VALVE TESTER

VT-1000

ENGLISH

OWNER'S MANUAL

Thank You!

Since 1968 when the company was founded, Orange has been a pioneering force in the guitar amplification industry. Today, with a team of the world's finest amplifier engineers, Orange continues to push back the boundaries of conventional valve amplifier design.

Our commitment to craftsmanship and quality control has allowed our amplifiers to stand the test of time, giving their owners as much pleasure now, as the day they were bought. To maintain this level of excellence, each Orange amplifier is put through many rigorous test procedures before leaving the factory.

The warmth, tonal quality and rich harmonics generated by a valve amplifier cannot be reproduced by 'artificial' means. Many guitarists have reached the same conclusion: neither the transistor nor microchip is a suitable alternative to valve technology.

This booklet contains valuable technical and safety information Please take the time to read this manual as the information may enhance the sound and performance of your amplifier. We are confident that you will be delighted with your new purchase and that it will provide you with many years of enjoyment.

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IMPORTANT SAFETY INSTRUCTIONS

The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of un-insulated 'dangerous voltage' within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock.

The exclamation point within an equilateral triangle and "WARNING" are intended to alert the user to the presence of important operating instructions. Failure to heed the Instructions will result in severe injury or death.

Read these instructions, keep these instructions. Heed all warnings, follow these instructions.

WARNING: Electrical equipment is dangerous and can contain potentially fatal high voltages. Voltages are present when the equipment is turned on and also for some time after the equipment has been turned off. You can still get an electric shock when the equipment is turned off and disconnected from the power.

Disclaimer: Orange Amplifiers, its suppliers and subsidiaries accept no liability for any damage(s), injury(s) or death incurred from using this product.

- Only use the power supply provided to operate this product.
- The unit should be kept out of the reach of children and **under no circumstances should anything other than a valve be inserted into the test sockets**. Valves should be inserted and removed from this product in accordance to the user manual.
- Do not use this product if it has been exposed to liquid or if objects have fallen into open areas. Do not use in damp or wet conditions and keep away from liquids at all times.

- Do not open the equipment case. There are no user serviceable parts in this product. Refer all servicing to qualified service personnel. Unauthorised modification of this equipment will invalidate any warranty.

- If the product does not operate normally when the operating instructions are followed, then refer the product to an authorised service engineer.

- All electrical and electronic products should be disposed of separately from the municipal waste stream via designated collection facilities appointed by the government or local authorities.

This device complies with the Canadian Interference Regulations CAN ICES-3(B)/NMB-3(B).

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:

1) *This device may not cause harmful interference.*
2) *This device must accept any interference received, that may cause undesired operation.*

Note: *This equipment has been tested and found to comply with the limits for Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.*

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try and correct the interference by one or more of the following measures.

- *Reorient or relocate the receiving antenna.*
- *Increase the separation between the equipment and receiver.*
- *Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.*
- *Consult the dealer or an experienced radio/TV technician for help.*

How Does The Orange VT1000 Differ From Other Commercially Available Valve Testers?

Commercial valve testers have been available, almost since valves were invented, incorporating many excellent techniques and designs over the years. However, the vast majority have a number of common features, which we considered to be a barrier to the modern valve user namely:

- They require a certain level of user interaction in that parameters have to be set for individual valves being tested.
- They require a certain depth of knowledge about valve theory, which some users may not have.
- The results obtained on meters or digital readouts require a certain level of user interpretation.
- They are often quite large and bulky.

In a lot of cases, they are also not very portable and since most are mains operated, require selection of mains voltage if required to be used in other than their native country. When developing the VT1000 we decided to 'break the mould' to produce a fully automatic valve tester, which performs a wide range of tests quickly and accurately.

Requiring little or no knowledge of valve theory, it can be operated by experienced users and those who just want to know that the valves in their amplifier are in good condition. It requires no user interaction other than inserting the valve to be tested into the correct socket, selecting the type from a list using two up/down buttons using an LED bar display, then finally pressing an 'OK' button to start the test.

The test then proceeds without any further user input and elapsed time is shown on the LED display during the test, when one of three LED's is lit to indicate a 'Good', 'Worn' or 'Fail' condition.

In addition, the LED display indicates a 'matching number' which is based on a summation of the many results obtained during the test and has been specifically designed to reflect the operation of the valve, according to its normal function in an audio amplifier. For example, power valves are graded with their emission and control grid performance as primary factors, whereas pre-amp valves are graded with different parameters to reflect their role in signal amplification and phase splitting applications. If the valve is faulty or worn, then this will be indicated at the end of the test.

The simplicity of operation belies what is going on 'inside the box', where a sophisticated microprocessor controlled testing system (incorporating DIVO Technology) is in operation, allowing full control over all inter-electrode switching and measurement operations. In addition all voltages required by the tester are internally derived, stabilized and controlled by the microcontroller, allowing rapid static and transient tests without generating unnecessary heat. The test algorithms used have been developed using data from tests on hundreds of new, used and faulty valves.

We are passionate about valve technology and our aim throughout has been to make the Orange VT1000 a sophisticated, modern, truly portable valve tester which is primarily useful but also stylish, appealing to all valve users whether amateur, professional or in the music retail trade.

BEFORE USING YOUR VT1000

With the VT1000, Orange has designed a compact, safe and simple alternative to the large, dangerous and complicated valve testers of the past. However, despite its small size the VT1000 Valve Tester is a highly accurate and sensitive piece of test equipment, and should be treated as such.

When in use the VT1000 is taking thousands of micro measurements and performing over 20 tests in order to grade your valves. These tests measure very small voltage and current changes under high impedance conditions, which means a number of external factors can affect the end results.

To obtain the most consistent readings, we advise observing the following:

1. The Valve Tester casing is made from thick, heavy duty metal. During transit/storage they are enclosed in their boxes and can be subject to various changes in temperature and humidity. Any condensation which may occur on the valve bases or internally can influence initial results. Due to the thermal insulation properties of the packaging and the high thermal mass of the metal case, the VT1000 may remain at a very low temperature for a considerable time if left in the packaging. If it is brought into a warm room and immediately used, condensation will naturally occur and produce false test readings. For this reason, it is recommended the VT1000 is allowed to stand for around 30 minutes out of its packaging before initial use for these effects to subside.

2. With temperature being a factor we suggest that the VT1000 is used, wherever practically possible, in a location where temperature and humidity will remain constant. If inconsistent test results are being observed during the first couple of tests allow for further time for the effects of humidity, condensation and temperature to neutralise and re-test.

3. Do not test hot or warm valves. The VT1000 uses high voltages to ensure accurate readings from the valves which are tested with the correct voltages as stated in their manuals. Under testing, the valve will become warm and this heat will alter the impedances inside the valve. If the same valve is then repeatedly tested before being allowed to return to room temperature, or if a warm valve is tested having just been used (e.g. in an amplifier), false readings will be given. We advise leaving valves to reach or return to room temperature before testing.

4. The grading/matching system, explained later in the User Manual (pp. 16-18), is based on a decision made after performing over 20 tests at the conditions at that given time. For this reason and the sensitive nature of valves (particularly 12AX7/ECC83s) some slight variance may be seen during testing. If this is observed allow the valve to cool, move the VT1000 into an area of constant conditions and re-test.

By following these practices and keeping conditions as constant as possible, you will achieve more consistent test results, whilst learning how your Valve Tester grades valves and how the different matching numbers affect the sound of your amplifier.

FEATURES AND FUNCTIONS

	Description
A	Valve socket for octal power valves
B	Valve socket for EL84 valves
C	Valve socket for pre-amp valves
D	Selected valve type text (both UK and US)
E	Valve matching value (range between 1 & 15)
F	Valve status result: good, worn & fail
G	Control buttons. Centre button selects valve type and starts the test. The two outer buttons move valve selection from right to left.

WHAT WILL MY VT1000 TEST?

The Orange VT1000 valve tester performs a series of comprehensive tests based on manufacturers design specifications and typical valve failure modes.

Testing sequences include:

- Heater filament test: Short circuit
- Heater filament test: Open circuit
- Heater filament test: Tolerance check
- Heater cathode insulation: Leakage
- Heater cathode insulation: Short Circuit
- Tests for heater current abnormalities
- Amplification factor
- Voltage gain
- Power gain
- Screen grid test
- Mutual conductance test
- Dual test for double triodes
- Emission
- Inter electrode leakage
- Inter electrode short circuit
- Flash-over (arc detection, high voltage breakdown)
- Gas ionisation test

In addition to the tests listed above, the VT1000 performs a series of unique tests under varying load conditions which are designed to filter out bad valves and to assess if the valve is good, or needs to be replaced.

VALVE SOCKETS & VALVE SELECTION

VALVE SOCKETS:

Valve socket 1 (far left) for octal power valves

EL34/6CA7; EL34L; 6L6; 6V6/6V6GTA; KT66; KT77; KT88; 6550; 5881

Valve socket 2 (middle) for EL84 valves

EL84/6BQ5

Valve socket 3 (far right) for pre-amp valves

ECC81/12AT7; ECC82/12AU7; ECC83/12AX7; ECC99; 12BH7

PHYSICALLY DAMAGED VALVES:

No damage will occur to the VT1000 by testing faulty or damaged valves. However, under no circumstances should any attempt be made to insert into the test socket or to test a valve which is physically damaged, as this could present a hazard to the user or others. If a valve envelope is accidentally damaged during a test, the 'OK' button should be used to terminate the test and the power connector removed. The valve should then be allowed to cool after which it should be removed using protective gloves and then safely disposed of. DO NOT touch any exposed metal parts of the valve during the operation and ensure that no fragments of glass remain around the tester before using it again.

USING YOUR VALVE TESTER

Step 1:
Decide what valve you would like to test and identify what valve test socket is required for the test.

- Octal power valves such as EL34s, KT66 etc… use valve socket 1
- EL84 valves use valve socket 2
- Preamp valves use valve socket 3

Step 2:
Carefully insert the valve into the correct valve socket and ensure it is seated flat.

- Valves must be tested at room temperature.
- Testing a hot valve may result in a failure as the tester is calibrated to heat the valve up as part of the test sequence.
- **Only one valve must be inserted into the tester at any one time.**

Step 3:
Ensure the supplied power lead is connected to the tester and is switched on. Press the 'OK' **(G)** on the control buttons to initiate, then by moving the left and right selector buttons carefully select the valve type which you are about to test. When the correct valve type has been selected press 'OK' again and the test will commence.

Step 4:
Wait**.** It takes approximately two minutes for the tester to test a valve, during this time a number of red LEDs will illuminate and flash. As the test progresses the number of LEDs illuminated will gradually decrease until the test is completed. If the valve fails at any point, the test is automatically terminated and the red 'FAIL' LED is illuminated.

Step 5:
Once the test completes and the green, yellow or red indicator lights, then the test is finished; however, as valves may get hot during the test, we recommend that you make sure that the glass envelope is cool before attempting to remove it. In any case, we recommend the use of protective gloves when handling valves.

Test Status

GREEN - If a green LED is illuminated this indicates that the valve is **GOOD.**

YELLOW - If a yellow LED is illuminated this indicates that the valve is worn and should be replaced as soon as possible - this is for matching values 3, 4 & 5.

RED - If a red LED is illuminated this indicates that the valve has failed and should be replaced immediately.

Note: Some specific faults found by the VT1000 may be either transitory or not immediately obvious when used in normal operation. However, they could manifest themselves when the valve comes under stress or heavy load during a performance.

VALVE MATCHING VALUE

VALVE MATCHING VALUE

A 'matching number' indicated by the LED(s) at the end of the test, is based on a combination of measured parameters to give an indication of how the valve will perform, according to its typical function in an amplifier.

After the valve has been tested, the tester will assign a matching number ranging from 1 to 15. Basically: the higher the value, the higher the gain of the valve. If a number of valves are tested, the gain or 'matching valve' can then be used to group together pairs or quads of valves. For example if two EL34s were tested and both passed with a 10 'matching value' then these valves could be considered as a matched pair of EL34s.

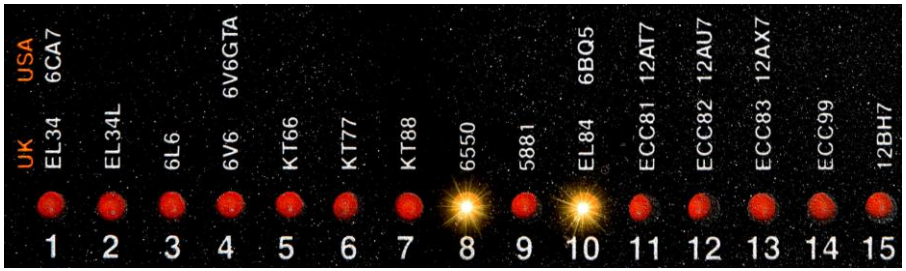
Specific tonal variations have been noted, even between closely matched, fully serviceable valves having different 'gain' groups, even produced by the same manufacturer. The VT1000 matching number can provide a way to ensure that the amplifier has a consistent tonal quality even after the replacement of one or more valves.

Sometimes new valves don't give high matching numbers; does this mean that they are still OK?
Normally, yes - In general, a higher number indicates a newer or less worn valve, however due to manufacturing tolerances, a range of values are possible, even with new stock. Manufacturers of amplifiers design their products to accommodate these normal tolerances without any deterioration in performance. When fitting power valves in pairs or quartets, the closeness of the number is much more important, as mismatched valves will directly impact the sonic performance of the amplifier. Pre-amp valves are often 'double triodes' i.e., they have two identical valves in the same glass envelope and close matching of these two 'halves' is very important in some parts of the circuit.

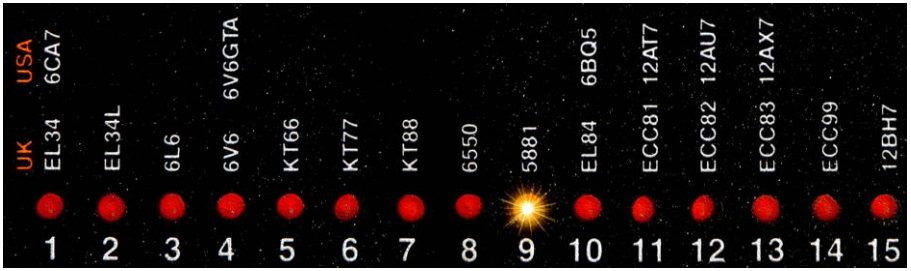
VALVE MATCHING VALUE FOR DOUBLE TRIODE (PRE-AMP VALVES)

Double triode (pre-amp valves) have two valves inside one envelope i.e. an A & B side. After the VT1000 has tested a double triode (providing that the valve passes) two matching value LEDs will illuminate. For section A the LED will flash and for section B the LED will be constant. If only one constant LED is illuminated, this means that both sides of the valve are the same. In general, the closer the LEDs are together the better, if two matching valves are apart by more than 6 values the VT1000 will fail the valve.

In the example below both sections of the valve are fairly well matched.



In the example below both sections of the valve are the same (one constant LED).



VALVE MATCHING VALUE FOR DOUBLE TRIODE (PRE-AMP VALVES) CONTINUED…

Due to the concise nature of the LED display, occasional very slight matching value variations may be observed in some pre-amp valves. For example, one side of a pre-amp valve may display a higher or lower value on a subsequent test (no more than a single digit). In this instance, the side showing the variation is straddling the boundary between grades. Ultimately the matching value displayed is based on many micro measurements taken under the specific conditions at the time of the test.

Many pre-amp valves have critical roles within amplifier circuitry and some areas are less critical than others. A valve with a low gain value may still function to an acceptable level, depending on where it is used within the circuit. If such circuits are known and understood, valves can be arranged according to their circuit location in order to get the best sound from the amp.

Note: Tonal variations will come down to personal preference and an optimum set up could be a result of experimentation using different valves with different matching values used in different locations within the amp.

FAQ

Why do I need a valve tester when I can test old or suspect valves in an amplifier?

There are several reasons why old or suspect valves should not be 'tested' directly in an amplifier. Valves can have many different fault conditions; some are obvious, such as internal arcing or inter-electrode short circuits. These fault conditions may cause serious damage to other components in the amplifier. Others are not immediately obvious but can lead to instability, unreliable operation, poor performance and possibly long term damage to other components. The VT1000 gives a clear indication of a wide range of fault conditions which could otherwise cause damage to other components. In addition, a patented 'predictive' software algorithm has been developed from the analysis of hundreds of faulty valves, which seeks to intelligently determine the onset of fault conditions, sometimes before they become apparent in normal operation.

If I re-test the same valve the readings are slightly different, is this ok?

The VT1000 uses a complex algorithm which analyses the many different tests which are automatically performed. In order to keep the total test time to a minimum, the unit is calibrated at manufacture to test cold valves. If a valve is subsequently re-tested while still warm, then a slightly different reading may be observed. There is nothing to be gained by re-testing the valve as the glass envelope will become hotter and increase the length of time before it can be safely removed.

Some faulty valves fail at different stages in the test, is this normal?

Yes, the VT1000 automatically performs many tests on the valve whilst the LED bar-graph elapsed time indicator is running. If the valve fails at any point, the test is automatically terminated and the red 'FAIL' LED illuminated. In this way, the test time for faulty valves is kept to an absolute minimum.

If I accidentally plug a double triode into the EL84 socket or vice versa, will any damage be caused either to the valve or to the VT1000?

No, the VT1000 will detect that the wrong type of valve is fitted and the red 'FAIL' LED will be lit. Unlike some competitive products, no damage will be done to the valves under these circumstances

FREE EXTENDED WARRANTY OFFER

The Orange VT1000 valve tester is under warranty for one year subject to consumer protection laws in the country of purchase and distributor's terms and conditions. An additional year can be added by registering your product online.

Valves supplied with an Orange amp or purchased separately at our online store are covered for 90 days from the date of purchase.

The warranty status of any Orange product is subject to its being used for its intended purpose in suitable conditions. As the manufacturer we reserve the right to refuse to warranty any Orange product which has been misused in any way whatsoever.

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Our website is a great place to view high resolution images of our products, hear sound clips of our amplifiers, view important Orange news releases and read 3rd party product reviews. We also sell merchandise and certain products online such as Valves, clothes, books, footswitches, spare knobs and dials are available from many music retailers as well as direct from orange. Visit us at www.orangeamps.com and also to access our secure online shop.

SOCIAL MEDIA

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We use social networks such as Facebook to help us see how thousands of our customers are using Orange products around the world. We regularly engage in discussions about past, present and future products. Photos from tradeshows, award ceremonies and other events are regularly featured on our Facebook page and is the best way to get the very latest news about all things Orange. To join the community you can visit our Facebook page www.facebook.com/orangeamps.

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YouTube:

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