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EML 45B

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Description



Features

- The 45B tube is designed to build amplifiers with fully original 45 tube sound, but the 45B is able to do so at more than twice the output power. However to achieve this, the amplifier needs to be modified, or new designed.
- Without modification, the 45B can be used in every normal 45 amplifier just as well.

High Resolution

About the 45 tube, 45B tube, and how to use it.

The 45B tube resulted from the many conversations I had with my friend Roger Modjeski, who unfortunately passed away in 2020. Roger spend his entire life and career on designing classical tube amplifiers, combining high output power with long tube life.

[How to use the 45B instead of the 45.](#)

Guarantee program for first owner.

At EML we have the normal guarantee. In addition to that, the first owner can register the tube within 4 weeks after receipt, at the Emission Labs website, to participate in the 5 years guarantee program.

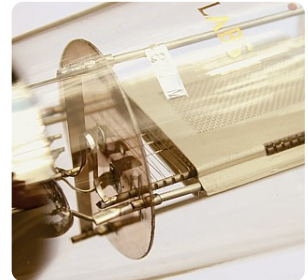
[Our Guarantee conditions](#)

[Register here for the 5years guarantee](#)

EML 45B Filament Ratings

Filament Voltage	= 2.5Volt (AC or DC)
Electronic heater modules:	Only voltage source
Tolerance on filament voltage	5%
Filament Current	~ 1.5Ampere
Maximum Time on Stand By (Heater voltage only)	2 hours

All 45 Versions



Several other versions exist. We have a solid plate version, the 45M (mesh) version, and the new 45B, which can be used to achieve higher output power. Additionally we sometimes build a limited series of globe glass 45 or 45M tubes.

45 (Solid)

45M (Mesh)

45B

Globe

Lifetime of the 45



We have this amazing lifetime report by a customer from Canada, who build a pair of 45 into an amplifier with hour counter on it.

[Read more...](#)

Very Nice Article

EML 45B Capacitance

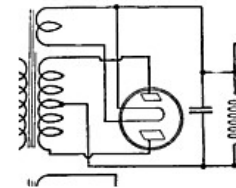
Grid to Plate	7pF
Grid to Filament	4pF
Plate to Filament	3pF

EML 45B Maximum Conditions

Plate Voltage	420Volt
Plate Current	53mA
Minimum Plate Dissipation	8.5Watt
Continuous Plate Dissipation	22Watt
Power Output in Class A	5.2Watt
Grid resistor	500k Ohm

EML 45B Factory Test conditions

Plate Voltage	275V
Plate Current	36mA



Written it 1929, but nothing has changed ever since.

[Full article](#)

Did you know?

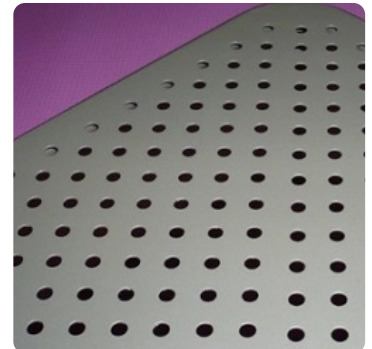


Emission Labs was the first company to re-introduce the 45 tube again, in 2001

45B Recommended Single Ended operating points. Bias Method: Auto Bias.

Line	Vb	Ua	Rk	Ug	Ia	Ra	Transformer examples	P Tube	P Out	Damp. factor	2nd harm. (%)	Tube
						Ω	See also note 2, 3, 4, 5					
1	331V	275V	1555Ω	-56V	36mA	4k6	LL1663-40mA. 8Ω	9.9W	2W	3.5	4.5%	45, 45M, 45B Classic RCA circuit
2	331V	275V	613Ω	-46V	75mA	5k5	LL1620-080 4-8-16Ω	20.8W	2W	6.4	0,72%	45B Note2 Graph
3	466V	384	2000Ω	-82V	41mA	9k2	LL1679-055 8- 16Ω	15.8W	3.1W	4.6	3.5%	45B only. Note6
4	466V	384	2000Ω	-82V	41mA	6k5	LL9202-050 4- 8-16Ω	15.8W	4W	3.2	4.9%	45B only. Note7
5	495V	408V	1800Ω	-87V	48mA	9k2	LL1679-055 8- 16Ω	19.7W	3.6W	5.1	3.4%	45B only. Note6
6	495V	408V	1800Ω	-87V	48mA	6k5	LL9202-050 4- 8-16Ω	19.7W	4.5W	3.6	4.4%	45B only.

Warning for FAKE mesh

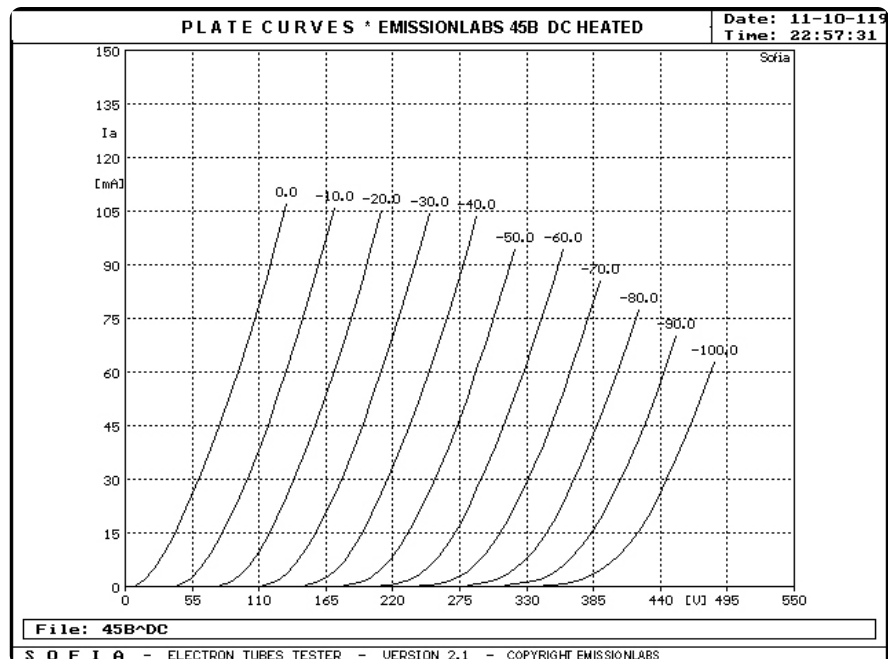
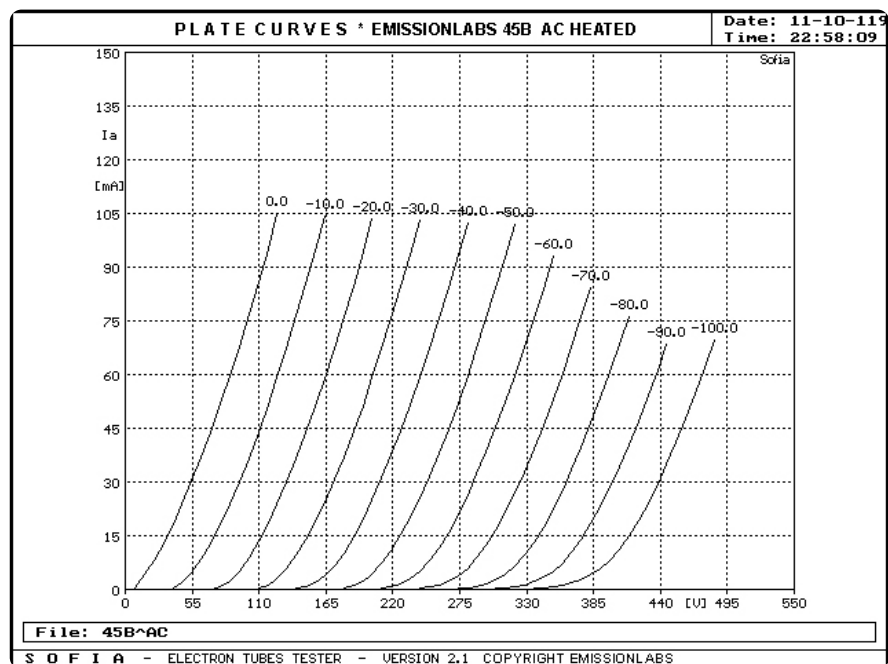


[Full article](#)

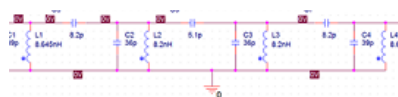
													Note7
7	495V	408V	1800Ω	-87V	48mA	5k	LL1663-050 8Ω.	19.7W	5.2W	2.7	5.6%	45B only. Note8	
8	495V	408V	1800Ω	-87V	48mA	5k	LL1663-050 8Ω.	19.7W	4.5W	2.7	3%	45B only. Note9	

A final note about distortion: Note10 .

Credit: We want to honour our late friend Roger Modjeski, from the company RAM-LABS / Music Reference USA, for doing many detailed measurements on the 45B tube. He showed, the published maximum distortion and maximum output power in this data sheet was achieved easily. Even so, the 45B seemed capable of doing more as published here. Thank you very much Roger. You will be remembered!

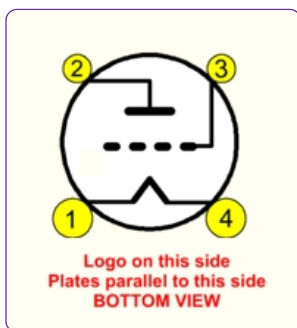


SPICE Parameters for circuit simulation



[SPICE Parameters overview](#)

EML 45B Mechanical Data



Ceramic UX4 Base

Size including Socket
(but excluding pins)

145 x 58 mm

Weight of one tube:

140 Gram

Pin 1: Heater1

Pin 4: Heater2

Pin3: Anode (Plate)

Pin3: Grid

Notes

- Note1) With tubes, miniaturization and linearity do not go together well. This is explained by electrical fields having specific behavior which does not follow the miniaturization exactly. With the EML45, the plate is larger than the historical 45, which large size contributes to lower distortion. This is documented by an external company, and they report 30% lower distortion compared to historical 45. [Read here](#).
- Note2) Almost no distortion, and exceptional high damping factor. Ultimate circuit for back loaded horns, which need little power, but highest damping factor, to prevent muddy sound. Damping Factor is R_a/R_p . Here 6k/933. [Proof of calculations here](#).
- Note4) Distortion drops considerably at lower signal. A distortion compare between two operating points should be made at the same output power.
- Note5) Transformer DC loss NOT included in Supply voltage. So depending on the chosen transformer, the Supply voltage needs to be chosen slightly higher, to compensate for the DC loss across the transformer.
- Note6) This working point gives superior results for all parameters, being: Output power, distortion and damping factor.
- Note7) This working point gives damping factor and distortion similar to the RCA circuits. Yet at higher output power.
- Note8) This working point is optimized for highest output power, at the compromise of damping factor. Distortion may seem high at 5.2 Watt, but this reduces drastically at lower output signal of 4.5 Watt. For this see Note 10.
- Note9) This is the same working point as above, and it demonstrates an amazing 30.4dB low distortion, yet at 4.5 Watt still. However damping factor is not very high. This would be a meaningful application for loudspeaker systems using an active bass, so damping factor plays no important role.

- Note10) As you see from the examples, there is no "best" working point. It is confusing if you were looking for that. You need to choose one, which suits your own needs best. Keep in mind, distortion is specified at full power for the working points, but it drops exponential at lower power. A triode amplifier with 5% distortion at full power is considered very good, as distortion drops drastically at half of maximum power.