

Western Electric 91A/B, 300A, (1933 ?)

Iron input, 310A, 310A, 300A OPT.

This amplifier is equipped with four amplifying stages !. First the input transformer, then the two 310's and finally a little gain from the 300A.. Note the 1u capacitor coupled from the Voltage divider (made of 390k and 10k) to the humvice “neutral” midpoint of the filament cathode. This would as such equal feedback (Like a cathode follower) , but as the decoupling of the cathode resistor removes the AC signals here, the 1u cap and Voltage divider does not do much. In practice the 1u is returned to ground via the 25u, hence forms a low pass filter that bypasses the 10k to ground. I fail to see the point of this network and would simply remove it.

Looking at the PSU , we note the use of series capacitors and resistor network around these. Despite what is often claimed by hardcore WE fans, there is absolutely NO advantage, whatsoever, by doing this. The reason why WE did it this way, was due to the poor technology of capacitors back then. In order to obtain a “high” value of capacitance and not to overloading these by excessive Voltage, it was very sensible to connect these in series and in order to balance the Voltage for the “loose” and drifting capacitors of the time a Voltage divider by means of the resistors were made. It is as simple as that. Today we would replace the entire mess around the first capacitor with a single 20u/600V of good quality. And the one after the choke with a single 10u/600V.

Most of the special WE tricks were made to improve stability and to insure safe long term use. A PSU choke of 10H would be fine. a choke of 5H will do and 20H would be very good.



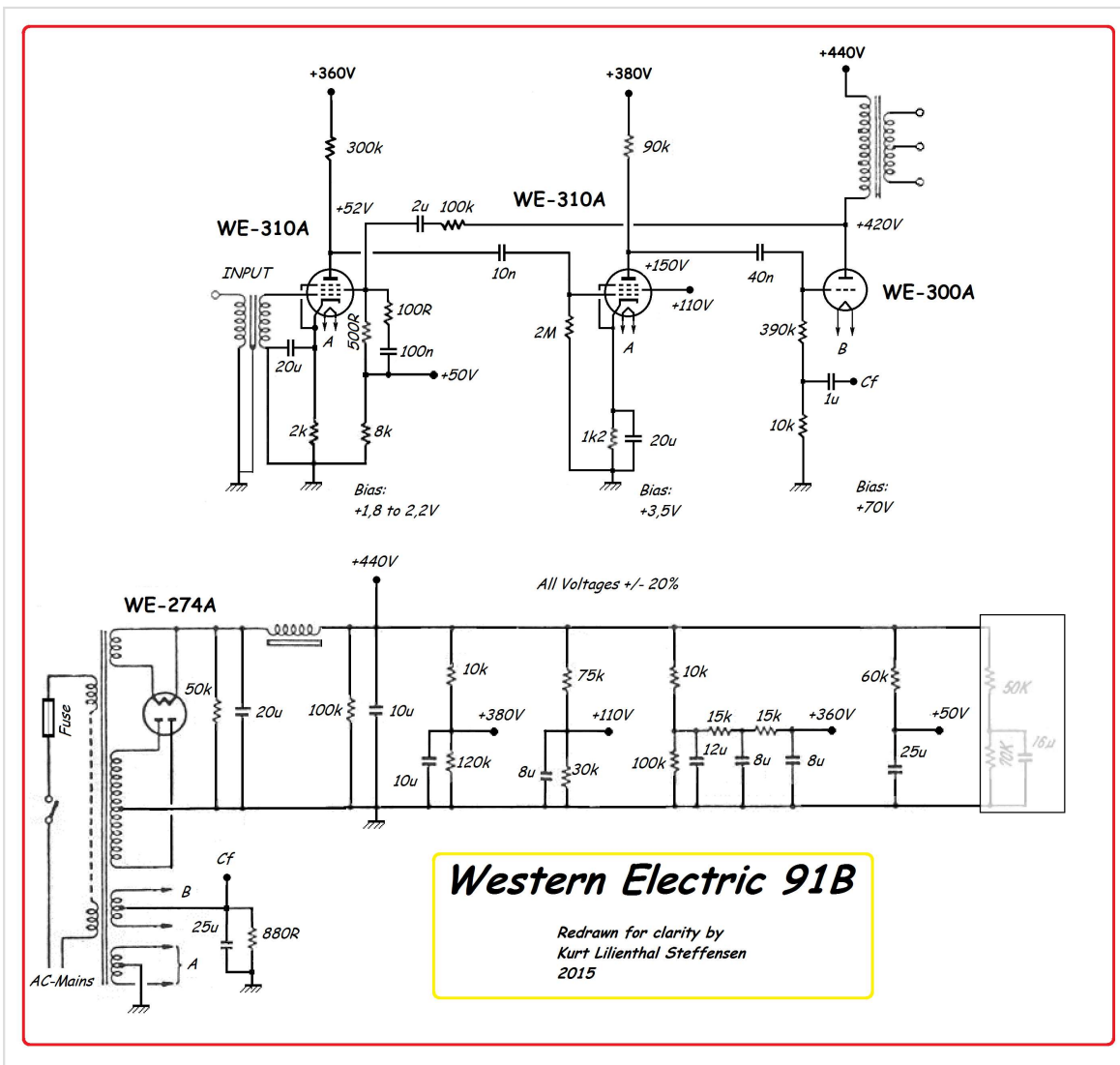
(Pix from “westernlabo.com)

As in most of the vintage amplifiers the gain/sensitivity is way too high for use today .All though it made a lot of sense for use in the 1930’s cinema movie soundtracks from where signals were low, it is also a noise and distortion machine. In particular as we do not need all that gain. The remedy, however is simple..

Remove a stage or two (Sometimes even three) and you are there.

In this case it is relatively easy for a single 310A to serve as the Voltage amplifying stage as well as the driver for a 300A, the 300A being auto biased with a grid resistor of 500k Ohm. I would place an input volume pot before the 310A and it is worth trying to triode couple it. (Two stages might be necessary in particular if you would want to use feedback)

By the way – have you spotted an error in this schematic ? No..?....Well, the grid at the first tube has no ground. This is not good. The secondary of the input transformer needs to be grounded. I have redrawn the schematic for easy read, but I kept that error, for the amusement of it. This schematic has circulated in the die hard SET society for years and I think it is time that someone draws attention to this serious drawing error. Apart from this it is indeed a nice amplifier....80 years on the back...and still rocking...



Western Electric 91B

I have received several emails regarding difficulties in understanding/reading the old WE schematics. Actually they are not that difficult, it is rather that we are unfamiliar with the way they were drawn. Anyway – here it is drawn with the PSU and amplifier separated. Parallel components are drawn as single components, just as WE would have used had they access to modern components. Apart from the Cf return, this is indeed a textbook circuit.