



Mid-Atlantic Antique
Radio Club

Collecting and Preserving Our Electronics Heritage

MODERN HIGH-END TUBE TESTERS

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5 June 2026

PRESENTATION PURPOSE

- Why is Vacuum Tube Testing becoming increasingly more important nowadays?
- How do modern day tube testers help to meet the demands for known good vintage vacuum tubes for Radio, TV, HiFi and Commerce users?
- What are the design parameters and functional concepts of two key testers, the Amplitrex AT1000 and the Maxi-Matcher?
- What are these testers limitations/weaknesses?
- How should the test results of these testers be interpreted?

PRESENTER NOTES:

- Why should anyone care about testing vacuum tubes?
- To present and discuss the advantages and limitations of the Modern-day Tube Tester as it relates to Radio, HiFi and Commerce tube testing purposes
- Discuss the design parameters and functional concept of the Amplitrex AT1000 and the Maxi-Matcher
- Identify their limitations as it relates to the original design trade space.
- Review of how these testers function and how the test results should be interpreted/analyzed.

WHY VACUUM TUBE TESTING IS VERY IMPORTANT

- Vintage vacuum tube equipment has become increasingly popular in some consumer areas.
- Most vacuum tube types are no longer made
- The remaining “stock” of vintage vacuum tubes is diminishing.
- Known “good” or NOS Vintage vacuum tubes are preferable to users, buyers and sellers.
- Buyers are seeking the best VALUE for the seemingly ever-increasing prices of good and NOS vintage vacuum tubes.
- Getting value for the money involves knowing how a tube was tested as well as the intended application.
- Asking the “right questions” and being an “educated buyer” is extremely helpful.

PRESENTER NOTES:

- Why should anyone CARE about testing vacuum tubes?
- Vintage HiFi, Musical Instrument, Amateur Radio and Antique Radio equipment has become increasingly popular.
- Most major manufacturers of vacuum tubes ceased all production by the mid-1980s (40+ years ago).
- Remaining stock of AVAILABLE vacuum tubes continues to dwindle despite cited enormous production numbers
- Premium vintage vacuum tubes can fetch enormous prices nowadays so testing is key in providing value particularly in rigorously demanding applications.
- Asking questions as to, what tester was used, what test parameters were used, what was the Q-point in relation to the published specification and/or data and even VISUAL EXAMINATION of the tube for key signs of wear (or even misuse) are all ways to be an educated buyer.
- Yes, there are esoteric, “cottage market” designers in audio that design with vacuum tube technology.

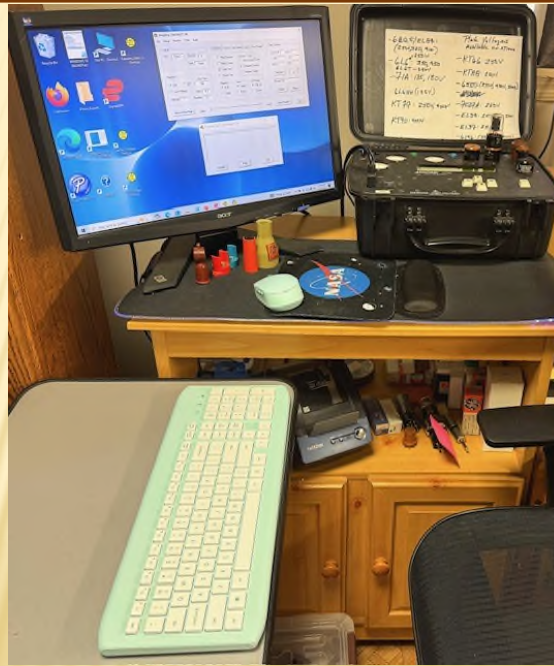
AMPLITREX AT1000 – WHO BUYS THESE?

- Target Customers:
 - Users that desire standard, repeatable test results that can be easily documented and compared to original tube design data. These would include:
 - Design engineers
 - Repair shops – guitar amps, HiFi audio amps, Broadcast Radios, Test Equipment, and Amateur Radio
 - Resellers – commerce individuals that are trying to meet the demands for “Known Good Vintage Tubes”, especially those for the musical instrument and Audiophile communities.

PRESENTER NOTES:

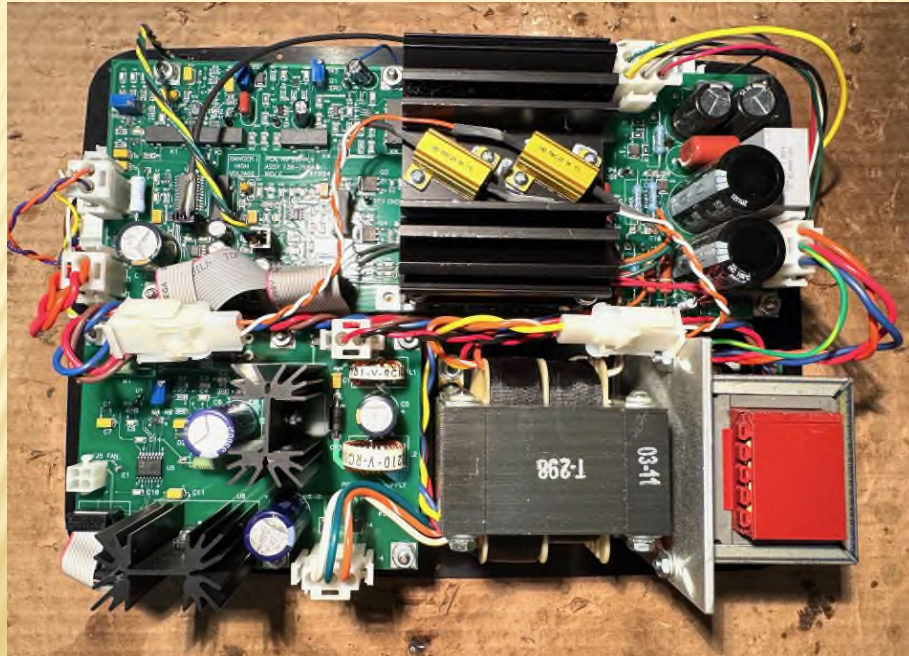
- These are for the BUYERS of this tester but YOU as a buyer of TUBES for vintage equipment should be familiar with what VALUE you are getting.
- Validation use of tubes purchased for use in personal vintage equipment.

MY AMPLITREX AT1000 TEST SETUP W/LABEL MAKER



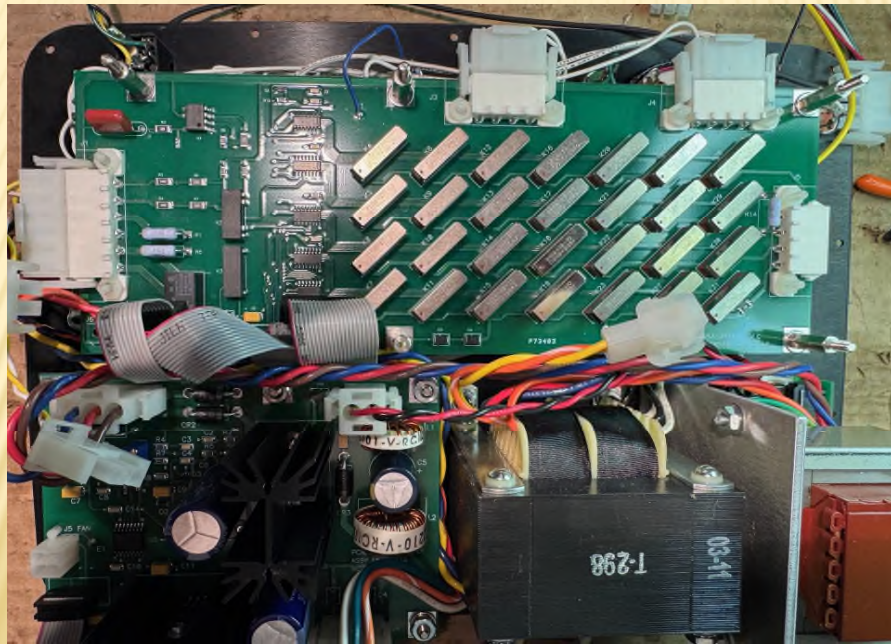
PRESENTER NOTES

MY AMPLITREX AT1000 TEST SETUP W/LABEL MAKER



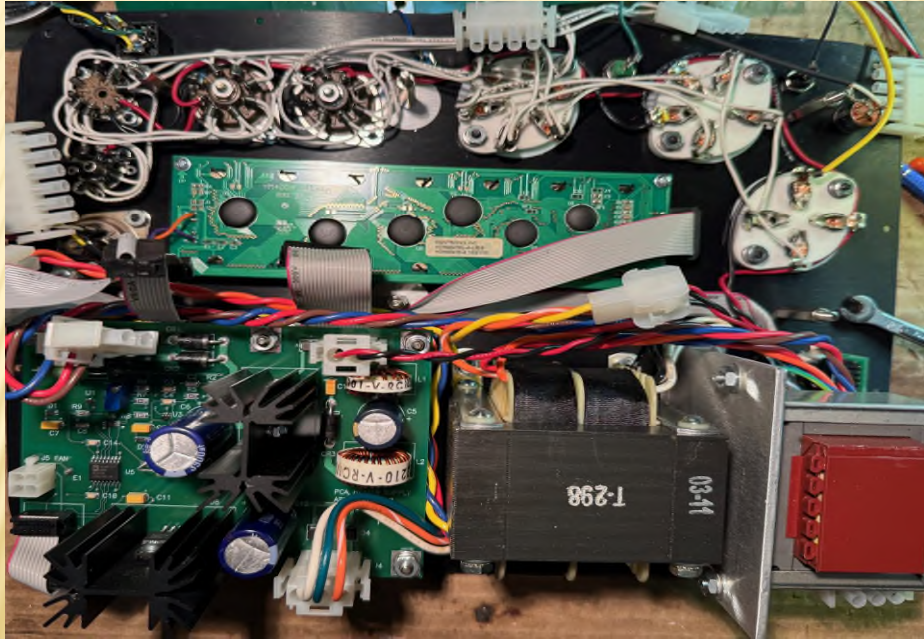
PRESENTER NOTES

MY AMPLITREX AT1000 TEST SETUP W/LABEL MAKER



PRESENTER NOTES

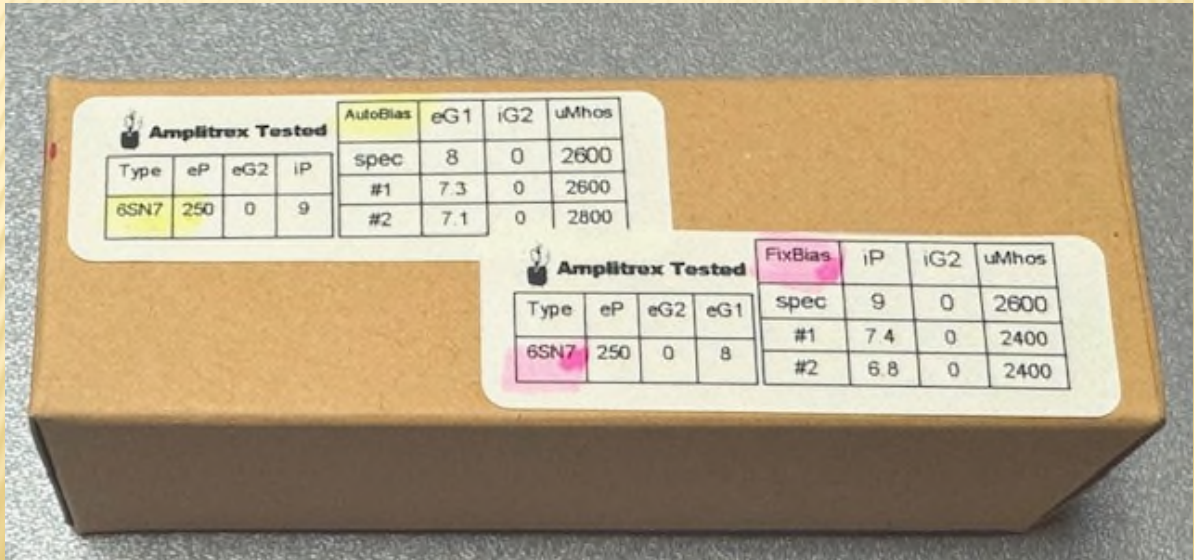
MY AMPLITREX AT1000 TEST SETUP W/LABEL MAKER



PRESENTER NOTES

AMPLITREX AT1000 – TEST DATA ANALYSIS

➤ Test Data Analysis:



Amplitrex Tested				AutoBias	eG1	iG2	uMhos
Type	eP	eG2	iP	spec	8	0	2600
6SN7	250	0	9	#1	7.3	0	2600
				#2	7.1	0	2800

Amplitrex Tested				FixBias	iP	iG2	uMhos
Type	eP	eG2	eG1	spec	9	0	2600
6SN7	250	0	8	#1	7.4	0	2400
				#2	6.8	0	2400

PRESENTER NOTES:

- What do the terms “Auto Bias” and “Fixed Bias” mean for the test data results?
- What are these tube test results trying to tell me about how it will function in a particular application?

AMPLITREX AT1000 – AUTO BIAS TESTING

➤ AutoBias Testing:

- This test is commensurate with the “Cathode bias” or “Cathode Resistor” type biasing used in most small signal applications and some Audio Output configurations:
- In essence, this characterization test implies that if the plate current is held at the specified level what bias voltage produces that outcome (at the specified Plate voltage).

- PRESENTER NOTES:
- Consists of an appropriate value tube Cathode to ground resistor that utilizes the plate and screen currents to place the Cathode at a more positive voltage potential than the tube Grid.
- The tube grid is now at a specific negative bias voltage (in relation to the Cathode) at the configured test Q-point.
- This test is especially useful for triodes and small signal tubes where the screen current is either non-existent or is very minimal.
- This test also serves as a corollary to the FIXED BIAS characteristic test

AMPLITREX AT1000 AUTO BIAS DATA – RCA 6SN7GT

Test Settings Tube 6SN7 PRINT

Test Method Auto Bias

Item	Spec	Test Setting
Plate Volts	Ep vdc	250
DC Plate Current	Ip mAdc	9
Screen Volts	G2 vdc	0
Screen Current	IG2 mA	0
Grid #1 Volts	G1 vdc	8
Heater Volts	Eh vdc	6.3

Plate Current Range 150 mA

Plate Curve Setup	Start	Step Size	Maximum
Plate Volts	125	10	250
Grid #1 Volts	6	1	
Screen Offset V	0		
Total # of Curves	1		

Plate Curve Limits	mA	Watts
Plate	9	3
Screen	0	1

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Test Results Tube 6SN7 UPDATE PRINT

Test Method Auto Bias

Item	Spec	Result 1	Result 2
Plate Volts	Ep vdc	250	250
DC Plate Current	Ip mAdc	9	9
AC Plate Current	Ip mAac	~	0.26
Screen Volts	G2 vdc	0	0
Screen Current	IG2 mA	0	0
Bias Volts	G1 vdc	8	7.3
Test Signal Volts	RMS	~	0.1
Mutual Conductance	uMhos	2600	2600
Grid #1 Leakage	uA	0	0.17
H/K Leakage	mA	0	0
Plate Resistance	PP ohms	~	8.3K
Tube Gain	Mu	~	21.5
Heater	eFvdc	6.3	6.3
Heater Run Time	Sec	193	211
Timestamp	5/30/2026 11:40:53 AM		

Notes

- PRESENTER NOTES

AMPLITREX AT1000 AUTO BIAS LABEL – RCA 6SN7GT

 Amplitrex Tested				AutoBias	eG1	iG2	uMhos
Type	eP	eG2	iP	spec	8	0	2600
6SN7	250	0	9	#1	7.3	0	2600
				#2	7.1	0	2800

- PRESENTER NOTES

AMPLITREX AT1000 – FIXED BIAS TESTING

➤ Fixed Bias Testing:

- This test is performed by holding the Grid bias potential and the Plate voltage at a specified fixed level and noting the resultant Plate Current.
- This test configuration is very useful in characterizing output tubes that are used in a fixed bias configuration.
- Noting the resultant Plate current at the published Q-point provides a very easy way to see if a tube has significant life on it.

- PRESENTER NOTES:

- It also may supply screen current, which tends to increase with age min power output tubes, tproviding another key insight into the life of the tube.
- As a corollary to the “Auto Bias” test characterization the 2 tests can be compared as to what happens when the Plate current is hereby held constant and the resultant bias voltage is observed VERSUS the Grid Voltage being held constant and the resultant Plate current is observed.

PRELOADED TEST SETTING FOR AMPLITREX AT1000

Test Settings Tube: 6SN7
Test Method: Fixed Bias PRINT

Item	Spec	Test Setting
Plate Volts	Ep vdc	250
DC Plate Current	Ip mA dc	9
Screen Volts	G2 vdc	0
Screen Current	IG2 mA	0
Grid #1 Volts	G1 vdc	8
Heater Volts	Eh vdc	6.3

Plate Current Range: 160 mA

Plate Curve Setup	Start	Step Size	Maximum
Plate Volts	125	10	250
Grid #1 Volts	8	1	
Screen Offset V	0		
Total # of Curves	1		

Plate Curve Limits	mA	Watts
Plate	9	3
Screen	0	1

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Test Results Tube: 6SN7
Test Method: Fixed Bias UPDATE PRINT

Item	Spec	Result 1	Result 2
Plate Volts	Ep vdc	250	250
DC Plate Current	Ip mA dc	9	7.4
AC Plate Current	Ip mA ac	~	0.24
Screen Volts	G2 vdc	0	0
Screen Current	IG2 mA	0	0
Bias Volts	G1 vdc	8	8
Test Signal Volts	RMS	~	0.1
Mutual Conductance	uMhos	2600	2400
Grid #1 Leakage	uA	0	0.13
H/K Leakage	mA	0	0
Plate Resistance	RP ohms	~	8.3K
Tube Gain	Mu	~	19.9
Heater	eF vdc	6.3	6.3
Heater Run Time	Sec		309
Timestamp		5/30/2026 11:43:00 AM	

Notes

- PRESENTER NOTES

PRELOADED TEST SETTING FOR AMPLITREX AT1000

 Amplitrex Tested				FixBias	iP	iG2	uMhos
Type	eP	eG2	eG1	spec	9	0	2600
6SN7	250	0	8	#1	7.4	0	2400
				#2	6.8	0	2400

- PRESENTER NOTES

AMPLITREX AT1000

- A note about Transconductance:
 - “Plate Current is the horse that Transconductance rides in on” – Paul Hart
 - Both the Auto Bias and the Fixed Bias will yield Transconductance data. These values overall may vary depending on the age of the tube being tested.
 - Ideally, the Transconductance should be identical for both types of bias tests.
 - When a tube has a lot of age on it the test results may vary widely between Auto Bias and Fixed Bias and the Transconductance is typically lower than specified.

- PRESENTER NOTES:
- Vary bias and the Plate Current and transconductance will change.
- This is because no difference would exist between changing either parameter. The fixed Plate current would produce the specified Grid bias voltage and the specified fixed Grid bias would produce the specified Plate current (especially true for a Triode).
- Transconductance testing and readings are performed by most testers.
- Screen currents may be very low in Beam Power Tubes, Tetrodes and Pentodes when new (1-2ma).
- Fixed Bias is generally a more revealing test.

AMPLITREX AT1000

- Tube usage versus Amplitrex Data:
 - A tube WORKING in a specific application and the tube circuit working OPTIMALLY may be 2 very different things!
 - A tube that seems to have appreciable time on it may work very well in a particular application BECAUSE that circuit was designed to work at much less than the specified optimal tube performance by using Worst Case Analysis (WCA),
 - This is exactly why some people will prefer a certain manufacturer's used tube over another manufacturer's that is NOS.

- PRESENTER NOTES:

- Proper WCA may even indicate that the circuit will function with a tube that functions at levels FAR BELOW (<50%) the "new" tube published specifications.
- WCA parameters used in critical applications may dictate that if the tube functions even 10% the circuit must still work (even if at a diminished level).
- In recent years some of the overseas producers of vacuum tubes EXCEED the previously published data. These tubes may test WONDERFULLY but have troubles in an older design application because it was never designed to work properly significantly ABOVE the published design parameters.

AMPLITREX AT1000

- Some final Thoughts:
 - In Power output tubes it may be very advantages to “COOK” a tube BEFORE running any tests.
 - Better emulates “real life” conditions.

- PRESENTER NOTES:
- Cooking involves running the tube at or near rated conditions for 10-30 minutes.
- Maximum rated conditions may not be possible but then use the specified Q-point for the eventual test.
- This cooking allows the user to test if the tube starts to deteriorate with “on time”.
- Many testers are not designed to cook tubes immediately prior to testing nor to hold test parameters for a long time before exercising the tube tests.

OLD, RARE, LABORATORY TUBE TESTERS WHICH USE TUBE SPEC DATA - **NEW LONDON INSTRUMENTS 901A**



- PRESENTER NOTES:
- I own one of these that allegedly came out of Collins Radio.
- Picture is of a beautifully restored one.
- These are EXPENSIVE AND EXTREMELY RARE.
- Test Signal is 10 KHz (RCA WT-100A uses 45KHz)
- 600VDC insulation
- Regulated Power Supplies
- Yes, I own the more rare MANUAL for it!

OLD, RARE, LABORATORY TUBE TESTERS WHICH USE TUBE SPEC DATA - **NEW LONDON INSTRUMENTS 901A**

TRANSCONDUCTANCE ANALYZER and CIRCUIT DESIGNER Model 901A



SPECIFICATIONS:

0-50,000 micromhos in six ranges. Four continuously variable DC power supplies regulated to 1% for plate, screen, suppressor and grid. Plate supply 0-300V at 200ma. AC and DC filament supply. Voltage controls direct reading. Four multi-range current meters.

FEATURES:

Inherently stable calibrating circuit, $\pm 5\%$ accuracy of GM measurement; convenient matrix of color coded push-button switches for rapidly connecting any electrode to any power supply. Binding posts with shorting links in series with each tube pin permit insertion of active and passive circuit elements and external metering. This feature replaces bread-boarding of many vacuum tube circuits.

USES:

Performs transconductance, short, gas, VR, emission, leakage and noise tests. Facilitates rapid design of vacuum tube circuits.

\$895.00*

- PRESENTER NOTES:
- NLI was mostly a Military/DoD test equipment manufacturer hence these were NOT popular with service technicians, etc.

SPEC DATA - RCA WT-100A

ELECTRONICS — August, 1956

- 21

OLD, RARE, LABORATORY TUBE TESTERS WHICH USE TUBE SPEC DATA - **DAYSTROM/WESTON CA-1630**



- PRESENTER NOTES:
- Only 360 of these were manufactured in 1957 for the Civil Aeronautical Administration (Canada).
- It can output curves to an Oscilloscope.
- EXTREMELY SCARCE and very costly – especially in restored working condition.

MAXI MATCHER TUBE TESTER FOR POWER TUBES



WHY THE MAXI-MATCHER?

- Can accurately measure plate current to match output tubes
- High-voltage needed for output tubes vs. conventional testers, i.e., TV7, Hickok 6000, Eico 666, etc.
- Reasonably priced @ \$900
- Digital circuitry with short protection
- Digital display superior to analog meters
- Can rely on tester data vs. TV7
- Nice and compact, easy to carry on site



PRESENTER NOTES:

- These are for the BUYERS of this tester but YOU as a buyer of TUBES for vintage equipment should be familiar with what VALUE you are getting.
- Validation use of tubes purchased for use in personal vintage equipment.

MAXI-MATCHER FEATURES



- Accurately measure tubes for amplification quality
- Instantly identify weak or damaged power tubes
- Precision matching for plate current and transconductance
- Selectable real-world plate voltages – either 325 or 400 VDC
- One step, all-element test for inter-electrode short circuits
- SmartFuse high speed automatically-resettable protection circuit
- Rugged plastic carry case with handle
- US 120VAC, Euro 240 VAC, Japan 100 VAC

MAXI-MATCHER DISPLAY



- Display for both the plate current and the transconductance as shown, can test up to four (4) tubes in one setting
- Note: there is a 5th socket for testing shorts of a suspect tube w/protection circuitry

MAXI-MATCHER MAXI-PREAMP 2



MAXI-PREAMP FEATURES

- Measure preamp tubes for Gain, Transconductance and Noise
- Test any common dual or single preamp triode
- Listen to your tubes with dual-RCA Direct Audio Output
- Scanning Digital Sampling Converter for highest accuracy
- Continuously updated every 250 milliseconds
- Displays two results on LCD simultaneously
- Eight bi-color operational LEDs – one for each tube section
- Proprietary dual matched current-source drive circuits
- New elegant carry-case increases portability

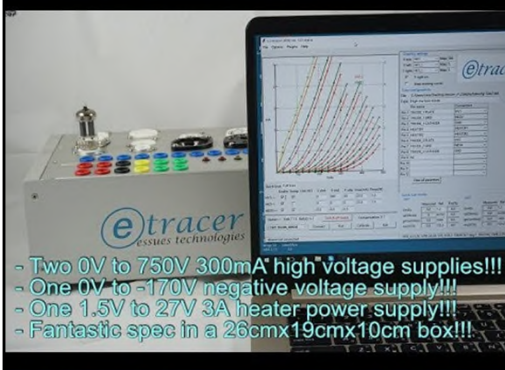
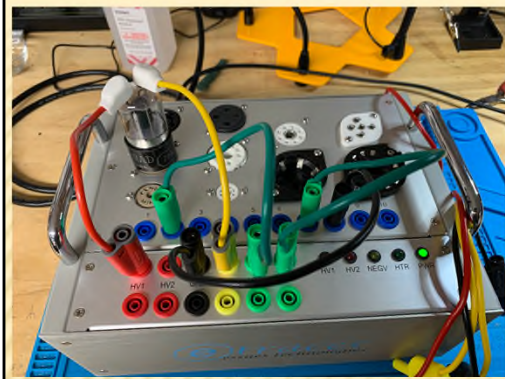


MAXI-PREAMP DISPLAY

Note the readings in umhos for both sides of the single tube on the left, you can also see the lighted LEDs indicating the tube, which in this case shows highly matched sections.



[illegible]



- Two 0V to 750V 300mA high voltage supplies!!!
- One 0V to -170V negative voltage supply!!!
- One 1.5V to 27V 3A heater power supply!!!
- Fantastic spec in a 26cmx19cmx10cm box!!!



From our friends at
Aliexpress, not cheap
@ \$1000!

**Demonstration of the
AMPLITREX AT1000
and
Maxi-Matcher
Testing Tubes**

APPENDIX

AMPLITREX AT1000 – DESIGN & TRADE SPACE

➤ Design Concept and Trade Space:

- A small, lightweight, safe, piece of ATE (Automated Test Equipment) that can characteristically test (per the tube design data) popular Radio, TV, Amateur Radio and Audio Tubes.
- Can be used as a standalone tester with limited options **OR** can be used with a computer as a “Laboratory Tester” and “curve tracer” with printable test results.
- Can perform both “Auto Bias” and “Fixed Bias” Tube Testing.
- Is expandable (within certain limits) using socket adapters and programmable ATE software to test additional Radio, TV and Audio tubes than those initially provided.
- Tests all tube types per the EIA or manufacturer’s published datasheet. This is especially true for testing popular audio output tubes (dual and multi-section tubes too).
- Critical Test parameters measured and/or set: H-K Leakage, gas, shorts, Emission, Microphonics, Life Test (lowers Filament voltage), Heater voltage, Grid bias voltage, Plate voltage, Plate current, Transconductance. (sets tube Quiescent operating parameters (“Q-point”) as defined in the specification).
- Must have a detailed user’s manual describing all functionality, user software programming instructions, proper use, computer requirements and computer peripheral interfaces.
- Must be able to have on-going support and customer service.

PRESENTER NOTES:

- User Safety in HV testing applications is crucial nowadays.
- Modern computer and parts technology now affords designers the ability to produce vacuum tube ATE that is more accurate, doesn’t require external routine calibration, lighter, smaller, more energy efficient and easier to use than vintage equipment.

AMPLITREX AT1000 – DESIGN & TRADE SPACE

- Trade Space:
 - Is not designed to test RF transmitting, Magnetrons, Klystrons, HV Thyratrons, Nixie tubes or other tube types requiring:
 - Specialized HV tube sockets
 - Specialized testing protocols
 - High Plate voltages (>500VDC)
 - High Screen Voltages (>500VDC)
 - High filament (Heater) currents (>3.5A)
 - High Filament (Heater) Voltages (>12.6V)
 - High (negative) bias voltages (< -100VDC)
 - Does NOT test 6.3V Rectifier Tubes
 - Tests only 1 tube at a time –Price is commensurate with other modern day specialized ATE (presently ~ \$3500).
- Adapter sockets, socket savers, and plate caps add cost.



PRESENTER NOTES:

- 6.3 Rectifiers – dedicated socket configuration for 5V rectifier tubes only.
- 1 Tube - intended to fully characterize a tube in relation/reference to its original published design specifications.