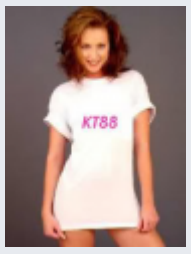
Author | Topic: I made a thing... Resistance Soldering Unit (Read 6234 times)

0 Members and 1 Guest are viewing this topic.

bulldozed
Senior Member



Posts: 8321
Melbourne, VIC

I made a thing... Resistance Soldering Unit
« **on:** January 18, 2014, 05:43:05 PM »

So... some people here know that I dabble in another hobby, Model Railways.... a useful construction skill is mastering high-end soldering, to assemble etched brass, 'whitemetal'/pewter and occasionally nickel-silver alloy kits. I've been out of practice for a while, and struggled with my $13 workhorse soldering iron (you would be astonished at what you can do with them though!), and having bought a better Goot fixed-temp iron that proved to be faulty (its' replacement is great), and being faced with a few constructional challenges, I sought some advice from far more skilled model builders - and the resounding answer was "get, and learn to use, an RSU".

Google search: $300-600 for a pre-built unit.

Second Google search: huge number of DIY projects with wildly varying standards of construction and component use. But a lot of promise.

I tied myself down to a particular "application" of the construction method. A local model shop happens to carry original-part carbon/copper-wrapped RSU tips - I bought one to have a "known" starting point for my build, although I plan to buy and test some mass produced welding rods

The basic details are as follows;
- PC 'ATX' PSU as the power source, with slight alteration to avoid the need for PC "push-button" switching
- Integrated relay switching for safer operation
- PVC pipe handle with brass terminal-strip segment used for tip retention
- Contact switch in the handle, as opposed to a footswitch

For anyone playing at home (and I advise you spend a little time researching the idea - it's simple but you can run into a few snags with people's varied ways of "doing things" - I'm not saying my method is best, but it's relatively safe and is tested), I've used a few Jaycar-sourced components for my build - listed here for convenience... disclaimer - I have no attachment/financial interest in Jaycar, just being helpful and supporting some Aussie jobs.

- SY4077 Relay Horn 12VDC 30A SPST - incorporates a automotive blade fuse holder with 30A fuse in there. Absolutely perfect application for my particular PSU.
- HM3200 Terminal Block - the inner diameter of the brass collar is about 4.5mm, again - ideal for the purpose.

The PC PSU I've gutted out I'd actually purchased new - as I don't presently have any not-stripped ones here!! Critical spec was the +3.3VDC/29A output on the "orange" lead outputs. Healthy amount of power, useful range. Other voltage/amperage ranges will give good results, I took a stab at this (knowing I had the +5V/43A outputs inside that I could put to the task if required) having seen recommendations from others online in that relative power range.

Photographs and step-by-step to follow

Logged

Terrible Amplification & Sawdust Concern - Custom Valve Amplification, Effects & Hardwood Accessories - made in Melbourne, Australia
FB: terribleamps ## Insta: @terrible_amps ## Reverb.com: terribleamps

amp_mangler
Gearhead
Posts: 679

Re: I made a thing... Resistance Soldering Unit
« **Reply #1 on:** January 18, 2014, 05:55:45 PM »

HHMMM I dont really like the idea of a computer PSU !!!!

Its supposedly isolated, but I dont know the specs !!!

Wear rubber gloves while using it, DONT stand on the wet floor

DO wear insulating boots.

Perhaps Im paranoid, but my experience with computer PSU,s (I have repaired thousands)
is that they "leak" by that I mean sneaky bits of electricity may get thru and bite you!!

Keep this post going!!! Maybe somebody else will know more than I do (like a newborn duck !!)

I ALWAYS used a 240:240 isolation transformer !!!!

what is a far better idea is to wind a few turns of very heavy guage wire around a big toroid!!!

I dont know how big your "junk box" is but several layers of insulation tape then a few turns of HEAVY wire
probably safer idea.

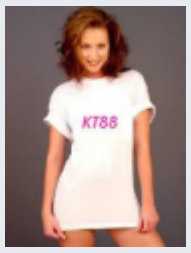
Joe

Logged

bulldozed

Re: I made a thing... Resistance Soldering Unit
« **Reply #2 on:** January 18, 2014, 06:05:36 PM »

Senior Member



Posts: 8321

Melbourne, VIC

Build progress;

Parts collection. PVC pipe cut down to form a handle, holes drilled in specific locations to put the push-button at my right thumb and have the LED visible, with the tip aligned to be off-centre and at the bottom edge of the tube. The tube was, obviously, really easy to work with and feels solid and sturdy. Note also the small alteration to the lump of terminal strip with some of the nylon cut away to give a solid spot on the outside of the brass barrel to solder the electrical connection to. As opposed to using one screw terminal for the electrical connection and one for the tip to be secured, this allows two screws to hold the tip, and the tip can be over-length and threaded back into the handle another inch or so.

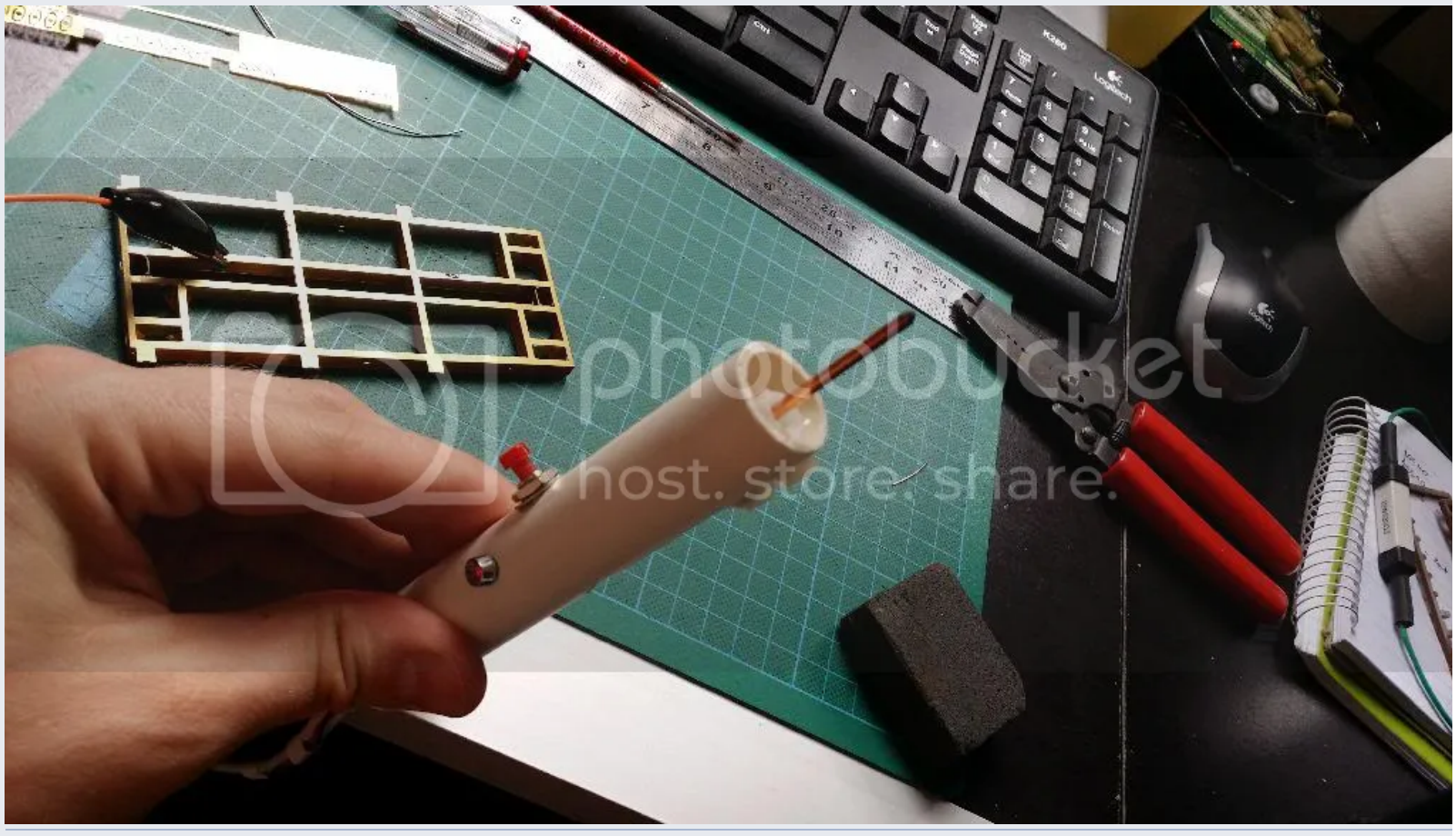
The segment of terminal strip very solidly araldited into position. Not going anywhere.

LED and push-button switch tested for position. The ergonomics aren't too bad. One thing that I didn't consider was that, due to the make/break on the circuit, the LED is typically on and 'blinks off' when the button is pressed - which makes the circuit for the heat to be applied at the end of the tip. Not the end of the world.

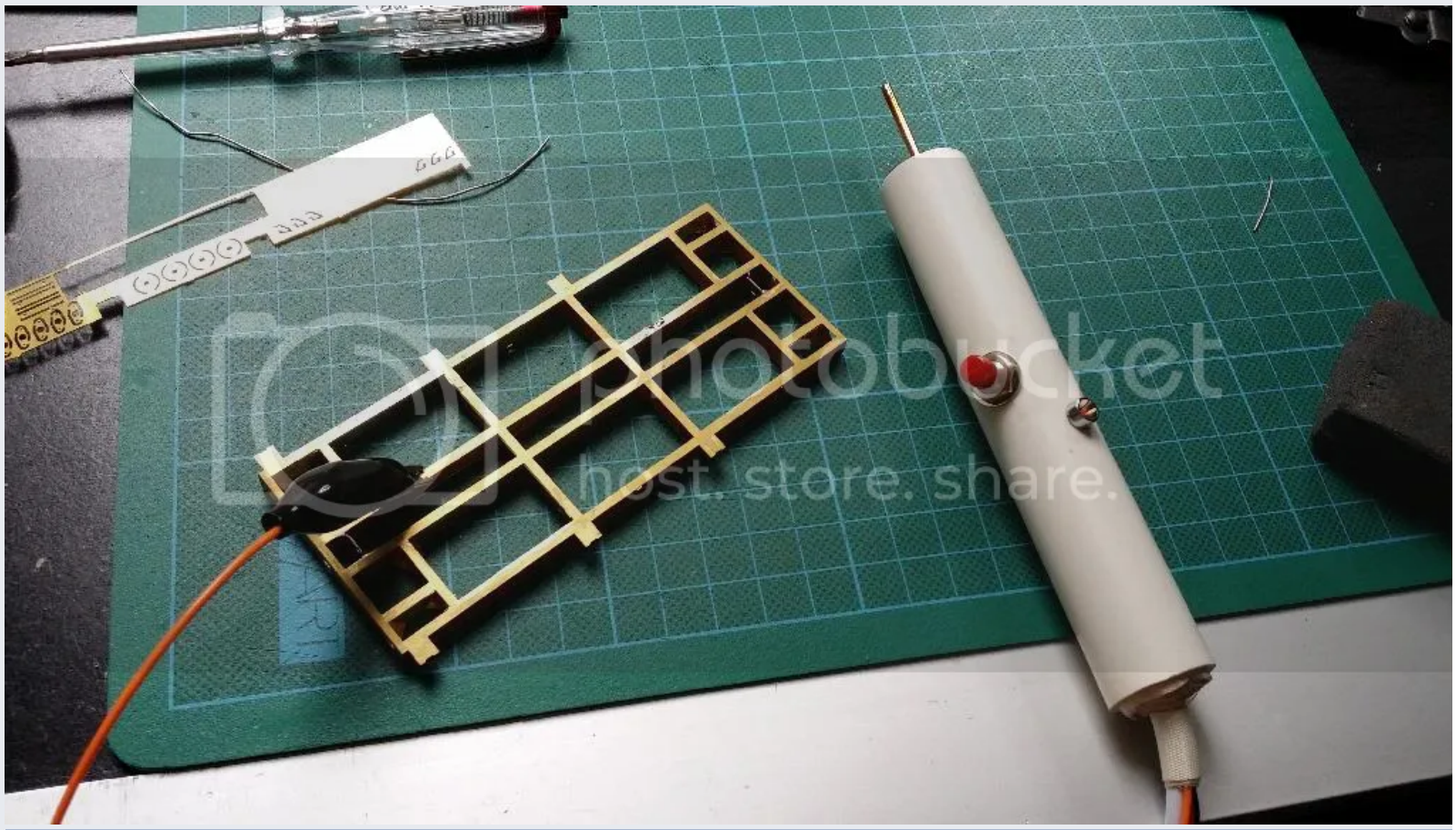
The back end of the handle. I went mad with my fibreglass electrical tape and formed a tight-fitting plug to push into the end of the tube, around the leads. The orange wire goes to the alligator clip for the electrical return path. Red/black is for the auxiliary 12v relay switching, and the white is a 2-core mains flex (found in Jaycar).

Down the barrel, showing the relative position of the terminal block and the push-button switch. The end is left open for ventilation.

Power supply box. Not terribly exciting, but inside is the relay/fuse module and a red LED to remind me it's on (if I can't hear the fan for some reason).



The finished job, with tip in place (sorry for the poor focus!)

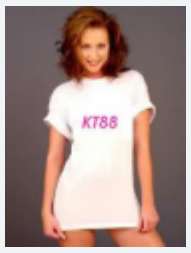


Very satisfied with my day's work

Logged

Terrible Amplification & Sawdust Concern - Custom Valve Amplification, Effects & Hardwood Accessories - made in Melbourne, Australia
FB: terribleamps ## Insta: @terrible_amps ## Reverb.com: terribleamps

bulldozed
Senior Member



Posts: 8321
Melbourne, VIC

Re: I made a thing... Resistance Soldering Unit
« **Reply #3 on:** January 18, 2014, 06:08:59 PM »

I should point out - I will never use this on anything electronics-based due to the electrical induction going on - this is purely a tool for model-making with no live electronics components involved. I have other irons for electronics

Another point - the idea of the RSU is that it's "on" for very short periods of time - much as one would use a spot-welder. The main power lead gets a little bit of radiated warmth if I forcibly hold it on for more than a second (which will rarely happen, as you can start seeing "weld spots" appear on the metal surface!). It's important to consider having sensible gauges of wire at play - indeed, the feed wires inside the PSU are doubled-up to ensure there's a bit more copper for the power to travel down. Not ruling out putting some larger gauge wire inside the box when I've settled on everything.

« *Last Edit: January 18, 2014, 06:12:44 PM by bulldozed* »

Logged

Terrible Amplification & Sawdust Concern - Custom Valve Amplification, Effects & Hardwood Accessories - made in Melbourne, Australia
FB: terribleamps ## Insta: @terrible_amps ## Reverb.com: terribleamps

amp_mangler
Gearhead
Posts: 679

Re: I made a thing... Resistance Soldering Unit
« **Reply #4 on:** January 18, 2014, 06:12:19 PM »

I was thinking more in terms of your life !!!!! BUGGER the CMOS fuzzbox

Joe

Logged

jamtin
AGGH Supporting

Re: I made a thing... Resistance Soldering Unit
« **Reply #5 on:** January 18, 2014, 09:59:36 PM »

Member

Posts: 816

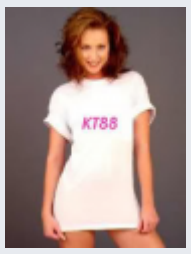
any chance of spot welding light gauge aluminium (1 mm or so) with that bad boy ? I built a (dodgy) sheet metal bender a while ago with the idea of folding up some chassis, but the question is how to hold them together once bent.

Logged

It's Only Rock and Roll But I Like It

bulldozed

Senior Member



Posts: 8321

Melbourne, VIC

Re: I made a thing... Resistance Soldering Unit
« **Reply #6 on:** January 18, 2014, 10:05:05 PM »

I doubt this sucker's got enough juice for that kind of thing - and I'm probably not keen on putting that kind of load on a PC supply! It's been a long time since I've been in front of a spot welder, but I thought they were running somewhere around a hundred amps??

Logged

Terrible Amplification & Sawdust Concern - Custom Valve Amplification, Effects & Hardwood Accessories - made in Melbourne, Australia
FB: terribleamps ## Insta: @terrible_amps ## Reverb.com: terribleamps

Roly

Gearhead.

Posts: 4593

On CRO, Keys, and Guitar

Re: I made a thing... Resistance Soldering Unit
« **Reply #7 on:** January 18, 2014, 11:03:43 PM »

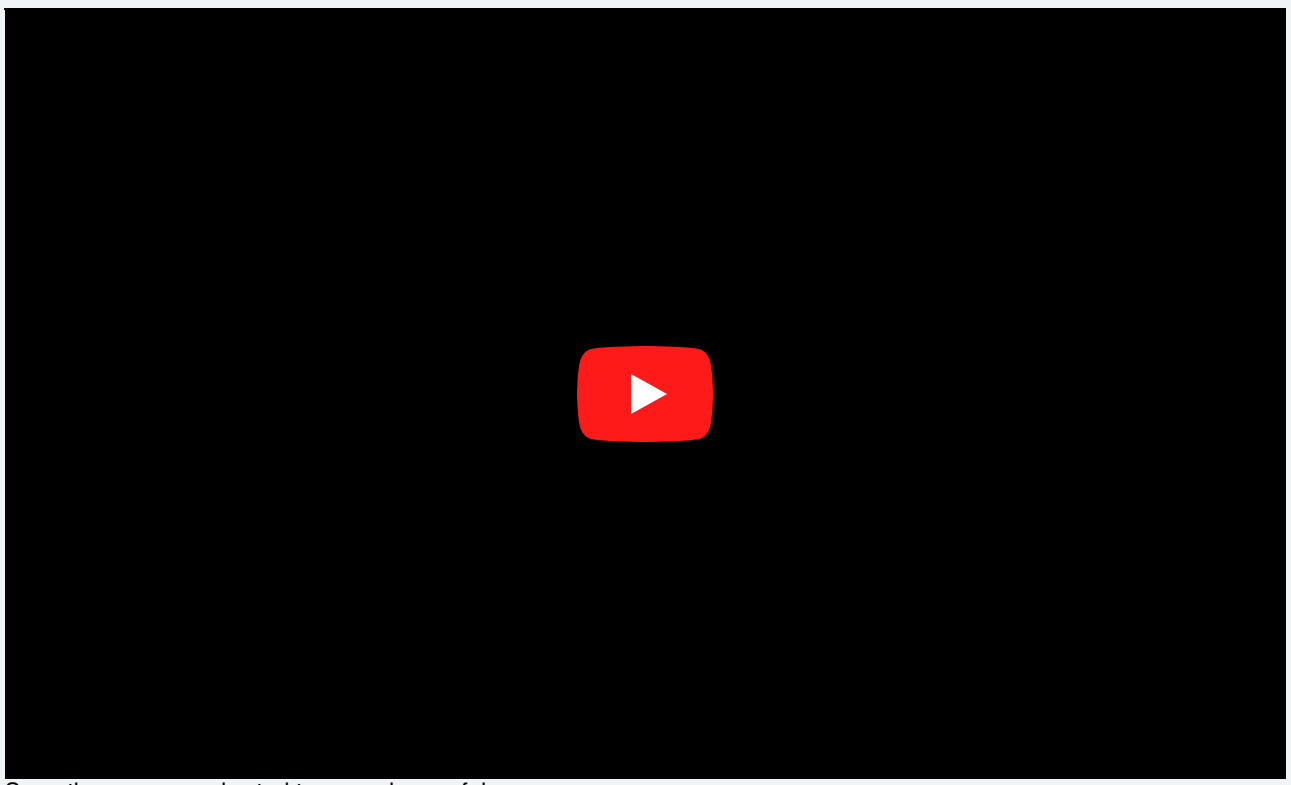
I've just checked a couple of dozen assorted computer PSU's and all have the low voltage common connected to the case and mains earth. Any "tings" from the low voltage side would mean that the mains earth is open.

A mains isolation transformer is a good idea **if** you don't have an Earth Leakage Breaker/Safety Switch installed on your switchboard, however it doesn't seem to be widely understood that **if you have an ELB an isolation transformer defeats its operation.** An isolation transformer is better than nothing, but all things considered an ELB gives better protection than an isolation transformer.

Quote from: bulldozed

> I should point out - I will never use this on anything electronics-based due to the electrical induction going on

Wise, but assuming that this is similar to the old Scope soldering iron with its carbon element (which are still available BTW) then to remove any possible confusion it's simply a matter of voltage drop, not induction as such, because there are also induction heaters.



Sometimes even a shorted turn can be useful.

With the advent of solid state this was a concern with Scope irons 'tho I've never seen or even heard of failures from that cause, and I used a Scope myself on lots of solid state in the early days without problems.

Quote from: jamtin

> any chance of spot welding light gauge aluminium (1 mm or so) ?

I'm also dubious this setup would have enough grunt for chassis spot welding, but a trick that is used to spot weld aluminium is to sandwich the joint between two thin sheets of scrap steel. The reason spot welding aluminium directly is difficult is that it has a much higher thermal conductivity that allows the heat to escape from the joint area. The steel forms a hot spot that concentrates the heat into the intended joint. Again it's a long time since I've done any, but it worked like magic.

Logged

If you say theory and practice don't agree you haven't applied enough theory.

R.I.P. Roly Roper
1949-2016

Kagliostro

Gearhead

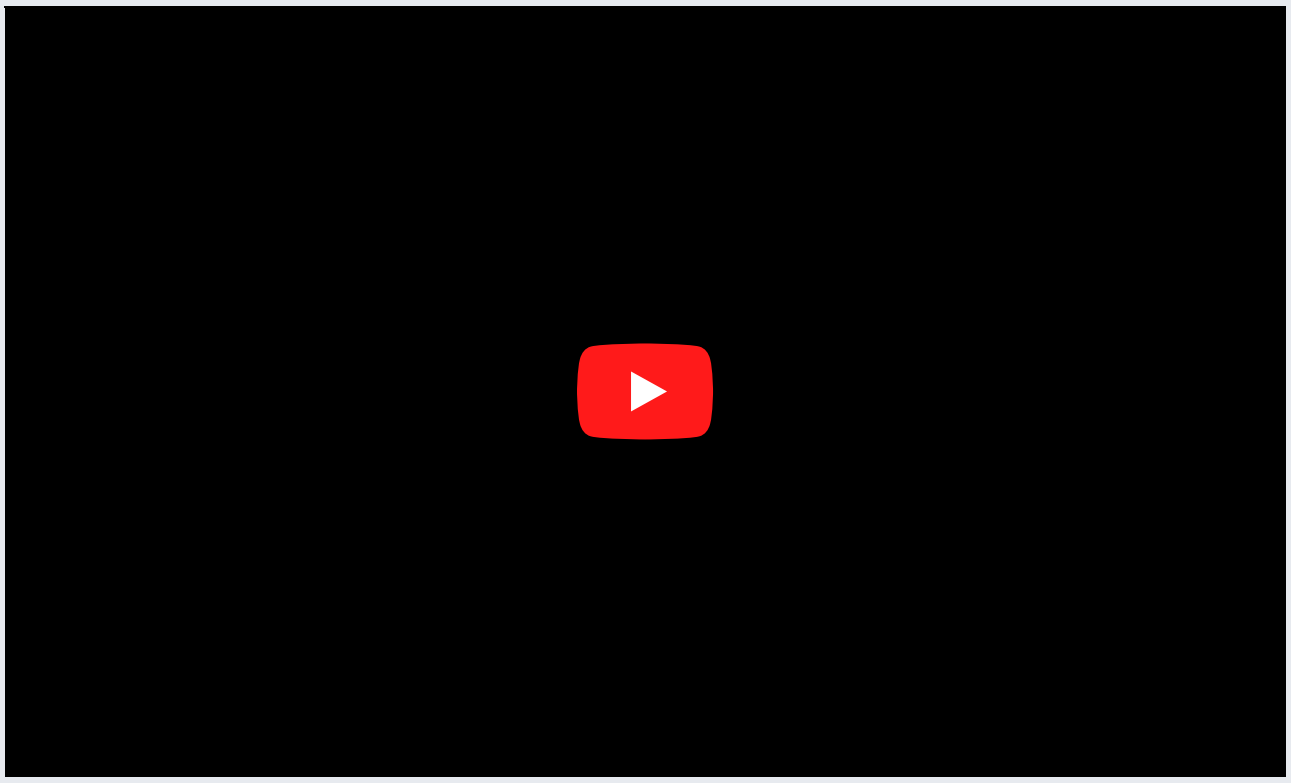
Re: I made a thing... Resistance Soldering Unit
« **Reply #8 on:** January 19, 2014, 03:29:36 AM »

I'm (slowly) building my own Spot Welder

in the web you can find dozen of indication about the reuse of a microwave oven power transformer (pay attention don't connect it to line before the mod, with the original secondary windind you have 2000v AC that is lethal)

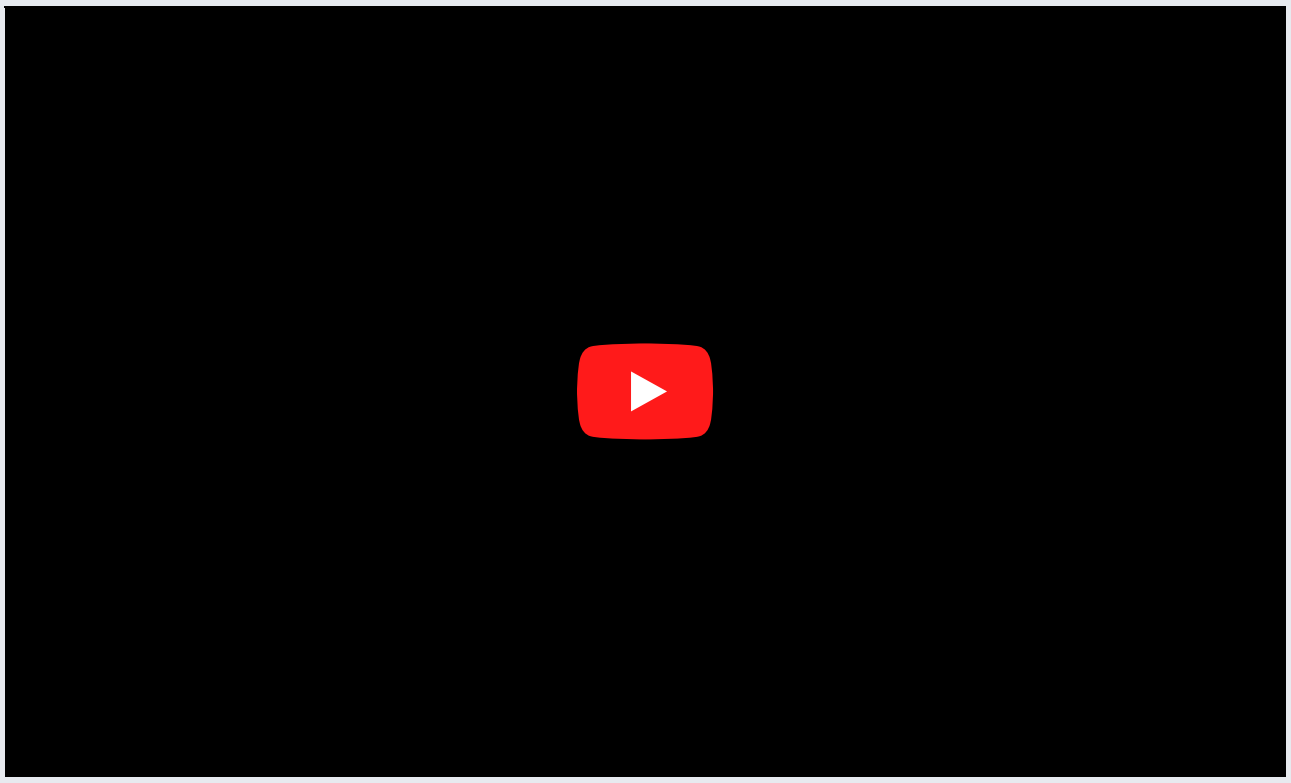
Posts: 1005

I think one of those transformers can do better the job than a PC PS unit



in my case I was lucky because I recovered the transformer of an arc welder 140A 48V (~ 6700W) but it will be difficult to spot weld aluminium also with this big transformer

however the trick to use a pair of iron sheet seems to be functioning well, but this is with a professional spot welder realized for iron, aluminium spot welders has huge current abilities



When the guy say you must use a 220v spot welder not a 110v spot welder you must remember that in the USA the 110v is devoted to standard uses and 220v is devoted to industrial use and big machinery

K

« *Last Edit: January 19, 2014, 03:36:27 AM by Kagliostro* »

Logged

amp_mangler

Gearhead

Posts: 679

Re: I made a thing... Resistance Soldering Unit
« **Reply #9 on:** January 19, 2014, 07:56:31 AM »

Kagliostro has it !!!!!

A spot welder is only a couple of volts!! I have has success by winding 3 or 4 turns of half inch copper water pipe around the primary on a BIG transformer core.
Because its a very short duty cycle, the primary lasts a while :)

Professional spot welders have the arms that hold the "spotting bits" are in fact thick brass pipe that has water running through them to keep them cool.

The small spot welders available from bunnings etc are plenty good enough for chassis work, but you will get a very quick lesson in warping your nice flat chassis.
Its quite an art to make nice chassis. I in fact TIG the corners together !!!
I bought a 200 amp MIG/TIG/MMG Rossi unit (well known Italian brand) for $750 brand new.
THats probably too much for the casual builder, but some years I make 20 amps, or preamps so it was justified.
I was paying $100 per chassis to have them (beautifully) made for m, so it didnt take long to amortise the cost.
I did have to buy a gas regulator for those 5 kilogram gas bottles though, and that was a further $50, and the gas bottles I get of fleabay for $300 for six bottles.

Joe

Logged

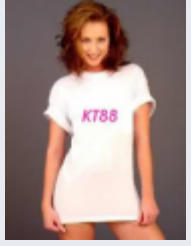
bulldozed

Senior Member

Re: I made a thing... Resistance Soldering Unit
« **Reply #10 on:** January 19, 2014, 08:32:26 AM »

After a bit of chatter on another site about RSU's, I'm looking at Mk #2 already, specifically because of the wire gauge used on this version. My casual noting of 'the wires getting warm' is a noteworthy issue - I'm using 18 and 20AWG wiring, where I should be looking closer to 10-12AWG for the power transmission for safer operation. I'll only have "lost" a few bucks and a half-hour or so in making a new handle and putting in some new wiring, so it's not a concern... at the same time, I can give myself a bit more cable-length.

I've not gotten around to buying a 1:1 isolation transformer yet, this sounds like as good-as-any excuse to get one. A 'Mk #3' edition could see me finally put the old sewing machine I bought a few months back into service, and wind up a specific low-volt high-amperage supply and do away



Posts: 8321

Melbourne, VIC

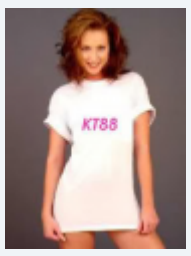
with switchmode...

Logged

Terrible Amplification & Sawdust Concern - Custom Valve Amplification, Effects & Hardwood Accessories - made in Melbourne, Australia
FB: **terribleamps** ## Insta: **@terrible_amps** ## Reverb.com: **terribleamps**

bulldozed

Senior Member



Posts: 8321

Melbourne, VIC

Re: I made a thing... Resistance Soldering Unit
« **Reply #11 on:** January 19, 2014, 01:59:22 PM »

For anyone playing at home - I had a little bit more of a test with the unit today with some scrap brass. One fair "merit" of using a PC power supply is its' own overload protection, which will pop the internal self-resetting thermal fuse if the iron is held on too long. The particular configuration I've got here works very well for the thin brass material I'm working with - and it seems that it won't be overloaded past the internal protection in this kind of application. The leads will warm up a little bit (up to a peak of about 40-50 degrees at a guess- enough that you can tell there's a temperature rise) if a pulse of about 3-4 seconds is applied. There is certainly a thermal loss, but it's all still tolerable and the performance is perfectly adequate at the probe tip.

The internal fuse will pop at about 6-7 seconds held on and heating - not that anyone doing a proper joint would need it on anywhere near that long! You could probably penetrate 3-4mm of brass in that time!! 1-2 seconds is more than enough for the joins I'm working with, most of the tiny bits will be heated for half a second and will use pre-applied flux and minute amounts of a solder paste which allows instantaneous melt/flow. Having to break the tension of your run-of-the-mill flux cored 0.7mm electrical solder takes that tiny bit longer. If it sounds scary - wait until I put up some photos of the intricate finished project I'm working on!!!

I am planning out a refined 'mark 2' unit with a handwound PT and heavier gauge wire for the contact leads. Very satisfied with the learning experience, and this new tool will help a great deal.

Logged

Terrible Amplification & Sawdust Concern - Custom Valve Amplification, Effects & Hardwood Accessories - made in Melbourne, Australia
FB: **terribleamps** ## Insta: **@terrible_amps** ## Reverb.com: **terribleamps**

Roly

Gearhead.

Posts: 4593

On CRO, Keys, and Guitar

Re: I made a thing... Resistance Soldering Unit
« **Reply #12 on:** January 21, 2014, 12:48:13 AM »

Scope carbons. Couplebucks. Two sizes, standard and mini, threaded metal ring.

SI2603 SCOPE #3 SS CARBON ELEMENT

I can imagine two of these brought together in opposition with a bit of pressure might make an effective spot weld at a "tolerable" current.

Logged

If you say theory and practice don't agree you haven't applied enough theory.

R.I.P. Roly Roper
1949-2016

Pages: [1] **Go Up**

PRINT

« previous next »

Aussie Guitar Gear Heads » Site Resources » In The Shed » I made a thing... Resistance Soldering Unit

Jump to: => In The Shed go