CPA1 Mk III & CLA1 Mk III Instructions

Please read carefully before installing

The VAC CPA1/CLA1 Mk III Preamplifiers are designed for the most exacting applications. The two models are similar except for the omission of the phonograph preamplifier in the CLA1. All audio circuits are Class A triode vacuum tube types. In addition, all direct audio signal paths are hard-wired for best performance.

General Precautions

1. DO NOT OPEN POWER SUPPLY OR PREAMPLIFIER CHASSIS - THERE ARE NO USER SERVICEABLE PARTS INSIDE. DO NOT REMOVE TUBE CAGE UNTIL UNIT HAS BEEN SWITCHED OFF FOR 15 MINUTES. TUBES BECOME HOT IN USE. DO NOT EXPOSE EITHER CHASSIS TO MOISTURE. DO NOT PLUG INTO AN AC SOURCE UNTIL ALL CONNECTIONS ARE COMPLETED.

2. Complete all connections *before* connecting the AC cord to the wall outlet, particularly the 6 pin cable from the power supply to the preamplifier chassis. Similarly, always remove the AC power cord before detaching the 6 pin DC power cable. Failure to observe this sequence will result in damage to the power supply.

3. At turn on, all volume controls should be full counter-clockwise and the mode switch should be set to MUTE. Allow 1 minute for warm up before selecting STEREO.

4. For protection of your speakers and power amplifier, always switch preamp to MUTE before switching the power supply off or on.

5. *Allow the system to sit switched off for at least 10 minutes before disconnecting the preamp from its power supply.*

Operation - Line Stage Section

The line stage can be operated in two basic modes, Active and Passive-Buffered. The active mode may be of high gain or moderate gain. These three options are selected by a rotary switch on the top of the chassis on the right side. *Mute the preamp before operating this switch*.

In the *Passive-Buffered mode* the *amplifying* triode (V4) is bypassed, and the controls are fed directly to a Class A *impedance translating* Class A triode tube (V5). Since the output is buffered, there are no gross cable interaction problems of the type encountered with passive control centers; since there is no gain stage, this mode has ‘unity gain’. The VAC Passive-Buffered mode is capable of driving long cable runs and the preamplifier may be located some distance from the

power amplifiers.

Since the Passive-Buffered mode has zero gain, you may need to turn the volume controls well clockwise...the exact position depends on the output level from your source, and the sensitivity of your power amplifiers and loudspeakers. Many audiophiles have the belief that it is never good to run volume controls wide open. With a circuit of this type, however, it is actually preferable to do so. Don't worry about where the control is set, just be concerned with how it sounds. The Passive-Buffered mode does not invert absolute phase with respect to the line inputs.

The *Active modes* add a Class A amplifying triode tube to each channel, and causes the main outputs to have inverted absolute polarity with respect to the line inputs. To correct for this you may invert the polarity between your power amplifier and loudspeakers. In most systems, the Active mode retrieves more ambient and reverb information.

Operation - Phono Stage

Begin by selecting the appropriate phono stage gain using the control on the top of the chassis at the right rear. The high gain position is appropriate for most moving coil cartridges. The medium gain mode is appropriate for some high output moving coils and moderate output moving magnets. The low gain position is for use with very high output cartridges. If in doubt, feel free to experiment and use the settings that sound best. *Mute the preamp before switching gain*.

The phono stage delivers an inverted signal with respect to line inputs. Therefore you may wish to invert the connections at your phono cartridge if its design permits.

Cartridge load impedance and capacitance are adjusted by two rotary switches on the back of the unit. Start at 47k ohms and 150 pf. Listen for a bit, and then reduce the impedance to 22k. Continue until you find the best impedance setting. Next, try raising and lowering the capacitance. When you have found the best capacitance setting, listen to a few other impedance settings to verify your earlier choice.

In general, higher capacitances smooth high frequency resonances. Lower impedances have a similar effect, and can also improve subjective detail.

Often the load parameters you choose will differ from those recommended by the cartridge manufacturer. This may happen because of dynamic load characteristics, which are typically better behaved with vacuum tube circuits. Use the settings that sound best.

The available load parameters are approximately:

Impedance	Capacitance
47,000 ohms	0 picofarads
22,000	100
10,000	120
1,000	150
100	180
	220

Grounding

Noise and hum may often be eliminated by connecting a wire from the binding post on the power supply to the ground post on the preamplifier. The other traditional methods of curing ground loops may also be tried. Some forms of noise may be temporary and associated with warmup of the preamplifier and/or power amplifier. Determine correct grounding after all components are fully warmed up. Sound quality may also be affected by power cord polarity of your components.

Tubes Compliment

V1	6DJ8/6922/E88CC	phono input - should be tested for low noise
V2	12AX7A/E83CC	phono
V3	12AX7A/E83CC	phono
V4	12AU7A/E82CC	line amplifier (active modes) & tape buffer
V5	12AX7A/E83CC	output impedance buffer

Phono noise is most likely caused by V1. Line stage noise (active mode) is most likely caused by V4.

(Historical note: The earlier CPA1 and CPA1a used a 12AT7 in the V1 position. The CPA1 Mk II and Mk III use a 6DJ8 as indicated above.)

The V4 position has no impact on the sound of the preamplifier in the Passive Buffered mode.

Please note that *power cords* will have a profound influence on the character of reproduced sound inspite of the CPA1's extensive power supply filtering and regulation, as will floating the ground conductor.

About Microphony

Every amplifying device, be it tube or transistor, produces some output with mechanical stimulation (microphony). In fact, even cables possess microphony. Acceptability is not a question of whether this characteristic is present but rather the degree to which it is present.

In the VAC preamplifier, every tube (except possibly V5) will emit a sound through the speakers if it is directly struck. This is a normal situation. The exact amount of sound depends on the tube type, its location in the circuit, and slight random variations in tube manufacture and condition.

The amount of sound emitted when the tube is struck is irrelevant. The tube and circuit card assembly are shock mounted from the main chassis, and as such are isolated from direct contact. When the chassis itself is struck sharply there may be either no sound or a slight sound emitted from the speaker, but it should die away rapidly. Again, this is a normal result, and not representative of the type of mechanical or acoustic stimulation encountered when the unit is properly installed and playing music. However, if the sound rings on strongly when the chassis is struck, the offending tube should be replaced.

It is best not to subject the tubes to tapping or the chassis to repeated mechanical jars, as this may damage the precision of the tubes and cause them to become more microphonic.

About Noise

Every amplifying device, be it tube or transistor, produces some amount of noise. If fact, even a resistor produces noise in the presence of current flow. Acceptability is not a question of whether this characteristic is present but rather the degree to which it is present.

In the phono stage, the most likely source of noise is tube V1. This is because any noise produced by V1 is amplified by all of the following tubes. With normal low noise tubes, the subjective level of electronic noise will be approximately 1/3 of the groove noise, referenced to a .3 mV output MC cartridge and a good direct to disc recording played at loud levels. Electronic noise will be insignificant with normal recordings at normal levels.

In the line stage active modes, the most likely source of noise is V4. The audibility of noise produced in the line stage itself is not affected by the volume control setting, and is determined by the sensitivity of the power amplifier and the efficiency of the speakers. With a speaker of extremely high efficiency (for example, a Klipschorn) the preamplifier should be set in the passive-buffered mode to eliminate the noise of amplifying tube V4. Noise should be insignificant in either mode with speakers in the typical efficiency range of 80 to 93 dB/1 watt.

To confirm which tube is noisy, you may swap the tubes between the channels. For example, exchange V4L and V4R. If the noise changes channels the V4 tube in the noisy channel should be replaced. Be sure to mute the preamplifier, turn it off, and allow the tubes to cool before making swaps.

CPA1 Mk III / CLA1 Mk III NOMINAL SPECIFICATIONS

Frequency Response:

Phono, RIAA +/-.15 dB from 20 Hz to 20,000 Hz

Line, 7.5 Hz to 180 kHz +0/-0.5 dB into 20,000 ohm load and 1 meter shielded interconnect

1.5 Hz to 380 kHz +0/-3.0 dB into 20,000 ohm load and 1 meter shielded interconnect

Tape: 2.0 Hz to 380 kHz +0/-3.0 dB into 20,000 ohm load and 1 meter shielded interconnect

Phono Stage Gain - CPA1 only (1 kHz at line stage input):

High gain mode: 65 dB
Medium gain mode: 55 dB
Low gain mode: 39 dB

Phono Overload:

High gain mode: 3.8 mV @ 1 kHz, 36 mV @ 20 kHz, .45 mV @ 20 Hz
Medium gain mode: 12.2 mV @ 1 kHz, 110 mV @ 20 kHz, 1.4 mV @ 20 Hz
Low gain mode: 88 mV @ 1 kHz, 820 mV @ 20 kHz, 9.8 mV @ 20 Hz

Line Stage Gain (1 kHz):

Passive buffered mode: - .75 dB
Medium gain active mode: + 9.0 dB
High gain active mode: +18.5 dB

Line Output vs. Distortion (1 kHz into 20,000 ohm load):

1.5 V @ .1% THD
5.0 V @ .2% THD
11 V @ 1.5.% THD (overload)

Absolute Phase:

Line stage, Passive mode is non-inverting from line inputs
Line stage, Active modes is inverting from line inputs
Tape output is non-inverting from line inputs
Phono stage delivers an inverted signal to line stage and tape buffer
The above comments are true for the optional balanced outputs with respect to the EIA standard

Tube Compliment:

CPA1	CLA1	Type
6	2	E83CC/ECC83/12AX7A
2	0	E88CC/ECC88/6DJ8/6922 (low noise for MC)
2	2	E82CC/ECC82/12AU7A

AC Power Requirements (US market):

110 VAC to 126 VAC
Alternative input voltages selectable at the fuse holder (adjust fuse value accordingly as well)