

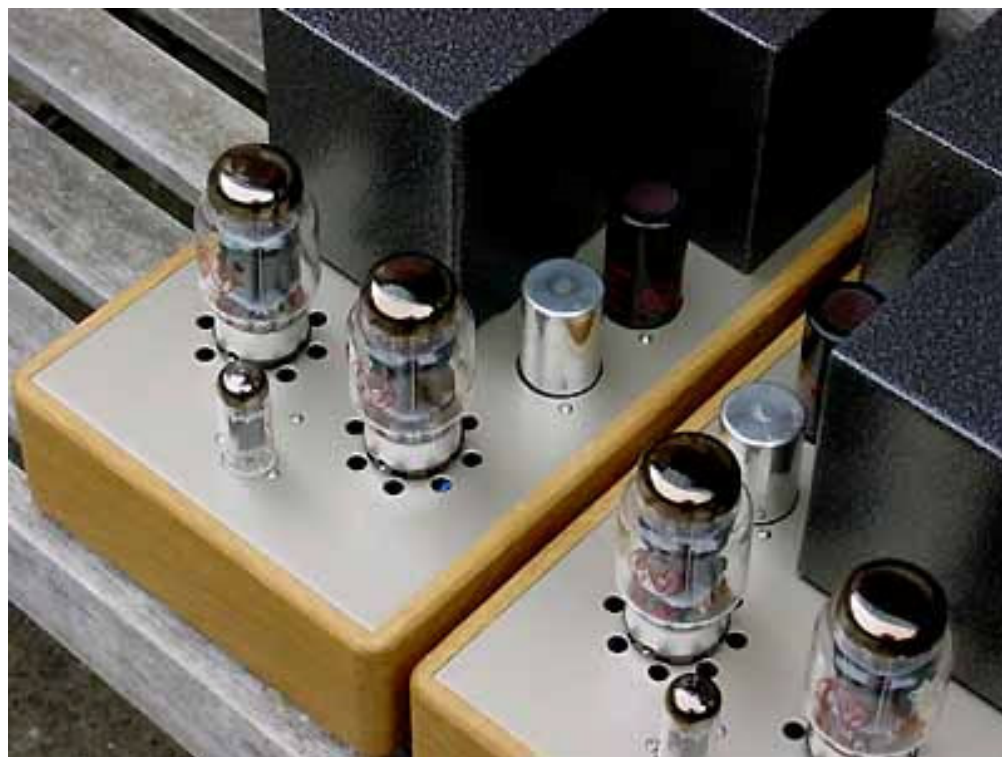
# Triode Dick's Page

## MonoBill

...or rather monoblocks?...

part 1

update: 8-2-2006



### MonoBill?...

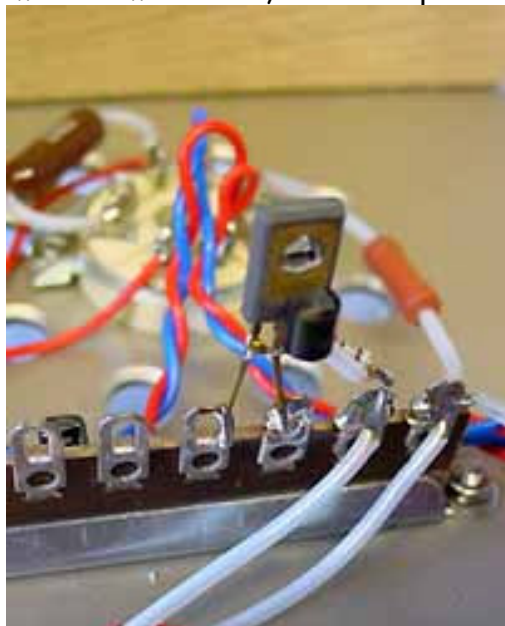
Who or what is 'MonoBill'? I can be short on that... MonoBill is the mono block version of 'Bill', not all that different, but without the first amplifying stage and sliced in two pieces. But even after that, there is a slight difference.

To begin with: every channel has it's own power transformer now and I also wanted to limit the input sensitivity. MonoBill is in comparison to Bill a real power amplifier. Over-sensitivity of the power amps input, is sometimes really annoying if there's a pre-amp that have to be used also. Unless you like to have full output power on your speakers, having the volume pot on the eight o'clock position.

## A 'new' Phase Shifter...

MonoBill's control stage/phase shifter is somewhat different as the one I used in the Bill amplifier. The three triodes placed there are making up a trinity in the control stage/phase shifter, where the direct coupled first tube, is also responsible for the setup of the phase shifting stage. That classic so called Schmitt or Longtail Phase shifter sounds excellent and does it's job in a stable and trustful manner, also in the long run.. Bad tongues are claiming now and than, that it's an old fashion and out-used phase shifter, but don't listen to that kind of twaddle of mostly armchair audiophiles. (a lot of drivel coming from their chair, but never ever made some effort themselves) Let the music speak for itself and you know enough. It is of course an old but proven concept. You find these Schmitt phase shifters in many present commercial amplifiers... even in the very expensive ones. And when they are well made, there is nothing wrong with that.... In contrary I should say.

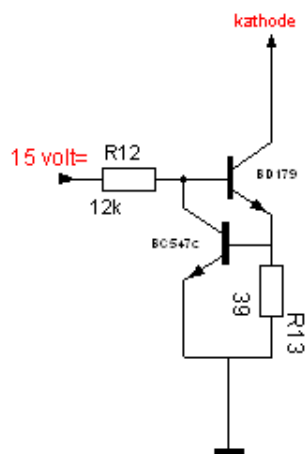
Within MonoBill the input guide is fired and the phase shifting stage has to it's job by itself. That could be accomplished in two ways in a pure practical way: The classic way (you can see it in amps where the designer is not trusting the direct coupled stages and separated them) using a couple capacitor. Or using a current-source, made with a few transistors. I have to admit: for the last method mentioned, I have to pull an internal switch... ☺ Deserving or



undeserving? I leave that in the middle.

Fact is that Dalojan convinced me that its is a fine way to perform this task. Jan is from my generation, but is fully solid-state raised and educated. Meanwhile he has seen the light of glowing filaments... better late than never shall we say. He went on building with tubes in a very active way and with fine results. The only backlash he suffers from time to time, is spreading solid state components in his designs in an easy manner.

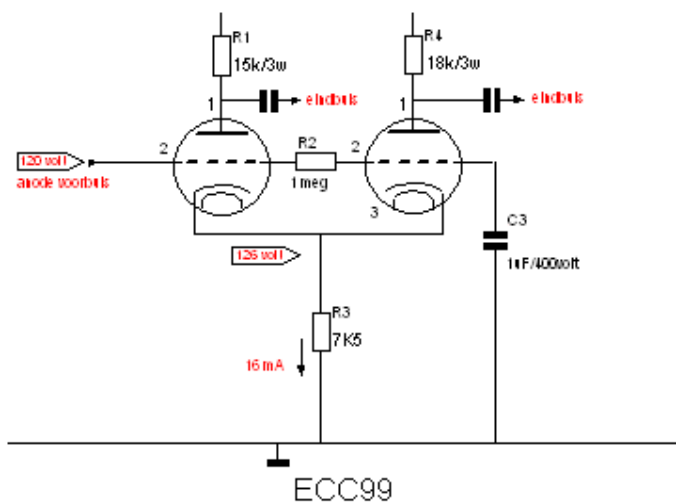
But the man is also a technician with many good ideas what makes him a fine audiobuddy. And why trying to invent the wheel again? Jan's



current-source is not hard to make. Even hardwiring, as I did myself, is a piece of cake and it works excellent.

## Just some explanation to do...

We started out with the classic 'Schmitt' Phase shifter, also known as 'Long tail Phase shifter'. Other kinds of Phase shifters you can find on Bills amplifier pages.



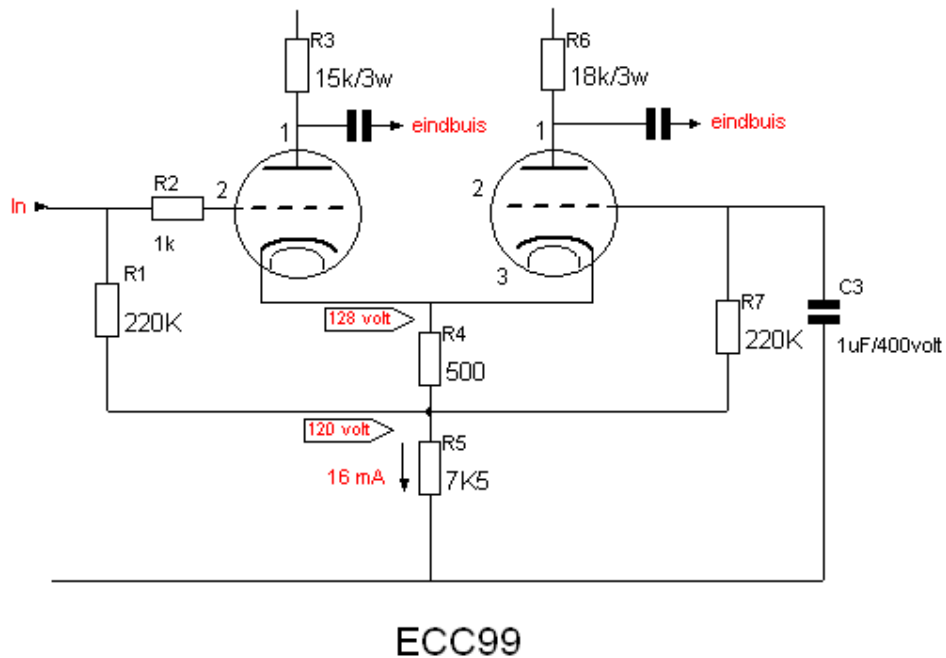
This is in draft the Schmitt Phase Shifter I've used in my Bill amplifier, The Phase Shifter (the parts that is drawn here) will be set by a direct coupling to the anode of the first tube (not visible here). As you can see, the controlled screen of the ECC99 is set here on a DC of 120 Volts.

But... we want to get rid of the first amplifying tube. MonoBill is evidently just a power amplifier. The additional gain from the first stage is only bothering us and the less electronics, the better... so 'cut' and the tube is gone.

Although, the tube has to receive its settings from somewhere... and it won't happens by it self.

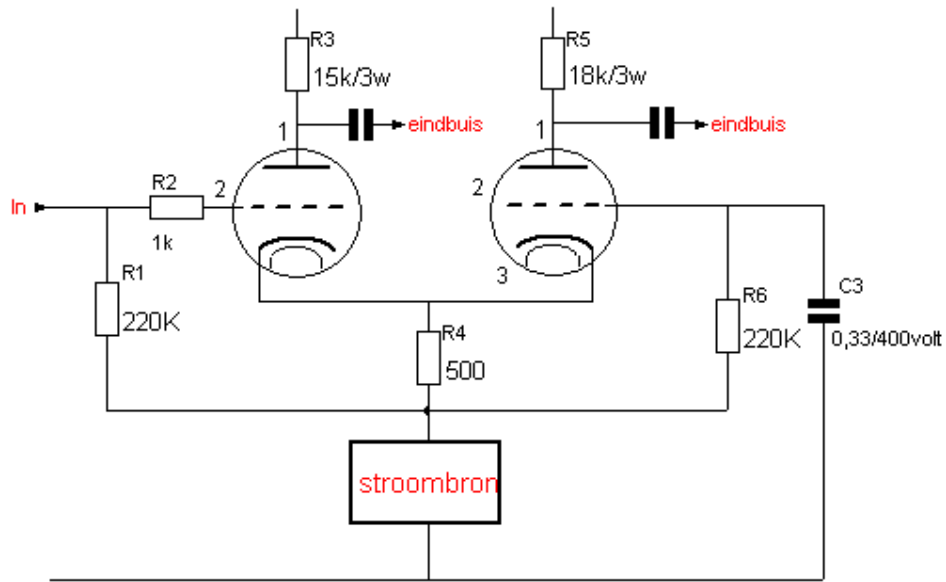
You can split the shared cathode resistor which will give you a voltage drop of a few volts over the top resistor, which will be used to create a negative screen voltage in respect to the cathodes of the ECC99 that's used here. No news here... also a classic circuit. Sounds also fine and is, as point of departure, used in the same manner for MonoBill. The first thing I wanted to know was if the

addition of solid state components on this spot didn't give a negative result on the final sound quality.



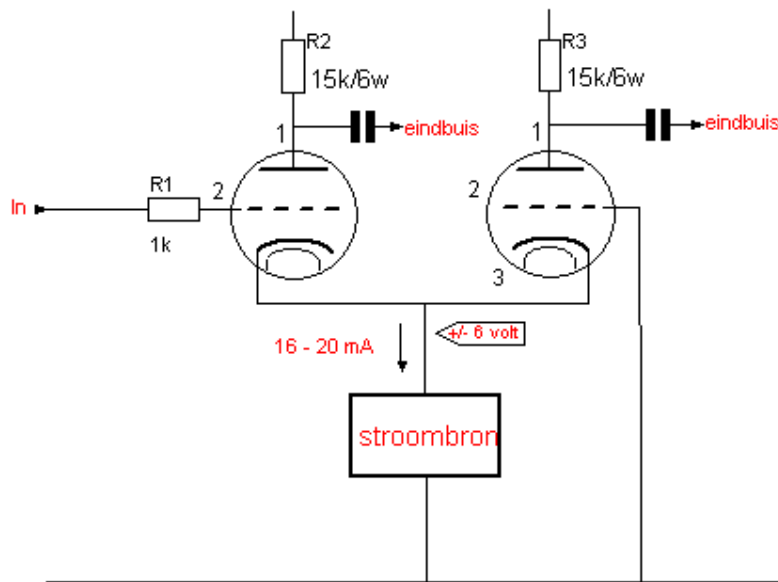
If we want to get rid of the large cathode resistor with its accompanying high voltage drop and heat dissipation, something has to fill the gap and that something is a current source. By nature it has a high internal resistance, much higher than the 7K5 in the shown circuit, and also provides us with a very low voltage drop. An additional advantage is the virtual everlasting high  $R_i$  of the current source (a multiple in comparison with the existing resistor) which results in a more ideal controlling of the 2nd tube half. Compensation of the output voltage by the using somewhat different anode resistors, isn't necessary anymore. Both tube halves will get an almost equal amplification.

And by all this, we arrive in the following situation....



ECC99

But now, there is something totally wrong here..... We have to lose more components (!) for a normal working operation. When all the unnecessary parts are erased, this simple circuit is what's left.



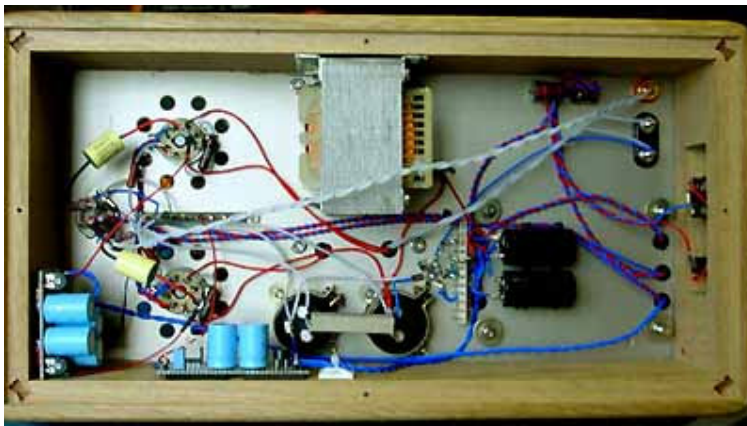
ECC99

The current flowing thru the tube has become a fixed value. Now, you have to determine the value of the anode resistor in a way, that the half of the anode

voltage is dropped here. No more automated settling on average as we were used to in a 'normal' circuit.. No, the current is and stays fixed. One advantage is the possibility to use Ohm's Law to calculate the correct resistor values. What? No.. don't tell me you don't know how to use Ohms Law.... You have to do some study first.

Okay, the Controller Stage/ Phase Shifter is ready, now the rest of the amplifier...

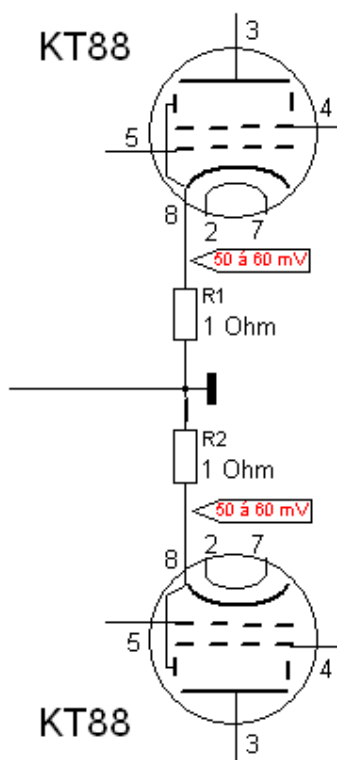
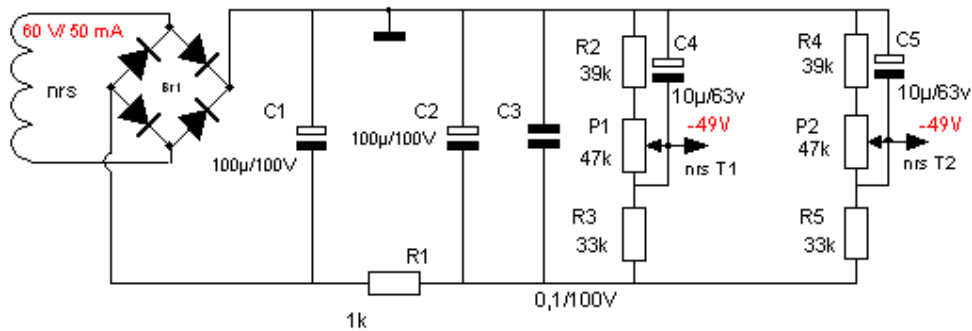
### Is there more to come after the Phase Shifter...



The first stage is working well and we proceed with the end stage. The lovely thing about mono blocks is, that it all looks so simple. No stuffed chassis, but a clean, nice and tidy inside. The PSU choke, by far the

largest component in the chassis, has become a place below deck. The matrix circuit boards are used for setting the current (Bias) of the power tubes and for supplying the current source. In the next amplifier I want to build, I have to find a better solution for that. A nice circuit board on which I want to put both supplies. That will make a trustworthy copy of this Amp even more secure as it is now.

Now, the only thing we have to do, is supplying two power tubes with a negative voltages (Fixed Bias) what will give the circuitry a lot of oversight.



You can measure the current that is flowing thru the power tubes by using a small resistor with a 1 Ohm value in the cathodes of the KT88's. A reading of 60 mV on your meter will comply with 60 mA thru the tube. Indeed, there is Ohm's Law again...

It is a very good idea to make your pots available from the outside chassis and make some measurement busses on top of the chassis. I found with Conrad some nice busses especially made for 2 mm probes.

I didn't apply them in the Amp in the pictures, but I certainly will do that in a MonoBill I'm working on right now. A remarkable positive thing is b.t.w. the current being nice and stable, even after many hundreds of hours playing music. When you switch on the Amplifier for the first time, you have to set the negative screen voltage to its Max. (negative that is) in other words put: as low as possible. Check this by measuring on the grid connectors of the power tubes. Is the voltage at

its maximum negative, then your amplifier can't blow-up a tube, after switching on the high voltage. The next thing to do is set the tubes to 60 mA and leave it for what it is. Check again after 10 minutes. No nervous adjusting the pots in the meanwhile. When they run an hour, you can make the definite setting. When you check up after a week or two, you will see (in most of the times) that no adjusting is necessary. The pots are connected in a way that if the runner (the arrow of the pot) is giving up, the current will be automatic set on a lower setting. When you are stuck with some KT88 tubes in your amplifier which need more negative voltage than the supply provides, lower the values of resistors R3 and R5. (in de picture above, not in the overall circuitry picture)

## The Power Supply...

The Power Supply is not much different from that used in the Bill amplifier, except for a few details. You can find a MKP in oil capacitor in the schematics for decoupling the pre stage. It is pure selected on sound. JJ capacitor have a beautiful silk like character. They have nothing of the harsh sounding of normal Electrolytes. If you compare them with, also well appreciated Electrolyts of BC Components, the old Philips caps, the last ones have a somewhat screaming sound character. If that by accident is needed in the amplifier concept, it doesn't matter, but I've gone to appreciate the JJ's more and more. But sometimes you get more than you want and that happened in this case. The Amplifier sounded to gallant and could use somewhat more bite. By coincidence I had a rather good experience with the MKP in Oil caps that are sold by Conrad and manufactured by the Italian Icar. I have used then also in the Cleo-V and Attila amplifiers. Changing the decoupling caps for the Icar caps, brought me what I wanted. The nice thing is that the size of the Icar is exactly the same as the JJ double C. We are not talking about a difference of day and night, but about a subtle tweak.



If you are using a loudspeaker with a high presence, you maybe find the JJ a better choice. Tweaking is a part of the Audio hobby and building yourself makes it very accessible. Everybody is free to try a Blackgate WKZ. Who knows.... As you can see, the bolt is sawed off (be careful) en the lettering is polished off.

Further on I've used the good old 500uF cap from JJ again. I find it a top class thing. The era that the somewhat larger capacitances were slow and large as bricks, is a long time ago, thanks to the switching PSU's of computer systems.. These 'larger than normal' guy lets you hear that for sure. It gives the amplifier meat, blood and muscle. If you want power, the PSU must be able to supply enough current, or do you expect to hear the canons in the 'Overture solenelle 1812' from Tchaikovski coming out of your speakers by it self? The current the speaker needs on the moment of ignition, have to come out of the PSU of your amplifier. If it's collapsing, the canon shots will sound like pistol



shots. In the early days I was averse of using Electrolytes, maybe for a good reason in that days, but they have become significant better over the years, especially on bandwidth. I always used the lower value capacitances, most often MKP's. Good stuff, no bad sentence about them, but the Amps didn't have the drive on my speakers as they have today. When I browse thru my older designs, I see that I use much higher PSU capacitance as in the old days.