Two Stroke Amp Kit

Notes and Updates – *read carefully before beginning any work!*

Circuit

Be aware that the circuit has changed very slightly since the book was published, in that the core design now employs a single 6L6 output tube rather than a pair of 6V6s. In fact this makes it simpler to build the amp: just wire up the 8-pin output tube socket that's on the right in the diagram on p181 of *The Guitar Amp Handbook* (socket V2) and ignore the connections to V3. This means you also don't need to have the 500 ohm bias resistor and 25uF/50v bypass cap at the far left of the circuit board, so simply ignore those, which leaves plenty of clearance room for the pilot lamp assembly. You also now obviously don't need the wire going under the board (dotted line) connecting the top of V3's resistor/cap network to that of V2 – the latter just goes straight to ground (as indicated).

I made this change because, after much playing of the prototype, I decided the 1x6L6 format sounded just a little better than the 2x6V6 arrangement anyway, so it wasn't worth putting builders to the extra trouble. If, however, you still feel you would like a 2x6V6 option, you can punch your own chassis hole of the appropriate size between the two existing 8-pin socket holes, add a third socket, and wire everything up exactly as per the original diagram (buy yourself an extra 8-pin socket, or drop me a line and I'll send you one).

Tone Capacitor

There was a small error in the redraw of the book diagram that none of us caught before publication. The signal capacitor going from the Tone pot to ground is labeled ".047uF" but that should have been ".0047uF" – the latter is correctly supplied with your kit.

Power Transformer

The wiring has been changed on the power transformer since the book diagram was drawn and published. It's the exact same part number, but they have added some wires for some other optional voltages. Nevermind, it's still a good little PT intended for the exact same job and will work absolutely fine, you just need to ignore certain wires and cap them off.

Here's what to do:

First, instead of two black wires for the 120 voltage coming in (one side – the other +) they now have one black to be used as -, and two others (blue for use as + in 125V areas, brown for use as + in 120V areas). We are going to want the brown because most US domestic voltage is closer to 120V (unless you happen to know that yours runs particularly high - sometimes it does). You will want to cut the unused blue primary wire to the same length as the brown and shrink a piece of heat-shrink over the end of it (with a little extra heat shrink sticking out to shield the wire core from any contact) and coil it up and tuck it out of the way. You might want to use this connection in the future, if a new rectifier tube delivers higher voltages, or if you just want to tailor the sound.

Now the black should go to the fuse holder connection, and the brown should go to the power switch connection. In fact, if you prefer, you can modify

your power switch to select from both voltage options. Buy a sturdy SPDT on/off/on toggle switch to replace the on/off switch supplied (most hardware stores sell these as power tool switches), and wire the power cord's + wire to the center tab, the PT's blue wire to one end of the switch and the brown wire to the other end (remember that with such switches the wire connection engaged is that on the opposite end from where the switch toggle is pointing). The lower voltage supply should make the amp sound relatively softer and more easily distorted, and the higher supply should be a little tighter and cleaner. The amp should work fine of both voltages.

The two extra red/white wires are to provide a 300V-0-300V AC optional output from the PT for applications that might want this. We will still use the red pair as in the diagram in the book, so you will do the same with the red/white wires as you did with the unused blue primary lead. BUT, it is probably a good idea to trim these only as short as the two red wires you use, cap them off safely (individually) then coil them and tape them out of the way in the chassis to the left of the transformer (it makes sense to swaddle these entirely in electrical tape and secure them firmly - you don't want them to come loose and contact anything within the amp). You might need to use these in the future if NOS 5Y3 rectifiers become unavailable and the newer-make 5Y3 you end up using provides significantly higher voltages into the circuit, which is often the case. At a future date, changing from the red-red to the red/white-red/white pair would bring down the voltages in the amp considerably.

Heater/Filament Supply Wires

To clarify: the heater supply wires should run in a twisted pair from where indicated coming from the pilot light to V2 #7 and #2, and on from there in a twisted pair – one wire to be connected to the joined 5&4 pins on V1, and the other to pin 9 on V1.

Speaker Outputs

The positions of the two speaker outputs and the impedance switch have been reversed from what is seen in the book's diagram. This requires a simpler and more direct wiring arrangement. The impedance switch (large DPDT with three connection tabs) now goes in the single enlarged hole between the preamp tube and the output tube, and the two outputs go in the pair of holes to the right of the preamp tube (as viewed from the back of the chassis). Simply bring the OT's yellow, white, and black wires up through the grommet in the hole near the switch position, and attach the yellow and white wires to the switch there as in the diagram, but trim the black wire long enough to reach the output jacks from there. You then need to make the wire from the 68k resistor on the board (that's the negative feedback loop) long enough to reach the + connections on the jacks. See the diagram at the bottom of these instructions for the correct wiring connections to the impedance switch being used here. Unlike many toggle switches, the connections made inside this switch are to the tabs on the SAME end of the switch to which the toggle bat is pointing (the narrow angled tab is the output to the jacks, and the squared tabs with circular ring connections are the two inputs from the OT wires).

Output Transformer Mounting
Note that the OT is to be mounted in a different position on the chassis to that shown in the photos in the book. It is now placed more centrally in the chassis, somewhat above and between the two holes where the rubber grommets for the wires will go, to enable it to fit between the magnets of the speakers in the 8”/10” combo format.

Grounding Terminal Strip
The only correct three-terminal strip I have been able to source for use as a grounding connection for the power supply (as originally mounted on a PT bolt) now must be mounted on the bolt on the left side of the rectifier socket, unless you want to enlarge the hole yourself with a hand file. Tighten it down well and it will work fine in this location.

Cabinet prep
The Full Combo Kit’s cabinet will come complete, and in many cases with the speakers already mounted. The one item of prep that our cabinet-maker doesn’t do for us is drill the holes in the cab for mounting the chassis, so you will need to do this yourself. To mark up the cab for the drilling job, stand it upside down on a work bench or on the floor (you might need to stand it on two blocks to make clearance for the handle), remove the lower back panel (which now appears upper!) to give you room to reach inside, and make a line along the back edge of the upper back panel where it meets the underside of the top of the cab so you have some indication of the depth of that panel into the back of the cabinet (you can remove that panel and attach some masking tape first, then reattach it, if you don’t want to mark on the cab/vinyl itself). Now remove that upper panel (the one with the vent slots), and position the empty chassis in the cab cut-out so that the back edge of the control panel side of the chassis is lined up along the indicator line you have drawn, and the fuse mounting hole and the right-side input hole (where the Boost switch will go) have approximately equal clearance within the cab’s cut-out. Mark an X on the cab or masking tape in the center of each chassis-mounting hole, and that’s where you’ll drill. Select a bit that’s just large enough for the mounting bolts to slip through the holes without needing to thread them into the wood (and note that, although you want to be pretty accurate, absolute accuracy isn’t necessary as regards the depths of the mounting holes into the cabinet top, because the chassis mounting holes are oblong and allow you to slide the chassis back and forth slightly on the bolts as you tighten them down).

You will also need to solder the jack plug(s) to the speaker wire, and the other end of the speaker wire to the speaker(s). With the multiple-speaker 8”/10” format in particular, take careful note to maintain the same wiring polarity with both speakers and both jack plugs.

Additional Notes
The availability of tube amp supplies is constantly changing, so some parts or specific values might be substituted for others at the time of shipping. For example, 40uF Sprague Atom filter caps have been difficult to find lately, so a 30uF is often substituted, and some people even find a 20uF works better here.

This part will work perfectly well with the Two Stroke supply stage, and is still considerably over-spec compared to the filter cap traditionally used in that stage in vintage amplifiers.

You will notice some very slight inconsistencies between the Two Stroke design as published in the book and the layout provided by the chassis included with the kit. This is the best and highest quality chassis available to us for the job, however, and acquiring a chassis perfectly suited to the original amp design would have incurred custom tooling and screening set-up charges that are prohibitive in this price range. Some points you should note, but not be overly concerned about, are:

- The hole between the preamp tube and output tube that is used for an the impedance switch has two small holes drilled beside it. This hole was originally spec'd for an RCA type jack mounted on a plate, but we are not using that, so the little mounting holes are excess to requirements. No big deal.
- There is no label for the impedance switch, but this is on the underside of the chassis, and you are advised to label it yourself as per the instructions in the book.
- The mini-switch used for the Fat/Off/Bright Boost function is smaller than the hole in which it is mounted, so larger washers are used above and below the chassis panel. There is also no silkscreen label for the Boost switch; this boost function is a "custom modification", if you will, and we are using a chassis that was designed for a simple two-input amplifier. Once you have built the amp, there will be no mistaking which position the switch is in!

Finally, note that every electrical component has a break-in period, which is more noticeable in some than in others. Signal carrying components are the most obvious, particularly tubes and signal capacitors. It will take several hours of operation for the tubes to burn in, and approximately 100 hours of operation for the SoZo capacitors to function to full performance. This break-in period is a factor in any quality new tube amp you might purchase. Speakers, too, will sound a little stiff and tight until they have been played-in for several hours, and they will continue to mellow with use.

Enjoy!

Dave Hunter/Backbeat Books c/o fredsville@verizon.net