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JANUARY 2015

MOD 102 Guitar Tube Amplifier Kit

The MOD 102 Guitar Amp Kit was designed for anyone interested in building a tube guitar amplifier head.

Ready-to-Build Tube Sound

This tube guitar amplifier kit is a fun and rewarding build experience that provides a great introduction to warm tube sound at an affordable price. The MOD 102 is sold by MOD Kits in the US. A non-US version that uses a different power transformer is available worldwide. This article details our experience as we assembled and tested this nice 5-W practice tube amplifier.

Reviewed By
Elektor.LABS
(The Netherlands)

MOD Kits is a US brand owned by Amplified Parts, in Tempe, AZ. The company provides novice and experienced musicians with the opportunity to build their own amplifiers and effects pedals. All MOD kits come with easy-to-follow instructions and use point-to-point wiring. A predrilled enclosure and all the necessary parts are included in the kit. All we needed were hand tools, a soldering iron, and solder.

The MOD 102 Guitar Tube Amp Kit costs $215 (the power transformer version is $250) and is a project for experienced builders. (The kit has a Level 5 Build Difficulty rating according to the MOD Kits website.) However, anyone with experience in audio electronics will find the project simple—even relaxing.

Amplified Parts also provides solutions for those musicians who are not electronic technicians but want to create their own sound or tone by modifying an existing amplifier or guitar and for musicians who just want to fix their own amplifiers or guitars.

The Circuit

This tube guitar amplifier circuit is based on a classic American circuit design combined with a British-style Class-A output section. As MOD Kits describes, "at low volume it produces a clean chimney tone that moves into smooth overdrive at higher volumes."

All the parts are included along with a predrilled steel chassis, wire, and tubes (one EL84 tube and one 12AX7 tube), generating at least 5 W. The chassis layout is open for easy assembly using clear, simple instructions.

Clearly, the MOD 102 Guitar Amp Kit was designed for anyone who is interested in building a tube guitar amplifier head. It is meant for practice amp volume, providing standard 8-Ω output impedance for connecting a speaker.

For those wanting a tube amplifier kit they can build for use on stage or for high-volume rehearsing with a band, MOD Kits also offers the MOD 101 Amp Kit. The MOD 101 Amp Kit is a Class-AB design with 60-W output power into 4, 8, 16, and 20 Ω. The kit uses one 12AX7 tube on the preamp stage and one 12AT7 phase inverter, together with one matched pair of 6L6GCs and one matched pair of EL34s (JJ Electronic brand).

Hands On

The first thing to note with regard to the build experience was the way things arrived—nicely

packaged and protected. Full documentation and detailed instructions were supplied. All the documents are also available for download from modkitsdiy.com.

For the inexperienced, the MOD 102 kit offers a great tutorial on things like soldering and wiring. It even lists the tools required for the assembly—most of which are commonly found on any electronics workbench.

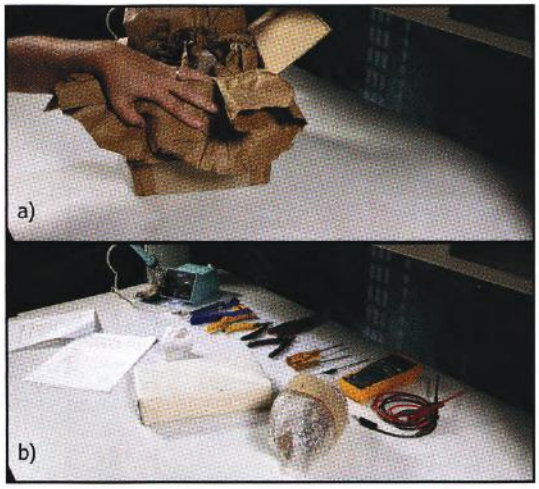
The instructions also listed all the parts supplied with the kit, a visual guide list to identify the parts, and even some safety tips. The tips included advice such as: "Only work on the amplifier when you are wide awake and sober," and "Be aware that tubes become very hot when the amplifier is on and can take up to 10 minutes to cool down after power is turned off."

The step-by-step assembly process was clearly explained. If the supplied wiring diagrams and instructions are methodically followed, there should not be any surprises. The result will be a nice product, as we have had the opportunity to confirm. We built the amplifier and documented the assembly process in a time-lapse video, which we have made available on YouTube and the *audioXpress* website (visit the Supplementary Material section on www.audioxpress.com).

Obviously, our "builder" was an experienced electronics technician and our experience assembling the kit was an absolute delight. But, we were really interested in the performance of the finished product. The experience itself did not provide us with any "unusual" details to report, apart from confirming that everything is well explained and that building this kit is an experience we would recommend.

When we approached MOD Kits with the idea of reviewing the 102 Tube Amp Kit, one of the challenges was that we intended to do it in partnership with Elektor.Labs in the Netherlands. After we received a reply saying that the MOD kits were designed for the US (120 V/60 Hz) mains, MOD Kits offered us the non-US version. The MOD102-F (the F is for Foreign) that included a Hammond 369EX world power transformer instead of the 269EX used in the US version. That kit does not include a power cord due to variations in electrical outlets around the world, which is not a big deal. We simply used the supplied diagrams to determine the 369EX primary wires needed for the European (230 V/50 Hz) mains and used a standard IEC/CE power cord.

The only problem to note was the time it took before the packaged arrived, as well as dealing with customs in the Netherlands. Apparently, shipping



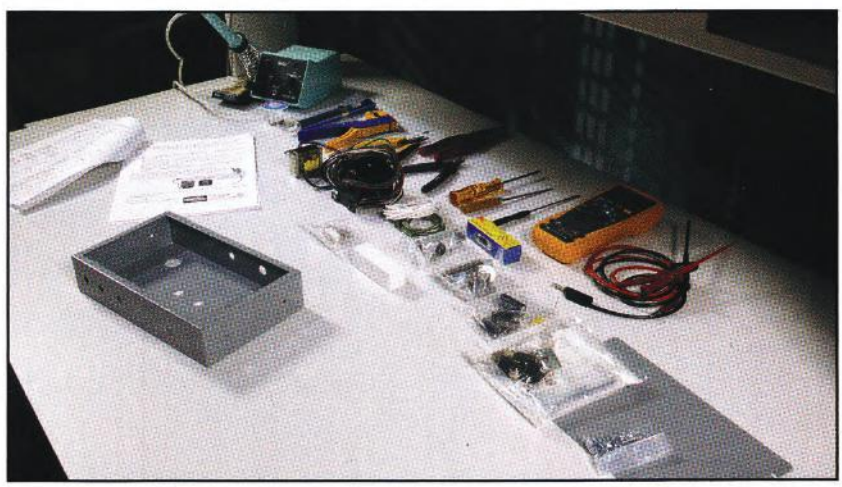
We recommend you view the unboxing (a) and step-by-step assembly video we provided. All the basic contents in the package (b) arrived in good condition.

electronic components these days attracts the curiosity of customs and border security. After all, tubes are no longer familiar items. Because they took a closer look at the package, they charged us 20 Euros. So, our advice for non-US readers who want to order the MOD 102 kit is that they request a detailed description of the package contents in advance for faster clearance through customs and be prepared to pay duties, depending on your local country's laws.

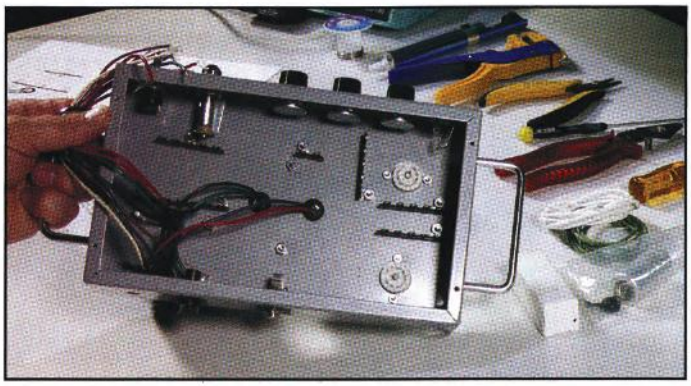
Step By Step

As noted, the packaging was solid. The box contained two separately bubble wrapped transformers, while the chassis enclosure contained all the necessary components. The documentation included:

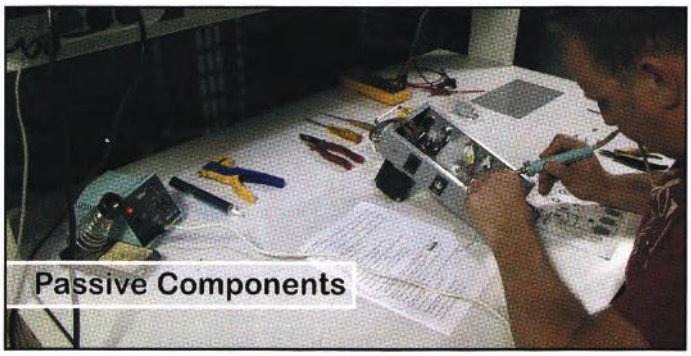
- A parts list, which was very handy to determine if everything was included (In our case, the fuse holder and the set of labels



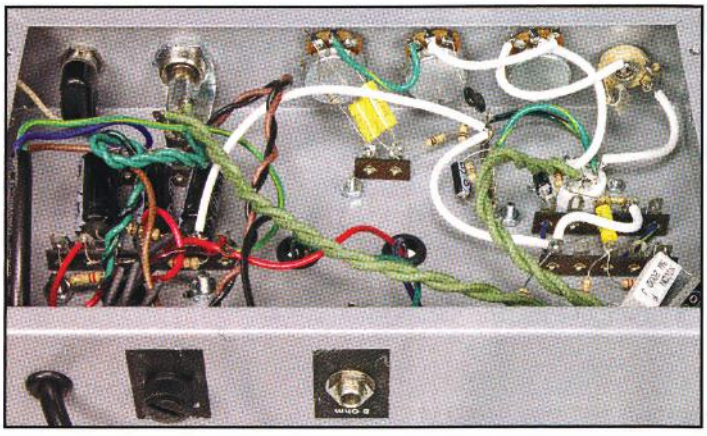
Read the supplied instructions, gather the necessary tools, and most importantly, read the safety tips. For those who are less experienced, read the soldering, wiring, and hardware fastening tips before starting assembly. Using the supplied parts list drawings, it's easy to find and identify each part along with the corresponding part numbers. Mount the main components to the top of the chassis, including the tube sockets, side handles, and power transformers. Be sure to label everything.



From the bottom of the chassis box, we can see the mounted front components. The power switch, the bass, treble, volume potentiometers, and input jack are already in place, along with the rear output jack and fuse holder.



Soldering the passive components and completing the wiring is where experience counts the most.



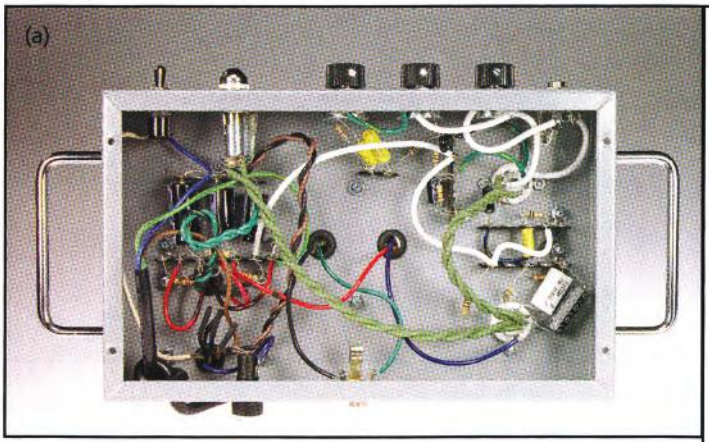
After mounting the internal terminal strips and passive components, connect the controls, input and output jacks, lamp holder, and power switch in the front and the fuse holder in the rear. Cut all the wires to size and connect the ends.

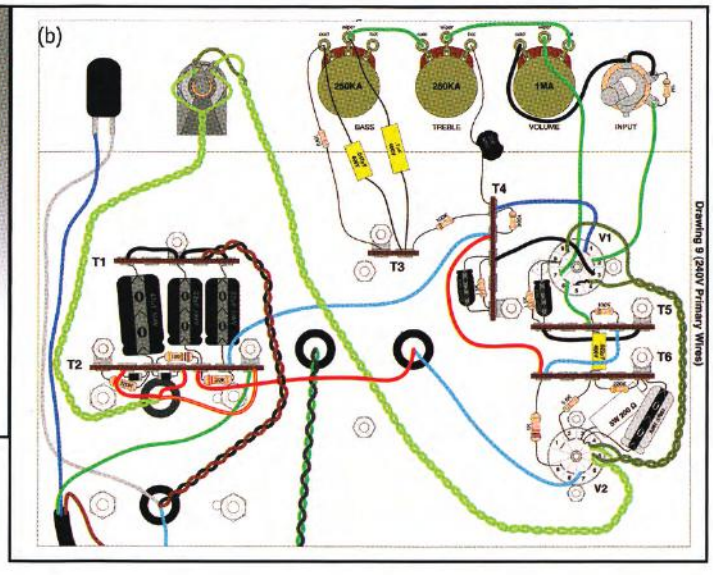
were missing. Luckily we had a fuse holder in stock and we downloaded the labels from the modkitsdiy.com website and printed them on an adhesive laser printer sheet.)

- A very detailed step-by-step illustrated manual, no complaints about it at all
- Primary wiring diagrams showing how to connect the transformer for each country's mains voltage (which was as described)
- A set of reference drawings showing how to place and connect all components

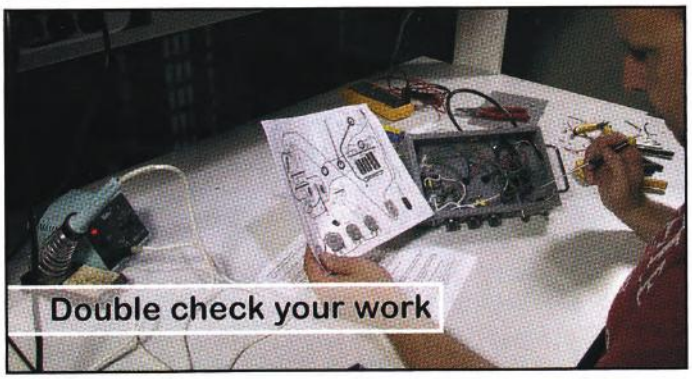
The chassis was painted grey, which gives it a nice vintage look. All the holes were predrilled and everything fit perfectly into place.

The power transformer has a lot of wires, making it suitable for almost all mains voltages: 100, 110, 120, 200, 220, and 240 VAC. After checking the primary winding diagram, we cut the obsolete wires and isolated them.

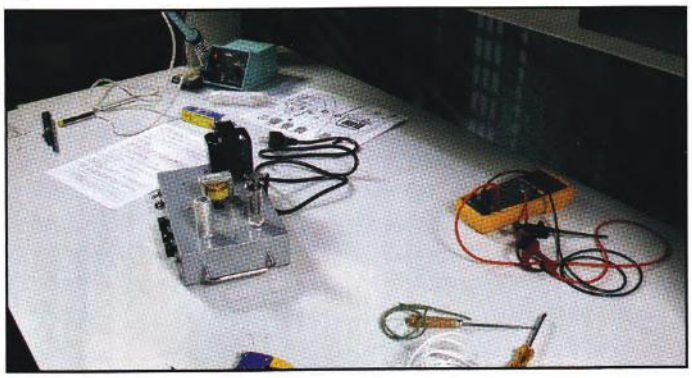




Compare the end result (a) with the supplied MOD 102 Kit's assembly drawing (b).



Before placing the tubes and connecting the tube wiring, thoroughly double check your work. Here we check the inside of the chassis and follow the wiring paths, comparing the wires with the drawings before we put the chassis cover in place.



After connecting the transformer, power supply wires, and the tube filament wiring, the unit is ready for power.

The knobs, switch, power light, and connectors are very solid and have a nice vintage look. Well chosen. The components were soldered on solder strips, the old-fashion way. The manual took us through the step-by-step process of connecting the components, telling us where and when to solder every connection. A PCB would have made things easier, but it is not necessary.

The heat resistant wires supplied in the kit were of great quality. In the manual, all the wire lengths were provided in inches only. After calculating the correct cable lengths in millimeters, everything worked fine.

After double-checking the wiring and attaching the chassis cover and rubber bumps, we placed the tubes in their sockets—the EL84 with the retainer and the 12AX7 with the tube shield—and we were ready to power up. Building this kit took six hours, and we enjoyed every minute of it.

Project Files

To download additional material, visit http://audioxpress.com/page/audioXpress-Supplementary-Material.html.

Resources

Amplified Parts, www. amplifiedparts.com.

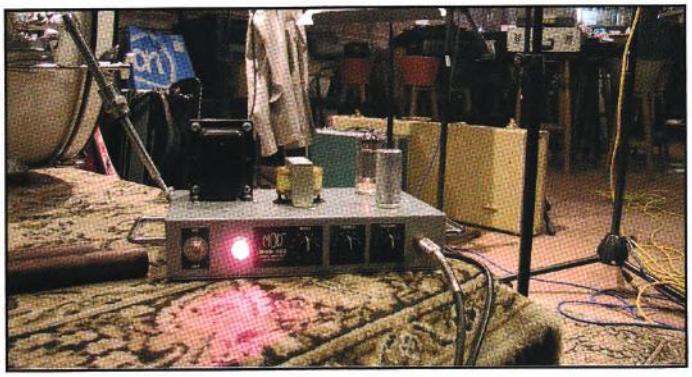
MOD Kits, www.modkitsdiy.com.

Turn It On and Play

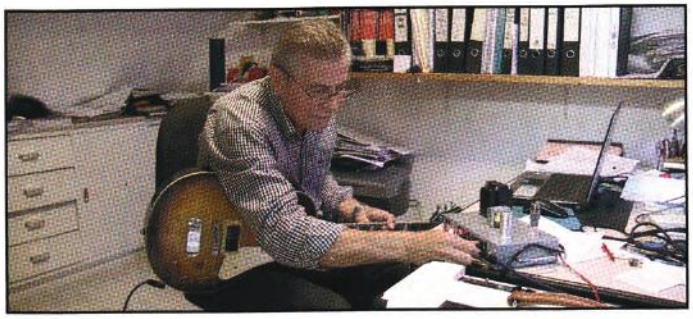
The MOD 102 has a single-ended (Class A) output stage. There was no need to check the bias, we just had to plug in the amplifier, connect the output to a proper 8-Ω load, let the tubes heat up for at least 10 s, and it was ready to play. We plugged in the amplifier and it worked without any problem, no tuning needed.

For our final review test, we took the MOD 102 to different guitar-playing friends who still remember and appreciate the tube sound. The following are personal comments from two of those experienced musicians—Robin Paesen, a solo guitarist at Who's Next, and Sjef Boonen, Bass Guitarist at Who's Next.

Paesen said, "I hooked up the amp to my 2x G12T75-Celestion cab and tested it with my Fender Strat (American Standard 2012). The sound is very balanced (no setting caused too much bass or treble) and I was amazed by the clean headroom the amp showed, since the actual power output in numbers is quite limited. The amplifier starts to distort when the gain is turned up past 6. The amp also reacts nicely to a hooked up overdrive effects pedal. Using a Digitech Bad



The MOD 102 is meant to be used as a practice amplifier (up to 5 W). It has a 8-Ω output impedance and should be used with a speaker cabinet that has an overall power handling of at least 10 W.



To test the MOD 102, we connected it to several different guitar speaker cabinets and guitars (e.g., a Washburn, a Hagstrom, and a Fender Stratocaster, etc.) and even with a bass (Framus P-bass type). It always sounded well balanced with lots of headroom and nice saturation at higher volume. All the guitar players who tested it liked the tone controls.

Monkey, the input stage overdrives without too much compression, provided that the amp isn't turned up too loud. The 5-W and single-channel design, limit its potential when using it in a band setting (without extra amplification through a PA you'd never be heard over the drums), but as a practice or travel amp it is very, very nice. It doesn't weigh a ton and sounds pretty good."

Boonen commented, "First of all, I like the way it looks (though perhaps a chrome-plated case would be even nicer). Looking at the vulnerability of it, it doesn't seem to be suited to be moved around a lot.One of the first things I noticed was the absence of a gain dial, in my eyes an indispensable feature. Although a decent effect pedal can be a good alternative. I tried the amp with a Fender Strat. The sound was very clean and clear, which brought out the Strat's potential.

The tone controls are very direct, which I like. The amplifier also responded very well to the tone controls on the guitar. Many amps do not allow for this kind of control. With the volume setting past two o'clock, overdrive starts to kick in. This is very nice when called for, but if you want to stay 'clean,' this amp doesn't allow for higher volumes. This is pretty much the only down point on this amp: it fares really well in the living room or bedroom, but 5 W simply doesn't cut it in a band setting, be it rehearsal or live. Personally I would think that 15 W would be better suited for a more all-round usability."

Editor's Note: The Amplified Parts and MOD Kits websites are great resources. They feature detailed documentation for every product, tips, advice, and even some extra schematics for frequent modification request. For the MOD 102, the FAQ section features a schematic on how to add a headphone jack to the amplifier's output.

MOD 102 Guitar Amp Rating

POSITIVES

- Looks
- Clean sound
- Well-defined tone control
- Responds well on guitar tone control

NEGATIVES

- No gain setting
- (Too) little power

Tips from an Expert

Dutch expert tube amp designer Menno van der Veen provided a few tips when building the MOD 102 Guitar Tube Amp Kit.

"I know these kinds of guitar circuits. They sound excellent, are very simple to build. They bring you back to the roots of creating sound and soundscapes." However, when building the amplifier he said, "please put at each control grid (pins 2 and 7) of the pre-amp valve a series resistor of 1 kΩ (grid stopper) to prevent any oscillation due to wiring layout. Place these resistors as close to the socket as possible."

Menno also noted that "although not directly recognizable: the filament connection at the EL84 power valve and its grounding minimizes the hum. A really smart solution."

He added that the tone-control section is fine, but "if you replace the lowest resistor (6k8) with a 10 kΩ (log) tone control pot, you also have the mid control available. This costs almost nothing. Enjoy this smart amp and play the nicest music!"

Resources

M. van der Veen, *Designing Tube Amplifiers*, Elektor Publishing, 2013.

——, *High-End Valve Amplifiers*, Elektor Electronics, 2011.

Vanderveen Audio Electronic Research & Consultancy, www.mennovanderveen.nl.

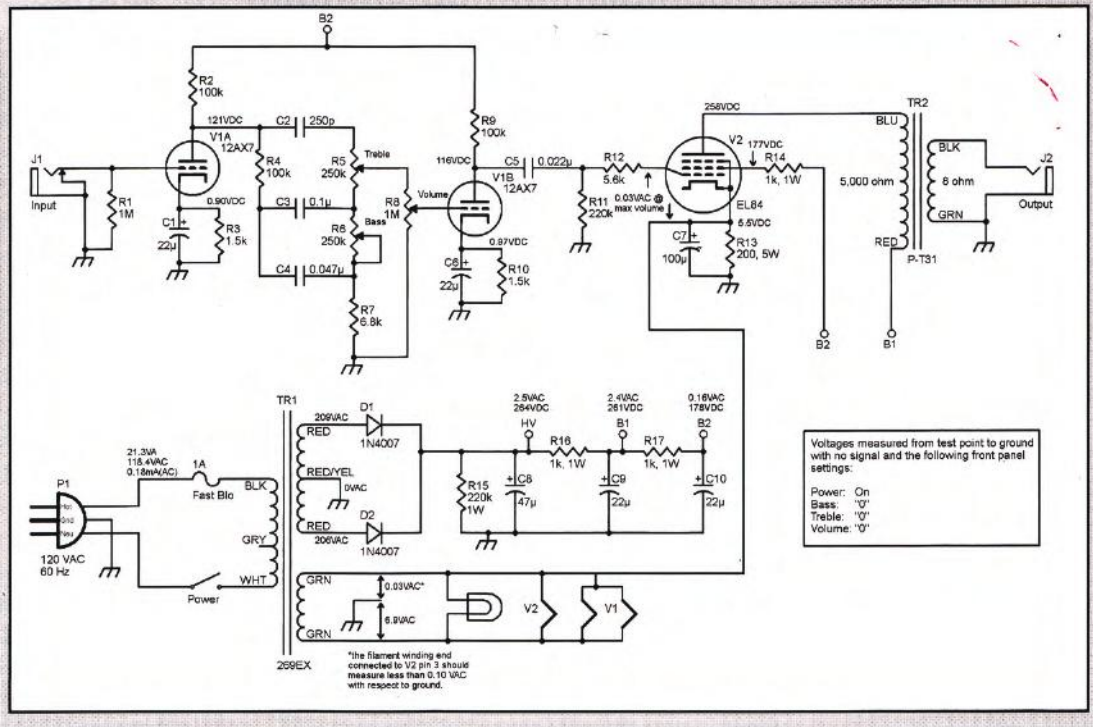


Figure 1: The MOD 102 schematic details the amplifier's layout.