

ORANGE[®]

VALVE TESTER MKII

ORANGE



Ever since the founding of the company in 1968, Orange has been a pioneering force in the guitar amplification industry. Today, with a team of the world's finest engineers, Orange continues to push back the boundaries of product design.

Our commitment to craftsmanship and quality control has allowed our products 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, all Orange products are put through many rigorous test procedures before leaving the factory.

THANK YOU FOR CHOOSING ORANGE

WHAT'S IN THE BOX

- 1 x Valve Tester MKII
- 1 x Power Supply
- 1 x Mains lead
- 1 x Manual
- 1 x Pencil



IMPORTANT SAFETY



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

This equipment should be used under the supervision of an adult at all times.



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 to persons.



The "Caution, hot surface" symbol indicates the marked item may be hot.

Ensure the apparatus is installed with plenty of space around the unit (> 6"/12.5cm) as this apparatus may generate heat under normal use. This equipment is not intended to be used on soft support (like beddings, blankets etc.). This equipment should always be placed on a flat, stable surface.



To reduce the risk of fire and electric shock do not expose this apparatus to rain or moisture. Do not use in damp environments, e.g. bathrooms etc.



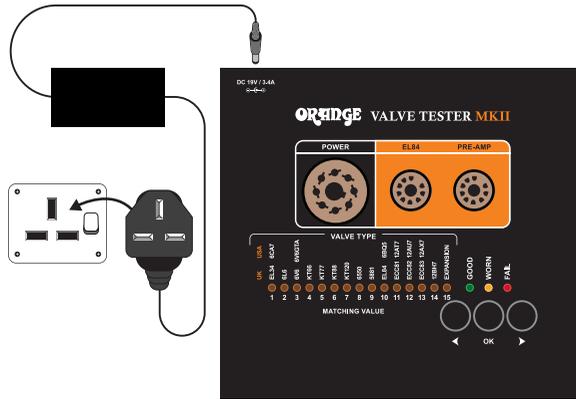
Do not place objects containing liquids on, or near the product.

Do not operate this apparatus or connect/disconnect a power plug whilst hands are wet.

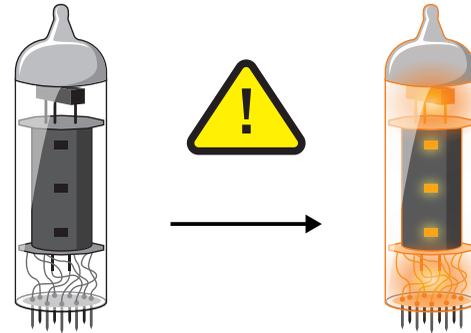


Do not attempt to gain access to the interior of the product. No user serviceable parts inside. Refer all servicing to qualified servicing personnel.

The Orange Valve Tester MKII (VT MKII) supply input is 19V DC 65W. The DC input socket is centre positive polarity and the barrel plug is a 'standard 2.5mm type.' To avoid the risk of product damage it is highly recommended to only use the power supply supplied with the product, or an exact equivalent.



Warning valves can get hot during testing, ensure they are cool to handle before removing from the valve tester. Valves are fragile, so always be gentle when handling them and attaching or detaching them from the VT MKII.



*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.

WHY CHOOSE THE ORANGE VT MKII?

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:

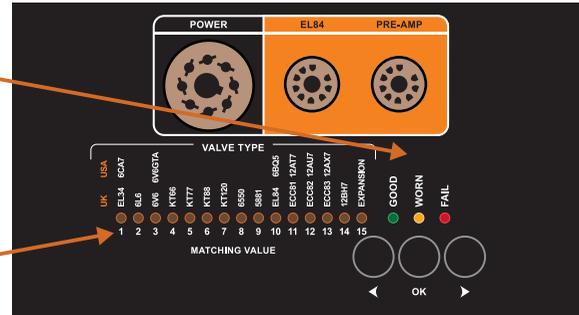
- They require a certain level of user interaction in that parameters have to be set for individual valves being tested.
- They require a certain depth of knowledge about valve theory, which some users may not have.
- The results obtained on meters or digital readouts require a certain level of user 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 VT MKII 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, then 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 TubeSync® 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, stabilised 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 VT MKII 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 VALVE TESTER

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

When in use the VT MKII is taking thousands of micro measurements and performing a vast array of 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.

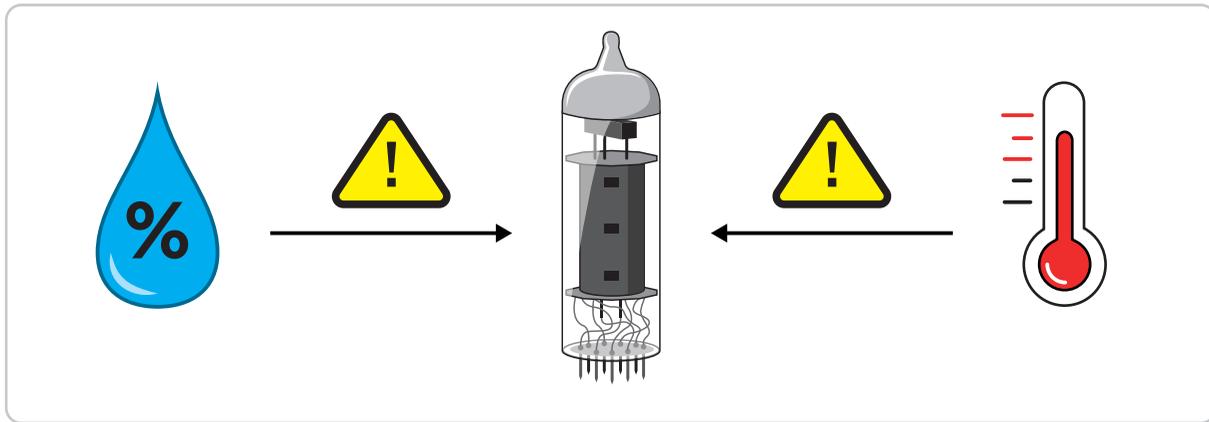
TO OBTAIN THE MOST CONSISTENT READINGS, WE ADVISE OBSERVING THE FOLLOWING:

With temperature being a factor we suggest that the VT MKII 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.

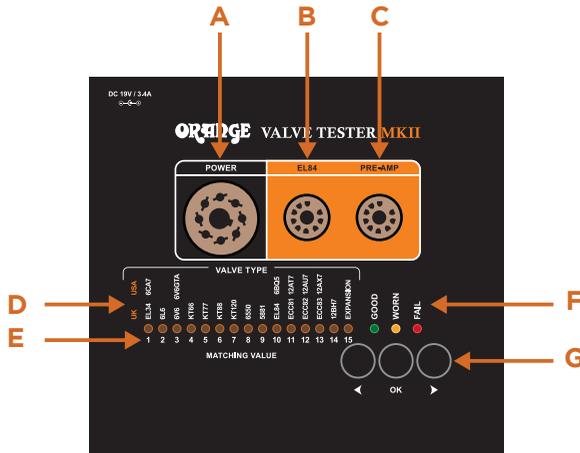
The grading/matching system is based on a decision made after performing over 20 tests. For this reason and the sensitive nature of valves (particularly 12AX7/ECC83s) some slight variance may be seen during testing. If this is observed allow the valve to cool, move the VT MKII into an area of constant conditions and re-test.

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 VT MKII 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. We recommend the VT MKII is allowed to stand for around 30 minutes out of its packaging before initial use for these effects to subside.

Do not test hot or warm valves. The VT MKII 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 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.



CONTROLS AND FUNCTIONS



- 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.

VALVE SOCKETS & VALVE SELECTION

VALVE SOCKETS



**EL34/6CA7; 6L6;
6V6/6V6GTA; KT66;
KT77; KT88; KT120
6550; 5881;
EXPANSION MODULE**



EL84/6BQ5



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

PHYSICALLY DAMAGED VALVES

No damage will occur to the VT MKII by testing faulty or damaged valves.

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 glass 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 which valve you would like to test and identify what valve test socket is required for the test.

- Octal power valves (EL34s, KT66 etc.) use valve socket 1.
- EL84 valves use valve socket 2.
- Preamp (ECC83, 12BH7) valves use valve socket 3.

STEP 2

Carefully insert the valve into the correct valve socket and ensure it is seated correctly.

- Only one valve must be inserted into the tester at a time.
- 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.

STEP 3

Ensure the supplied power lead is connected to the tester and is switched on. Press the 'OK' button to start, then by moving the left and right selector buttons 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

It takes approximately two minutes for the tester to test a valve, during this time a number of orange 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 the green LED is illuminated this indicates that the valve is GOOD.

YELLOW - If the yellow LED is illuminated this indicates that the valve is worn and should be replaced as soon as possible.

RED - If a red LED is illuminated this indicates that the valve has failed.

In the case of a RED FAIL light the tester will also display a number ranging from 1-8, this reflects the valve failure mode. (See the fault log at the back of the handbook). For example : if the FAIL LED and LED 7 are illuminated simultaneously after a test, the valve is a fail and the reason for the failure is due to control grid leakage.

Note: Some specific faults found by the VT MKII 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.

NEW FEATURES ON THE VT MKII

A more rugged mechanical design
with improved test sockets

New enhanced grid leakage
detection test

Improved algorithm with higher
current capability

New microphony function for ECC81, ECC82
and ECC83 and 12BH7 pre-amp valves

Valve failure mode identification

New thermal runaway test

Capability to function with external
expansion modules enabling the testing of
other valve types such as rectifiers and EF86s

Capability to test directly heated valves
such as a 300B via the expansion module

VALVE MATCHING NUMBER

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.

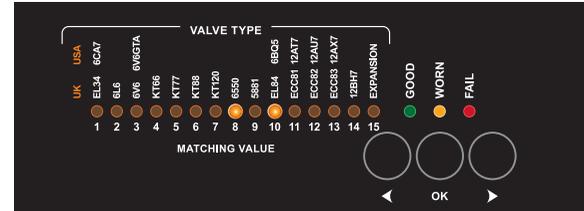
VALVE MATCHING VALUE FOR DOUBLE TRIODE (PRE-AMP VALVES)

Double triode (pre-amp valves) have two valves inside one envelope i.e. an A & B side. After the MK II has tested a double triode (providing that the valve passes) two matching value LEDs will illuminate.

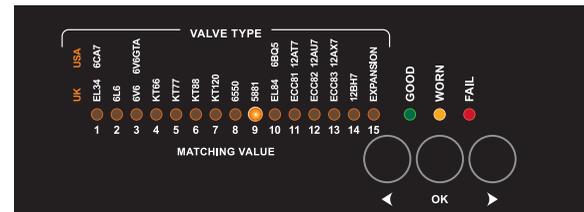
For section A the LED will flash and for section B the LED will be constant. If only one constant LED is illuminated, this means that both sides of the valve are the same.

In general, the closer the LEDs are together the better, if two matching valves are apart by more than 6 values the VT MKII will fail the valve. See the examples below.

Both sections of the valve are fairly well matched.



Both sections of the valve are the same (one constant LED).

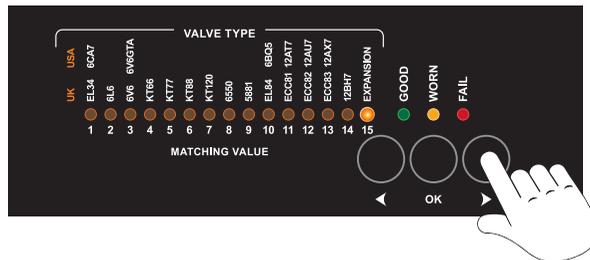


MICROPHONY MODE

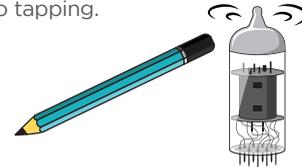
To begin the microphony test insert the valve into the PRE-AMP socket. (ECC81, ECC82, ECC83, 12BH7 valves only).



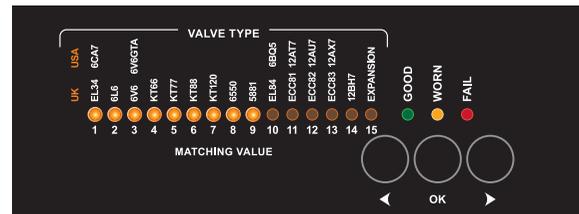
Toggle along to number 15 and hold the right button down for 3 seconds. When the yellow light comes on the valve is heating up.



When the valve is heated, the yellow light will go out and the green will come on. The valve is now ready, tap the valve gently with a pencil to test microphony. Note: If there is any noise present in the valve some LEDs will illuminate prior to tapping.



The higher the LEDs go in the moving LED bar, the greater the microphonic disturbance. **Note:** this test is indicative only, however with experience the user can easily detect a valve that exhibits a microphony issue.

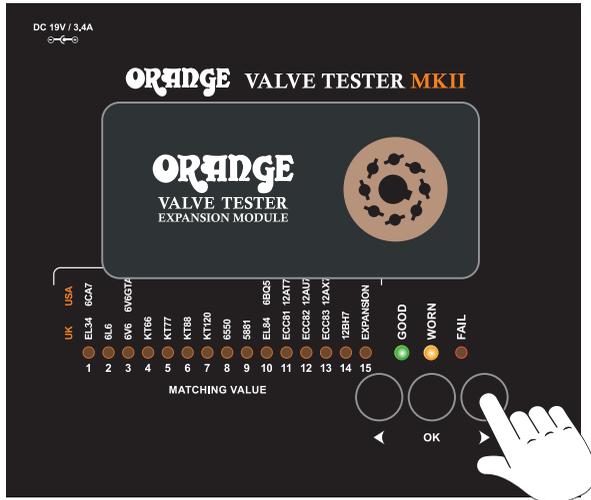


EXPANSION MODULES

Insert the expansion module, then select number 15 using the right arrow button. The yellow and green light will illuminate for a second and then go out. This indicates the tester has downloaded the test parameters for the particular valve.

The number 15 LED should then remain solid, LEDs 1-14 will flash. to start the test press the OK button.

*Expansion modules are available to purchase separately.
For further information please see orangeamps.com*



FAULT LOG

| FAULT NUMBER | REASON FOR FAULT | ALTERNATIVE REASON |
|----------------------|---|--------------------------------|
| 1 - Immediate fail | Heater open circuit or value missing | |
| 1 - Fail during test | Heater current below minimum valve for valve type | |
| 2 | Heater current too high | Total or partial short circuit |
| 3 - Pentode test | Anode current exceeds max valve for valve type | Internal leakage or short |
| 3 - Triode test | Anode 1 current exceeds max valve for valve type | Internal leakage or short |
| 4 - Pentode test | Anode current does not achieve min value for valve type | Very low emission |
| 4 - Triode test | Anode 1 current does not achieve min value for valve type | Very low emission |
| 5 - Pentode test | Screen grid current exceeds max value for valve type | Internal leakage or short |
| 5 - Triode test | Anode 2 current exceeds max valve for valve type | Internal leakage or short |
| 6 - Pentode test | Screen current does not achieve min value for valve type | Very low emission |
| 6 - Triode test | Anode 2 current does not achieve min value for valve type | Very low emission |
| 7 | Control grid leakage | |
| 8 | Thermal runaway during test | |

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