



Φ 300.1

The VAC Phi Three Hundred, “A” version
Stereo/Mono Beam Power Amplifier

Operation & Maintenance Information



Valve Amplification Company

Manual issued 03/06/2007
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CAUTION - SAFETY NOTICE

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.

THE TUBE COVERS WILL BECOME HOT IN NORMAL OPERATION. DO NOT SET OR SPRAY ANYTHING ON THEM.

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.

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INTRODUCTION

The Phi 300 is a unique power amplifier, and the most powerful and detailed in VAC's history. Featuring a new direct-coupled input & driver circuit, extremely fast and vivid sound is achieved from both single-ended and balanced sources.

The Phi 300 may be used as a 150 watt/channel stereo amplifier, or as a 300 watt monophonic amplifier, as determined by the rear panel switch. In either mode, front panel level controls may be selected or bypassed; these can be useful in balancing room acoustics or trimming level balance in biamp applications.

Triode switches are provided for those who wish to explore that operating mode.

Front panel attenuators may be selected for aid in balancing channels. These may also be used to trim spectral balance when biamplifying. In the mono mode, leave the right attenuator fully clockwise, and use the left to control gain.

The chassis is machined from thick aluminum, finished in a metallic base coat/clear coat finish.

The Phi 300 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.

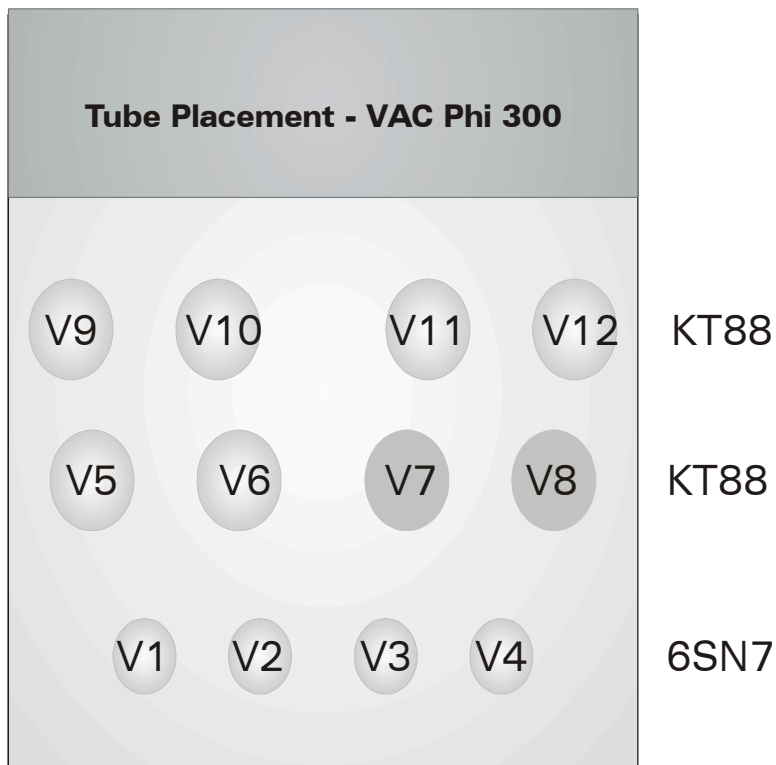
INSTALLATION

- 001) 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) Verify that the two “Ultralinear / Triode” switches are set to the desired position. The ultralinear setting will deliver the best sound quality in most systems.
- 03) Carefully install the front glass and top rails (see detailed directions in the next section of this manual). Take care not to chip or scratch the glass.
- 04) Set the rear switch to mono or stereo as desired.
- 05) Set the rear panel attenuator switch to DIRECT (bypassing the front panel level controls) or VARIABLE (engages front panel level controls) as desired. Note: in the mono mode, leave the right attenuator fully clockwise, and use the left to control gain.
- 06) Connect the speaker cables; the black lead goes to “-” or “Ground”. The red lead goes to “+” or “Positive”. Follow the chart of the back of the amplifier for the impedance that best matches your loudspeakers.
- 07) Set the input type switch to XLR (for balanced input) or RCA (for single-ended input).
- 08) Connect 12 volt trigger input cables into the appropriate sockets on the back panel if desired; either will slave the off/on function to the external connection.
- 09) Provide adequate ventilation - allow at least 3 inches above and to each side.

- 10) Do not place in a completely enclosed cabinet. Do not stack other equipment on top of the VAC unit.
- 11) Do not operate on carpet or any other surface that might block air flow.
- 12) The chassis and glass will become hot in normal use.
- 13) 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.
- 14) 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 or by an authorized VAC importer.
- 15) Avoid power conditioners that float the ground pin.
- 16) Power requirements are approximately 1000 watts. Pay close attention to power quality, and be aware that different power cords can alter the sound.
- 17) **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.
- 18) Note that there is a front panel TEST switch; this engages the eight blue LEDs used for setting or monitoring the bias settings of the KT88 tubes. See Biasing & Checking Output Tube Condition for directions.

NOTE: Do not remove and connect input cables or speaker cables while the 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 operate without the front glass and top rails in place.

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.

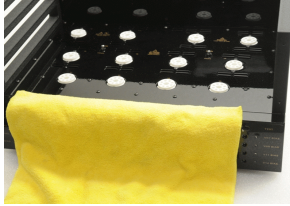
Never touch a tube if the glass is broken. The internal structures carry high voltage and could present a serious, possibly lethal shock. If a tube breaks, unplug the amplifier and wait 30 minutes, then remove the tube.

Keep flammable objects away from the amplifier.

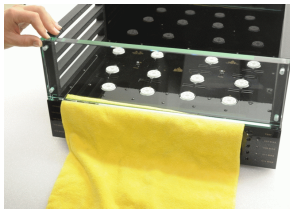
INSTALLING THE FRONT GLASS AND TOP RAILS

Your amplifier has been shipped with the front glass and the top rails removed.

The following steps show how these are installed.



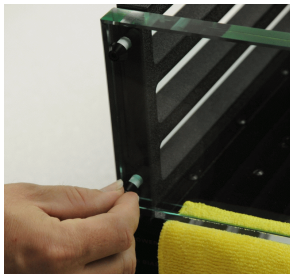
Lay the provided microfiber cloth on top of the fascia as shown.



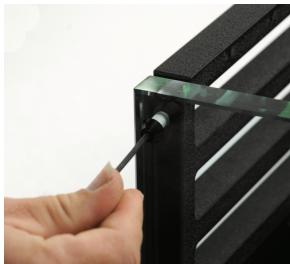
Set the glass in place. Steady it with your hand; do not let go.



Insert one of the provided screw/cone washer assemblies into one of the top holes in the glass. Start the screw, taking care that the threads align properly. Tighten as much as you can using only your fingers.



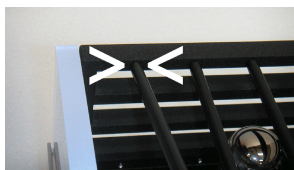
Insert and tighten the remaining three screw/cone washer assemblies.



Using the provided Allen driver, tighten the four screws to a gentle but firm pressure



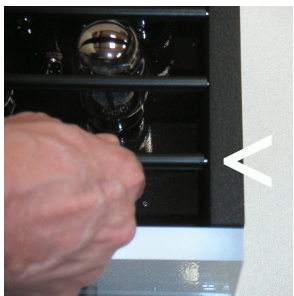
Pull the microfiber cloth free, starting at one side as shown



The top tube cage bars have a spring pin in each end.

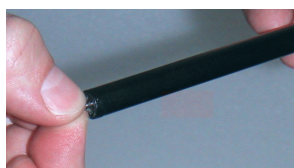
To install, place one of the spring pins into one of the small dimples machined into one of the side rails.

In the Illustration, the pin has been located into the left side rail.



To complete the installation, press the bar in the direction of the pin already inserted, and manoeuvre the other end into the corresponding dimple in the other side rail, then release.

In this illustration, the bar is pressed to the left, while the right spring pin is set into the dimple in the right side rail.



The amount of protrusion of each pin may be adjusted slightly if needed.

REMINDER: 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.

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

REMINDER: Provide adequate ventilation may not be safe. Failure to do so may shorten the amplifier's life, and may result in tube failures. Operating the amplifier on a thick carpet will also cause this, and is not safe.

OPERATION

By time delay, sound will begin approximately 60 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.

ILLUMINATED LOGO

The illumination of the front VAC logo may be dimmed or turned off via a switch on the back panel.

TRIODE & ULTRA-LINEAR MODES

Triode amplification is the oldest form of amplification known, while partial triode ("ultra-linear") operation of pentodes and beam power tubes dates back to 1937. Both modes of operation are available with your VAC Phi amplifier via a single switch on the top plate.

Although the mode may be changed with the amplifier in operation, we strongly suggest that you turn only operate the switch when the amplifier is off and the tubes have cooled down [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.] Turn the switch to the position indicated, then power the unit up and listen.

Less power is available in the full triode mode, but distortion before clipping may be reduced, as is output source impedance. Experience reveals that the triode mode will sound somewhat lean on some systems and better defined on others. In many ways this is an issue of system matching, and universal recommendations do not exist. Listen to both, and select the mode most pleasing in your system.

Note that the bias current will typically read slightly lower in the triode mode than in the ultra-linear mode. Simply follow the BIAS procedure if necessary to restore the correct reading for each tube.

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. Remove the top cage rods and the old tubes after they have cooled down (THE CAGE RODS BECOME QUITE HOT IN NORMAL USE; 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.

Adjust the bias control(s) for the new tubes 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. 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 / 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.

The condition of the individual KT88 output tubes is checked using the TEST switch and eight built in indicator lights (four on each side of the front panel, adjacent to the adjustment points..

If checking existing tubes, allow the amplifier to reach normal operating temperature (about ten minutes of warmup should be sufficient). If installing new tubes, see INSTALLING NEW OUTPUT TUBES.

To start, be certain to stop the music; no music should be playing during the adjustments. Next, move the TEST switch to the right.

Start with the V05 BIAS control. Insert the supplied screwdriver (or a small flat bladed screwdriver) into the adjustment control and turn in clockwise until the adjacent LED just lights; then turn it slightly counterclockwise until the light goes out. Next, go to V06 BIAS and repeat the procedure, and so on, through the V12 BIAS setting.

Because the adjustments can interact slightly, recheck all eight tubes, starting with V05.

The TEST switch may be turned off, or may remain on while playing music. If left on, the lights will illuminate at low volume levels and appear to flash with the beat of the music. This is a simple way to monitor bias in an ongoing fashion; the lights should be out between songs, and come on more or less equally at low levels of music.

REPLACEMENT OF LOW LEVEL TUBES

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

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 and the fascia are finished in an acrylic lacquer, similar to fine automobile; similar care must be taken in wiping or cleaning. THE AMP MUST BE SWITCHED OFF AND UNPLUGGED, and at no time may any cleaning material be allowed to get into the tube sockets or jacks.

TIPS & ADVICE SECTION

A Word About Tubes in General

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 will probably find that they may not even 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 better performance characteristics after two years of continual 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.

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 of 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 website (<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 principals 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 300 when operated at 120 VAC, 60 Hz.

Power Output: 135 watts/channel continuous average power at 1 kHz with less than 3% THD into 4 ohms connected to the 8 ohm tap in the stereo mode.

300 watts in mono operation.

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 comments are always welcome. Contact:

Valve Amplification Company
1911 East Avenue North
Sarasota, FL 34234
Telephone (941) 952 9695 Fax (941) 952 9691
info@vac-amps.com

Detach and mail to the address above as soon as possible.

Phi 300.1a Registration Form

Name _____

Address _____

Telephone _____ / _____ - _____ e-mail _____

Dealer name _____ City _____

Salesperson _____ Purchase date _____ Serial Number _____

How did you first learn of VAC products? _____

What other brands/models did you consider? _____

What made you decide on the VAC? _____

What else would you like us to know? _____

Optional:

What magazines do you read regularly? _____

What are your hobbies (besides filling in warranty cards)? _____

What are your favorite types of music? _____

On what format? (CD, LP, DVD, SACD, MP3, etc.) _____