

 $\Phi 200$

The VAC Phi Two Hundred Stereo Beam Power Amplifier

Operation & Maintenance Information



Valve Amplification Company

Manual issued 01/02/2009 Revised 03/11/2009, 01/21/2010 **CAUTION - SAFETY NOTICES**

THE AMPLIFIER CONTAINS NO USER SERVICEABLE PARTS. DO NOT REMOVE THE BOTTOM PLATES OR CHASSIS COVERS. LETHAL VOLTAGES ARE PRESENT WITHIN THE CHASSIS. DO NOT OPERATE THE UNITS IF THEY ARE WET.

VACUUM TUBES BECOME **HOT** ENOUGH TO CAUSE SERIOUS BURNS. NEVER TOUCH A TUBE WHEN THE UNIT IS ON. IT MAY TAKE SEVERAL MINUTES FOR THE TUBES TO COOL DOWN AFTER THE UNIT IS SWITCHED OFF. IT IS STRONGLY RECOMMENDED THAT THE TUBE COVERS BE LEFT IN PLACE AT ALL TIMES.

Never touch a tube if the glass is broken. The internal structures carry high voltage and could present a serious, possibly lethal shock. If a tube breaks, unplug the amplifier and wait 30 minutes, then remove the tube.

Keep flammable objects away from the amplifier.

DO NOT LEAVE THE AMPLIFIER UNATTENDED IN OPERATION.

THE AMPLIFIER IS **HEAVY**. IT IS ADVISABLE TO HAVE ASSISTANCE IN UNPACKING, MOVING, AND SETTING UP. BE SURE TO USE PROPER LIFTING TECHNIQUES TO AVOID BACK STRAIN AND INJURY. BE CERTAIN TO INSTALL IT IN A SECURE LOCATION FROM WHICH IT CAN NOT FALL OR TIP OVER.

Provide adequate ventilation - allow at least 3 inches above and to each side.

Do not place in a completely enclosed cabinet. Do not stack other equipment on top of the VAC unit.

Do not operate on carpet or any other surface that might block air flow.

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INTRODUCTION

The Phi 200 is a unique power amplifier, and one of the most vivid and detailed in VAC's history, second only to the larger Phi 300.1. Featuring a new direct-coupled input & driver circuit, extremely fast and vivid sound is achieved from both single-ended and balanced sources.

The Phi 200 may be used as a 100+ watt/channel stereo amplifier, or can be connected as a 200+ watt monophonic amplifier.

The Phi 200 is designed not to the latest fad but to substance, for the highest possible sound quality. Time spent familiarizing yourself with this manual will be well rewarded.

INSTALLATION - STEREO USE

01) Install the vacuum tubes. Each tube or its box has a "V" number, which corresponds to the labels on the top plate of the amplifier; these indicate where each tube should be installed.

Fit each tube into the matching socket.

When inserting and removing tubes, handle them by their bases, not by their glass bulbs.

Note that there is a locator pin on the octal (eight contact) tubes that indicates proper alignment.

- 02) Connect input cables, either RCA types for unbalanced sources, or balanced XLR types for balanced sources.
- 03) Verify that the two "Balance / Single-Ended" switches are set to the same desired position. Set the input type switch to XLR (for balanced input) or RCA (for single-ended input).
- 04) If your amplifier is fitted with a MONO SWITCH, ensure that it is set to "STEREO".
- 05) Connect the speaker cables; the black lead goes to "-" or "Ground". The red lead goes to "+" or "Positive". Follow the labels for the impedance that best matches your loudspeakers.
- 06) Connect a12 volt trigger cable into the socket on the back panel if desired; this allows the amplifier to be turned on and off by an external device.
- 07) Provide adequate ventilation allow at least 3 inches above and to each side.
- 08) Do not place in a completely enclosed cabinet. Do not stack other equipment on top of the VAC unit.
- 09) Do not operate on carpet or any other surface that might block air flow.
- 10) The chassis will become hot in normal use.
- 11) Do not allow the chassis to touch any metal parts, such as the frame of an equipment rack. This might create a parallel ground path that could degrade the sound of your system.
- 12) Connect the power cord to the power source indicated on the rear panel (will be either 100, 120, 220, or 240 volts AC). Voltage conversions must be done at the factory of by an authorized VAC importer.
- 13) Avoid power conditioners that float the ground pin.
- 14) Power requirements are approximately 600 watts. Pay close attention to power quality, and

be aware that different power cords can alter the sound.

15) Check the bias settings of the output tubes when the unit is first installed and whenever a tube is changed. It is also a good idea to verify the settings periodically, such as once a week. Follow the bias procedure outlined later in this manual.

NOTES:

Do not remove and connect input cables or speaker cables while is amplifier is running. Doing so risks damage to your loudspeakers or the amplifier.

Do not operate the amplifier without a loudspeaker or load resistor attached.

Do not allow anything to touch the tubes in normal operation - they become very hot.

Take care to keep everyone, especially children and pets, from being able to reach and touch the tubes, which become extremely hot and cause serious injury.

Never touch a tube if the glass is broken. The internal structures carry high voltage and could present a serious, possibly lethal shock. If a tube breaks, unplug the amplifier and wait 30 minutes, then remove the tube.

Keep flammable objects away from the amplifier.



MONO CONNECTION - with Mono Switch option

For 200+ watt mono operation:

- 1) Set the MONO SWITCH to "Mono".
- 2) Ensure that the two BALANCE/SE switches are set identically to one another.
- 3) Connect the input cable to either XLR connector (balanced source) or to either RCA connector (unbalanced source).
- 4) Connect the negative speaker lead to either "COMMON" binding post.
- 5) Connect the positive speaker lead to the "4-8" binding post associated with the Common post selected in step 4. In mono operation, this will match well with speakers ranging from approximately 2 to 8 ohms.
- 6) Do not use the "1-2" or "2-4" binding posts.

MONO CONNECTION - without Mono Switch option (early production units)

For 200+ watt mono operation:

- 1) Connect identical input signals to the two input jacks. It is possible to use a "Y" adapter to do this, or with two cables if your preamplifer has two pairs of outputs.
- 2) Connect a jumper wire between the two binding posts labeled "COMMON".
- 3) Take note of your loudspeaker's impedance. If it is 4 or 8 ohms, connect a jumper between the two binding posts labeled "8 OHMS"; if it is 2 ohms, connect a jumper bewteen the two binding posts labeled "4 OHMS".
- 4) If your speaker is 4 or 8 ohms, connect it to the COMMON and 8 OHM binding posts of either channel; if your speaker is 2 ohms, connect it to the COMMON and 4 OHM binding posts of either channel.
- 5) Ensure that the BALANCE/SINGLE-ENDED switches are set identically.

OPERATION

Power on early units is applied with a front panel push button switch. Note how you are pushing the button if 'contact bounce' occurs, and you'll soon acquire a reliable technique.

Power on later units is applied through a front panel rocker switch.

Sound will begin approximately 45 seconds after turn on.

As with all high fidelity products, the sound characteristic of the VAC changes somewhat as it warms up. We advise against leaving the equipment on at all times for safety reasons, and because of the attendant acceleration of output tube wear and power consumption. Life of the output tubes averages 3,000 to 8,000 hours. For best tube life, turn the amplifier off when you are not listening.

Any time that the VAC Power Amplifier has not been used for a few weeks the sound may be different. This is also normal for high resolution audio equipment. Optimum sound should return after a few hours of operation, preferably with an audio signal.

Please note that although your VAC System has been run for 48 hours at the factory, the break-in time of high resolution audio equipment is infuriatingly long. The Phi sound will continue to season for approximately 200 hours. The early sound of the amplifier will be less extended, dynamic, and coherent. Then the sound will improve noticeably, followed by a period of darker sound, finally giving way to the desired musicality. Patience is a virtue.

Also be aware that many components display the need for a new break in period after being transported in unheated cargo aircraft.

INSTALLING NEW OUTPUT TUBES

First, see the SAFETY NOTICE earlier in the manual.

Output tubes are type KT88. Replacement output tubes should be purchased from VAC. It is desirable that tubes be in matched quartets for each channel, and be close to the "bogey" values for the major parameters. Make certain that each tube fits firmly in its socket.

ALL POWER MUST BE OFF. Wait until the old tubes have cooled down (TUBES BECOME HOT ENOUGH TO CAUSE SERIOUS BURNS WHEN IN OPERATION AND MAY TAKE SEVERAL MINUTES TO COOL DOWN). Install the new tubes firmly and fully in the sockets, observing that the tube will only fit into the socket in one orientation, determined by the plastic "keyway" in the center of the base. Do not use excessive force. Replace the top rods before operating the amplifier.

Adust the bias control fully counterclockwise.

Switch on the amplifier and follow the bias procedure outlined later in this manual. Bias must be checked and adjusted when the amplifier first turns on, at 60 seconds, 90 seconds, two minutes, and five minutes. In the earliest checks, set the bias so that the meter read a bit to the left of center. Final setting should be made after 15-30 minutes. Recheck new tubes daily for the first week.

Whenever a tube is changed, the bias settings must be checked and adjusted.

A slight violet glow in the tube is not cause for concern. If at any time the plate (the outermost metal structure) of the output tubes begins to glow bright orange or red SWITCH OFF IMMEDIATELY (a small area with a dull orange glow is normal for certain versions of the KT88). The red glow indicates that the tube is "running away", being destroyed by conducting excessive current. Tubes may run away for several reasons:

- 1) The tube is not fully inserted in the socket.
- 2) The tube fits loosely in the socket and thus can not make correct contact. Such a tube is unusable.
- 3) The tube is defective.

In the event that trouble is encountered check connections and/or try another tube. Stop if the problem persists and consult with your dealer or VAC.

For further information, refer to Tips & Advice: Tubes in General and Tips & Advice: Output Tubes.

CHECKING OUTPUT TUBE CONDITION

The condition of each individual KT88 output tube should be checked with the built in indicator LED lights, located behind each KT88.

Proper setting is indicated by an LED that is dark when no music is playing, but lights 'with the beat' as music is played. To achieve this setting, place the provided adjustment screwdriver in the bias adjust opening for the tube to be set. While watching the associated LED, turn the control clockwise until the LED lights; then turn the control slightly counterclockwise until the LED just goes out. Be certain to stop the music before making the reading.

Repeat the adjustments if necessary, as the tubes interact slightly.

Do NOT touch the tubes themselves, as they are hot enough to cause serious burns.

NOTE: Some versions of KT88 will evidence a dull orange glow over a <u>small</u> percentage of the tube's anode (see photo).

Output Tube Bias Adjustment:

Bias settings it should be checked when you install your amplifier and approximately once every month thereafter. It must also be adjusted each time a tube is replaced.

Allow the amplifier to reach normal operating temperature (about ten minutes of warmup should be sufficient). Mute the preamplifier and set the bias for the four KT88 tubes by referencing the amber LED lights behind each tube.

Using the supplied tool (or a small flat bladed screwdriver), rotate each control in turn clockwise until the associated LED just lights, then back up slightly until the light just goes out.

Since the adjustments can interact slightly, recheck all four tubes.

REPLACEMENT OF LOW LEVEL TUBES

All power must be switched off. Allow tubes to cool down. Remove and replace with new tubes of the appropriate types. Note that these tubes have a central platic shaft with a locator ridge on one side; this ridge must be aligned with the slot in the socket.

Replacement tubes are available from VAC and other sources.

For further information, refer to Tips & Advice: A Word About Tubes in General and Tips & Advice: A Word About Low Level Tubes.

CARE OF CHASSIS

VAC chassis are machined aluminum for superior electromagnetic performance. The main chassis is finished in a durable matte powdercoat paint. Cleaning the unit with a damp cloth WHILE THE AMP IS SWITCHED OFF AND UNPLUGGED should suffice. Do not get cleaning solutions onto or into the tube sockets or jacks.

TIPS & ADVICE SECTION

<u>A Word About Tubes in General</u>

It is true that each brand of tube sounds different in a particular high resolution circuit. This is because no two manufacturers make a tube type in quite the same way, and the central tendencies of the performance parameters will differ slightly with each maker. To emphasize the point, examine the plate structure of any two 6SN7 from different manufacturers and you may find that they are not the same shape and size. (Be careful here, as often a tube is made by a firm other than indicated on its label. In the heyday of tubes it was common to crossbrand between major labels, such as GE and RCA. Today many labels do not manufacture their tubes at all, including Gold Aero and RAM.)

This sonic variability may at first seem a liability, but further thought will reveal that it is an advantage, just like the ability to adjust VTA on a tone arm. The owner of a tube amplifier can select those tubes which sound like the real thing in his/her specific system. Of course, if the manufacturer you prefer is rare you may want to purchase a few spare tubes for the future.

How long should tubes last? It has long been known in professional circles (and probably now forgotten) that a tube such as the 12AX7 will display <u>better</u> performance characteristics after <u>two</u> <u>years</u> of <u>continual</u> operation than when it was new. In normal use it is not unusual for a low level tube to last 5 years or longer. Output tubes are another story, as they are continually providing significant amounts of current. Here the sound is your best guide. Certainly a tube should be replaced when its emission is significantly down or its transconductance is substantially out of specification. In normal use, output tubes will last at least 2 years and perhaps more than 5 years.

It is normal to see a slight violet glow in a power tube such as a 300B or EL34. However, a vivid violet indicates excess current flow through the tube and should be investigated.

VAC can test tubes for concerned customers.

Tips: Output Tubes

Your VAC Amplifier uses the KT88 kinkless tetrode. It is strongly recommended that replacement tubes be purchased only from VAC. If, however, you want to customize the sound to your tastes, be aware that as with interconnects and speaker cables, each tube manufacturer's KT88 tends to have a distinct sound, as well as its own reliability profile.

Tips: Low Level Tubes

The Voltage Amplifier/Phase Splitter and driver tubes in the Phi is the 6SN7 medium mu octal twin triode. Your amplifier is fitted with the current production VAC Tested 6SN7 from China, which we find superior to the NOS types we have tried. There are dozens of versions of this tube available in new old stock (NOS) from a variety of sources. It would be impossible to characterize them all.

Other equivalent type numbers are 5692, 13D2, B65, ECC32, QA2408, QB65, and CV1988.

Tubes V1 and V2 should be transconductance matched, and tubes V3 and V4 should be transconductance matched; this minimizes distortion.

We strongly recommend obtaining tubes as sets from VAC.

Tips: Impedance Matching

We strongly suggest that you experiment with the available impedance connections for the best sonic match with your system. Since no loudspeaker represents an unchanging impedance at all frequencies, it is impossible to assert with certainty which output tap is appropriate to use. In many systems an amazing difference in sound will exist between the various impedance taps.

Since the impedance of most loudspeakers vary over a wide range experimentation is essential. Most speakers have a rated impedance of 4 or 8 ohms. We recommend starting with the 8 ohm connection; after you know the sound if that connection, try the 4 ohm connection. Choose the connection that sounds best to your ears.

If you bi-wire your system (run separate speaker leads from the amplifier to the high and low frequency transducers) you may discover that two different impedance taps work best.

Contrary to popular misconception, no power is lost due to unused output taps.

For more information consult VAC Technical Monograph 90-9, which may be viewed on our wesite (http://www.vac-amps.com).

Tips: Audio Grounding

Systems incorporating single-ended interconnect cables ("RCA cables") are prone to a problem known as "ground looping", which can result in extraneous hums and buzzes audible through the loudspeaker. If this occurs in your system, you have to attempt to minimize the ground loop.

To minimize the buzz using the normal RCA input jack, there are several steps you can take:

- 1) Use the shortest interconnects possible.
- 2) Use interconnects with good shielding properties.
- 3) Keep the audio cables as close together as possible.
- 4) Keep the AC cords away from the audio cables.
- 5) Try different ground settings on your preamplifier, if it has them. For example, the VAC Signature, Phi, and Renaissance preamplifiers may be set to "ungrounded" or "XLR" audio modes.
- 6) The use of cheater plugs is not recommended and poses a safety hazard.

SPECIFICATIONS

The VAC Phi has been developed with the critical ear as the major arbiter of quality, with both conventional and unique measurements providing insight and guidance as necessary. The lack of emphasis on measurements is due to the fact that engineering's arsenal of equipment and techniques do not operate on the pattern recognition principles that control human perception of sound.

In the immortal words of Daniel von Recklinghausen, if it measures good and sounds bad, it is bad. If it measures bad and sounds good, you've measured the wrong things.

For those concerned with test bench performance, the following describes typical measured performance of the Phi 200 when operated at 120 VAC, 60 Hz.

Power Output: 110 watts/channel continuous average power at 1 kHz with less than 3% THD into 8 ohms connected to the 8 ohm tap in the stereo mode.

220 watts in mono operation, 4 ohm load connected to paralleled 8 ohm taps.

- Frequency Response: down 0.5 dB at 7 Hz and 30 kHz, ref 0 dB = 1 watt @ 1 kHz. down 3.0 dB at 3.5 Hz and 115 kHz, ref 0 dB = 1 watt @ 1 kHz.
- Absolute Polarity: Does not invert absolute phase.

WARRANTY

Your equipment is warranted for a period of thirty (30) days from the date of purchase. In addition, if the registration form is received by VAC along with a copy of your sales receipt from an authorized VAC dealer within this thirty days, the warranty will be extended to two (2) years (tubes excepted). This warranty applies only to units sold in the United States of America through authorized VAC dealers and operated within the United States by the original purchaser. It covers factory service and, within the continental U.S., standard return shipping. For warranty information outside of the U.S. contact the importer of VAC equipment for your country. Units sold outside of the U.S. should still be registered with VAC. It is the responsibility of the customer and/or dealer to ensure suitability of this equipment for any particular application.

Your questions and	d comments	s are always welcome. C	Contact:		
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		Detach and mail to the addres	s above as soon	as possible	
		<u>Phi 200 Regis</u>	tration	<u>Form</u>	
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