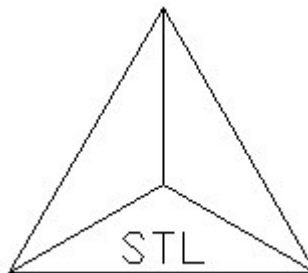


User Manual

Audio Tube Tester

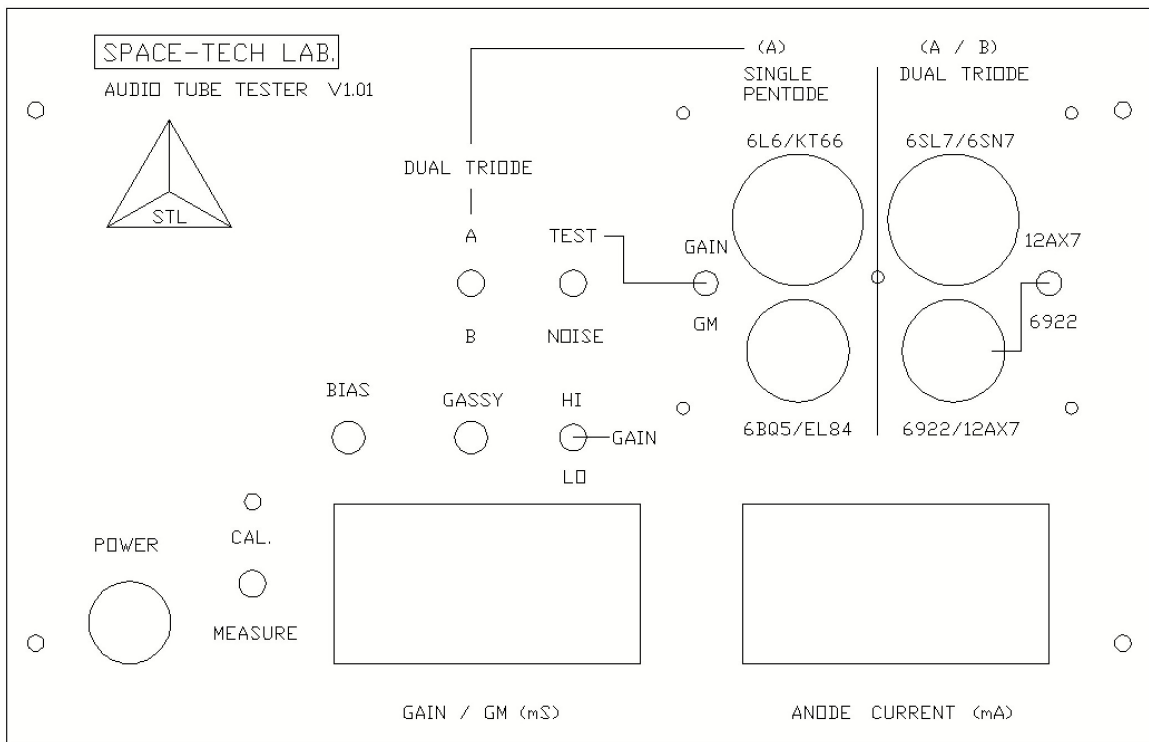
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Ver. 1.1



Product description:

This is an universal audio tubes tester with super user friendly human interface, no need for steep learning curve, just plug and play and get a very reliable and repeatable result on 'Gain', 'Gm mutualconductance (mS)' and 'emission current (mA)', so that you can select and match them for best audio experience. There are 4 test sockets include single pentode in octal 8 pin + regular 9 pin socket, as well as dual triode in octal 8 pin + regular 9 pin sockets. Please do not leave tubes under test for too long time (over 5 minutes) without attention, since the test condition might set to very extreme and exceed the maximum spec of the tubes, then the tube under test might be damaged or even the tester circuit.



Functional description:

For small signal tube testing, the bias setting usually set to max. as standard test point. For high power output tubes, please set bias to minimum as start, then turn to desired test current after tubes warm-up and take the reading. Usually we recommend use bias current between 40-60mA for power tube testing.

Bias – this knob control the bias current, for small to medium size tubes most of the case set to max. (around -0.8 to -1V) , for big size power tubes set to desired mA, most of the case 60mA will be proper for power tubes like 6550, EL34, 6L6, KT88...etc as reference point. You can also set to certain desired current to mimic the operation condition of your audio gears. Please check on-line tube data for recommended bias current, set to max. bias might damage certain power tubes if they are too much aged or weak.

Test /Noise – this switch select “TEST” (Gain / GM) or “noise test” mode. When set to 'TEST' position, the test signal from EAT-100 will deliver to the tube for measurement of either gain or GM . If set to 'noise' position (TEST switch set to “Gain”) , the test tone will be cut out from the tube, so the display and RCA output is the residue noise of the tube and the system noise. When choose “Noise” test, the Gain/GM setting must in “Gain” position in order to have valid readings. Use the finger nail to knock on the glass of the tubes should show higher noise value and is absolutely normal.

GAIN / GM – This switch select between “Gain” test or “Mutual-conductance Gm” test. The relationship between gain and Gm is $\text{Gain} = \text{Gm} \times \text{Rp}$, which Rp is the plate resistance of the tube. Which means in order to practically match tubes in the audiophile world, test the gain is the real deal, because even Gm is matching exactly but the Rp of the tube is different, the end result gain will be different too, and that will reflect in the channel balance. The Gm test is mostly for tube seller or manufacturer, because not all tubes being sold will be used in the audiophile field, in certain equipment circuits, Gm is the most important aspect for tube matching. This switch must set to “Gain” for noise testing. **GAIN/GM** – This switch select between “Gain” test or “Mutual-conductance Gm” test. The relationship between gain and Gm is $\text{Gain} = \text{Gm} \times \text{Rp}$, which Rp is the plate resistance of the tube. Which means in order to practically match tubes in the audiophile world, test the gain is the real deal, because even Gm is matching exactly but the Rp of the tube is different, the end result gain will be different too, and that will reflect in the channel balance. The Gm test is mostly for tube seller or manufacturer, because not all tubes being sold will be used in the audiophile field, in certain equipment circuits, Gm is the most important aspect for tube matching.



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Hi / Lo – This switch select between “High Gain” or regular reading for the gain display. For tubes with gains higher than 30 can set to HG position, so that the gain reading will co-related to the data sheet. Such as 12AX7 with a idea gain of around 100, if use regular reading the tester will only show 30-40, if set to HG position then it can show the idea gain according to the tube datasheet. This setting can also use to enhance the resolution of the noise or gain reading display by multiply the measured reading by a few times, so that a higher reading will be displayed for more precise matching. A tube with gain of x10 might measure as 10.0, if the other tubes under matching shows 10.1, which is a resolution of +/- 0.5%. If set to HG position, then the first tube might display as 30.0, and the other tubes might show 30.1, this is a resolution of +/- 0.16%, much higher resolution than the regular settings.

GASSY – Set “TEST/Noise” switch to Noise position, for normal tubes this LED will not lit up in any bias position, for shorted grid tubes will show lit up when turn the bias pot in certain spots.

A/B – this switch select between different section of dual triode. Set to A position for single pentode testing.

12AX7/6922 – this switch select between 12v filament or 6V filament for 9 pin dual triodes (pin 4-5), wrong setting just will not lit up the filament of the tube but will create no damage.

Anode current meter – this meter shows the real time anode current (or plate current) of the tube under test in mA from 0.1-199.9mA. Due to the current limit protection of this unit, max. current reading will be less than 120mA.

Gain/Gm meter – this meter can shows either gain , Gm , calibrated reference and noise voltage by proper switch combinations. When set to gain it should the amplification factor, when set to GM it shows the Gm in mS, when set to noise it shows noise in AC mV, when set to calibrate it shows Reference signal in AC mV.

CAL. /Measure – this switch select between calibration mode or measurement mode, when set to “CAL.” position, the Gain/GM meter will show the reference voltage, user should calibrate the reading to between 99-101mV (thru a small hole with a trim pot right above this switch) , then the test result can be within +/- 1 % accuracy. If set to between 99.5 – 100.5mV, then the test result can be within +/- 0.5%. Switch back to 'Measure' position after calibration for normal testing. Please be noted that the “TEST/Noise” switch has to set to “TEST” position when do the calibration without any tubes in the sockets.

Noise Output – this is noise signal from the tube under test, you can connect to an audio amplifier with volume control and monitor the noise. Just use a noise free tube and set the volume of the amplifier to hear some regular background noise. Then put in a tube for noise test and hear if any different noise shows. You can use finger nail to hit on the body of the tube, the digital readout should indicate certain value, and you



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should hear the noise when connect to this output. There will always be some more or less stable readings when doing noise test even the tube is noise free, for noisy tubes, you will see the reading jump up and down, the higher the jump then the more noise it indicate. Which is similar to knock the glass of the tube with your fingure nail. The higher the noise reading vary when the nail hits the glass of the tube, the higher microphonics of the tube it is.

Note: 6922 is a very sensitive tubes, to test this tubes should first set the bias to minum, wait for the tube to warm up, then slowly increase the bias voltage untill the anode current shows 10-15mA, then you can take the gain or GM readings. Due to the instability of this tube, the bias current might drift quickly, so should keep close monitor and adjust the bias properly, otherwise the anode current might be too high and killed the tube with an extensive time of unattention.

The following tubes can be tested, as well as all their pin compatible models

(for 6922 / 12AX7 socket) 6V filament tubes set to 6922 position, 12V filament tubes set to 12AX7 position.
12AX7, 12AU7, 12AT7, 12AY7, 12AV7, 12BH7, ECC81, ECC82, ECC83, ECC85, ECC88, 5814, 5751, 6922, 6H30, 6N1P, 6DJ8 and all their pin & filament voltage compatibles..etc

(for 6SL7 / 6SN7 socket)

6SL7, 6SN7, 6SU7, ECC32, ECC33, ECC35, 5691, 5692 all their pin & filament voltage compatibles..etc

(for 6L6 / KT66 socket)

6L6, 6V6, 6Y6, 6G6, 6F6, 6550, EL34, KT66, KT77, KT88, KT99, KT100, KT120, KT150, 6CA7, 5881 all their pin & filament voltage compatibles..etc

(for 6BQ5 / EL84 socket)

6BQ5 , SV-83, EL84 all their pin & filament voltage compatibles..etc (EF86 and 6267 require converter)

Those tubes not in the above listing can still be tested as long as the pin configurations and filament voltage can fit this tester



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With the upgrade of our 300B or 845 expansion adapter, the test capability can be further expanded. Simply plug in the included small adapter cable, with the 8 pin octal end to the 6L6G socket, the 4 pin metal connector to the expansion adapter rear 4 pin input, and set to proper test voltage (between 2.5 to 12V) will do. Please make sure connector orientation must correct otherwise serious damage might happen to either the tube test or the expansion unit.

Example on how to test a 6SN7 (which is a dual triode, typical test current is 9-10mA according to most of the datasheet)

1. put in the 6SN7 tube to the test socket label 6SL7/6SN7
2. set A/B to A (testing for the side A of this dual triode)
3. set measure / cal to measure
- 4 set test/noise to test
5. 12ax7/6922 switch doesn't matter what position, since it is use to select either of these tubes
6. set Gain / GM to Gain
7. set Hi/Lo to Lo
8. cal. bias to make emission current around 9-10mA (right side meter)
9. wait for tube warm up and the reading on the gain/GM (meter in the center) meter should be the gain
10. set Gain /GM to GM
11. cal. bias to make emission current around 9-10mA (right side meter)
12. the reading on the gain/GM meter is the GM in mS , if you want the reading in uS just multiply it by 1000.
13. set A/B to B (testing for the side B of this dual triode)
14. repeat step 3 to 12
15. set test/noise to noise (test the noise of side B since the A/B is already in B position)
16. the basic noise level of the tube should shown in the gain/Gm meter, if the meter shows a stable reading then it is just the background system noise and no need to concern. If the reading is jumping up and down then this is the noise of the tube, the observation pretty much the same as when you tapping the glass of the tube with your finger.
17. set A/B to A (test the noise of side A this time)
18. after test remember to remove the tube from the test socket. Left the tube in the tester unattended might shorten the lifespan of the tube and the tester.

Reference Data (different tube manufacturers may vary)

Testing examples on reading of different common audio tubes

Set GM/ Gain , then set Hi/Lo accordingly

Calibrate the Bias knob to make the Anode Current roughly within the range (mA) then you should get the proper GM and Gain readings respectively

	GM (mS)	Bias(mA)	Gain (Lo) / (Hi)
6922/6DJ8	7.0 – 13.0	10-15	60-90
12AX7/ECC83	1.0 - 2.0	0.8-1.0	80-120
12AU7/ECC82	2.0 – 3.0	8-12	15-20
12AT7/ECC81	3.5 - 4.5	5-6	50-100
6SN7	1.5 – 3.0	9-10	15-25
6SL7	1.0 – 2.5	2-2.5	60-90
6SU7	1.5 - 3.0	2-2.5	60-90
6L6G/EL34/6550/KT88	4.0 -12.0	30-40	6 - 10
6BQ5/EL84	11.0 – 14.0	25-35	15-20

for more information about gain and exact Gm of certain models, please search on the web for tube data sheet.

Power input :

AC version : 100-240V AC 50-60Hz (for USA and CANADA orders)

DC version 12V DC 5A (international orders will be built using this option including an external DC 12V adapter)



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Caution: There is high voltage inside this unit and its attached modules , should not open the box unless with qualified technician, or under proper instruction. Make sure you know what you are doing and is do it at your own risk !!

Disclaimer:

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Warranty : One year free parts and labor warranty apply under normal operation condition , buyer pay for shipping. Physical damage or abuse of system will not covered.