

RENAISSANCE SEVENTY/SEVENTY Mk. III

Dual Mono

Zero Feedback

All Triode

Power Amplifier

by

Valve Amplification Company



Operation & Maintenance

IMPORTANT INFORMATION

PLEASE READ CAREFULLY

Your Renaissance Seventy/Seventy has been fitted with a thermal sensor circuit. It works in conjunction with the indicator lights located under the VAC logo on the front panel, and has two functions:

- 1) If the idle current in a pair of 300B output tube should drop well below acceptable limits, the light corresponding to that pair (left-most pair, left-center pair, right-center pair, right-most pair) will light green. At least one of these tubes should be replaced. Obtain a new tube, and replace one of the pair. If this does not resolve the indication, return the original tube to its socket and replace the other tube of the pair.

These lights will also be green when the amplifier is first switched on, and will extinguish when the bias resistors have reached normal operating temperature after several minutes. Note: a strong cool air current could cause the lights to remain green even in normal operation.

- 2) Should any output tube draw excessive idle current (run away or internal short) the light corresponding to that pair will glow red and the high voltage supply to that channel will be shut down. The red light will stay on until the power switch is turned off. One tube of the pair must be replaced. Obtain a new tube, and replace one of the pair. If this does not resolve the indication, return the original tube to its socket and replace the other of the pair.

The lights for the other three pairs will show green after a few minutes...this should be disregarded.

This protection feature normally will operate with much greater speed than the AC line fuse, and provides a high degree of protection against elevated temperature or fire due to a major failure in an output tube. However, completely failsafe methods are not possible. As with any high power electrical device, never leave the amplifier run unattended. Turn the amplifier off immediately if you smell any strong odor, or if you see any parts glowing orange through the gold vent grille.

To minimize difficulties, always source the highest quality tubes, avoiding inexpensive or generic 300B tubes. We recommend obtaining replacement tubes from VAC, stating that they are for use in the Renaissance Seventy/Seventy.

CAUTION

THESE UNITS CONTAIN NO USER SERVICEABLE PARTS. DO NOT REMOVE THE BOTTOM PLATES OR TOP 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.

USE DUE CAUTION WHEN OPERATING THE AUDIO GROUND SWITCH. ALLOW THE UNIT TO BE SWITCHED FULLY OFF FOR 5 MINUTES FOR THE TUBES TO COOL DOWN. THE TUBES AROUND THIS SWITCH BECOME VERY HOT AND COULD CAUSE SERIOUS BURNS IF TOUCHED.

THIS AMPLIFIER IS VERY HEAVY. IT MAY BE ADVISABLE TO HAVE ASSISTANCE IN UNPACKING, MOVING, AND SETTING UP. BE SURE TO USE PROPER LIFTING TECHNIQUES TO AVOID BACK STRAIN AND INJURY.

INDEX

Introduction

Unpacking

Installation

Operation

Installing New Output Tubes

Replacement of Low Level Tubes

Care Of Chassis

Tips and Advice

 A Word About Tubes in General

 A Word About Output Tubes

 A Word About Low Level Tubes

 A Word About Impedance Matching

 A Word About Feedback

 A Word About Grounding

 Tuning Your System

Specifications

Footnotes

Warranty & Registration Form

INTRODUCTION

The Renaissance Seventy/Seventy is a completely unique power amplifier. It allies purist amplifying devices with the power and solidity required to control modern audiophile loudspeakers.

The most noticeable feature of this amplifier is the 300B filamentary triode output tube. Originally designed by Western Electric in 1935 (Footnote 1), it has several extremely desirable features that have kept it in continuous production since that time. An examination of its dynamic curves (Figure 1) reveals it to be a naturally linear device, more so than triode connected pentodes or beam power tubes (ex: KT88, EL34), let alone any transistor device. It gives this superb performance with voltages on the order of 450 VDC, not the 1000-1500 VDC required by other output triodes like the 211 or 845. This lower voltage and lower output impedance allows superior output transformer design, control of the loudspeaker, and safety.

Each 300B tube has its own separate heater power supply and independent cathode self-bias network. This has several major advantages. No user adjustment of any kind is necessary to maintain proper balance of the amplifier. The stabilizing action of this technique upon the idle current (bias point) of each tube is exceptionally strong, and self corrects for large mismatches among tubes or drift with age. This circuit also results in real-world output capability much greater than the test-bench rating would indicate (Footnotes 2,3,4).

A total of four 300B are used in each channel to reach 70 watts per channel in Class A.

The input circuitry of the Renaissance Seventy/Seventy is derivative of the unique Williamson circuit, which provides pure, direct coupled, inherently balanced input amplification and phase splitting. Type 6SN7/5692 octal twin triodes do the honors.

The superb VAC output transformer provides superb voltage/current translation, allowing impedances from eight ohms to as low as one ohm to be driven.

The 35 pound chassis is machined from quarter inch thick aluminum plate. This strong, resonance-resistant structure houses two electrically independent channels of amplification. Each channel is separate, down to two dedicated shielded power cords. A total of eight transformers are used, providing sixteen power supplies.

The units is completely hand wired in three dimensional space for the shortest possible lead lengths, allowing passive components to perform much nearer to the theoretical ideal.

The Renaissance Seventy/Seventy 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.

UNPACKING

The Renaissance Seventy/Seventy is double boxed for the greatest possible protection during shipping. Tubes are packed individually to prevent damage, and must be fitted to the amplifier before installation can proceed.

Each tube socket is covered by a small round sticker. On this sticker is a number that corresponds to a numbered sticker on each tube. Fit each tube into the matching socket, first *removing* the sticker from the amplifier and the tube. No bias level adjustment is required. When inserting and removing tubes, handle them by their bases, not by their glass bulbs. Please note that there is a locator pin on the octal (eight contact) tubes that indicates proper alignment. For the 300B tubes, two pins are of larger diameter - the tube will only fit into the socket one way.

INSTALLATION

- 1) Provide adequate ventilation - allow at least 3 inches above and to each side.
- 2) Do not place in a completely enclosed cabinet. Do not stack other equipment on top of the VAC unit.
- 3) Do not operate on carpet or any other surface that might block air flow.
- 4) The chassis will become hot in normal use.
- 6) 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 will degrade the sound of your system.
- 6) Input connection is via single ended RCA jacks. Speaker connection is via 11 mm binding posts (be careful not to over tighten). Note that the negative terminal is the same for all impedance connections. For further information see *Tips & Advice: A Word About Impedance Matching*.
- 7) Connect each channel to the power source indicated on the rear panel, either 100, 120, 220, or 240 volts AC. The voltage may be select by means of the removable selector card located behind the fuses in the power connectors. Remove the cards and reinstall so that the desired voltage may be read. Avoid power conditioners that float the ground pin.
- 8) Power requirements are approximately 500 watts per channel. Pay close attention to power quality, and be aware that different power cords can alter the sound.
- 9) *Initially start with the Audio Ground switch in the "AF" position, and the left and right Feedback controls in the "0" position. See the TIPS sections for further information.*

OPERATION

Each channel has a separate power switch. By delay timer, 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. Best sound will be achieved after about one hour of operation. We advise against leaving the equipment on at all times for safety reasons (see Safety Notice at the front of this manual), and because of the attendant acceleration of output tube wear and power consumption. Life of the output tubes averages 5,000 to 10,000 hours.

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. Refer to the discussion of break in contained in the INTRODUCTION section of this manual for further information.

Please note that although your VAC System has been run for 48 hours at the factory, they will continue to "break in" for approximately 150 hours. 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

Replacement 300B output tubes should be purchased only from VAC. Output tubes are type 300B. It is important that the tubes be checked for any tendency to mechanical or electrical shorts (see Safety Notice at the front of this manual). 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.

Refer to Figure 2 for the location and types of tubes.

ALL POWER MUST BE OFF. Remove the old tubes after they 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, as two of the pins are of larger diameter. Do not use excessive force.

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.

Switch off immediately if any part under the gold vent grille glows orange. See Safety Notice at the front of this manual.

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

REPLACEMENT OF LOW LEVEL TUBES

Refer to Figure 2 for the location and types of tubes. All power must be switched off. Allow tubes to cool down. Remove and replace with new tubes of the appropriate types, noting the location of holes in the socket and pins of the tubes.

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, and finished in durable textured gloss paint. Cleaning 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.

TIPS & ADVICE

A Word About Tubes in General

It is a truth 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 tubes 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.

A Word About Output Tubes

Your VAC Amplifier uses the 300B or 300A filamentary triode. It is strongly recommended that replacement tubes be purchased only from VAC, as stated in the Safety Notice at the front of this manual. If, however, you want to customize the sound to your tastes, be aware that as with interconnects and speaker cables, each tube manufacturer's 300B tends to have a distinct sound. Here is a brief summary of our experiences with currently available tubes from different sources.

Western Electric 300B (U.S.):

The original and definitive manufacturer. This tube was made by WECO through 1989. Older production (pre-1980) is preferable to later production and is heartily recommended. World wide supply is limited. Be careful...used tubes and WECO rejects have been seen on the market at premium prices. The sound is somewhat midrangey, with soft bass and treble. Similar: Western Electric 300A (U.S.), the initial WECO production code, differs from the 300B in the shape of its bulb and the location of the bayonet locator pin - very rare.

VAC Tested 4-300B:

A new version of the 300B designed in Great Britain and manufactured in China. A very good tube, more open and detailed than the WECO. Successor to the earlier Golden Dragon series. Current production, our preferred tube, *highly recommended*.

Cetron 300B (U.S.):

A bit buzzy in sound, a bit more prone to microphony than the WECO or VAC. Some arcing may be observed at turn-on.

Sovtek (Russia):

Made by the Reflector factory in Saratov. Not recommended. Not reliable under the VAC operating conditions.

Svetlana (Russia):

Rather hard and airless sound.

JJ / Tesla (Slovakia):

Somewhat hard and airless sound, a bit buzzy in the midrange. Some arcing at turn-on. Excessive input capacitance.

Vaic:

Many versions produced, may sound good in some systems. Be certain that the version you use conforms to the WECO 300B standard for filament current (1.5A) or amplifier damage may result.

KR Enterprises:

Many versions produced, most deviant from 300B standards. Be certain that the version you use conforms to the WECO 300B standard for filament current (1.5A) or amplifier damage may result.

The Japanese publication MJ Audio Technology (Footnote 5) compared 300B from WECO, Golden Dragon (China), and Cetron, concluding that the WECO and Golden Dragon were comparable and superb in performance.

Please note that firms such as Gold Aero, RAM, and Penta do not design or manufacture their own 300B tubes. Various US companies marketed 300B tubes during the 1950's. Not much is known about their quality.

A Word About Low Level Tubes

The Voltage Amplifier/Phase Splitter and driver tubes in the Renaissance Seventy/Seventy is the 6SN7 medium mu octal twin triode. Your amplifier is fitted with the current production British/Chinese Golden Dragon, 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 usually are not terribly expensive, and may be worth experimenting with. VAC welcomes your comments.

One NOS variant worth mentioning is the RCA "Special Red" industrial version 5692. These represent the pinnacle of RCA's tube knowledge.

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

A Word About Impedance Matching

We strongly suggest that you experiment with the three 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. We often find that matching a speaker's minimum impedance is more important than matching its nominal (average) impedance.

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. For example, with early production Martin Logan Sequel II we find that the bass speaker is best matched with the 4-8 ohm tap, while the electrostatic panel is best controlled by the 2-4 ohm tap. On later production Sequels we use the 8-4 ohm connection to both drivers.

Contrary to popular misconception, no power is lost due to unused output taps. Also, the amount of negative loop feedback in the amplifier does not change, being set by the front panel switches. For more information consult VAC Technical Monograph 90-9.

A Word About Feedback

Two front panel controls (one for each channel) are provided by which controlled amounts of loop negative feedback may be introduced. The settings are as follows:

<u>Labelled</u>	<u>Comments</u>
0	no global feedback at all
3	3.5 dB negative feedback
4	4.5 dB negative feedback
5	5.5 dB negative feedback, compensated
6	6.5 dB negative feedback, compensated
7	7.5 dB negative feedback, compensated

A given amount of feedback reduces the sensitivity of the amplifier by that amount. For example, when switching from 0 dB to 3.5 dB of feedback, you will need to turn your preamplifier up 5.5 dB to achieve the same volume.

As small amounts of feedback are introduced, the sound will tend to tighten up and be more controlled. At the same time, the frequency response of the amplifier/loudspeaker combination will change. With dynamic speakers, 0 dB is often satisfactory, and excessive amounts will dry and brighten the sound too much. With highly reactive loudspeakers, such as electrostatics, more feedback may actually produce a more open, airy sound.

There is no "optimal" setting for this control in an engineering sense. While feedback improves static damping and lowers some forms of distortion, it also weights the relative balance of distortion components to a higher order. In other words, there's a little good and a little bad about feedback. Listen, and use the setting that provides the best overall subjective performance of your system.

For further information please read the Tips section entitled Tuning Your System.

A Word About Grounding

The Renaissance amplifier is designed to be used with a three prong power cable. The ground pin connects directly to the chassis, while the audio ground couples to the chassis as determined by the GROUND switch. In the DC position, the audio ground ties directly to the chassis. In the AF position, audio and radio frequencies ground information is referenced to the chassis, but DC is blocked. In the RF position, only radio frequency energy is bled to the chassis, and audio signals "float". Each of these positions will sound different and may produce different noise floors. The correct setting depends on how the rest of your system is grounded. Try each, and use the setting that produces the best sonic performance. Retest the settings any time you change a component in your system or change any power wiring.

Please note that some power line "conditioners" or "enhancers" do unusual things with the power line grounds, and may thereby create noise and sound quality problems.

For further information please read the Tips section entitled Tuning Your System.

Tuning Your System

The VAC Renaissance has unparalleled opportunities for fine tuning your system for best subjective reproduction. At first glance this may seem a bit intimidating, but it's actually quite easy to do. Let's go step by step from the beginning.

- 1) Start with the Ground switch at "AF" and the two Feedback controls at "0." Connect the loudspeakers to the highest tap that encompasses the nominal impedance rating of your speakers. For example, if your speakers are 4 ohms, connect them to the "4-8" tap rather than the "2-4" tap.
- 2) Play several different recordings that you are familiar with to get used to the sound of the system.
- 3) Turn the Feedback controls to the next highest setting. Turn up the volume control on your preamp until the volume sounds the same as before. Listen again to several recordings. If the sound seems improved, then try the next higher Feedback setting. Stop when you find the setting that sounds best to you.

In general, very reactive loudspeakers such as electrostatics will require more feedback for open sound.

- 4) Try the Ground switch in the "DC" position, then the "RF" position. Select the position that sounds best and does not introduce hum or buzz into the system. Be very careful when using this control, as the tubes are hot enough to cause a severe burn. If you're uncertain, switch the amplifiers off and wait 5 minutes for the tubes to cool down.
- 5) Try the speakers on the next lower impedance tap, and select the tap that sounds best to you.
- 6) If you made changes in steps 4 or 5, then repeat steps 3, 4, and 5.

Finally, remember that the break-in time of high resolution audio equipment is infuriatingly long. The Renaissance sound will continue to season for at least 200 hours. Typically, 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, as they say, is a virtue.

SPECIFICATIONS

The VAC Renaissance Seventy/Seventy 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 with no feedback (0 dB) at 120 VAC, 60 Hz.

Power Output:	65 watts continuous average power at 1 kHz with less than 2% THD into 4 ohms connected to the 4-8 ohm tap.
Distortion:	0.12 % THD at 10 watts.
Frequency Response:	down 0.5 dB at 6 Hz and 90 kHz, ref 0 dB = 1 watt @ 1 kHz. down 3.0 dB at 2 Hz and 103 kHz, ref 0 dB = 1 watt @ 1 kHz.
Power Bandwidth:	down 0.5 dB at 12 Hz and 58 kHz. down 3.0 dB at 8 Hz and 85 kHz.
Negative Feedback:	Selectable: 0, 3.5, 4.5, 5.5, 6.5, 7.5 dB.
Absolute Polarity:	Does not invert absolute phase.

FOOTNOTES

1. Tube Manufacturing at Western Electric: The WE 300, Attila R. Balaton. Journal of the Audio Engineering Society, Vol.37, No.11, November 1989, pages 949-958.
2. The Low-Loading Self-Biased Amplifier, L.B.Dalzell. Audio, December 1959, pages 19-21.
3. The Fixed-Bias Story (Is Fixed Bias Really Better?), Herbert Ravenswood. Radio-Electronics, February 1958, pages 47-49.
4. Philips Hi Fi Amplifier Circuits. Published in Holland, 1958.
5. WE 300B. MJ Audio Technology, 1992/5, pages 213-215.

WARRANTY

Your equipment is warranted for a period of thirty (30) days from the date of purchase.

In addition, if the registration card(s) is received by VAC along with a copy of your sales receipt from an authorized VAC dealer within this thirty days, a service contract will be extended to cover your equipment for three (3) years (tubes excepted).

This warranty applies only to units sold to and operated by private individuals in the United States of America through authorized VAC dealers. 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 dealer to ensure that this unit is suitable for any particular application.

Your questions and comments are always welcome. Contact:

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E-mail info@vac-amps.com

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

RENAISSANCE SEVENTY/SEVENTY Mk III REGISTRATION FORM

Name _____

Address _____

Telephone _____ / _____ - _____ E-mail _____

Dealer name _____

Salesperson _____

Purchase date _____ Serial Number to be registered _____

How did you first learn of VAC products? _____

Please provide any comments on VAC products or your dealer _____

What other brands/models did you consider? _____

Why did you choose the VAC? _____