

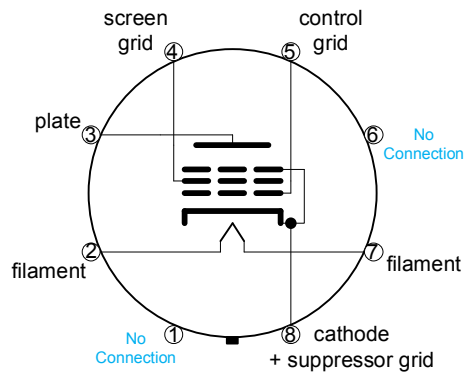
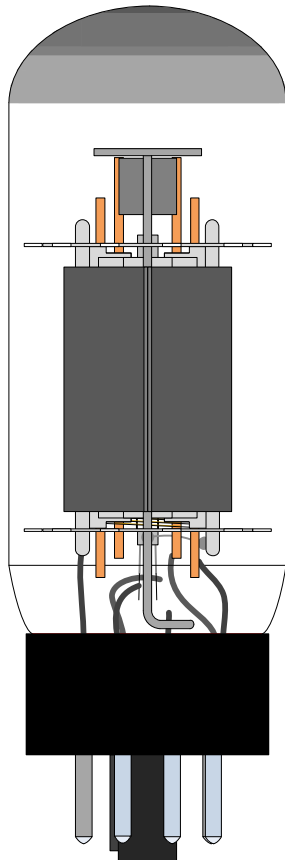
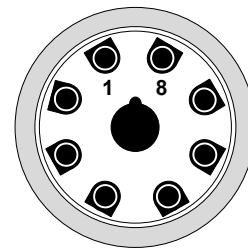
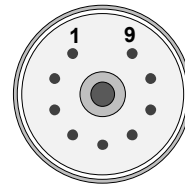
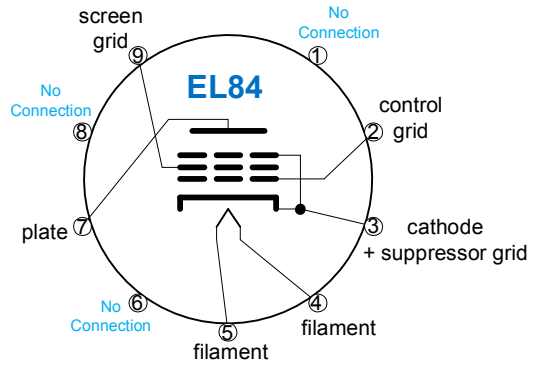
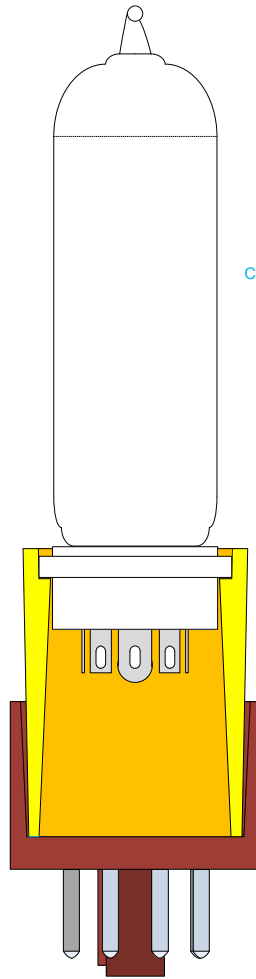
# Yellow Jackets® TUBE CONVERTERS



Yellow Jackets® tube converters allow EL84 power tubes to be used in place of the most common guitar amp power tubes including 6L6, EL34, 6V6, 7027, 6550 and 7591. Most Yellow Jackets® provide a substantial output power reduction and a “self-bias” Class A configuration for the EL84 so that no bias adjustment is required. Yellow Jackets® are like getting a whole new amp.

## Yellow Jackets® Types

|         |      |
|---------|------|
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## Why would I want to convert to EL84's using Yellow Jackets®?

Every power tube type offers a different characteristic sound and feel. EL84's have a very tight and focused sound which has become world renown by their use in the British VOX™ AC30 guitar amplifiers. Additionally, most Yellow Jackets® converters will produce a substantial maximum power reduction (50% to 90%) making it easier to find that sweet, warm mix of preamp and power amp distortion at a lower volume.

Yellow Jackets also convert the power tube bias to “self-bias” Class A so that no bias adjustment is necessary. You can switch back and forth between EL84's and your amplifier's original power tubes without rebiasing.

## How do you know which one to pick?

If you are in doubt, you may e-mail [info@yellowjacketstc.com](mailto:info@yellowjacketstc.com) and we will help you decide.

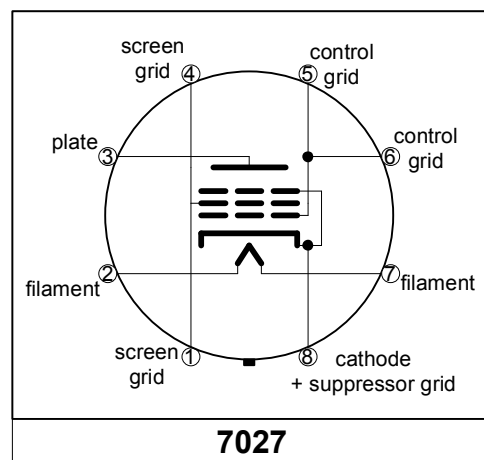
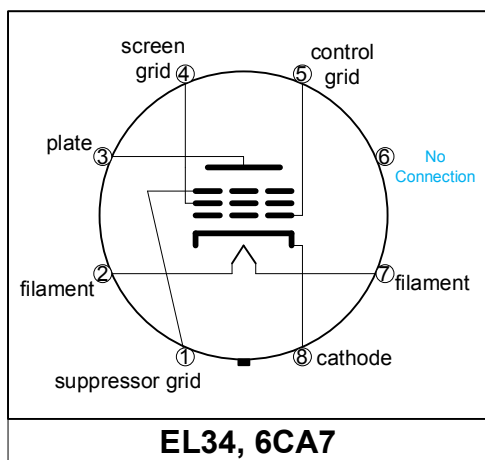
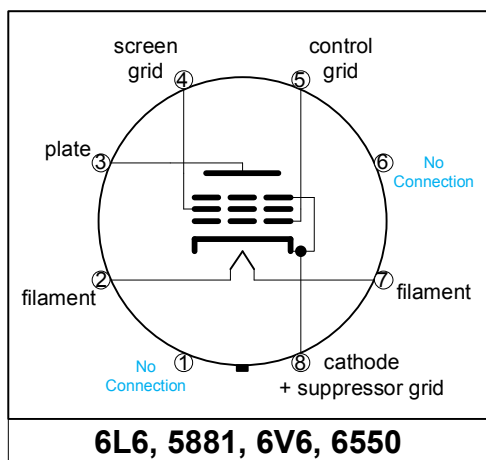
**Yellow Jackets® are not recommended for use in amplifiers that have a rated power output greater than 100 watts or plate voltages greater than 519 VDC.**

## YJS

*(Converts 6L6, EL34, 6550, 7027 or 6V6 to EL84)*

The YJS is for amplifiers with **fixed bias** power tubes. Fixed bias power tubes have their cathode connected directly to ground and a negative DC voltage applied to their control grid. The negative bias voltage is often designed to be adjustable by way of a bias pot.

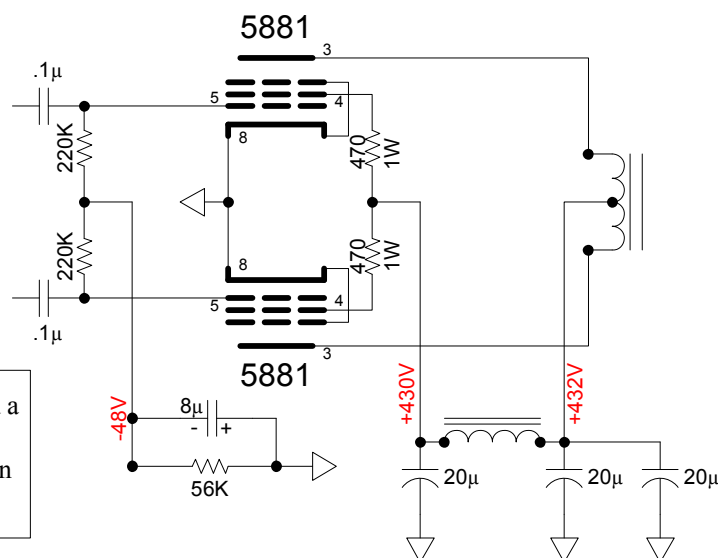
## BASING DIAGRAMS FOR COMMON TUBES THAT CAN BE CONVERTED BY THE YJS



The 1959 narrow panel tweed Fender® Bassman (5F6-A) is a historically significant 40 watt guitar amplifier. It is well known that this amplifier circuit served as the design base for the very first Marshall™ amplifiers, JTM45.

This partial schematic of the 5F6-A output stage is presented here as an example of **fixed-bias** power tubes. Notice the power tube cathodes (pin 8) are connected directly to ground (represented by the triangle) and the negative voltage connected to the control grids (pin 5) through the 220K resistors.

FENDER® BASSMAN 5F6-A OUTPUT STAGE SCHEMATIC



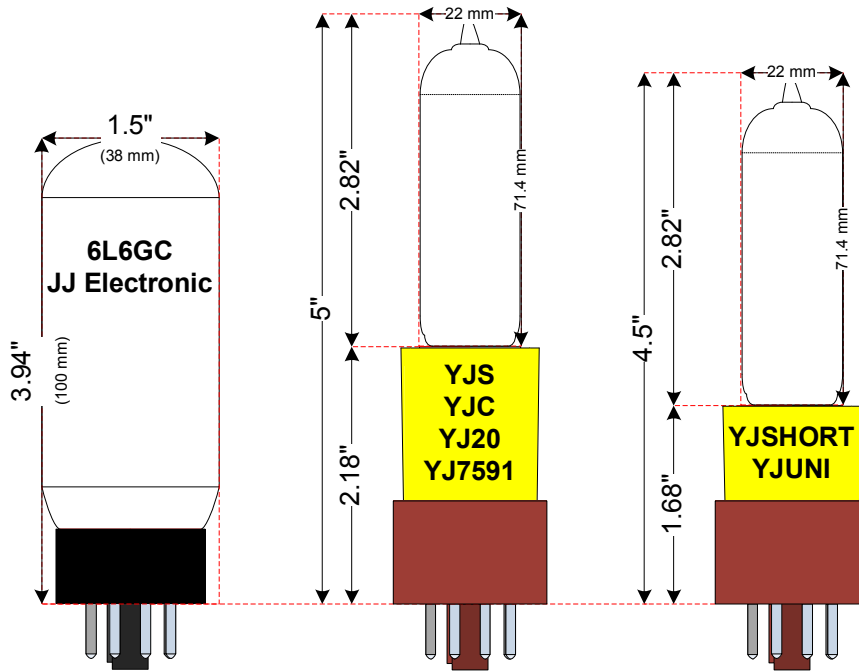
Some amplifiers (e.g. Fender® Hot Rod Deluxe) use a 1Ω resistor and a diode connected in parallel from the power tube cathodes to ground. These components are added to help when taking bias measurements in fixed bias amps and do not present any problems for the YJS.

## YJSHORT

(Converts 6L6, EL34, 6550, 7027 or 6V6 to EL84)

The YJSHORT is simply a short version of the YJS. It is 1/2" shorter allowing it to fit into more amplifiers. Before ordering Yellow Jackets® for your amp, it's a good idea to make sure you'll have enough clearance.

The YJUNI is the only other Yellow Jackets® tube converter that comes in the short style.



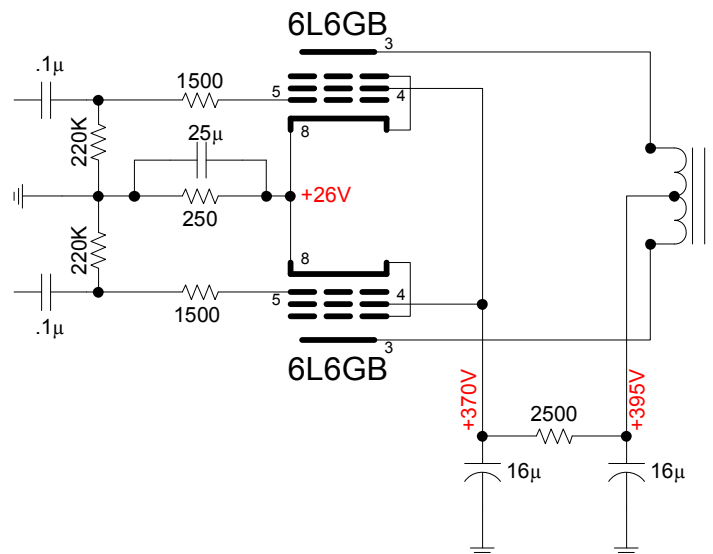
## YJC

(Converts 6L6, EL34, 6550, 7027 or 6V6 to EL84)

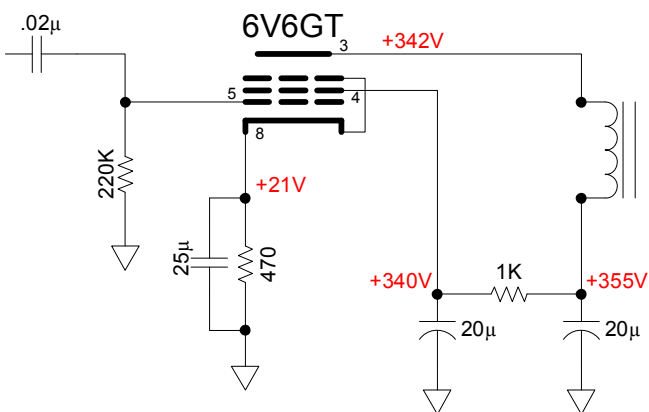
The YJC is for amplifiers with **cathode biased** power tubes. (This is often referred to as “self-bias” or “auto-bias” because it does not require a bias adjustment when tubes are changed). Cathode biased power tubes will have a resistor and bypass capacitor connected in parallel from their cathode to ground, as seen with most preamp 12AX7 triodes. The YJC is the YJS with an added ground wire. The ground wire is used to bypass the amp’s original cathode bias components so that the Yellow Jacket’s internal bias components are used instead.

These two guitar amp output stage schematics are provided as examples of cathode biased power tubes that would require the YJC converter. The 5E5 (1955, 26W) has a push-pull output, while the AA764 (1964, 4W) has a single-ended output.

FENDER® PRO-AMP 5E5 OUTPUT STAGE



FENDER® VIBRO-CHAMP AA764 OUTPUT STAGE



## What would happen if I didn't connect the ground wire in my cathode biased amp?

The amp would bias itself too cold to sound good, but no damage would occur. If you don't know how your amp is biased (fixed or cathode), you can just try connecting and disconnecting the ground wire and listen for which way sounds the best. (Connecting the ground wire in a fixed bias amp won't cause damage, either).

### YJ20

*(Converts 6V6 and similar based/low power relatives like 6F6, 6G6, 6K6, 6Y6, etc. to EL84)*

The YJ20 is like a YJC that does not drop the plate and screen voltages. It is meant for use in lower power output amps (20W or less) when **no power reduction** is desired. It comes with a ground wire for cathode biased amps.

### YJUNI

*(Converts 6V6 and similar based/low power relatives like 6F6, 6G6, 6K6, 6Y6, etc. to EL84)*

The YJUni is a **direct pin to pin converter** with no internal voltage dropping or bias components. It is meant for use in lower power output amps (20W or less) when **no power reduction** is desired and you would prefer to use the amp's original bias circuit. If used in a fixed-bias amp, the YJUni is the only Yellow Jackets® converter that would require a bias adjustment.

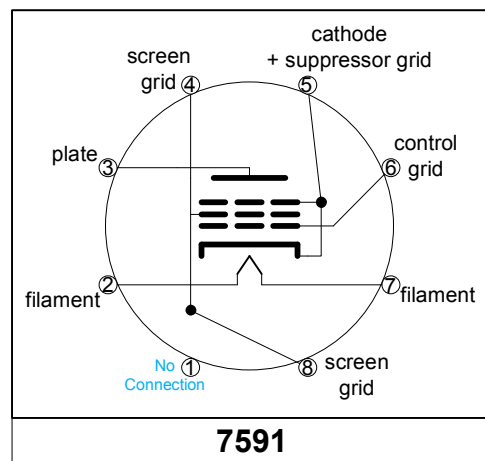
The YJUni was designed by THD Electronics® for use in their UniValve®, BiValve-30™ and Flexi-50™ amplifiers with the Hi V/Lo V switch set to Lo V (plate voltage = 300 to 320V).

### YJ7591

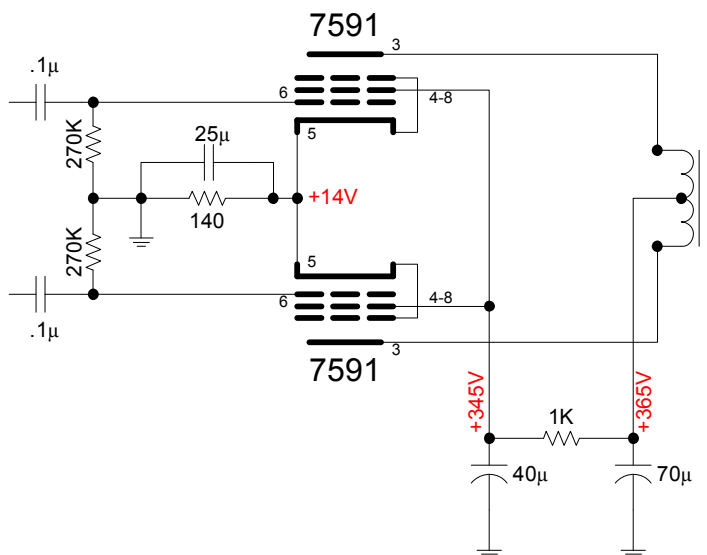
*(Converts 7591 to EL84)*

The YJ7591 is for amplifiers that use **7591 power tubes**. Only the triode version will provide a power reduction. It comes with a ground wire for cathode biased amps.

This output stage schematic of the Ampeg® J-12R "Reverbojet" (1967, 15W) is presented here as an example of a cathode-biased amp using 7591 power tubes. Notice how the pin-outs differ from the other common octal power tubes found in guitar amps.



AMPEG® J-12R OUTPUT STAGE

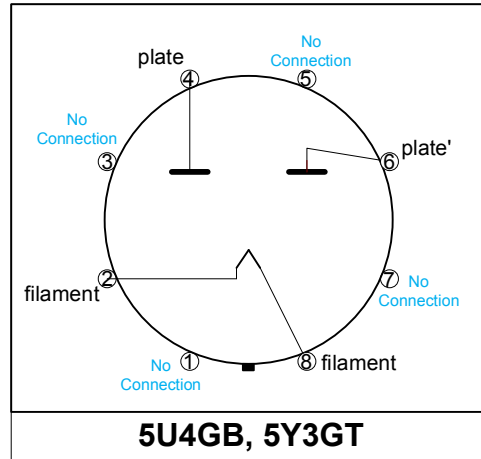
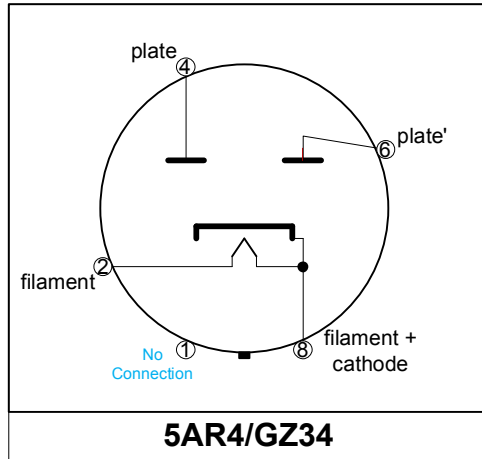


## YJR

(Converts 5AR4/GZ34, 5U4 or 5Y3 to solid-state)

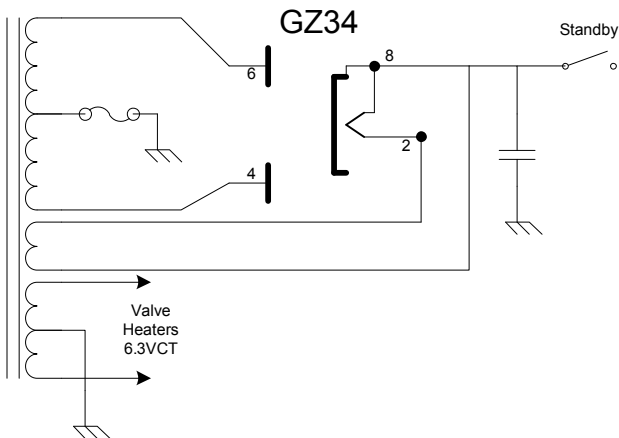
The YJR is used to convert full-wave tube rectifiers to solid-state. This is usually done to give the amplifier a tighter, more aggressive sound and feel.

Avoid tube cathode stripping by keeping your amp on standby for at least 30 seconds when using a solid-state rectifier. Tubes require some warm-up time before their electrons are ready to flow.

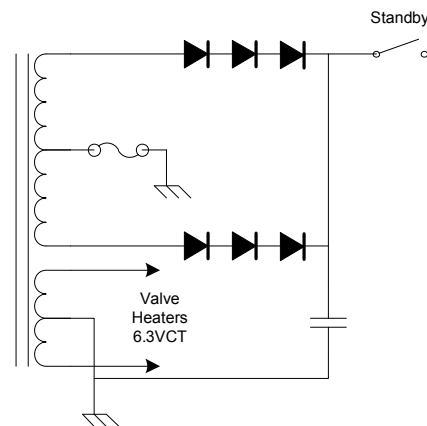


One of the more significant conversions from tube to solid-state rectification came in 1965 when Marshall™ created their 100W “Plexi” Super Lead JTM100.

MARSHALL™ JTM45 MODEL 1987 (RECTIFIER CIRCUIT)



MARSHALL™ JTM100 MODEL 1959 (RECTIFIER CIRCUIT)



## What's the difference between the normal and triode versions?

The triode version provides a greater power reduction and more linearity than the normal (pentode) version.

Most guitar amp power tubes are pentodes, meaning they have five electrodes:

- 1) cathode
- 2) control grid
- 3) screen grid
- 4) suppressor grid (or beam confining electrode)
- 5) plate

Power tube triodes like the 300B (more common to hi-fi stereo) have three electrodes:

- 1) cathode
- 2) control grid
- 3) plate

Pentodes can be wired to behave like triodes by connecting the suppressor grid directly to the cathode and the screen grid to the plate through a current limiting resistor.

## Do certain amps perform better with the triode?

This is a matter of personal taste. The triode version will provide a greater power reduction and is more linear (less distortion) than the pentode. If you're looking for the maximum power reduction and want to tame the response of your amp a little, then go for the triode. If you'd like a power reduction, but want a response with more bite and attitude, then go for the pentode.

## Amplifiers with Pentode/Triode Switch

Some amps, including Marshall™ JCM900, are designed with an "Output Mode Switch" that changes the power tube configuration from "low" power (triode) to "high" power (pentode). For these amps, you will want to use the Yellow Jackets® pentode version and let the amp's switch convert them to triode.

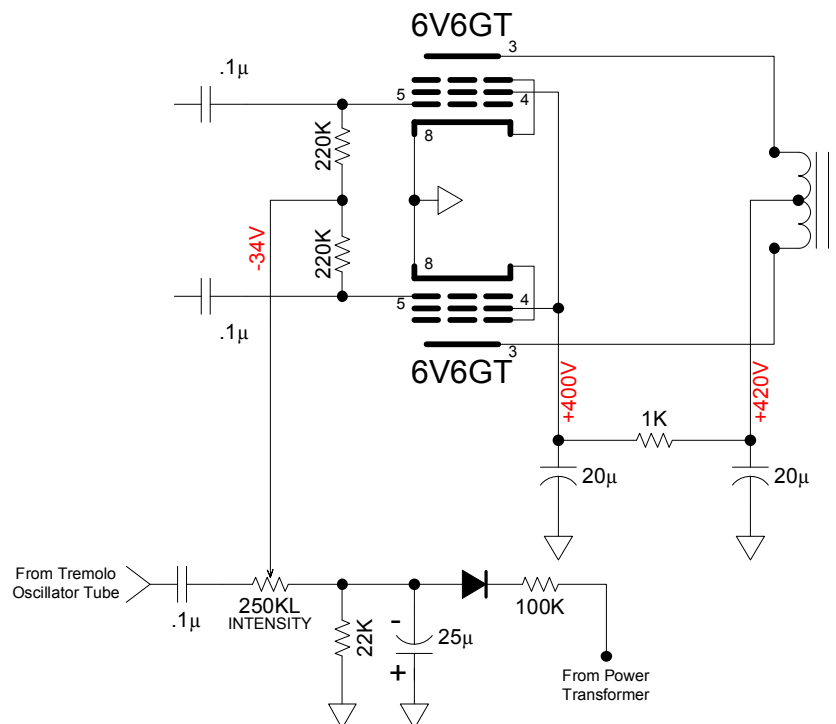
## Tremolo

Some amps have a tremolo effect that is achieved by varying the bias voltage of the power tubes as in the 1964 Fender® Princeton Reverb (AA1164). This particular type of tremolo effect will not work with Yellow Jackets® installed.

## Plate Voltage Too High

Yellow Jackets® are NOT to be used in amplifiers with extremely high plate voltages such as Marshall™ Majors, Ampeg® SVTs, HiWatt® 200's and Orange 120's. These amplifiers have too high a plate voltage and will damage the EL84's and possibly the Yellow Jackets® themselves. While the Yellow Jackets® reduce plate and screen voltages each by 100 volts, this would still make the plate voltage too high in certain amps.

FENDER® PRINCETON REVERB AA1164 OUTPUT STAGE



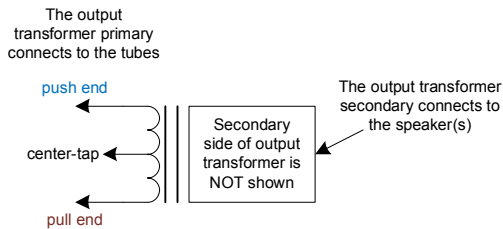
## Cathode Drive vs. Grid Drive

The vast majority of guitar amps use power tubes that are grid driven, like all of the other amps mentioned previously. Some amps like the Music Man® RD-50 (1982, 50W) use a cathode drive method. Notice how the tube cathodes (pin 8) are connected to transistors. **Yellow Jackets® will not work with cathode driven amps.**

## Output Stage Symmetry

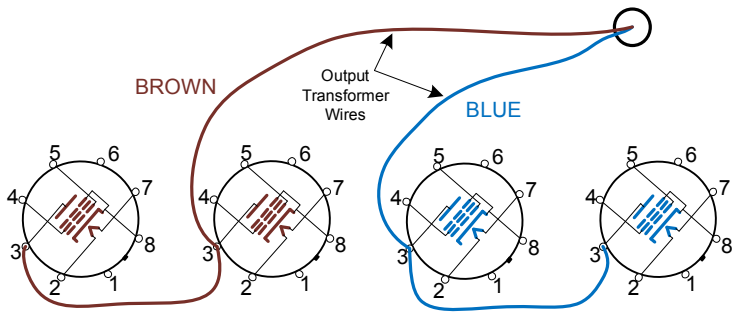
It is important to keep your output stage symmetric for best results when using Yellow Jackets®. An asymmetric output stage will present the cold, gritty sound of cross-over distortion.

Output stage symmetry refers to push-pull outputs (as opposed to "single-ended"). All but one of the amps discussed have push-pull outputs. This can be seen by the output transformer having power tubes connected to both "ends" and a "center-tap" connected to some high voltage power supply. We can think of the tubes on one end pushing, while the tubes on the other end are pulling (and vice-versa).

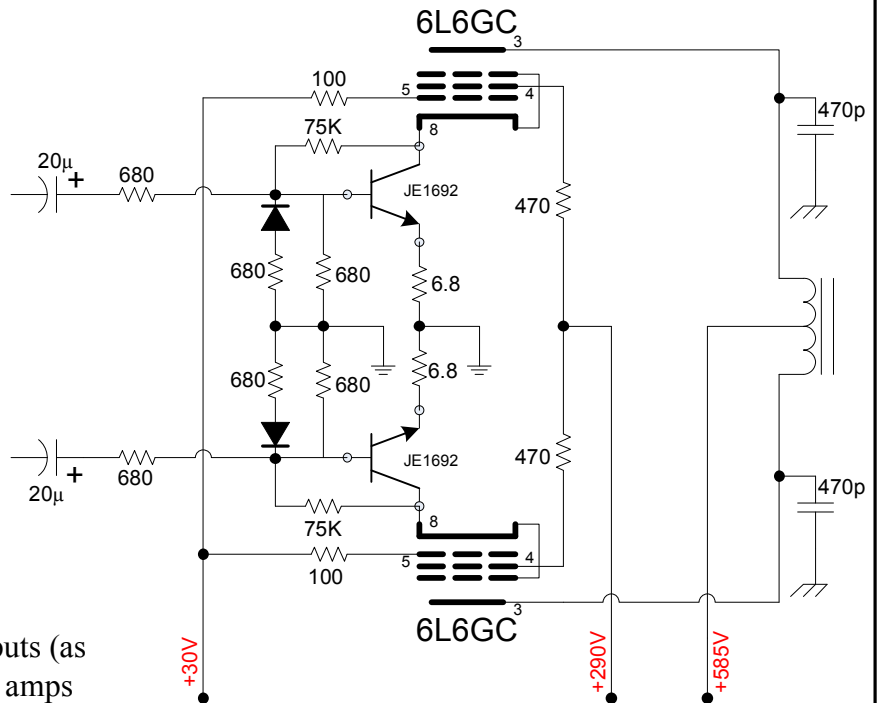


The output stage of the Fender® Twin Reverb AB763 (1963, 85W) is shown here in simplified schematic and layout form to illustrate output stage symmetry. The layout drawing shows where the tubes are positioned in the actual amplifier chassis. The two tubes connected to the brown wire will push together, while the two connected to the blue wire will pull together.

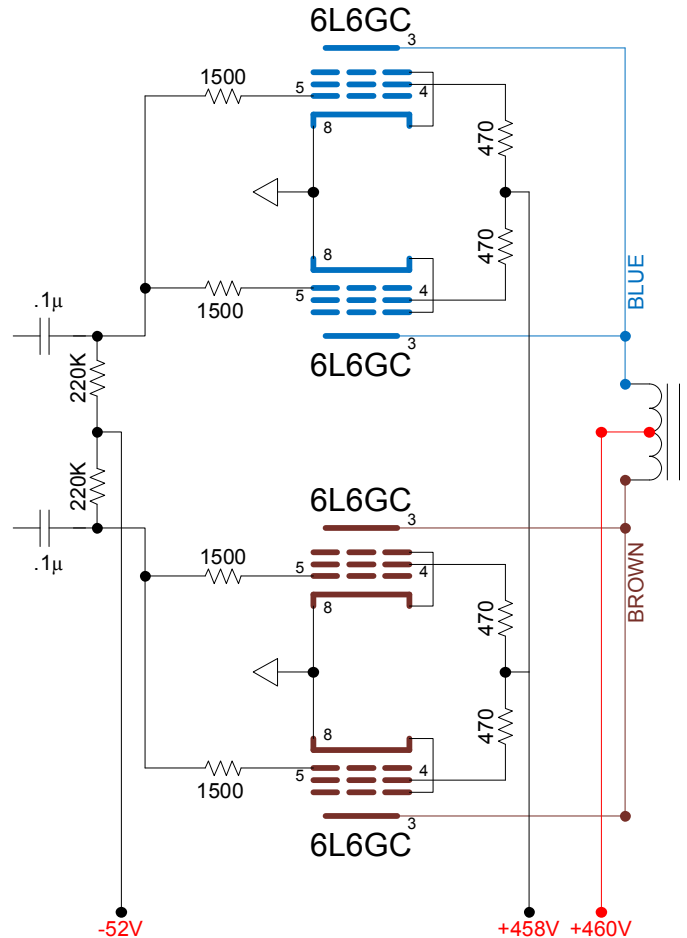
FENDER® TWIN REVERB AB763 POWER TUBE LAYOUT



MUSIC MAN® RD-50

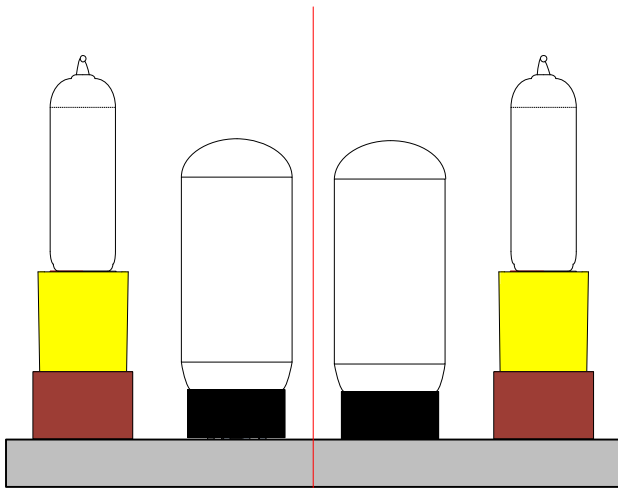


FENDER® TWIN REVERB AB763 OUTPUT STAGE SCHEMATIC

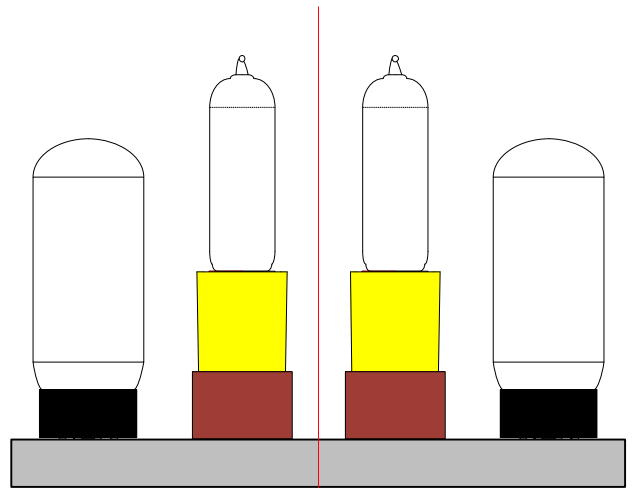


## OUTPUT STAGE SYMMETRY

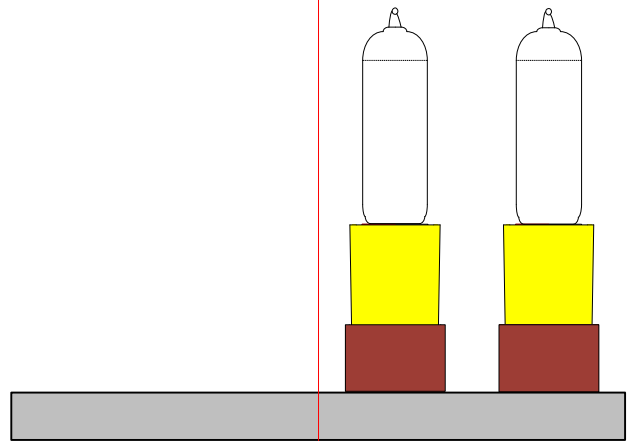
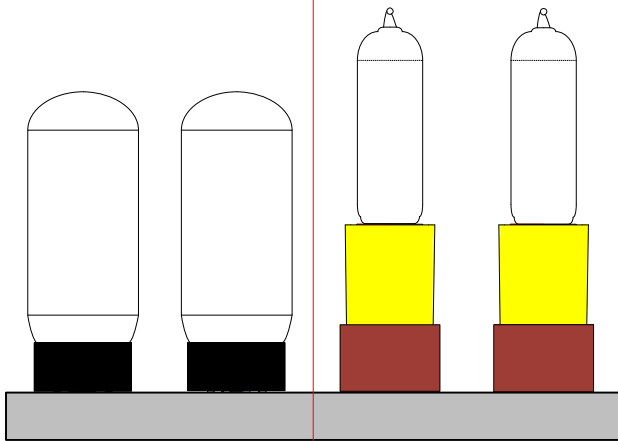
YELLOW JACKETS® ON THE OUTSIDE



YELLOW JACKETS® ON THE INSIDE



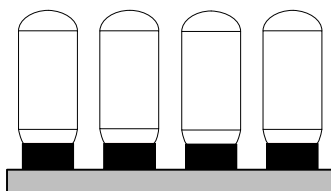
## OUTPUT STAGE ASYMMETRY



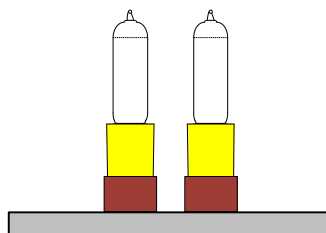
## YELLOW JACKETS® OPTIONS FOR AMPS WITH FOUR POWER TUBES

### Two YJ's and Two Empty Sockets vs. Four YJ's

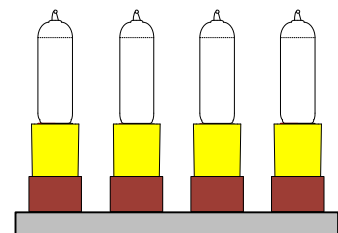
In a 100-watt amp like a Twin Reverb or Marshall 100, either two or four Yellow Jacket converters can be used. If only two are used and the other two (inside or outside) sockets are left empty, the output is dropped to about 20 watts. With four in place, the amp puts out about 40 watts and takes on a whole new warmth and richness.



$P(\text{out}) = 100\text{W}$



$P(\text{out}) = 20\text{W}$

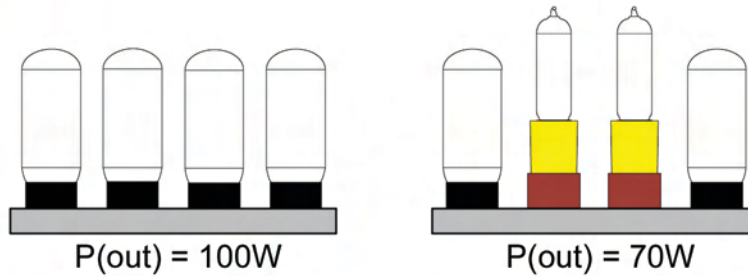


$P(\text{out}) = 40\text{W}$



## Class-A + Class-AB Combination

A further option in a 4-tube amplifier is to leave two of the original tubes in place and replace the other two (inside or outside) with Yellow Jackets. This gives a combination of Class-A and Class-AB operation which sounds quite sweet and complex. The pick attack is tight and punchy from the power of the two Class-AB tubes and the sustain is taken over by the Yellow Jackets operating in Class-A. Try it, you'll like it!



Visit [www.YellowJacketsTC.com](http://www.YellowJacketsTC.com) for product info and video demonstrations.



# Yellow Jackets<sup>®</sup>

### Written by Kurt Prange

Kurt Prange (BSEE) is the Sales Engineer for Amplified Parts in Tempe, AZ ([amplifiedparts.com](http://amplifiedparts.com)). Kurt began playing guitar at the age of nine in Kalamazoo, MI. He is a guitar DIY'er and tube amp designer who enjoys helping other musicians along in the endless pursuit of tone.