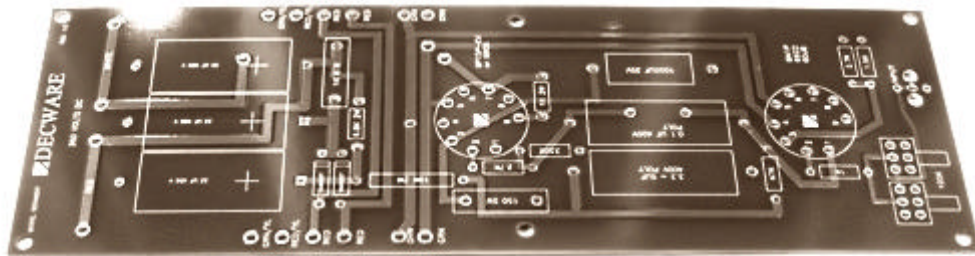


# THE ZEN TRIODE EXPIREMENTERS AMPLIFIER KIT

MODEL SE84CDIYMONO

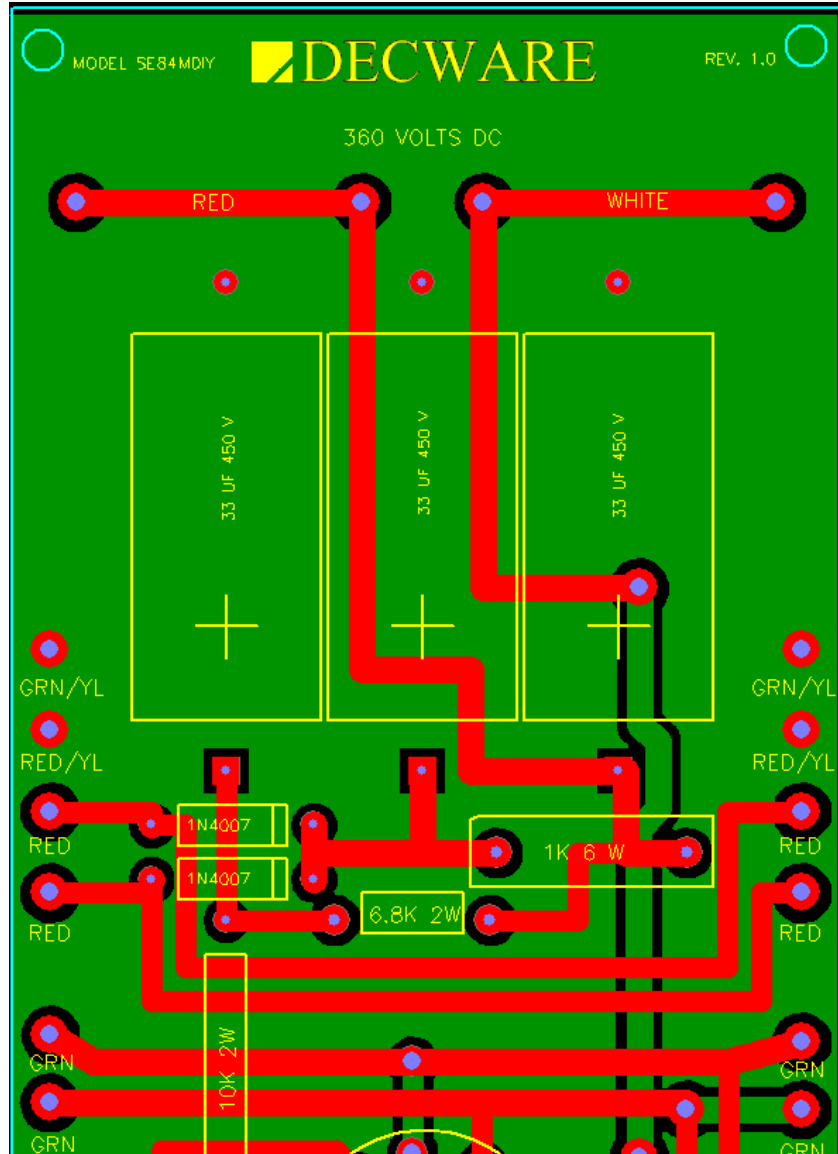


ASSEMBLY INSTRUCTIONS  
2008

The circuit board has been designed to be used in 2 ways;

- A) Mounted on stand-offs to a piece of wood and
- B) Mounted on stand-offs inside a metal chassis.

The picture below lets you see the traces on both sides of the board at the same time.



The silk screen is printed on the bottom side of the board. The tube sockets mount to the top side of the board only. Parts can be placed on either side of the board depending on how the board is mounted:

- A) Mounted inside a steel chassis parts (not tube sockets or volume control) are mounted on the bottom side with the silk screened parts layout.
- B) Mounted on a piece of wood, the parts including tube sockets and volume control are mounted on the top side where there is no silk screened parts layout.

Some other features of the board include :

- A) A horizontal AC bus that runs from the left to the right side of the board so that up to 3 boards can be installed on one power transformer.
- B) A dual layout for the volume (gain) control so that the volume pot can be mounted on either side of the board.
- C) A provision on the top (rear) of the board for optionally mounting the output transformer.

When built on a piece of wood, it is imperative that both the circuit ground and the ground plane be tied together with a short jumper wire. In addition, an earth ground must be connected between the amplifier's ground plane and the ground lug of your power cord. Without an earth ground you will likely get high frequency oscillations.

### **Precautions:**

If you build this amp on a piece of wood make sure you strain relief the power cord by connecting it to the wood in some fashion. Do not rely on the transformer itself to hold the weight and constant tugging of a power cord.

The output transformers as part of their design have very fragile lead terminations. This means bending the wire excessively, or putting anything other than tiny amounts of pulling forces on it will result in the lead wire pulling completely out of the transformer at which point you will not be too pleased. To reduce or prevent this from happening it is a good idea to place several drops of super glue at the spot where each lead enters the transformers before you build your amp.

**HIGH VOLTAGE**— Should be obvious, but high voltage can kill. Never power up your amplifier without a fuse and never use anything larger than the recommended value. In this case the value is 3 amps for 120 volt operation and 1.6 amps for 240 volt operation. Also remember that capacitors store electricity. When you power up the amp the large electrolytic caps will have 470 volts DC on them until the tube heaters warm up the output tubes enough to draw current. This usually takes about 20 seconds or so. With the amplifier warmed up and the output tubes drawing current the voltage will drop to around 400 volts. Turning the amplifier off at this point will create a situation where the output tubes still conduct for several seconds after the power is shut off allowing them to drain the capacitors. This is a good thing. On the flip side if you power the amp on and then right back off the caps will be fully charged and stay that way possibly for weeks.

The proper way to discharge caps is to use a resistor around 100 ohms and connect it between the cap positive and ground. This allows the voltage to drain quickly without damage to the capacitor. Shorting the cap to ground should never be done.

**CHASSIS**— If you build this amplifier on a piece of wood, DO NOT operate this amplifier in a residence where children or pets or other people can come in contact with the exposed high voltages! If you plan to ignore this warning please get an aluminum chassis from Hammond and punch the 3 tube socket holes on the top of the chassis followed by all the stand-off holes on the circuit board. That way you can safely mount the circuit board inside the chassis with only the tubes sticking out. If you choose a chassis with a 2 inch thickness you will have the option of mounting the output transformers inside the chassis.

## **The AC buss:**

The horizontal AC buss that the power transformer hooks up is rather unique in the tube amp world. It offers similar stereo separation to that of mono blocks between two or three boards hooked to the same power transformer. Each channel therefore has its own rectification and power supply filter so if you were to set this up with one power transformer and two boards (channels) you would exceed the performance of the original Zen Triode Amp that has one power supply filter and rectification to serve two channels.

When doing 3 channels you have the option of using one or two power transformers. It is important if you add a second power transformer to the buss that the red and green secondary windings be IN PHASE, meaning you will have to carefully test the transformers and mark the windings so you know what the phase is before installing them on the boards. Same holds true for using two power transformers on the same bus regardless of the channels. A 4, 5 or 6 channel buss will require two power transformers. Only the 5 channel configuration would actually necessitate using two power transformers on the same bus. A 4 or 6 channel set up could actually split the buss so that 1/2 the channels are on one transformer and 1/2 the channels are on the other.

## **Getting started:**

Start by using the circuit board as a template to mark the wood or chassis for mounting.

Install the parts in the circuit board and solder them using a low residue solder such as Kester # 245 or similar. If you can't find a low residue solder then clean the board with alcohol when your finished soldering in the parts.

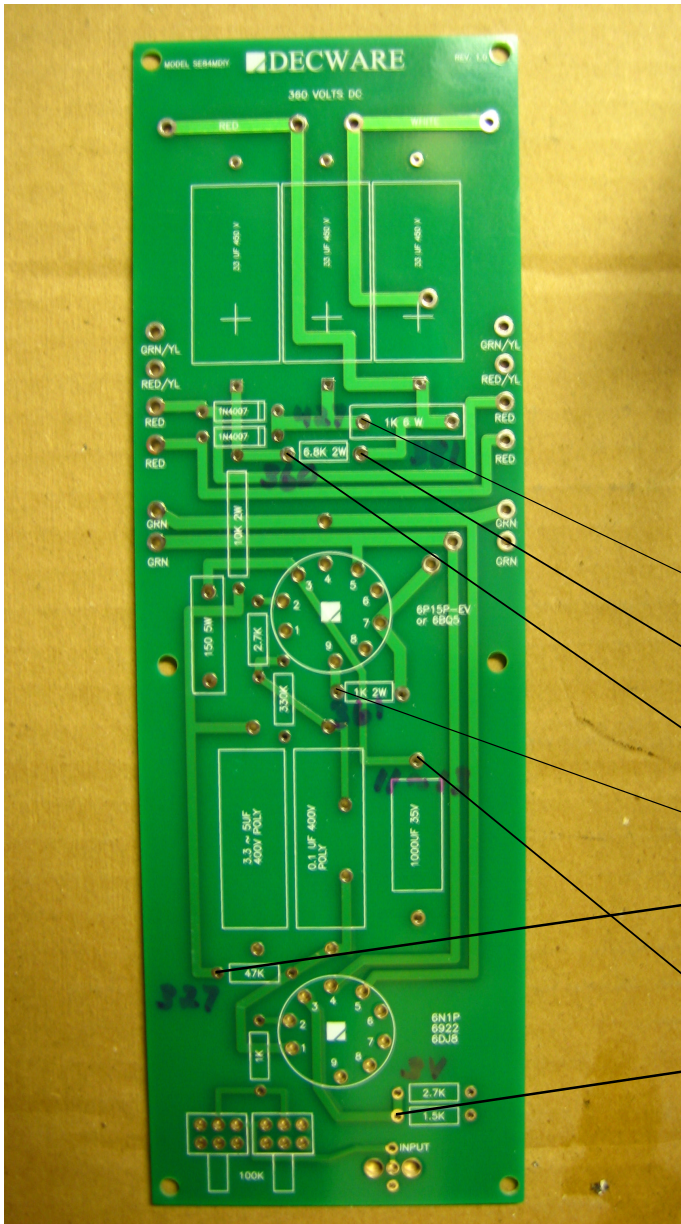
You are responsible wire and hardware, such as screws etc. We have supplied stand-offs that work with 4-40 machine screws or anything similar in diameter. The length of the screw you use will depend on how to plan to fasten it to the board. If the wood is hardwood, such as maple, you can drill and tap the wood itself. If the wood is soft you can install brass inserts into the wood that are threaded for 4-40 machine screws. You can also simply drill all the way through the wood and use a long enough screw to receive a nut under the wood.

The power transformer in order to be mounted to a piece of wood needs to be raised enough to allow for the wires to exist between it and the wood. We have supplied 4 rubber feet that can be used to solve this problem. Stick them to the 4 corners of the transformer core and then set it on the wood and screw it down. The rubber feet can provide some isolation and damping from vibration the result being better clarity in sound from less vibration reaching the tubes.

## **Pre-flight check:**

Before hooking the amplifier up to a pair of speakers, and before hooking up the inputs, turn the amp on, volume all the way down. Let it warm up. Check the following DC voltages outlined on the following page. If everything looks reasonably close, then hook up a pair of speakers and check for noise and or hum. It should be quiet enough that you have to place your ear in front of the speaker to hear anything. Hook up a line level source and raise the volume. If it sounds clear your done. Give it a month or so to completely break in. The first 40 hours will be glimpses of glory mixed with questionable sound. This is normal. By the end of the first 40 hours it will stabilize and then just grow better sounding over time as it seasons.

Test points as seen from bottom side of board:



The following voltage are taken with the amplifier on and warmed up. One power transformer, two boards. When using one power transformer and one board your voltages may increase a couple percent.

**ALL VOLTAGES +/- 10%**

- TEST POINT A 427 Volts
- TEST POINT B 381 Volts
- TEST POINT C 360 Volts
- TEST POINT D 361 Volts
- TEST POINT E 327 Volts
- TEST POINT G 11~13Volts
- TEST POINT H 3 Volts

Tip:

If your building your amp on a piece of wood, you'll be putting most of the parts on the top side which has no silk-screening.

You might want to put a white dot on the top side of the board at each of the test points to help you find them after assembly.

#### CIRCUIT OPTIONS:

This board has the two original resistors found in the Zen Triode Amplifier circuit for the input tube bias. One is a 2.7K and one is a 1.5K. They are in parallel. This is the more aggressive bias configuration with the most gain, and the best slam. Leaving out the 2.7K will drop the gain slightly, have a more laid back and refined sound. If your speakers are bass heavy leave the 2.7K out. If your speakers are a bit dry or lean, use both resistors. If you use a preamp with gain, the better sound will probably be with the 2.7K left out.

#### PRECAUTIONS:

Never unplug an input cable with the volume all the way up. Doing so could cause an oscillation that causes the circuit board to arc in rare cases, not to mention the loud hum or squeal you'll get is best avoided. This is true with most amplifiers btw.

#### AMPLIFIER OVERVIEW:

It is a 2 watt x 1 SET amplifier made up from top grade USA made parts with proprietary transformers that you build yourself. It can be expanded to 2 watts x 2 or 2 watts x 3 on a single power transformer by adding additional boards. It is based around the 6P15P-EV aka SV83 output tubes which are one of the most linear tubes in the world. It was chosen over 300B, 2A3, 45's and so-on because of it's incredible speed and sonics.

This amplifier has only 1 capacitor and 2 resistors in the main signal path. Unlike other SET amps this one loves low impedances and increases in power all the way down to 2 ohms with outstanding dynamics. Wonderfully overbuilt design, Transparency and believable 3D imaging with near perfect timbre and unparalleled detail are just some of the areas larger more expensive amplifiers fall short on by comparison.

#### IDEAL SPEAKERS:

We have successfully driven hundreds of different loudspeakers ranging in efficiency from 90 to 100dB 1w/1m. On 90dB speakers it works nicely in smaller rooms or for late night out of body experiences. 94 to 96 dB speakers are almost ideal in that they let you play beyond a normal listening level and preserving the dynamic headroom. When these amplifiers were first released in 1997 there were a minimal number of "high efficiency" speakers to choose from. Today that is no longer the case - they are everywhere. We also offer several different types of loudspeakers that will work with this amp. If you own speakers that you love and are afraid this may not drive them understand two things: A) It will drive them louder than you're expecting and B) you can bridge these amps into mono blocks. Because of the power increase into lower ohms, you will net 6dB of additional power. Same thing as doubling your power... twice.

#### TUBES:

This amp is designed for premium quality N.O.S. 6P15P-EV output tubes rated at 5000 hours. These Russian military spec tubes are the top grade of what we came to know in this country as the SV83. You can also use EL84's without adjustments of any kind. You'll find the SV83's to be unparalleled in speed and detail - in part because it is a video tube with much wider bandwidth than a normal audio tube. We think these are the best sounding most transparent tubes available today. The EL84 (6BQ5) is a bit warmer sounding giving the amp a different signature by just switching output tubes. The input tube is a single 6N1P, 6922 or 6DJ8 - your choice. 6N1P's have the warmest tone, 6922's have the best dynamics, 6DJ8's have the most air and micro-detail with a touch less bass. Again, a powerful tool for voicing your amplifier to your particular tastes.

## **Specifications:**

Weight 10 lbs. ea.

Dimensions 8.5" H x 7.250" W x 14.0" D

Circuit type Single ended Class A Triode

Power output 2.3 watts RMS into 4 ohms

NOTE: Power increases as ohms decrease

Stable into 1 ohm speaker loads

Input voltage 2.0 volts for full output

Noise / Hum 1.5 millivolts / -79dB

Response 20 Hz ~ 20 kHz

Feedback ZERO negative feedback used

Output tubes SV83 or EL84/6BQ5

Signal tube 6N1P or 6922 or 6Dj8

Transformers All transformers are custom made for this amplifier by Decware

Biasing Self-Biasing circuit - never needs adjustment

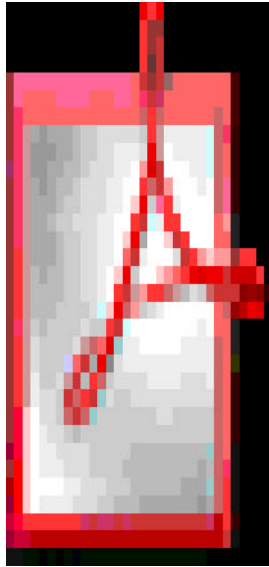
Resistors All resistors are precision WW/MF by DALE, VISHAY

Signal Cap Poly 1.0 uf 400v

Consumption 65 watts at full power with 1 power transformer driving two boards

Output jacks 5-way binding posts accept 14 gauge wire

Suggested Speakers dB/1w 89 dB minimum / 96 dB is ideal



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