

VAC iQ Continuous Automatic Bias System - Addendum to Statement iQ models

Introduction

In engineering, the abbreviation “Iq” denotes the quiescent current of a vacuum tube, also known as the idle current or bias point. The Iq is what is being set when you adjust an amplifier's bias.

For best performance, the Iq must be set and maintained precisely, even as the amplifier warms up, the power line varies, the tubes drift, and regardless of whether you're playing the music softly or loudly.

No system has been able to do this. Until now.

The result of 17 years of research, the VAC Iq Bias Control System is the first and only system able to monitor continuously the true bias point of each output tube and hold it precisely at the desired value, thus ensuring optimal performance at all times. It actually outperforms manual systems because it can correct for the heating effects that occur when reproducing loud passages of music. The VAC circuit both MONITORS and CONTROLS, continuously, in real time.

The resulting performance difference is one that you can easily hear. And not only does it sound better, it radically reduces the rate of tube failures, and is self-diagnosing.

Operation

Statement 450 and 450S amplifiers equipped with the VAC iQ system differ in several important ways from the standard models:

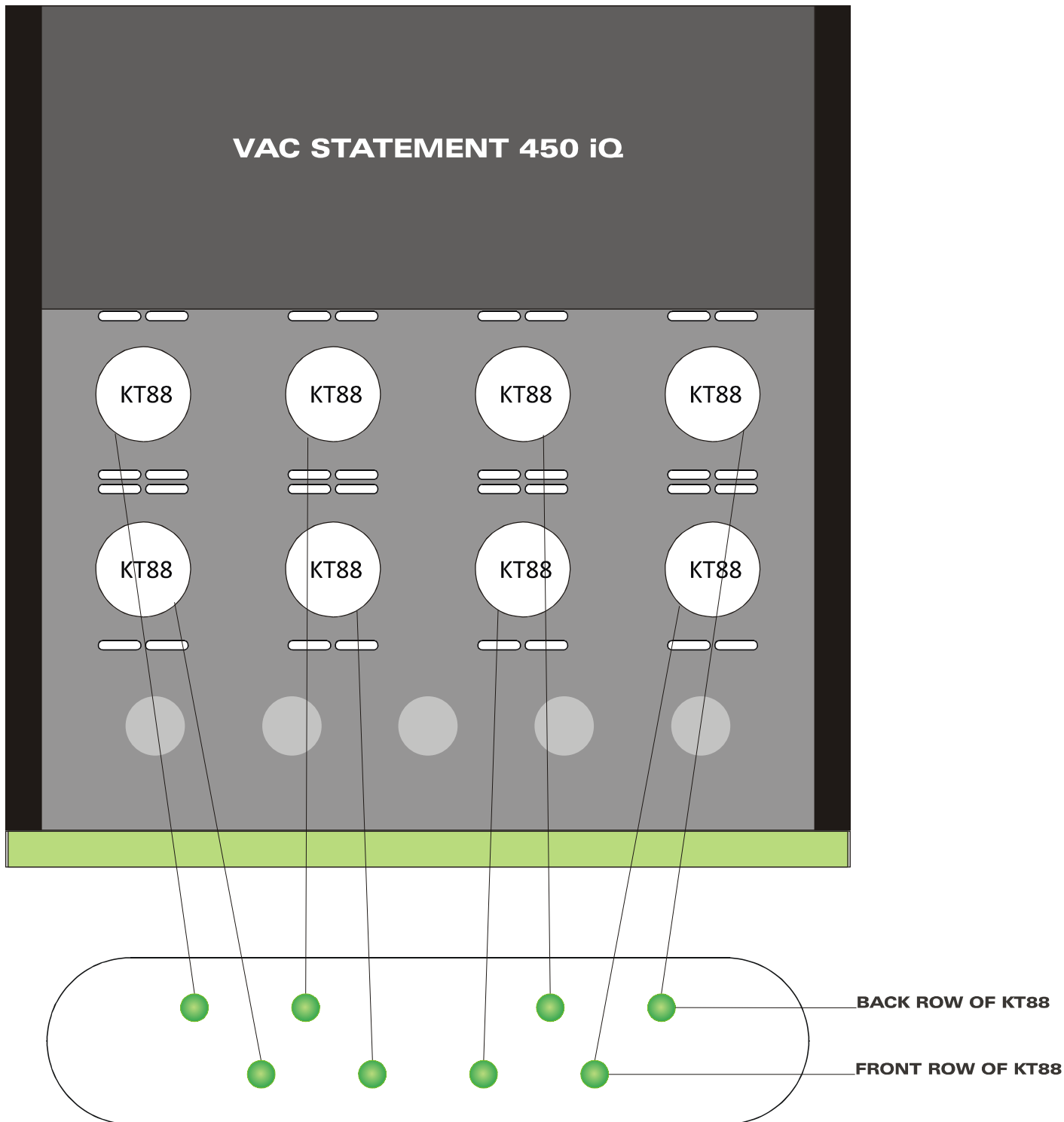
- 01) There is a third power cord between the power supply and audio chassis;
- 02) There are no bias adjustments;
- 03) The blue bias indicator lights are replaced with bicolor green/red LEDs;
- 04) The bias test switch is deleted.

In operation, the iQ circuit monitors and maintains the correct bias adjustment for the KT88 output tubes at all times, regardless of the music playing.

The iQ system contains two other components that inform you of tube condition and protect the amplifier; the operation of these two circuits is indicated by the bicolor LEDs.

If an LED illuminates GREEN, this is an indication that the associated tube is becoming weak. In a conventional amplifier, you would have advanced the bias control well clockwise for this tube. No immediate action is required; simply replace this KT88 with a fresh one when time permits, and the amplifier will make the best of the weak tube until then.

An LED will illuminate RED if an output tube draws excessive current, i.e., if a ‘run away’ occurs. Because of the stabilizing action of the auto bias circuit, this is most likely to occur if something inside the tube has physically broken. The iQ system detects the fault within a fraction of a second and shuts down the main power supply, thus preventing any damage; all of this happens long before the fuse can react. Switch power off, and replace and discard the indicated tube after it cools down.



GREEN = WEAK TUBE, REPLACE AT YOUR CONVENIENCE
RED = DEFECTIVE TUBE, DO NOT USE AGAIN!



The VAC Statement 450 Mono Beam Power Amplifier

Operation & Maintenance Information



Valve Amplification Company

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Revised 07/26/2011

CAUTION - SAFETY NOTICE

THE AMPLIFIER AND POWER SUPPLY CONTAIN 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 Statement 450 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.

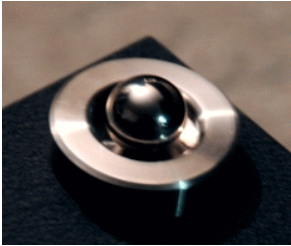
The front panel attenuator may be selected for aid in balancing channels. It may also be used to trim spectral balance when biamplifying.

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

The 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

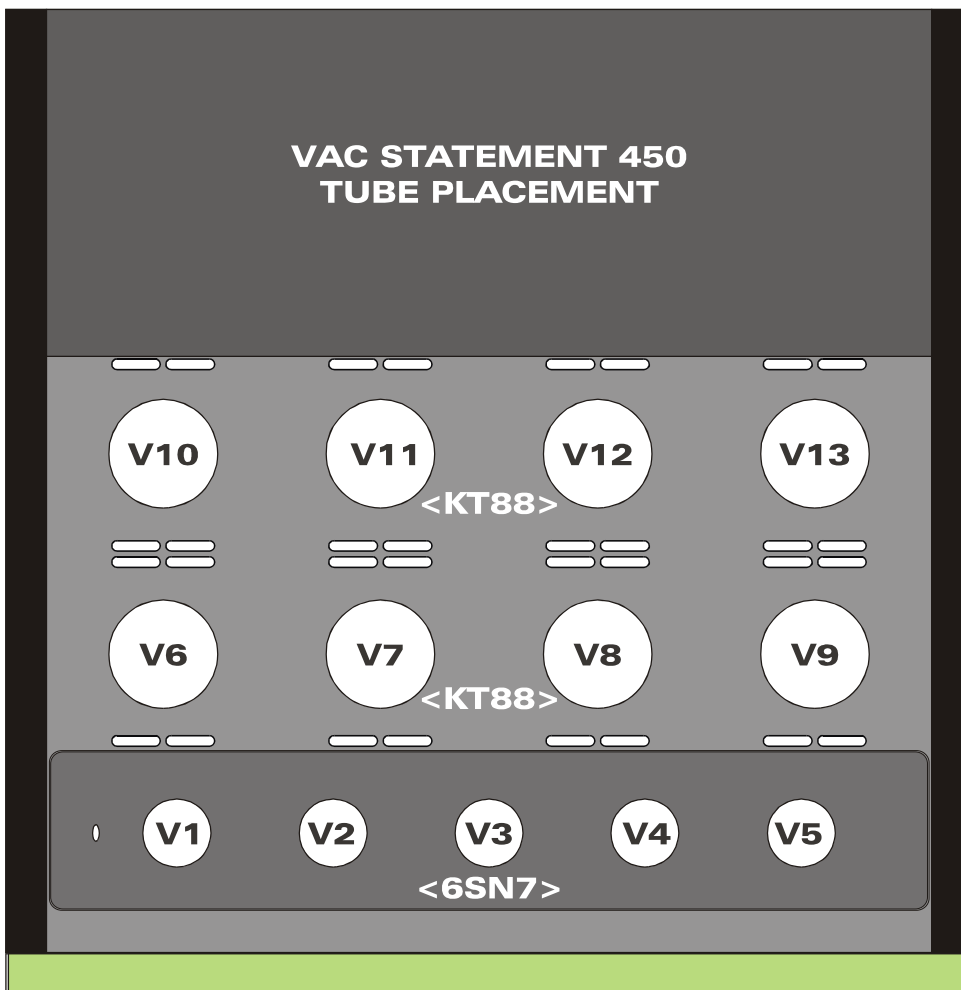
- 05) Place the power supply in its final location. It is quite heavy, and will become more so when the amplifier is installed on top of it. Consider the location carefully, and use appropriate help in lifting, etc., so as to avoid injury.



- 06) Place one of the metal balls provided in each of the three cups on the top of the power supply.



- 07) Carefully place the amplifier chassis on top of the power supply, taking care to align the balls on top of the power supply with the cups on the bottom of the audio chassis.



- 008) 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.

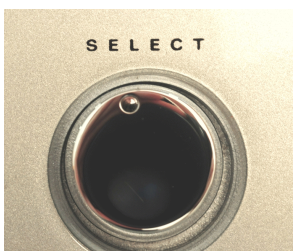
When inserting and removing tubes, handle them by their bases, not by their glass bulbs.

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

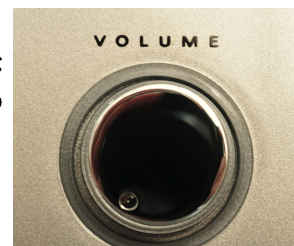


09) Carefully install the front glass and top rails (see detailed directions in the next section of this manual). Take care not to chip or scratch the glass.

10) Set the top switch to Balanced (for use with balanced sources on XLR connector) or Single-ended (via RCA connector) as desired.



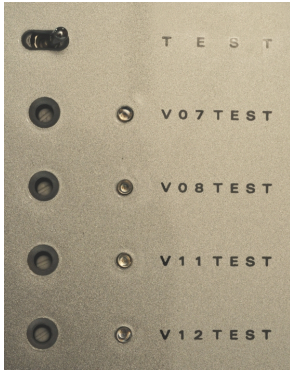
11) Set the front panel SELECT switch fully counterclockwise for full volume input, or clockwise if you wish to attenuate volume using the front panel VOLUME control.



- 12) Install the input cable in the back panel jack that corresponds to the switch settings selected above.
- 13) Connect the speaker cables; the black lead goes to “-” or “Ground”. The red lead goes to “+” or “Positive”. Follow the label on the back of the amplifier for the impedance that best matches your loudspeakers.
- 14) 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.
- 15) Provide adequate ventilation - allow at least 3 inches above and to each side.
- 16) Do not place in a completely enclosed cabinet. Do not stack other equipment on top of the VAC unit.
- 17) Do not operate on carpet or any other surface that might block air flow.
- 18) The chassis and glass will become hot in normal use.
- 19) The power supply may produce a small mechanical hum; therefore avoid placing the system on any surface that could act as a sounding board, or at any location in the room that corresponds to a resonance at your local power frequency (50 Hz. or 60 Hz.).
- 20) 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.
- 21) Connect both of the cables between the power supply and the audio chassis. Note that each has a locating key and a locking collar. Be sure to insert the connector properly, and fully tighten the locking collar.
- 22) 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.

- 23) Avoid power conditioners that float the ground pin.
- 24) Power requirements are approximately 1000 watts. Pay close attention to power quality, and be aware that different power cords can alter the sound.



- 25) 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.
- 26) 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.

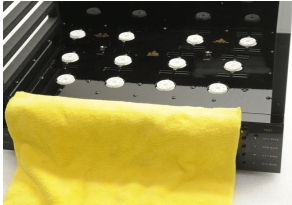
Never touch a tube if the glass is broken. The internal structures carry high voltage and could present a serious, possibly lethal shock. If a tube breaks, unplug the amplifier and wait 30 minutes, then remove the tube.

Keep flammable objects away from the amplifier.

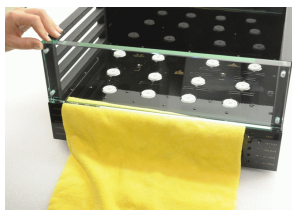
INSTALLING THE FRONT GLASS AND TOP RAILS

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

The following steps show how these are installed.



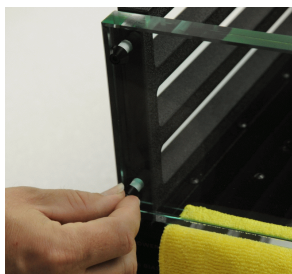
Lay the provided microfiber cloth on top of the fascia as shown.



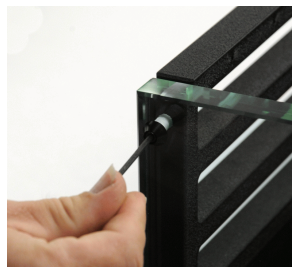
Set the glass in place. Steady it with your hand; do not let go.



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.



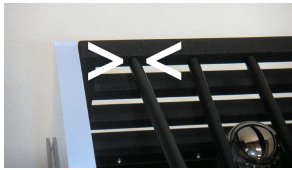
Insert and tighten the remaining three screw/cone washer assemblies.



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.

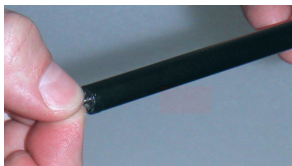
To install, place one of the spring pins into one of the small dimples machined into one of the side rails.

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

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 Statement 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 logos may be dimmed or turned off via a switch on the back panel of the power supply.

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 V06 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 V07 BIAS and repeat the procedure, and so on, through the V13 BIAS setting.

Because the adjustments can interact slightly, recheck all eight tubes, starting with V06.

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.

The exact characteristic of each tube and the relationship among the five 6SN7 is critical to the optimal performance and best sound of your amplifier. Therefore we recommend obtaining replacement tubes from VAC, specifying that they are for use in the Statement 450 amplifier.

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

Tips: Fuses

Your amplifier is designed to use “slow blow” type fuses. These are contained in the fuse drawer built into the power receptacle.

In the fuse drawer are two fuses. The one furthers in is the active fuse. The one nearer to the outside is a spare.

The fuse ratings are labeled on the back of the power supply. Be certain to use only the fuse rating applicable to your local ac supply voltage.

With a high power amplifier, there can be an appreciable surge of current for a few milliseconds when power is switched on. Over time, this can fatigue a fuse and cause it to fail at the instant that power is applied. This may be considered normal.

In installations where the ac power is exceptionally stiff, you may find that the fuse blows every second or third turn on. In such cases, please contact the factory for additional advice.

Tips: 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 KT88. 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 Statement is the 6SN7GT 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.

The matches among the five 6SN7 are critical to the Statement 450's performance. Therefore we recommend that replacement tubes be obtained in 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 Statement 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 when operated at 120 VAC, 60 Hz.

- 450 watt mono amplifier with separate power supply
- Gain: 39 dB, SE; 33 dB, balanced
- Frequency response 4 Hz to 75 kHz
- Power bandwidth 20 Hz to 70 kHz
- Single-ended input via RCA jack, non-inverting
- Balanced input via XLR jack, non-inverting relative to pin 2 ("pin 2 hot", traditional EIA/RCA broadcast/recording standard); amp is fully balanced in this mode
- 12 volt triggers
- Illuminated logo; may be switched off
- Dimensions: 17.8" wide, 18.25" front to back (not including connectors), 9.75" high (audio chassis), 128 lbs.
- Dimensions: 17.8" wide, 18.25" front to back (not including connectors), 5.5" high (power supply), 80 lbs.
- 8 x KT88, 5 x 6SN7
- Detachable power cord, standard IEC power receptacle
- May be factory configured for operation at 100, 120, 220, or 230/240 volt operation

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.

Statement 450 iQ 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.) _____