

12AU7 Valve Caster

Matsumin's notes, he mentioned that there are lots of schematics and designs for 12v, so he wasn't interested in making another 12v version.

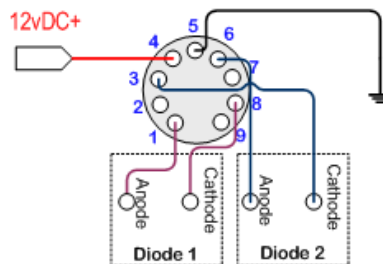
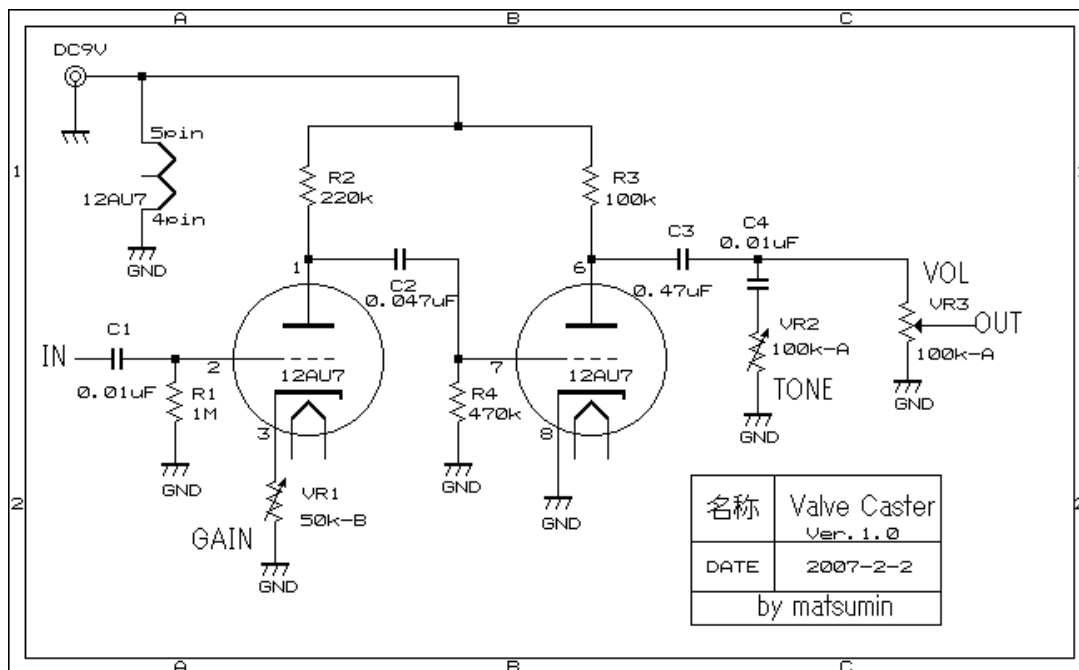
His original goal was to make a simple tube booster that anyone could easily build and if possible, make it 9v, and this was the result. He doesn't know lots of the theory and concepts involved with using vacuum tubes in these type of circuits and that this was an experiment to see if he could just make it work.

He said that on breadboard, he got a more cleaner sound with higher voltages like 12v and 15v and that for people seeking more clean headroom to try higher voltage power supplies.

He got some nice sounds with the 12AT7 tube, but preferred the 12AU7 in this circuit. He tried a 12AX7 but said that it didn't work well at all with this design.

He mentioned that he designed this for single coil pickups and that his humbucker equipped guitars were too boomy.

Pin 9 is left unconnected in this (and many other tube circuits using 12#7) because it is the 'centre tap' for the filament - using the centre tap and pin 4 you can power the heater at 6.3 volts/300ma. Using pin 4 and 5 you can power the heater at 12.6 volts/150ma.

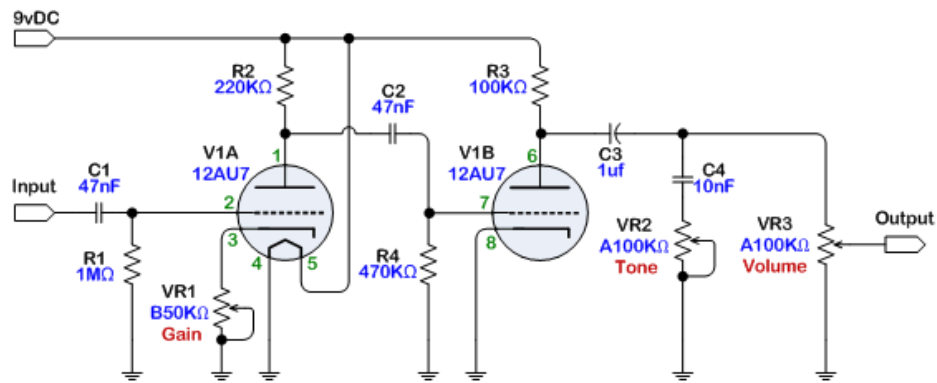


Tube as Diode
Wiring Scheme

<http://www.diystompboxes.com/smfforum/index.php?topic=63479.msg500563#msg500563>

matsumin Valve Caster

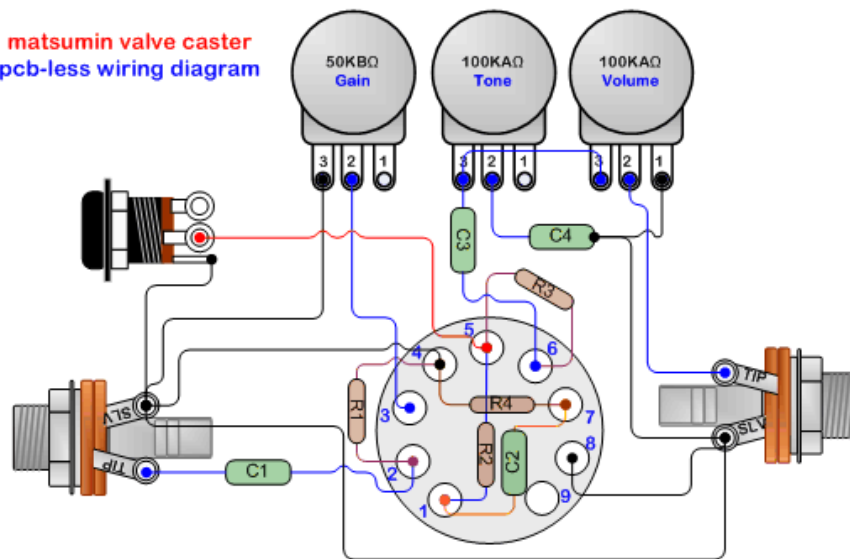
12AU7 tube boost and overdrive, running at 9 volts



drawn by dano/beavisaudio.com

<http://www.diystompboxes.com/smfforum/index.php?topic=63479.msg500470#msg500470>

matsumin valve caster pcb-less wiring diagram



drawn by dano/beavisaudio.com
original schematic from <http://www.matsumin.net>

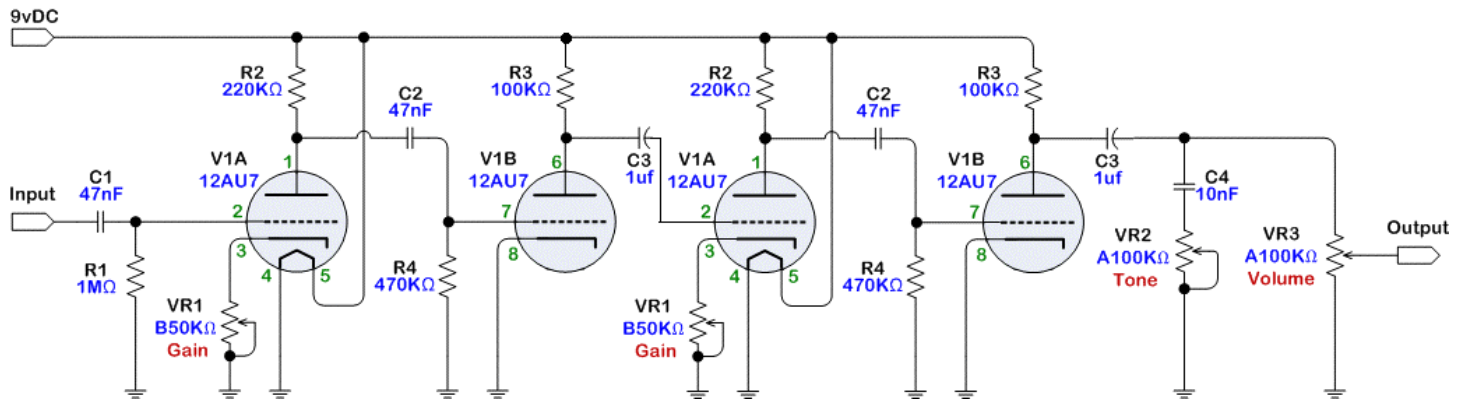
<http://www.diystompboxes.com/smfforum/index.php?topic=63479.msg500824#msg500824>

<http://www.diystompboxes.com/smfforum/index.php?topic=63479.msg517472#msg517472>



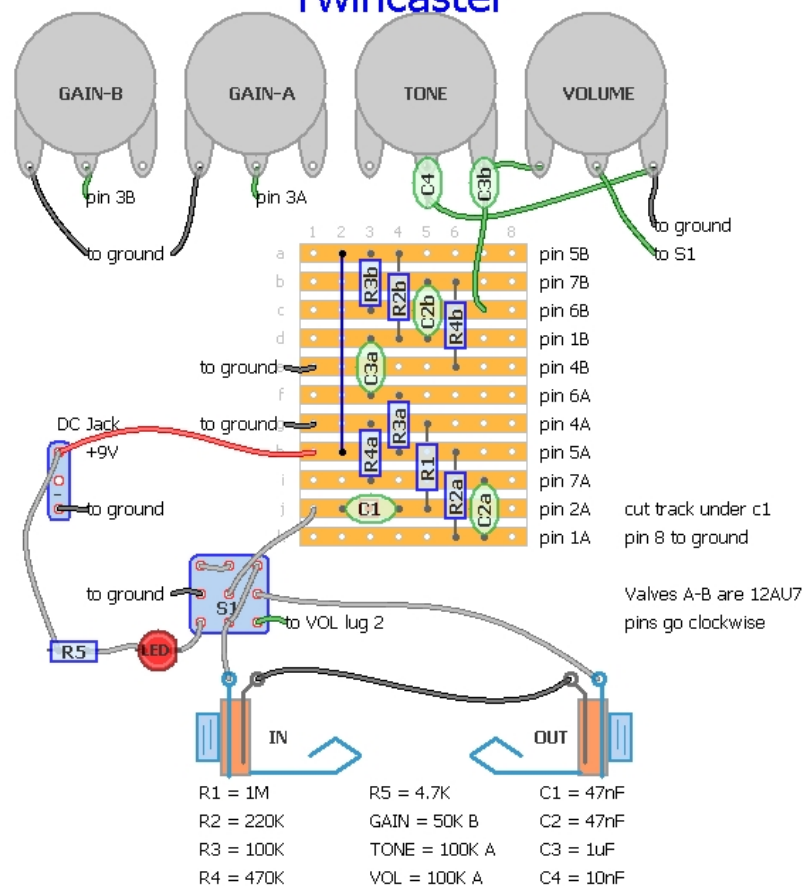
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Dual Valve Caster



<http://www.diystompboxes.com/smfforum/index.php?topic=63479.msg555933#msg555933>

Twincaster



This layout - 2008
 -= Renegadrian =-

Created with freeware DIY Layout Creator by Storm Software
<http://www.storm-software.co.yu/diy/>



<http://www.dystompboxes.com/smfforum/index.php?topic=63479.msg517536#msg517536>

Parts List

Matsumi Valve Pre	C1	47n (47000p)	581-BQ024G0473K 581-5YH473ZOEAM 581-BQ024G0473K
Matsumi Valve Pre	C2	47n (47000p)	581-5YH473ZOEAM
Matsumi Valve Pre	C3	1uF	581-BQ074D0105J 581-BQ014D0103J
Matsumi Valve Pre	C4	10nF	581-5ZH104ZVACJI 71-RN60D-F-1.0M
Matsumi Valve Pre	R1	1M	660-MF1/4CC1004F
Matsumi Valve Pre	R2	220K	71-RN60D-F-221K
Matsumi Valve Pre	R3	100K	In Stock
Matsumi Valve Pre	R4	470K	71-RN60D-F-475K
Matsumi Valve Pre	VR1	50K-B	313-1000F-50K
Matsumi Valve Pre	VR2	100K-A	313-1500F-100K
Matsumi Valve Pre	VR3	100K-A	313-1500F-100K

MODS

-A small value cathode resistor (1k) seems to work for 12AU7s, so a small resistor (470 ohms) and a trimpot of 1k would seem ideal. Large cathode resistance (e.g. 10k) is only likely to give **low gain**, and eliminate much of the "overdrive" effect. Personally, I would also keep any pot between stages 1 and 2 cranked,

<http://www.diystompboxes.com/smfforum/index.php?topic=63479.msg512549#msg512549>

- To anyone who's built this circuit -- stick a SHO boost in front! The result is a much more pleasing breakup than the gain pot provides. It also seems to make the tube boost more humbucker friendly. Cranking both the boost and the gain gives a fat saturated tone that I totally dig. Adding the boost was enough for me to decide that this circuit deserves an enclosure and a spot on my pedalboard.

<http://www.diystompboxes.com/smfforum/index.php?topic=63479.msg512629#msg512629>

I tried my Valvies with a SHO and with an AMZ Mosfet Booster, both before and after, and with my on board Stratoblaster. What they add to the sound is not that great for me, going from "uhm, okay" to "Hell, no!!!"

About the hiss I wrote...I have non regulated wall warts, and that simple mod gave me a deadly silent circuit...just the 3 pin regulator and a electrolytic on the power jack...that's it!!!

<http://www.diystompboxes.com/smfforum/index.php?topic=63479.msg533292#msg533292>

-I am bypassing the Valvecaster gain pot with a 2.2nf cap. This helps maintain some **brightness** when the VC gain is turned down. For the input cap on the Valvecaster I am using a combination of caps to give me 2.7nf. This helps tighten up the bottom end. The tube is a nos 12au7. I have been playing with the cap values in this circuit for a week and it sounds awesome with my Strat now into my blackface Fender amp. Seems like there are endless tones to be had with this pedal. It cleans up well with the guitar volume as well.

<http://www.diystompboxes.com/smfforum/index.php?topic=63479.msg516969#msg516969>

-Bring down that 220k to 100k it will def **lower the gain** a bit. I built mine with both plate R's at 100k.

<http://www.diystompboxes.com/smfforum/index.php?topic=63479.msg517831#msg517831>

-A 1M gain pot allows **massive, saturated gain**. A little mushy in the bass frequencies, but pretty cool. I'm considering putting a "more" switch in, whereby it adds a resistor in series to the regular gain pot.

<http://www.diystompboxes.com/smfforum/index.php?topic=63479.msg517900#msg517900>

-**maximum clean** headroom with his main axe on full volume was, I measured it, and ended up putting in a 12k resistor.

<http://www.diystompboxes.com/smfforum/index.php?topic=63479.msg517910#msg517910>

-Adding resistance to the plate resistors(R1 and R2) will **increase gain**. Adding resisatnce to VR1, in series with the gain pot, will **decrease gain**.

<http://www.diystompboxes.com/smfforum/index.php?topic=63479.msg518201#msg518201>

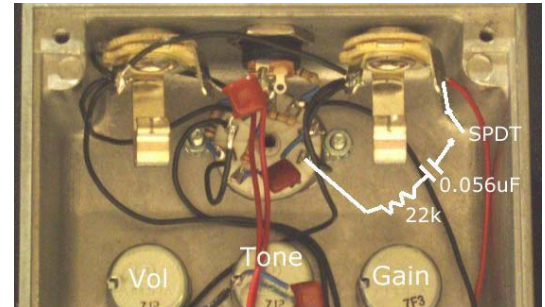
- Change the input cap (C1) to 22nF and its a whole new game. Lots of ACDC-esque tone, lovely response and works well with humbuckers

Next up, same as above but changed R3 from 100K to 240K and moved VR1 from the leg of tube pin 3 to pin 8 and jumpered pin three to ground - Not a masive change but enough to give a noticable comparison. Most obvious thing is the response of the gain control VR1, before, most of the control was in the last 1/4 turn but now its more evenly spread. Overall tone remains useable.
<http://www.diystompboxes.com/smfforum/index.php?topic=63479.msg518438#msg518438>

- A usefull tonal variation can be achieved by implementing a switchable negative feedback. Put a 22k resistor and a spdt switch between the output and the cathode of the second stage (lug 8). You can also make a "bass boost" filter out of it by inserting a 0.056uF cap in series with the resistor. This removes some of the mid range and helps keep things a little bit more together. It sounds nice and clean at low gain settings and it also sounds pretty good with everything maxed. More defined puch in the bottom and not so shrill. I've tried this with larger caps as well but it tends to get a bit too boomy.

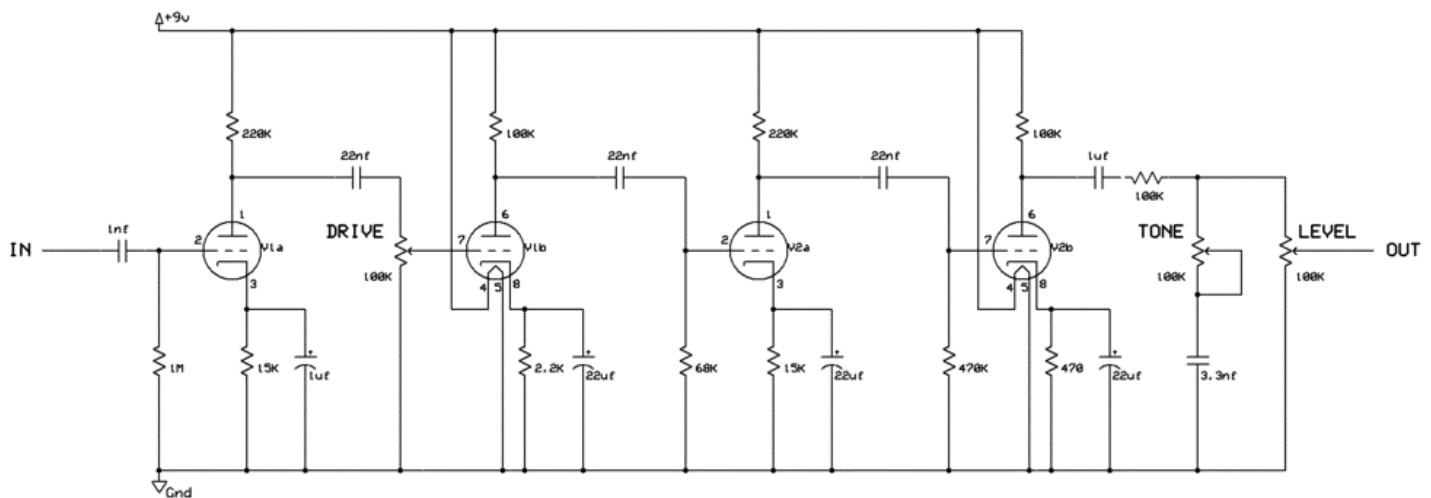
All in all this is a nice little mod which will tame the gain a bit. Nothing dramatic, but it helps if you want to tune the thing for a more clean boost.

<http://www.diystompboxes.com/smfforum/index.php?topic=63479.msg518458#msg518458>



- I tried 10k too but ended up using 22k

<http://www.diystompboxes.com/smfforum/index.php?topic=63479.msg518554#msg518554>



<http://img80.imageshack.us/my.php?image=lv1rev3bmprk9.png>

<http://www.diystompboxes.com/smfforum/index.php?topic=63479.msg523098#msg523098>

-Lower the value of the grid-to-ground resistor. 220k to 470k are good values. 1M is probably too high. Higher values "store" super-low frequency charge on the grid.

<http://www.diystompboxes.com/smfforum/index.php?topic=63479.msg533275#msg533275>

-I tried a big muff tone stack. Not impressed. For me, this circuit needs midrange punch, and gets even more from removing the tone control entirely

<http://www.diystompboxes.com/smfforum/index.php?topic=63479.msg533494#msg533494>

-PUT A TILLMAN PREAMP BEFORE A VALVECASTER!!!

After all, it's just a simple circuit, so you can just try...But I believe it won't disappoint you...

<http://www.diystompboxes.com/smfforum/index.php?topic=63479.msg533847#msg533847>

-Mods i made was, i paralleled the 1M resistor with 690k to get a lower resistance for more gain

i also changed the input cap to .022microfarads to lessen the bass

and then i changed the gain pot back to the 50k B from 1M A

and also i now run it at 12V

results... OH YEAH hahaha

<http://www.diystompboxes.com/smfforum/index.php?topic=63479.msg537905#msg537905>

-All nine pin double triodes "work" in this circuit. 5751's are low to medium gain and like the mentioned 5963 is a very good substitute for something like a 12AU7. I also tried some NOS GE 12AV7's and they are okay, although IMO not as nice and creamy as the 5751

<http://www.diystompboxes.com/smfforum/index.php?topic=63479.msg546234#msg546234>

The nicest clean sound I've found so far, is with the following mods:

R2 = 100k

R3 = 47k

C1 = 0.1uF

Remove C4 and VR2

-This has most likely been covered in this thread (I didn't feel like browsing the 30-some pages to see) but after being fed up with the lackluster sound of my valve caster (I had tried numerous different types of tubes, mods, input cap values, etc...), I decided to wire up two 9 volts and try running mine at 18 volts. Holy crap- it sounds.... thousands of times better. It sounds awesome! Highly recommended.

<http://www.diystompboxes.com/smfforum/index.php?topic=63479.msg563099#msg563099>

HUM and NOISE

- I added a 7812 regulator, and it now works like a charm!

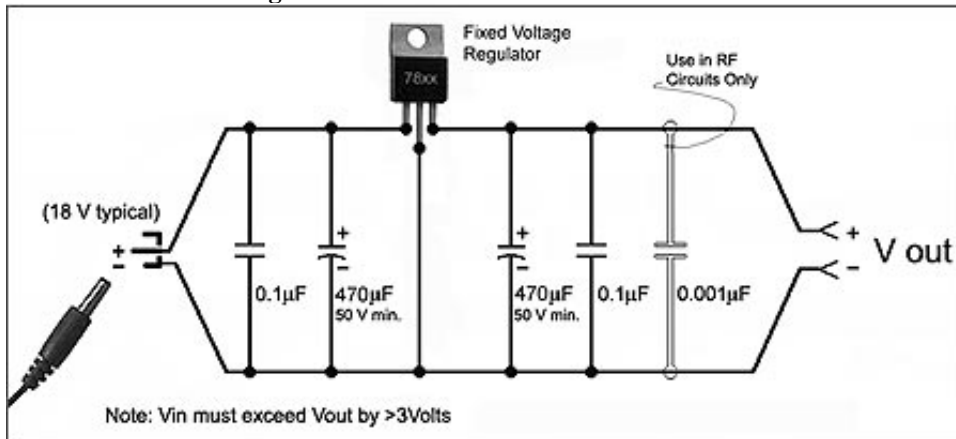
<http://www.diystompboxes.com/smfforum/index.php?topic=63479.msg517938#msg517938>

-7812 for 12V or 7809 for 9V

<http://www.diystompboxes.com/smfforum/index.php?topic=63479.msg533265#msg533265>

-http://www.dxing.info/equipment/wall_warts_bryant.dx . Build it with a LM317 with a heatsink and you adjust your power output via trim pot and its got enough filtration for most applications. (It was literally night and day when I added it) Cheap and simple.

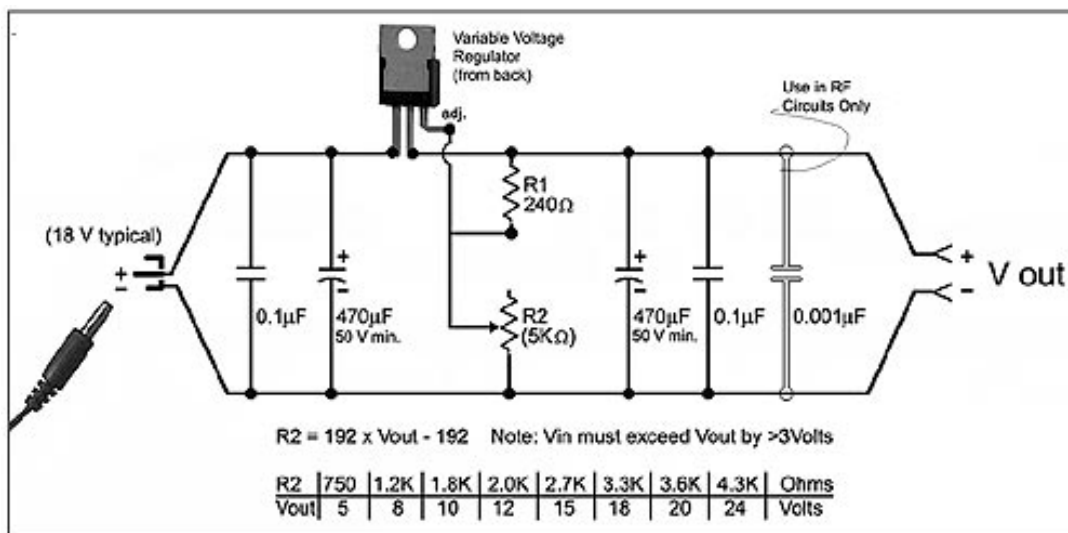
Circuit for Fixed Voltage



Electrolytic ("polarized") capacitor

curved side of symbol is always negative!

Circuit for Adjustable Voltage



-7812 - mounted with the 100uF filter cap on the dc jack - hiss is just a memory...

<http://www.diystompboxes.com/smfforum/index.php?topic=63479.msg528049#msg528049>

-100uF cap across the DC jack (positive leg to positive rail, neg. leg to neg. rail), then, instead of connecting the positive rail directly to the circuit, connect it to the regulator's pin1, ground to pin2, and the circuit to pin3. Then screw it on the enclosure. It is a 7812.

<http://www.diystompboxes.com/smfforum/index.php?topic=63479.msg528262#msg528262>

-Each 12#7 consumes 150ma @ 12 volts. Is it regulated? If not you may want to use a 7812. Also, always a good idea to use a decoupling cap across the power rails. I use 10uf.

<http://www.diystompboxes.com/smfforum/index.php?topic=63479.msg563139#msg563139>

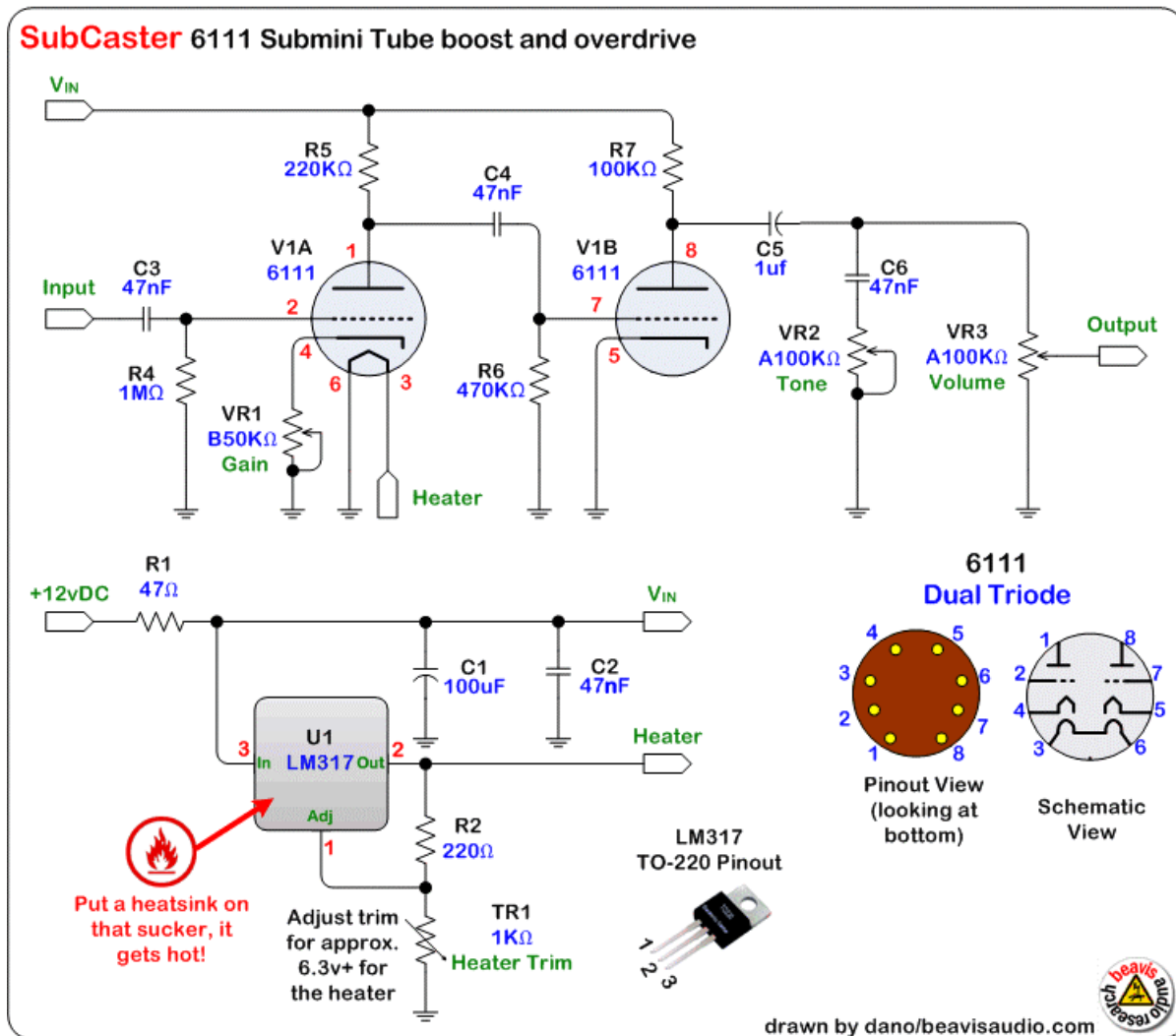
-Its not regulated but I am adding a little regulating board. Add 0.1mF at the start and a 100mF cap after the regulator.

<http://www.diystompboxes.com/smfforum/index.php?topic=63479.msg563161#msg563161>

Other Results:

12AT7 - 12V Sounds very very good. Turn the vol and gain up full and crank out the riff to Smoke on the water!

6111 Sub Caster



<http://www.diystompboxes.com/smfforum/index.php?topic=63479.msg506137#msg506137>

6111's for 7 dollars at tubesandmore.com

In the continuing saga of my 6111 submini tube fetish, I tweaked this some more. After some breadboarding and measuring, it was clear that the 9v source in the previous schematic, as it relates to using the 6111, doesn't work well:

- The heaters call for 6.3vDC. At 9 volts on the previous schematic, they aren't going to last too long
- 9v was simply not providing enough boost. So I bumped the supply up to 12vDC

To get a nice stable 6.3v heater voltage, and to add a little bit more control, I put together a power supply based on the LM317 adjustable voltage regulator. In combination with a 1Kohm pot/trimmer, I can tweak the heaters to as close to 6.3v as I want. I also added R1/C1/C2 to add a bit of noise reduction to the power supply. Note that the LM317 is going to get really hot, so slap a heat sink on it. You can get the 317 at Radio Shack, it's that common. Adjust TR1 to get 6.3v at the 'heater' connection.

<http://www.diystompboxes.com/smfforum/index.php?topic=63479.msg506137#msg506137>

The tubes' heaters allow 300ma to pass when there is 6.3V across them, and they are resistive. That means, as you properly compute, that the resistance of a heater is $6.3V/0.3A = 21 \text{ ohms}$. If you have 12Vdc and want to drive 300ma into you heaters, you can do that easily enough without using a voltage divider by putting a resistor in series with the heater. The resistor is $R = V/I = (12-6.3)/0.3 = 5.7/0.3 = 19 \text{ ohms}$. It would dissipate $5.7*0.3 = 1.7W$ and you'd need to use a 3W resistor to keep it from runnig at about 200C surface temp.

<http://www.diystompboxes.com/smfforum/index.php?topic=70212.msg564244#msg564244>

<edit: also found a potentially great way to mount those flying lead wires: use an 8-pin DIP socket as seen here:



<http://www.diystompboxes.com/smfforum/index.php?topic=63479.msg504946#msg504946>

Summary: Running a 6111 submini tube heater at 6.3 volts from a 12 volt DC supply.

Put a *19 ohms 3 watt* resistor in series with the heater.

So - no need for the LM317/220 ohm resistor/1K trimpot.

EDIT: I tried it - it works. I had two 10 ohm 3 watt resistors in my parts bin which I scavenged from an old T.V. set. With 5% tolerance, they add up to 19 ohm in series. They get HOT! But then so does the tube, or an LM317 for that matter! They actually get too hot to touch for more than a few seconds - much hotter than the tube.

<http://www.diystompboxes.com/smfforum/index.php?topic=70212.msg564287#msg564287>

Comments:

OK, I had a chance to try out a few more tubes in this circuit. I tried 12AV7, 12AY7, 12AD7, 12BZ7, and 6072. None of which sounded any good. 6111 sub mini's are still my fave. Need to get some 12U7's to try.

Jered

<http://www.diystompboxes.com/smfforum/index.php?topic=63479.msg511769#msg511769>

Subcaster working! All I did was remove C2, the 47nf cap across the supply rails and replace it with a different kinda 47nf cap. Weird. Hmmm, been bugging me for weeks!

So - I fired my Valvecaster into my Subcaster - WOW!!

It seems to me that the hassle of creating a 6.3 volt supply for the 6111 heater is a pain in the butt compared to powering a 12au7 heater at 12 volts. There really is no saving on space when you consider the extra circuitry required for the voltage regulator - and a heatsink on the LM317 too! There is a whole lot of heat generated by a 6111 in comparison to a 12au7. add that to the heat the LM317 gives out and you can warm the living room up nicely with a Subcaster!

My rule of thumb now will be to only use 6111's in pairs and run the heaters in series of 12 volts.

So - go ahead and build a Valvecaster. Or a dual Subcaster. Or a Pepper Shredder using two 6111's, like I'm doing next.

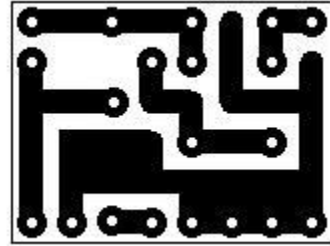
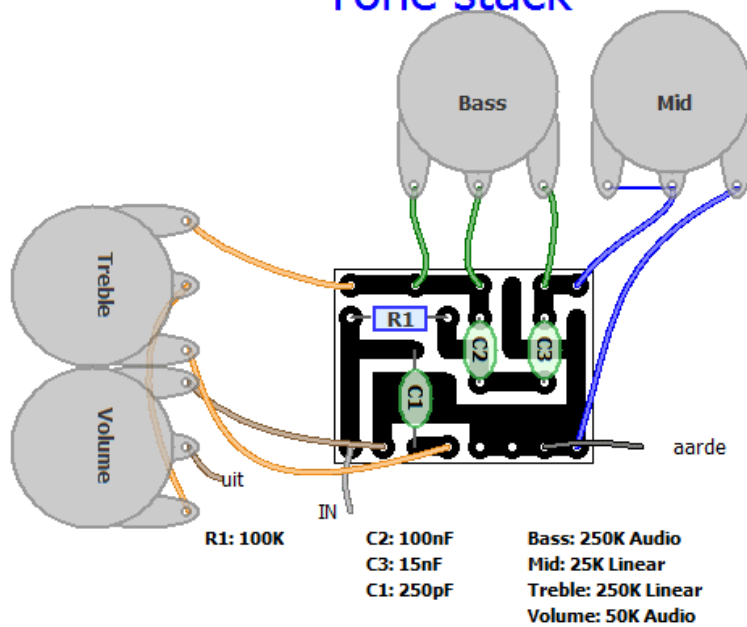
(sh*t, I would do it this weekend but I have to write some music for Volvo!)

Just don't build a single 6111 Subcaster!

<http://www.diystompboxes.com/smfforum/index.php?topic=63479.msg538221#msg538221>

-Fender-like tone stack.

Tone stack



Created with freeware DIY Layout Creator by Storm Software
<http://www.storm-software.co.yu/diy/>



<http://www.diystompboxes.com/smfforum/index.php?topic=63479.msg544289#msg544289>

One thing I'd like to add - I contacted Jimmy H re: the tone stack PCB. It wasn't making sense to me how it was laid out vs his Pepper Shredder PCB on page (25 ? 26?) which has -right on the PCB TS-A (tone stack in) and TS-B (tone stack out).

Here's his reply:

I see what you mean

And you should discard the volume pot in the layout of the tonestack (because there is already a volume pot on the shredder)

So Connect A with in

B with middle tap of the treble pot

Aarde with Ground from the pepper shredder.

I also have used this layout for an amplifier of mine, that's why the volume pot is on the layout of the tonestack.

<http://www.diystompboxes.com/smfforum/index.php?topic=63479.msg564318#msg564318>

6111 Data Sheet

Medium-Mu Twin Triode

Base & Bulb (GE - 1973)

Application

Subminiature type used as a general purpose amplifier in subminiature equipment. Requires either a subminiature socket or direct soldering of the wires from the tube to circuit components.

Mechanical Data

Outline	3-1
EIA Base	8DG
Electrical Data	

Heater voltage	6.3 V
Heater Current	0.3 A
Direct Interelectrode Capacitances (approx)	

Each Section	
Input	2.1 pf
Output	1.3 pf
Grid to Plate	1.4 pf
Maximum Ratings (Design Center values)	

Each Section	
Plate Voltage	165 v
Plate Dissipation	1.0 w
Characteristics and Typical Operation	

Class A Amplifier	
Plate Voltage	100 v
Grid No. 1 Voltage Derived from	
Cathode Bias Resistor	220 Ω
Amplification Factor	20
Plate Resistance (approx)	4000 Ω
Transconductance	5000 μS
Plate Current	8.5 mA

