Amp Tips

by Dan Torres

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"To Be or Not Tu-be Project #1 rectifier switch

Hello to everyone, this month we will start a series of articles concentrating on the rectifier circuit of tube guitar amps. Lots of new tricks and technology applied to this important but overlooked section of the amp.

The illustrations this month are for a switch to change from a tube rectifier to a solid state circuit.

This occurs on a lot of modern high-tech amps, and I'll show you how to install it on your amp.

Any and all work should only be attempted by a qualified tube amplifier technician.
Any suggestion, idea or instruction involving any electronic device should only be carried out by qualified personnel. None of these instructions are implied or intended for non-technicians or persons unqualified to work safely with high voltage AC and DC.

Do not attempt any electronic work without the proper tools, materials, work space, an isolation transformer, a "variac" type variable transformer and correct training in electronics.

Consider this paragraph to be inserted every 5 or 6 words in this article!

If your amp tech is still unsure, please see the full warning included on pages 4 and 5 of **"Inside Tube Amps"** by Dan Torres.

Overall, this is not a difficult project, but since you are working with the highest voltages and currents in the amp, it is necessary to have the proper experience, tools, and knowledge prior to attempting anything this dangerous.

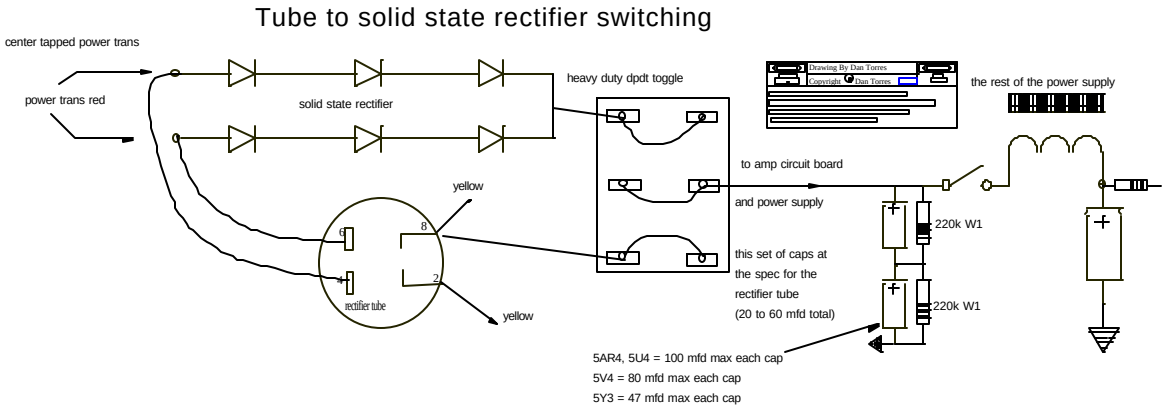
The power transformer secondary is a high voltage stepped up AC voltage. From 300 to as much as 500 volts on common amplifiers (a lot more on some.)

For a starter, only attempt this on amps of 50 watts or less output power.

This project requires a power transformer with a center tap wire. Usually a red/yellow wire.

Rectifier tubes require this kind of transformer, and solid state rectifiers “do not care” about it.

If your amp has a solid state rectifier as the standard installation, you will also need a supplemental filament transformer for the rectifier tube.



Lets only work on amps that have a TUBE rectifier. Switching to a solid state rectifier is easier, and more within the scope and space of this article.

(*Note: the Torres Engineering kit (www.torresengineering.com) will have parts and instructions for adding a rectifier tube, and for applying this technology to amps WITHOUT a center tapped power transformer.*)

The basic design is to switch the OUTPUT of the rectifiers, leaving both rectifiers connected to the power transformer secondary.

See the drawing for the connections to a dpdt switch. It is best to use a dpdt “center off” switch in this application, as it will provide a secondary “standby switch” in the center position, eliminating the need to, or chance of forgetting, to use the existing standby switch when switching rectifiers.

The switch is inserted between the rectifier(s) and the first bank of filter capacitors in the amplifier.

Why do this anyway? Both types of rectifiers have their advantages.

A tube provides the smooth compression and voltage sag providing a softer attack, most often desired by blues players. A whole lot of the classic tube amps, and lots of the modern tube amps depend on the tube rectifier for this characteristic of their tone.

The solid state rectifier is, by far, more efficient. It produces more power from the amp and a tighter tone with improved clarity, attack and bass response. This is also extremely famous with many classic tube amps such as the Fender Twin Reverb and Marshall Super Lead.

The solid state rectifier is also far more “forgiving” and is not limited in the amount of filter capacitance it can drive. See the drawings for the limitations of the tube rectifiers.

5AR4/GZ34 and 5U4 = Max of 50 mfd (two 100 mfd caps in series)
5V4(G or GB) = Max of 40 mfd (two 80 mfd caps in series)
5Y3 = Max of 20 to 24 mfd (two 47 mfd caps in series.)

Exceeding these maximums by 10% can be and has been done, but tube life will be limited. The more important danger is that the tube can be forced into failure at any time!! It could be in 15 minutes, or 2 months. Kind of running on the edge with not much in the way of benefits.

Both designs and circuits have their place in music. Future sections of this article series will take additional advantage of the solid state rectifier to provide a wider range of tones and amplifier characteristics at the flip of a switch - keep on reading next time!!

This article is for entertainment only. Any additional help will require the amplifier to be in our shop for service.

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Ok, here's the warning rap.
Warnings and disclaimer
Tube Amplifiers, all components and related products are electrical products with extremely high voltages that if mishandled or if used carelessly or for improper purposes, can cause life hazards and serious personal injuries. Such equipment is dangerous even when turned off or unplugged.
You shouldn't be working inside the amp unless you know what you are doing.
Don't work on an amp plugged in.
Always discharge the filter capacitors before starting work. If you don't know how, contact us for a reprint on how to do it ("**What the Hell are filter caps?**")

Solder neatly, and use the smallest amount of solder you can.
Be careful, but have fun.

Dan Torres is one of the most sought after tube amp experts in the world. Dan is the author of the definitive book on Tube Amp Technology, “**Inside Tube Amps**”. The latest new stuff from the Torres Shop are a whole series of new easy to build complete amp kits. Check out the catalog or web site for the latest. New technology every day!