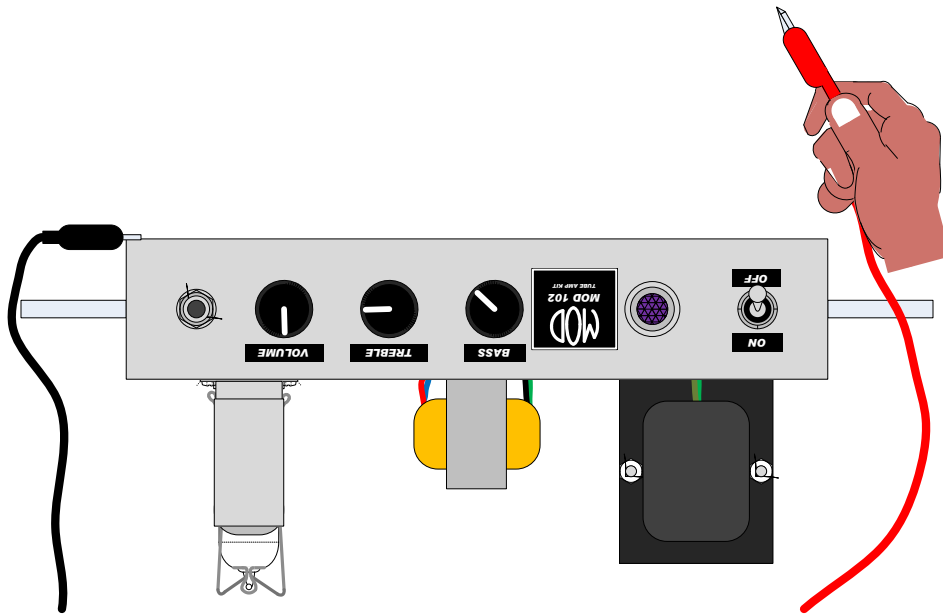


(K-MOD102) TROUBLESHOOTING SUPPLEMENT



Use this supplement to help:

- Measure voltage test points to identify major discrepancies and locate problem areas.

(Keep in mind that the voltage measurements will vary slightly from amp to amp. The voltages you measure should be in the same ballpark, but do not expect to get the exact same value.)

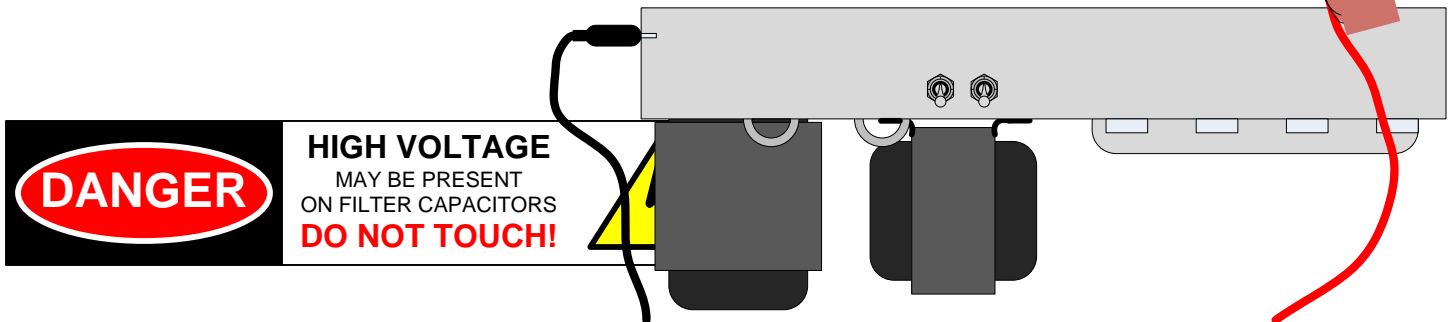
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SAFETY

Tube amps operate at high voltages that have the potential to injure and kill. Please remember the following when troubleshooting this project.

- Only work on the amp when you are wide awake and sober.
- Do not plug the amp in until you have gone through all of the instructions, checking and re-checking each step.
- Do not turn the amp on until you have connected it to a speaker cabinet or dummy load.
- Be aware that tubes become very hot when the amp is on and can take up to 10 minutes to cool down after power is turned off.
- Always follow the one hand rule when working with an amp that is connected to power or may have voltage present. *(Any amp that has been plugged in at one time, may have high voltage present).*

The one hand rule (pictured below): is a safety precaution for working on an amp that is plugged in or could potentially have high voltages present. Using alligator clips with your DMM, clip the ground side to the chassis and use the other side to probe at various test points with one hand. *This prevents a fatal shock which can result from current passing through the heart. (Many people even put their other hand in their pocket or behind their back).*

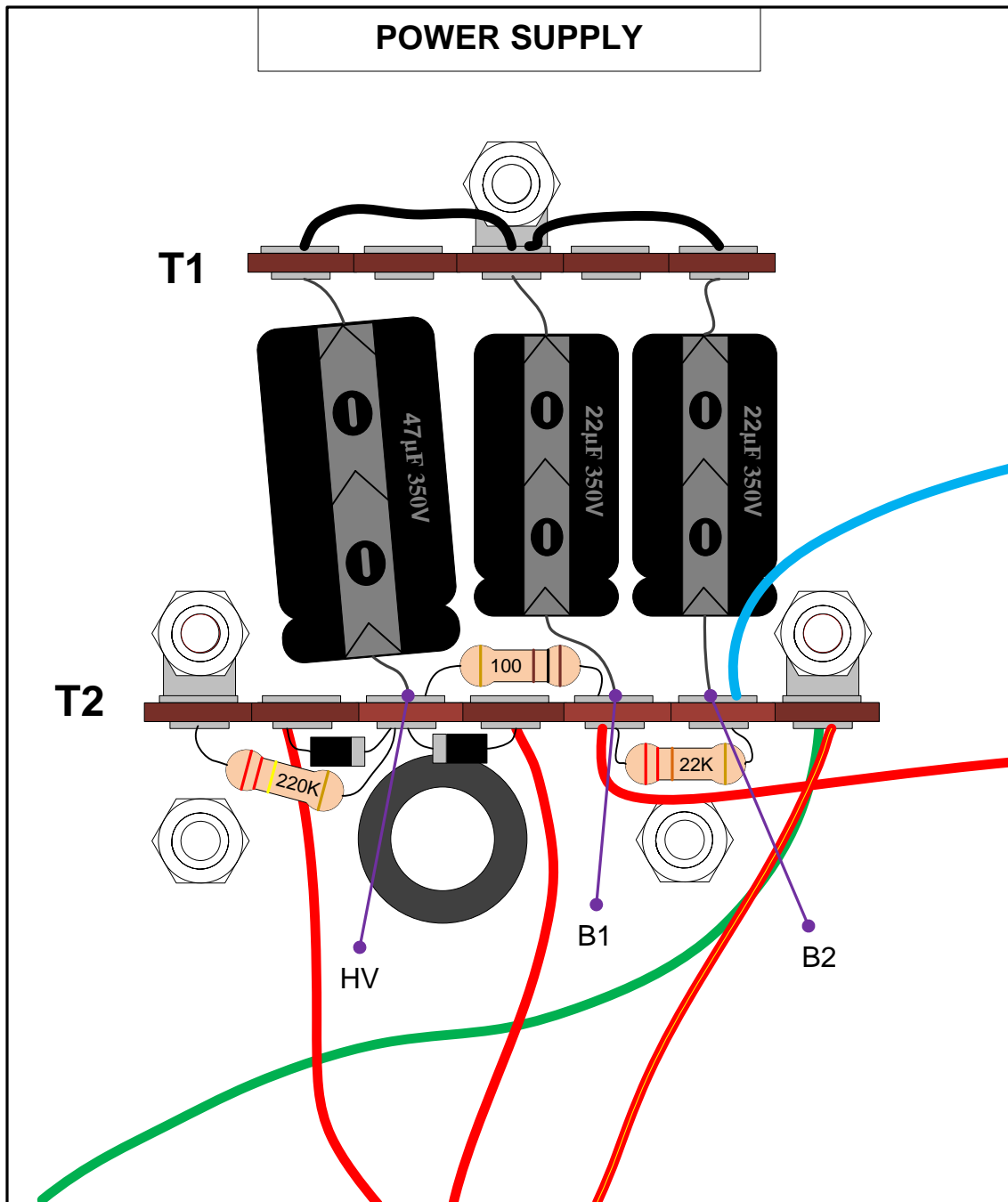


Measuring DC Voltages

After thoroughly double-checking your connections, the next step is to take DC voltage measurements to help locate problem areas. If you have discrepancies in the DC voltages, they must be corrected first before moving on to the AC voltage signal measurements.

- *Always keep the amp connected to an 8 ohm load when the power is on. For DC voltage measurements you do not need the guitar plugged into the amp.*
- **Amp settings:** turn all of the controls - bass, treble and volume to zero. Turn the power on and give the power tube at least 30 seconds to warm up before taking voltage measurements.
- Voltages are measured from test point to ground. We recommend connecting your meter with insulated alligator clips for safety.
- E-mail a list of all your amp's DC voltage measurements to info@modkitsdiy.com if you would like help determining what might be the cause of your voltage discrepancies.

Test Point	DC Voltage
"HV"	264 VDC
"B1"	261 VDC
"B2"	178 VDC

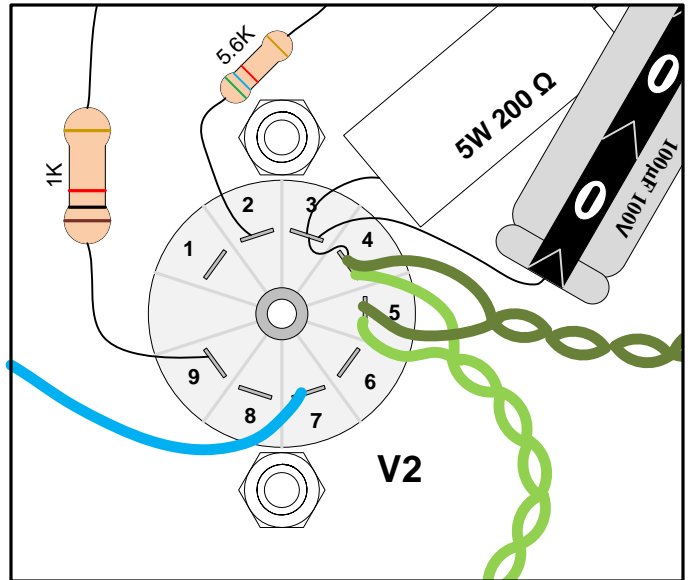


POWER TUBE

Test Point	Name	DC Voltage
V2 (pin 7)	V2 plate	258 VDC
V2 (pin 9)	V2 screen grid	177 VDC
V2 (pin 2)	V2 control grid	0 VDC
V2 (pin 3)	V2 cathode	5.5 VDC
V2 (pin 4)	V2 filament	5.5 VDC

Voltages measured from test point to ground with **no signal** and the following front panel settings:

POWER: ON
 BASS: "0"
 TREBLE: "0"
 VOLUME: "0"

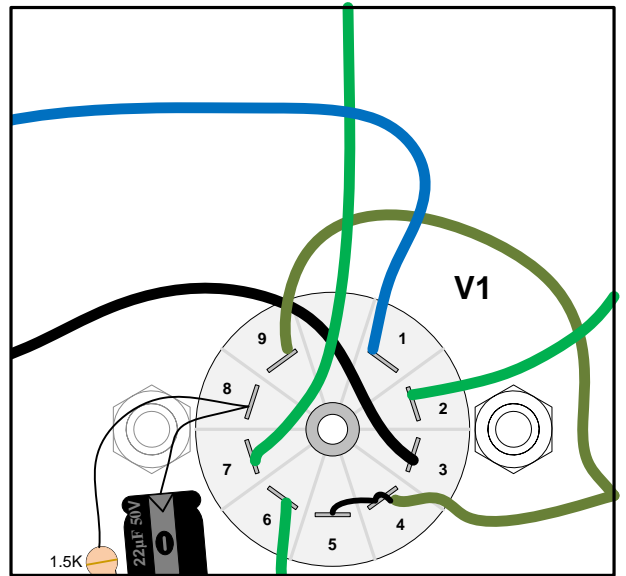


PREAMP TUBE

Test Point	Name	DC Voltage
V1 (pin 1)	V1 plate 1	121 VDC
V1 (pin 2)	V1 grid 1	0 VDC
V1 (pin 3)	V1 cathode 1	0.90 VDC
V1 (pin 6)	V1 plate 2	116 VDC
V1 (pin 7)	V1 grid 2	0 VDC
V1 (pin 8)	V1 cathode 2	0.97 VDC

Voltages measured from test point to ground with **no signal** and the following front panel settings:

POWER: ON
 BASS: "0"
 TREBLE: "0"
 VOLUME: "0"

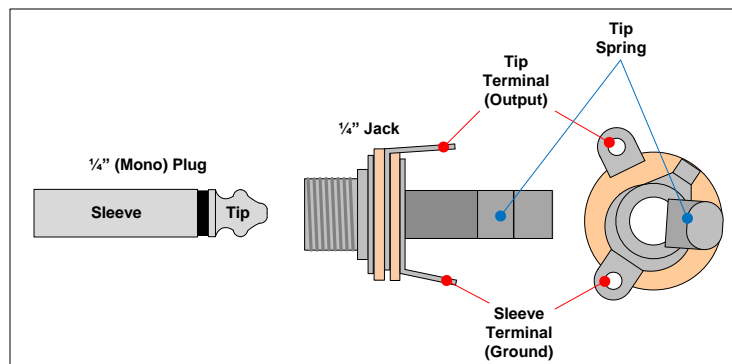


Measuring AC Voltages from the Guitar Signal

Once your DC voltages are in order, if your kit is still not working properly, you can measure AC voltages along the signal path to troubleshoot further.

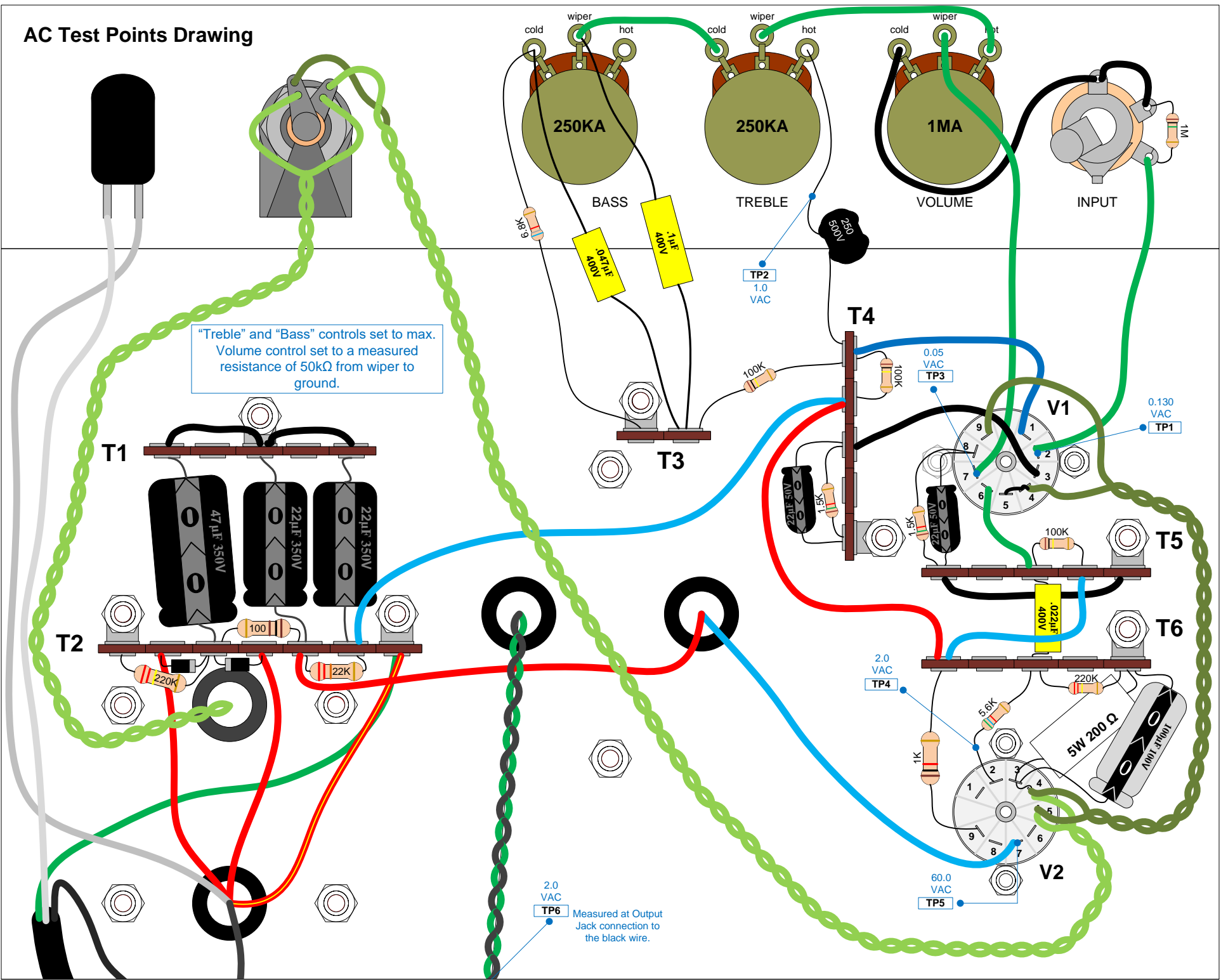
You will need a volt meter that can measure the small signal AC voltages that electric guitars put out. The output signal from your guitar will be less than 1 V.

First, measure the output signal directly from your guitar. You can do this by plugging your guitar cable into the guitar and leaving the other end of the cable disconnected. Connect your meter across the disconnected ¼" plug's "tip" and "sleeve" sections. Make sure your guitar's volume and tone controls are turned up and strum a chord. When you strum, you should see the AC voltage reading on the meter quickly rise to some maximum value and then fall back to 0 VAC when you stop strumming.



Once you are able to measure the output signal from your guitar directly, plug the guitar into the input jack of your kit and use the AC test point drawing to measure the guitar signal along the signal path. Start with test point one and move along in order. You should be looking to identify the last test point where the signal seems normal and the first test point where the signal seems unusual or where it is no longer even present.

AC Test Points Drawing

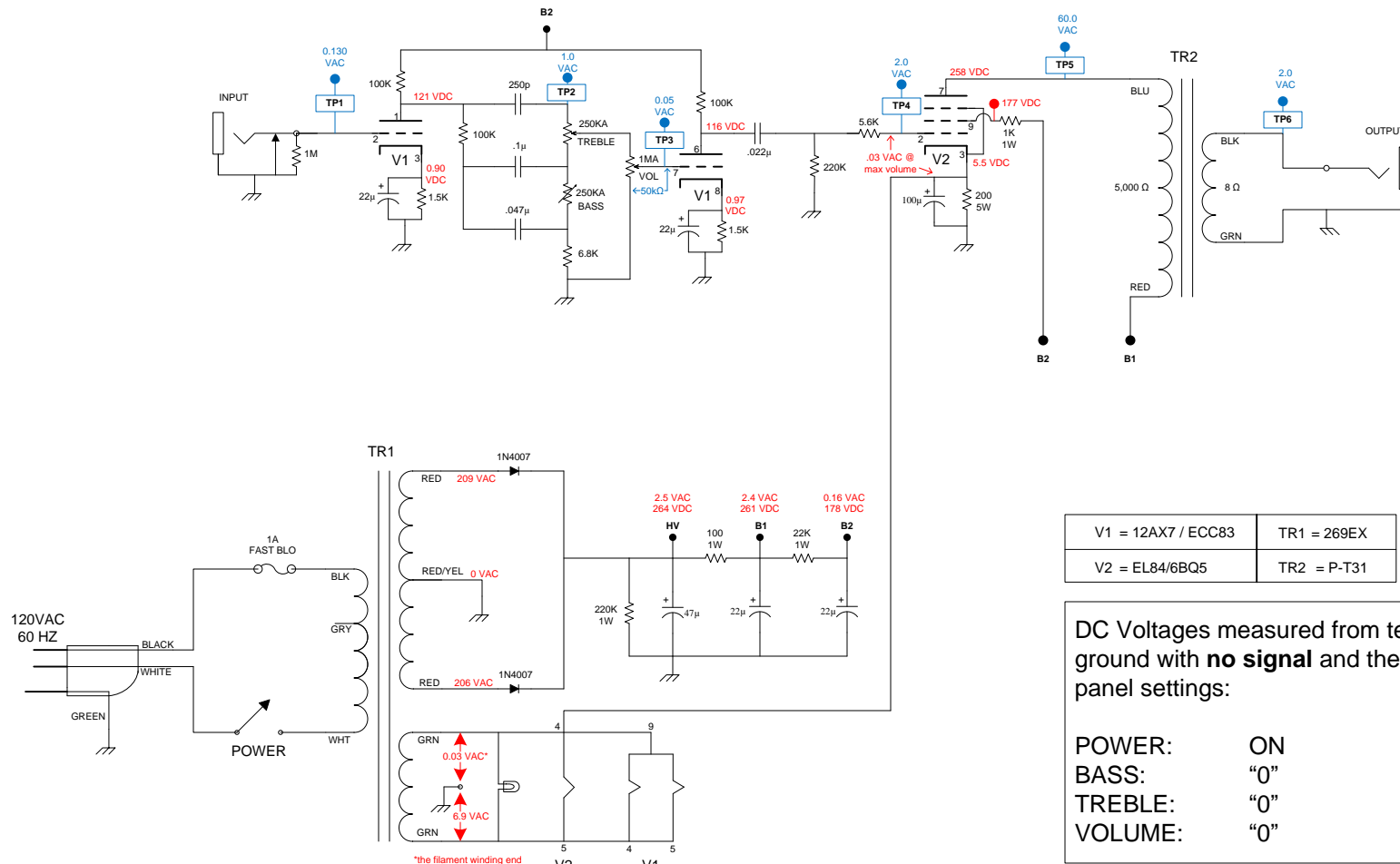


AC Voltages measured with respect to chassis ground. "Treble" and "Bass" controls set to max and "Volume" set to a resistance of 50kΩ from "wiper" to ground.

Signal: Mexican Strat played with open "E" strumming. All controls at max and set to Neck pickup (position 5).

V2 socket measurements with no tube installed:

- Pin 7 (plate) = 280 VDC
- Pin 9 (screen grid) = 242 VDC
- Pin 2 (control grid) = 0 VDC
- Pin 3 (cathode) = 0 VDC
- Pin 5 (filament) = 6.7 VAC



V1 = 12AX7 / ECC83	TR1 = 269EX
V2 = EL84/6BQ5	TR2 = P-T31

DC Voltages measured from test point to ground with **no signal** and the following front panel settings:

POWER: ON
 BASS: "0"
 TREBLE: "0"
 VOLUME: "0"

*the filament winding end connected to V2 pin 3 should measure less than 0.10 VAC with respect to ground.

269EX Resistance Measurements

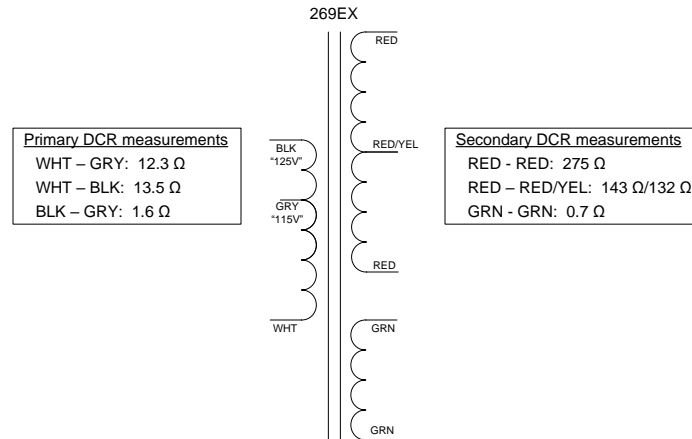
- Red(1) – Red(2): 270 Ω
- Red(1) – Red/Yel: 129 Ω
- Red(2) – Red/Yel: 141 Ω



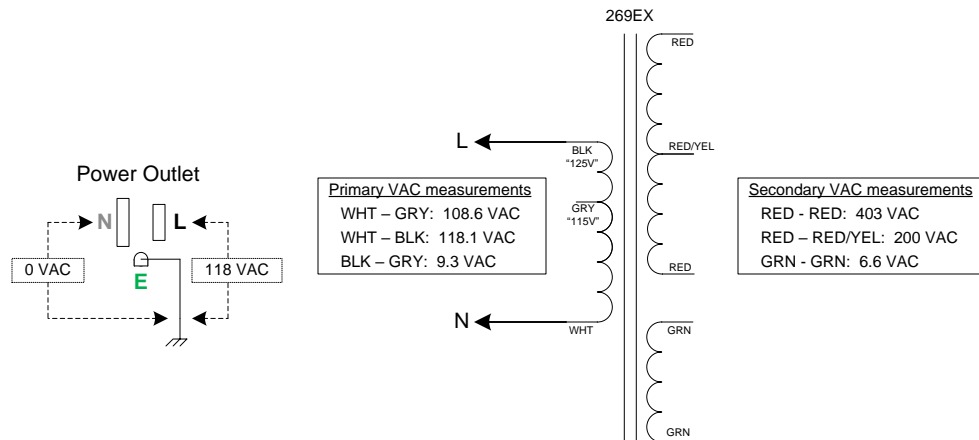
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K-MOD102 Schematic

Open Circuit (No Load) Resistance Measurements



Open Circuit (No Load) Voltage Measurements



V1 & V2 (no tubes)

		V1 (----)					V2 (----)		
		Pin	VDC	VAC			Pin	VDC	VAC
a'	-	1	278	6.2	-	1	0	0	
g'	g1	2	0	0	g1	2	0	0	
k'	k, g3	3	0	0	k, g3	3	0	0	
f	f	4	0	0	f	4	0	0	
f	f	5	0	0	f	5	0	6.8	
a	-	6	278	6.2	-	6	0	0	
g	a	7	0	0	a	7	281	6.3	
k	-	8	0	0	-	8	0	0	
fc	g2	9	0	6.8	g2	9	280	6.4	

V1 (no tube) & V2 (tube)

		V1 (----)					V2 (EL84)		
		Pin	VDC	VAC			Pin	VDC	VAC
a'	-	1	189	0.3	-	1	0	0	
g'	g1	2	0	0	g1	2	0	0	
k'	k, g3	3	0	0	k, g3	3	5.8	0	
f	f	4	5.9	0	f	4	5.8	0	
f	f	5	5.9	0	f	5	5.9	6.5	
a	-	6	188	0.3	-	6	0	0	
g	a	7	0	0	a	7	245	5.6	
k	-	8	0	0	-	8	0	0	
fc	g2	9	5.8	6.5	g2	9	188	0	

V1 (tube) & V2 (no tube)

		V1 (12AX7)					V2 (----)		
		Pin	VDC	VAC			Pin	VDC	VAC
a'	-	1	164	0	-	1	0	0	
g'	g1	2	0	0	g1	2	0	0	
k'	k, g3	3	1.2	0	k, g3	3	0	0	
f	f	4	0	0	f	4	0	0	
f	f	5	0	0	f	5	0	6.7	
a	-	6	158	0	-	6	0	0	
g	a	7	0	0	a	7	280	6.9	
k	-	8	1.3	0	-	8	0	0	
fc	g2	9	0	6.7	g2	9	243	5.6	

V1 & V2 (tubes)

		V1 (12AX7)					V2 (EL84)		
		Pin	VDC	VAC			Pin	VDC	VAC
a'	-	1	119	0	-	1	0	0	
g'	g1	2	0	0	g1	2	0	0	
k'	k, g3	3	0.8	0	k, g3	3	5.3	0	
f	f	4	5.3	0	f	4	5.3	0	
f	f	5	5.3	0	f	5	5.3	6.4	
a	-	6	114	0	-	6	0	0	
g	a	7	0	0	a	7	243	5.9	
k	-	8	0.9	0	-	8	0	0	
fc	g2	9	5.3	6.4	g2	9	170	0	