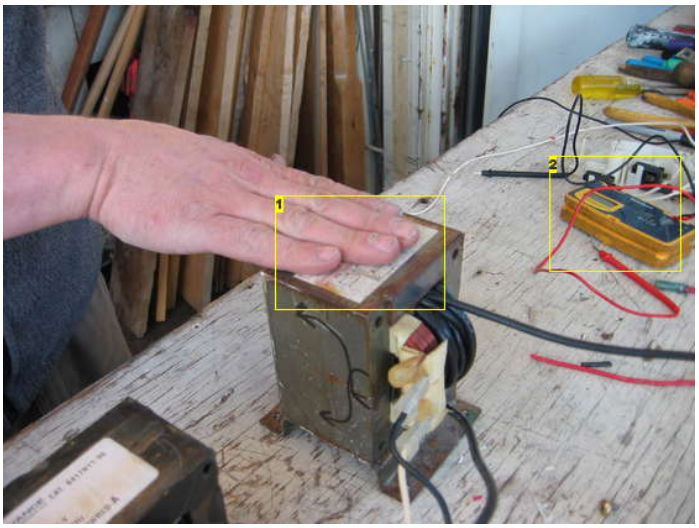


Image Notes
1. check the heat - these didn't really get warm, which is a great sign!
2. Radioshack autoranging multimeter. The best deal I know of for a little meter.
Why hasn't progress happened?

step 8: Weld

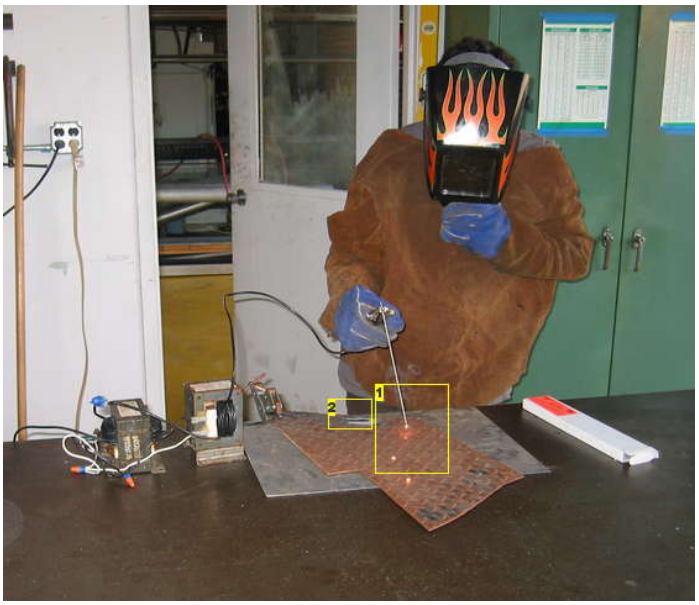
holy cow, it works!

We wanted to add a series inductor to give the unit more "inertia", but it didn't matter!

Here's Tim welding with some of those.

Built your welder, but not sure how to weld? Check out the instructional videos on youtube - search "how to arc weld". They're very good.

Here's Star striking an arc.
It welds great with these thin 1/16" 6013 rods. Even better with 3/32" 6013 rods.



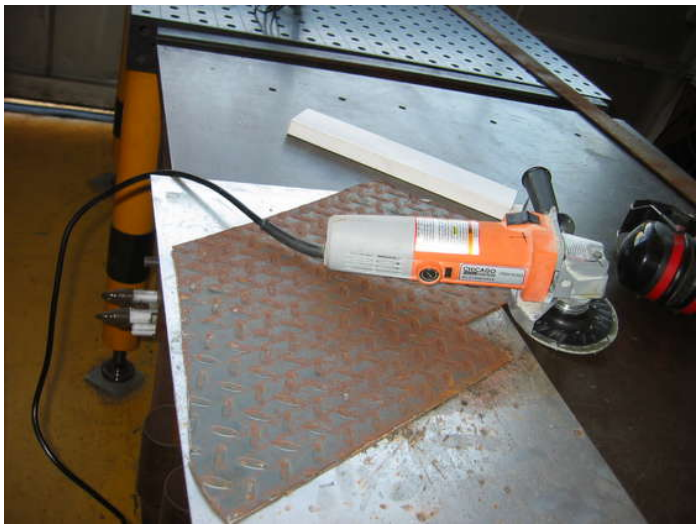


Image Notes
1. scratch start technique
2. Awesome first weld bead!

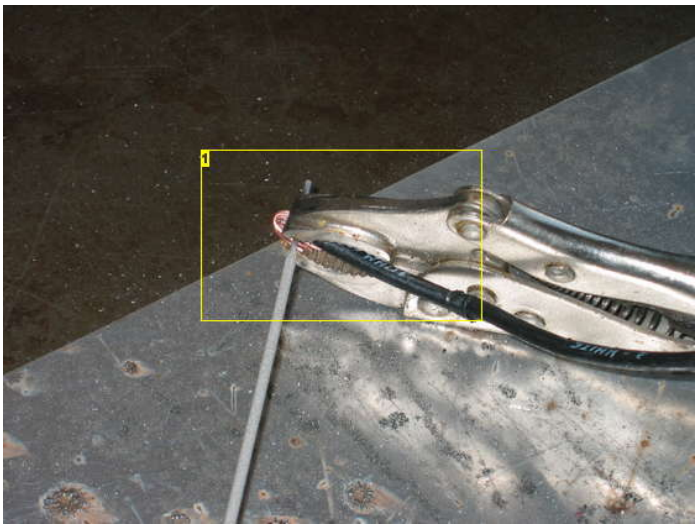


Image Notes
1. electrical connection, stick, and vice grip to hold it all together (all electrically active)

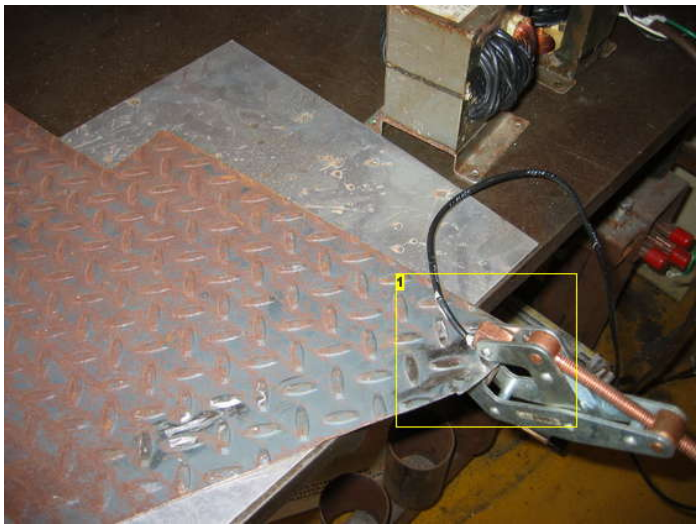


Image Notes
1. ground clamp

Image Notes
1. insulated glove for grabbing the electrically active vice grip

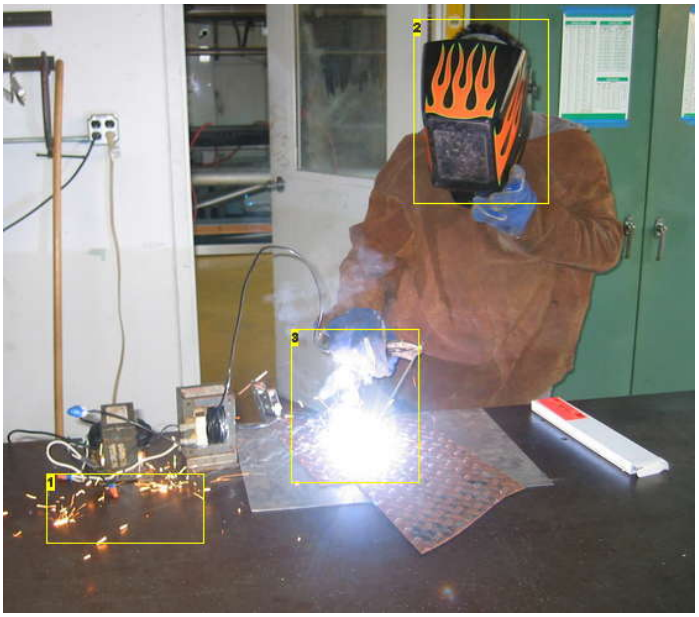


Image Notes
1. sparks! The good kind, from the weld, not the bad kind from the welder.
2. me welding
3. call me Flashdance.

step 9: Thick Rod Test

Those skinny 1/16" electrodes cost about twice as much as thicker ones.
We wanted to see how our welder works with thicker electrodes.
The next size up is 3/32", but we got a box of 1/8" 6011 electrodes.
When we pulled one out of the box we both said "wow, that's thick".

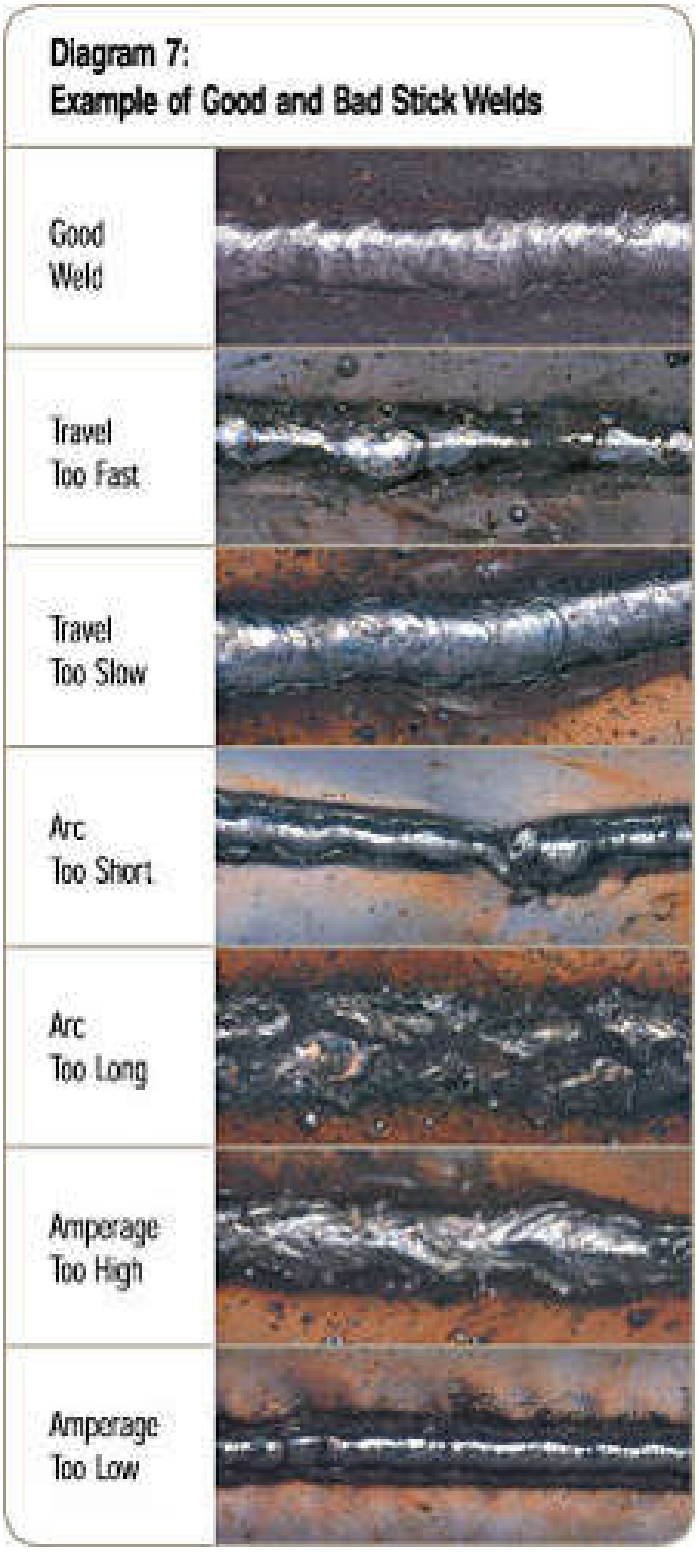
We fired up our welder and I welded this bead across the diamond plate with 1/8" rod.
The arc was pretty short but it burned in well and felt pretty good once I got used to it.
I had to shove it in a bit more than I'm used to to keep the arc going, but sticking wasn't a problem. I welded a long bead and used up more than half the rod without stopping.
That's the long weld in this photo.

Then I set the "torch" in this plastic tub so it wouldn't short out to anything.
I checked the transformers, and they didn't even get warm!
3/32" rods are less likeley than 1/8" to blow a circuitbreaker though. For your first welds get 3/32" 6013 rods.
6011 rods have thinner flux and make it easier to see what the metal of your weld is doing, but tend to spatter a bit more.

The next picture is for reference, from
hobartwelders.com

Udate 4/16/2008:
This is now my favorite welder. I made new leads for it from a pair of jumper cables. I left one alligator clamp on for a ground clamp, and added a $6 electrode holder. I've taught a bunch of people to weld using it.
The next photo is Ita welding for the first time, making an awning frame. That project was welded with this welder by total beginners using 3/32" 6013 rods. As you can see we have every other kind of welder, but the homemade ones are more fun.

Image Notes
1. It burns back into the coating, making it easy to maintain enough distance.



step 10: Welding Stainless Steel

We needed some brackets for Solara's mizzen mast.
So we went to the welding store and bought some 3/32" "Hobart Smootharc+ 316L - 16" stainless welding rods. They're only 12" long because stainless has high electrical resistance and they get really hot.
After much designing and sketching Victor, Kenny, and I cut, drilled, bent and welded these brackets. Very easy. When it cooled the flux went "tik" and fell off the weld. The dark area around the weld is soot from the flux.The welder could have handled much thicker rods due to stainless' high resistance and low thermal conductivity.

Important:
Use a fresh grinding wheel on stainless, or one that you only use on stainless.
You'll get rust if you use any abrasives that have been used on non-stainless steel. Same for the wrong wire brush. It will smear rustable iron on the stainless, and due to galvanic effects it'll rust quick if it gets damp.

Hooray! Where did I get the idea you needed TIG for stainless? Stick welds on stainless are just great!

step 11: Dimmer Control and Welding Thin Wall Tubing

The welder was too hot for thin-walled tubing frames, I kept melting holes even with the 1/16" 6013 rods. So I plugged the welder into a variac dimmer and turned the power down about 30%.
That gave me very fine control over power. Marc Lander and I did some very nice welds as seen here. After a few we got good enough to do the same welds with 3/32" 6013 rods and no dimmer and not burn holes.
More tricks - I used my left hand to feed a piece of mig welding wire into the weld to add more metal in and soak up the heat. Here's Marc doing that. Any wire is fine for this, coathangers are traditional for muffler work. Sand off the paint first if you don't like fumes.
Stopping to eat lunch helped a lot also. Your welds won't be good when you're shaky and tired.

I got my variac for free, don't buy one for this, they cost as much as a welder.
A solid-state dimmer that's rated for inductive loads does the same thing and costs a lot less.

If you're feeling particularly fancy, you can add in your own scr-based switching circuitry to vary the power, like this guy did.

Image Notes
1. Darth Vader doing crafts with his lightsaber on the weekend

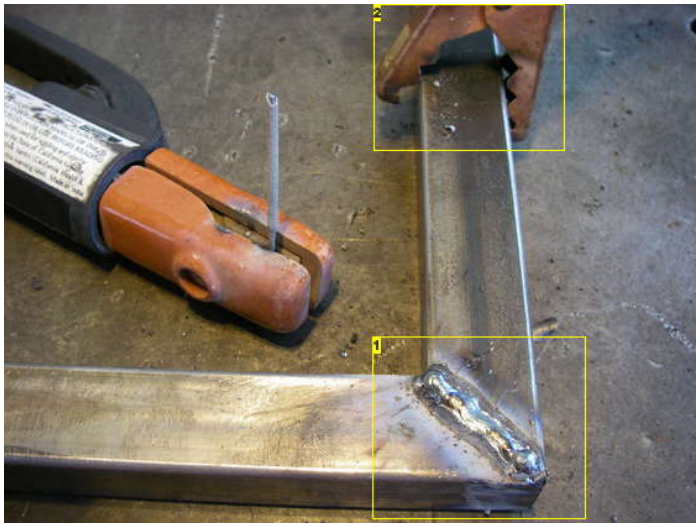


Image Notes
1. Nice Weld
2. automobile jumper cable ground clamp

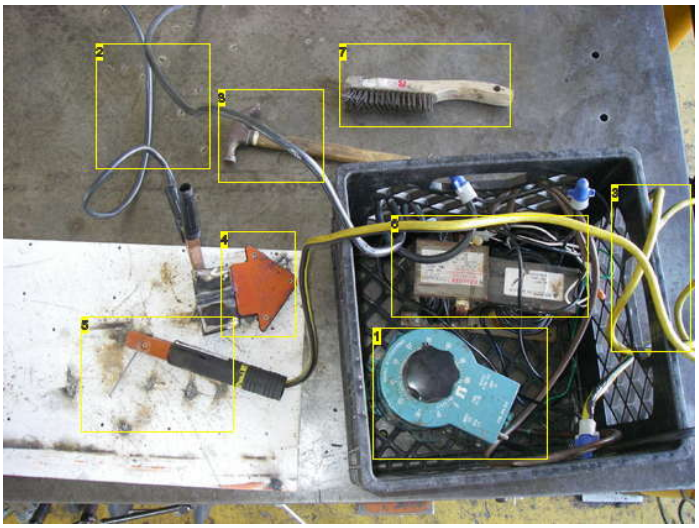


Image Notes
1. Mr. Variac a.k.a variable center-tapped autotransformer
2. Jumper cables
3. jumper cables. How many times in your life can you pull apart a zip-cord this big?
4. handy welding magnet
5. Handy non-vicegrip electrode holder should bring great joy to safety lovers everywhere
6. rewound microwave transformers
7. Your pal ms. Wire Brush. Brush rust away before welding, brush flux away after chipping.
8. Your pal ms. Hammer. Use to chip flux and peen the weld to reduce stress from weld freeze contraction

step 12: Other Welders

Folks have sent me a few photos and videos of welders they've built off of this instructable. I want you to be able to see them too, so here they are!

Here's a video I got from Paul du Buf, of the Netherlands (nice case, Paul!)

'

Cheyyne said:

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Hey there, here's my welder based on your instructabletion. It outputs 35.5v, because the
transformers were a little smaller than yours I think (couldn't wind a single more turn). So far I
have managed to lay down gobs of metal on various steel objects in my garage, but I still suck
at welding. Luckily I rented a nice welding video from Smartflix that had good reviews, hopefully
that'll give me some insight into the process. I did manage to lay down a 1" bead though! The
whole thing is going into a tacklebox housing.

Props for a great instructable. Thanks for it!
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llamafur followed with:

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Heres another one, same basic welder, but its housed in a .50 cal ammo can. Looks pretty
sweet. Its relay controlled ( two 15 amp HVAC control board relays wired in parallel) , I
measured 24 volts ac across the output wires.its also sorta heavy, 30 pounds.
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Image Notes
1. llamafur's welder

Image Notes
1. llamafur's welder

Image Notes
1. this case is metal, so it should be connected to ground.
2. llamafur's welder

Image Notes
1. llamafur's welder

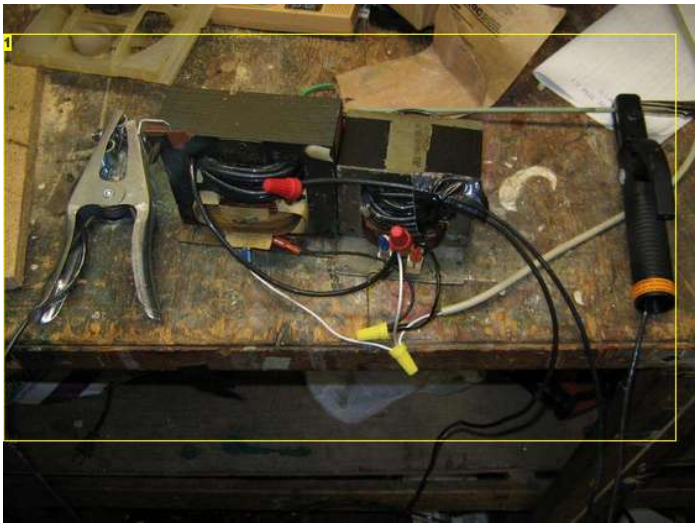

Image Notes
1. Cheyyne's welder

Image Notes
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skuitarman says: Feb 20, 2009. 7:20 AM REPLY
i got mine to work!! there is about 14 turns on each transformer now,and they put off 18 volts each, and in series together they put off 36 volts.

i works perfect with 1/8 rods

freewheel says: Feb 18, 2009. 10:53 AM REPLY
This is a fantastic idea! I have a transformer from a mig welder that I'd like to use as one of the transformers. The primary coil has three concentric windings of around 20 coils each, separated by an insulator between each winding. It has 6 leads coming out of the bottom. Could I connect the 6 leads in series to have a transformer that functions like one in the microwaves, or connect each set of leads to a switch to step voltage up or down? Thanks for your time ;)

eric m says: Feb 17, 2009. 5:37 PM REPLY
didn't explain the parallel & series part well enough.

220 = one outlet so you need to go series.

110= less hassle to rewire the transformer. just use the original plugs. Looks less commercial and pro and more GHETTO but it's less work.

aptyk88 says: Feb 14, 2009. 7:13 PM REPLY
ok so i followed the directions cept i only use 1 plug and im only getting 23 volts do you have to use 2 plugs?

skuitarman says: Feb 14, 2009. 5:56 PM REPLY
what if you have more windings on one transformer then you have on the other, will it still work

Randolar32 says: Feb 14, 2009. 2:06 PM REPLY
Hey there! Great instructable! just wanted to know if it would work if i just used one microwave transformer? My input current is 230 volts, Norwegian standard, so would the output current be higher then when the input is lower? like twice higher :-) ?

skuitarman says: Feb 13, 2009. 6:03 PM REPLY
how many amps can you get out of it???

kixter01 says: Feb 12, 2009. 6:59 PM REPLY
my question is do have to conect the secodary coils to the prim or just leave them un conected..

samuelgamlin says: Mar 25, 2008. 3:30 PM REPLY
i have the king of capacitors in my room i use it as a table its something along the lines of 200 Farads not UF not MF but full farads before you ask i got it from an aircraft carrier true story

sam

taoybb-TH says: Feb 3, 2009. 7:32 AM **REPLY**

Can i see it?
That are very big Capacity i had only 2.5Farads

seabeepirate says: Dec 21, 2008. 10:05 PM **REPLY**

you mean mF(microfarads or millionths of a farad) MF is megafarads (millons of farads)

stasterisk says: Dec 22, 2008. 1:37 AM **REPLY**

uF are microfarads. mF are millifarads. uF are more common.

MF in practice usually mean millifarads too.

autophile says: Feb 2, 2009. 11:25 AM **REPLY**

Don't tell that to an economist -- they'll tell you M means thousand (from the Latin *mille*, meaning thousand), so for example $100M means $100,000. As an engineer in an Intro to Econ course, I got pwned by the prof when I asked if he didn't mean mega :<

seabeepirate says: Dec 23, 2008. 2:11 AM **REPLY**

I've never seen MF used as millionths of a farad only millions, hence the capitalization of the M instead of the lower case m. But hey maybe I'm way off.

Laminarin says: Jan 16, 2009. 4:05 PM **REPLY**

Also milli = thousandths, not millionths.

stasterisk says: Dec 23, 2008. 7:39 AM **REPLY**

Whoah! Either your capacitance has all been on paper, or you're in some pretty high-energy physics!

In practice, greek convention is broken when it comes to capacitors.

Since megafarad caps don't exist, lazy industrial manufacturers don't bother paying for the "correct" prefix letter-stamp when a big capital M will do to mean "milli-".

seabeepirate says: Dec 23, 2008. 5:09 PM **REPLY**

All the capacitors I have use uF instead of mF... I have 8 from disposable cameras and a few others from old computer mainboards.

stasterisk says: Dec 24, 2008. 4:04 AM **REPLY**

Okay - but uF and mF are different units, microfarads and millifarads

seabeepirate says: Dec 25, 2008. 2:18 PM **REPLY**

Sorry got confused about the milli thing. Still though I've never seen a capacitor labeled with a capitol M.

Coffee bean says: Nov 26, 2008. 3:19 PM **REPLY**

wow what do you charge it with

bgugi says: Apr 17, 2008. 6:10 PM **REPLY**

dude... sweet...

taoybb-TH says: Jan 13, 2009. 7:08 AM **REPLY**

What size of your wire (In mm)

autophile says: Feb 2, 2009. 12:01 PM **REPLY**

Google is your friend. Ask it the size of 10-gauge wire. You'll probably find a site that gives the measurements of all sorts of wire. Bookmark that!

taoybb-TH says: Feb 3, 2009. 7:30 AM **REPLY**

THANK YOU to autophile

stasterisk use 10gauage it about 2.5mm
me use 3mm

I use a Aluminium wire because it very cheap i buy it long 20M cost are 100bath veryvery cheap) my output voltage are 15-17VAC at above 170A

I test weld with Steel wide about 5mm.
But!! I welding in 20s transformer are warm-hot about 37-39C

autophile says: Feb 2, 2009. 5:06 PM **REPLY**

Could this thing weld, say, two pieces of 0.25-inch aluminum square bar together? I'm not sure if aluminum can be arc welded...

dionysus2008 says: Sep 7, 2008. 10:51 AM **REPLY**

in preparing my transformer, i used my disc grinder and grind off the welding at the sides and just hit off the bottom of the core. then i side out the coils. its seems like a waste to destroy a perfectly good secondary coil so i kept it and dropped in my primary back and used some heavy duty welding wire to wrap my secondary, oh its much much easier to wrap it with the bottom of the core gone then when i was done just bolt it up and ready for use

autophile says: Feb 2, 2009. 11:48 AM **REPLY**

Agreed it's easier to wind, but the circuit formed by the magnetic flux going round and round the metal of the transformer is probably not amused by the sudden decrease in magnetic conductivity when it hits a poorly re-attached side. Make sure the side is firmly attached by bolts, C-clamps, or by re-welding, otherwise your transformer's efficiency will be vastly reduced.

autophile says: Feb 2, 2009. 11:20 AM **REPLY**

Just put a screwdriver or something metal you aren't connected to, across the two metal terminals...

I assume that "metal you aren't connected to" has two meanings: metal that you aren't electrically connected to, and metal that you don't mind getting messed up!

taoybb-TH says: Jan 31, 2009. 10:14 PM **REPLY**

tell me please.

openwater says: Jan 28, 2009. 7:24 PM **REPLY**

ok, I think I'm getting close. Got the 2 transformers wired and mounted and got 42v across the secondaries in series; this is good, yes? no? I also mounted the 2 fans from the micros to blow on the transformers, but am not sure how to wire/integrate them into the power to the transformers. Or should I just wire them parallel with their own power cord to wall juice? I just don't like the idea of having to take off the gloves every now and then to see how hot the transformers are. Oh yeah, and thanks for the inspiration/instruction with this one. (I still can't believe I'm trying this!) If I ever get this done, will post pics. Have been looking at getting a welder in order to upgrade the required security measures for an explosives magazine I need to get permitted for storage of pyro. (Can't believe I play with that stuff, either!!)

timinator says: Jan 28, 2009. 12:22 PM **REPLY**

I built a welder like this with two transformers but i am not getting enough current. Could i hook up a third transformer?

stasterisk says: Jan 28, 2009. 1:37 PM **REPLY**

stop - check how big your circuit breakers are.

openwater says: Jan 25, 2009. 4:22 PM **REPLY**

I got about 20' of 10ga. 3-strand copper stranded wire leftover from an old job. Should I use it, or just go buy the solid wire?

stasterisk says: Jan 28, 2009. 1:37 PM **REPLY**

stranded should be fine.

esofarm says: Jan 24, 2009. 5:53 AM **REPLY**

I need a better explanation about wiring together the 2 transformers. The video shows how to determine the direction of the primary windings, but stops short of discussing the "how to" on connecting the 2 units in series. What is the correct way? and What is the way to test? and What happens if not wired together correctly? Can someone help?

NoPegs says: Jan 21, 2009. 7:38 PM **REPLY**

There's two schools of DIY here. Some people bash the 120v windings out and put their secondary there. For two reasons. Higher current at lower voltages, and also significantly less likely to pop your circuit breakers when switched on.

If you do it this way, just watch out for grounded center taps in the HV side windings. if you run into these, just make sure the laminations themselves are insulated. Don't lay two center tap grounded transformers on your steel welding table. they'll either short out fantastically, or magnetize pretty well opposite each other and possibly collide.

I've made them both ways. I one of my friends had an addiction. He couldn't not pull over and pick up junk left curbside. He made a tidy profit stripping stuff down and selling the metals and or parts for scrap or on e-bay. I told him Eric, how soon can you get me 6 intact microwave transformers, he said Well, gimme a week. He had them in 3 days. I rewound two with 8ga THHN wire in the HV winding space, and two with it in the 120v winding space. The ones in the 120v side produce substantially more current, good for welding thick stuff, or carbon arc torching. The two on the HV side produced more voltage at less current, good for small gauge steel and aluminum (yes, you can arc aluminum, no, its not pretty...) The other two transformers ended up in a crazy steam-punk/mad scientist crossover Jacobs ladder that could be used as a bedside *lamp* and ozone comb sterilizer. :)

Oh, and definitely save the shunt plates. you can take them out later to adjust to your tastes (I was accustomed to welding with "real" commercial welders, so I adjusted mine to match) As this is how the old Lincoln Electric buzzboxes regulated current, the crank on the front moved the shunts in and out, and the voltage adjust just switched taps around.

NoPegs says: Jan 21, 2009. 7:26 PM **REPLY**

It should be noted here to not disassemble the magnetron assembly any further than removing the magnet from around the throat of the cavity. Most consumer magnetrons contain Beryllium oxide in the ceramic which can cause major health hazards if the dust is inhaled or ingested. (don't smash it, especially!).

Berylliosis is bad.

Grey Tusk says: Jan 10, 2009. 3:10 PM **REPLY**

Firstly, great instructable!!

But unfortunately mine doesn't work...
You see, i live in Australia and we run 240v out of the wall, so i hooked the transformers up like the diagram instructed for 240v. Success! It welded great, but after five minutes something went wrong and i turned around and saw one of the transformers continuing to shake even though it was no longer arcing, and emitting a white smoke. I quickly pulled out the plug, and saw that the secondary windings of that transformer had melted and all fused together... I cut out the melted windings and replaced them with new ones but the same thing happened again!

From what i can tell, the insulation is melting and the wires are touching each other and creating less windings?
But i don't know how to fix the problem, and i don't want to waste another 8 meters of wire if they are just going to melt again...
Any suggestions would be really helpful!
Thanks

MrV says: Jan 19, 2009. 7:52 AM **REPLY**

You got to have a fan blowing on the transformers so they wont get hot, when they are cool will not the insulation on the secondarys melt...

Grey Tusk says: Jan 14, 2009. 10:06 PM **REPLY**

I couldn't find any 10 gauge (possibly Australia doesn't use the same system for measuring?) but I think I read somewhere in the comments that 10 gauge wire was standard house wiring, and we had some left over from a house extension so I used that. But I doubt now that the wire was thick enough, it was not even single strand, it was something like 7 individual half mm wires. Could you suggest anywhere I could buy 10 gauge wire?

Thanks

G__ says: Jan 13, 2009. 10:46 PM **REPLY**

Hi

Here are a few links on transformers. Hope they are helpful. The last two links are pretty techie, but I'm the geek that had to study this stuff years ago.

http://www.allaboutcircuits.com/vol_2/chpt_9/5.html

http://ecmweb.com/mag/electric_basics_transformers/

http://en.wikipedia.org/wiki/Transformer

http://www.youtube.com/watch?v=PtSl3Khf1aE
oops! Wrong transformers..... :)

http://www.elec-toolbox.com/Formulas/Transformer/xfmrform.htm

http://www.epanorama.net/documents/components/transformers.html

Erfunden says: Jan 12, 2009. 10:52 AM **REPLY**

I wanted to write and say thanks. A buddy and I built a welder using this instructable (and some other stuff). I've been without welding equipment for the past couple years and it's nice to be able to sew with lightning again.
Here's a photo: http://i37.photobucket.com/albums/e57/Bohnhoff/junk%20tech/opencover.jpg

I spent $15 on wire since I couldn't find any to scavenge. Got any tips on where to find thick wire other than a boat?

dyermaker8 says: Jan 10, 2009. 7:38 PM **REPLY**

Built mine today,. wanted to say thanks,. Great instructable. I managed with 12 gauge wire at 22 wraps per transformer,. works amazingly well. Almost to well. After testing on sheet metal (failure, to hot, just burns righ thru) I switched to some 1/4" bar stock,. perfect. Couldn't believe how quickly and easily the arc struck with absolutly no sticking. Nothing like the horrid cheap 110v welders available at you local big box stores. I'd really like to see you add some more info in step 11. I'd love to be able to weld sheet metal with this as well. Can we get more specifics on the the solid-state dimmer? Thanks again!

worleyll says: Jan 10, 2009. 3:17 PM **REPLY**

I just picked up two microwaves and one is just like yours. i am just wondering where to get 24 foot of 10 gage wire?

woodfinery says: Jan 9, 2009. 9:05 AM **REPLY**

Wood FineryGreat post! I am a great fan of Atomic Zombie (weld your own recumbents from scrap bicycles) and need to build an inexpensive welder, thanks

Dunhausen says: Jan 4, 2009. 10:46 PM **REPLY**

First off, thanks a lot for posting this. :)

I am a novice to welding, but I had read that DC gives better welds. So I was wondering if that would be worth doing, and if there would be a good source to salvage a high current bridge rectifier, or if there is a better solution for getting DC at these currents.

Also, if the inductor you did not find necessary would still be in some way beneficent.

I appreciate any input. :)

twenglish1 says: Jan 4, 2009. 5:08 PM **REPLY**

how would i measure or calculate the output current?? i built this using one big transformer, but i think im going to need to add a second one cause i don't seem to be getting enough current

rndmnmbr says: Feb 8, 2008. 2:05 PM **REPLY**

For the next one, you might instead try making it run from 240v instead of regular 120v wall voltage. 120v breakers are usually 15 amp, and wired like this you're pretty close to throwing the breaker every time you weld.

240v has two hot lines and one neutral, each hot carrying 120v (if you look in your breaker box, you'll notice that you're getting 240v off the pole, which is split into two 120v circuits by simply splitting the wire). Just run one hot to one transformer and the second to the other, and combine them back on the neutral. 240v breakers are generally rated from anywhere between 20 and 30 amps, which is plenty, plus the cross phases of the 240v will make for a better, easier weld.

For reference, the best weld with standard 1/8" 6011 welding rod is done around 90 amps, or for the slightly less standard 1/8" 7018 rod is 130 amps. Most 120v welders, even set up like this, welds 6011 moderately to poorly and can't weld 7018 at all.

MrV says: Dec 30, 2008. 12:52 PM **REPLY**

You mean that he should seriewirering the transformers togheter and run them on 240v?

Derinsleep says:
try using 2 24 kV phase system. ding ding
BUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZ

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