

VAC DAC Mk II Instructions

0. DO NOT OPEN POWER SUPPLY OR DAC CHASSIS - NO USER SERVICEABLE PARTS INSIDE. DO NOT REMOVE TUBE CAGE UNTIL UNIT HAS BEEN SWITCHED OFF FOR 5 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.
1. Complete all connections, including the two power supply to DAC power cables, before connecting the AC cord to the wall outlet.
2. The associated preamplifier should be set to mute and/or its gain controls turned fully down.
3. The associated CD or DAT transport should be switched on and emitting a synch signal (playing).
4. Switch the DAC on and allow 1 minute for warm up.
5. Select a digital input (1 and 2 on coax, 3 for AT&T optical). For AT&T, read the special section later in this manual.
6. The green "magic eye" indicator shows three possible shadow angles. The approximately closed position indicates that the DAC is not receiving a synchronization signal from the selected input. The approximately 45 degree angle indicates that the DAC is receiving a synchronization signal and is not applying deemphasis (this will be the most commonly observed condition). The approximately 90 degree angle indicates that the DAC is receiving a synchronization signal and is applying high frequency deemphasis.

If the shadow is seen to vary rapidly the unit is hunting for a signal, and the output might be an unpleasant sounding hash. If this occurs, make certain that the input selected has good connection to a correct, switched on, and playing digital source. Then cycle the input selector to a different digital input, leave it there for 5 seconds, and switch it back again to the desired input. If the symptom persists, switch the source off, the DAC off, switch the source on, start the source playing, switch the DAC on. Persistent problems indicates bad cabling (most likely), a bad source, or a fault in the DAC (least likely).
7. Switch preamp to MUTE before switching the DAC on or off. Continuous operation of the DAC is recommended for best sound and longest tube life.
8. *Allow the system to sit switched off for 10 minutes before disconnecting the DAC from the power supply.*
9. The phase invert switch functions in a true push-pull differential circuit and does not add additional devices to the signal path in either mode. It is a true phase reversal control. Output is non-inverted when the control is set as marked.

10. The XLR balanced outputs are in conformance with the EIA standard, whereby pin 2 is non-inverted and pin 3 is inverted. Please note that a surprising number of manufactures fail to conform to the standard.
11. In some systems it may be found advantageous to connect an insulated lead (16 gauge or larger) between the ground binding posts on the power supply and main DAC unit.
12. Tube compliment is:

V1	12AX7A/E83CC
V2	12AU7A/E82CC

Low noise types are not required. However, V1L&R should be matched section for section. V2L&R should be matched section for section. Matching is important for channel balance in a zero global feedback circuit such as the DAC employs.

13. A digital output is provided for connection to the SP-DIF input of a DAT or CD-R recorder. Care should be taken to not select the recorder on the main input when it is in the record mode or digital source monitor mode, as feedback oscillation may occur. Such feedback could damage parts of your system.
14. Please call us with any questions you may have. It is better to ask than to guess. A full owners manual will be sent to you as soon as it is completed.
15. 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 (except tubes which are covered for 90 days). Receipt of your registration card will be confirmed in writing by VAC: it is important that you call VAC if you do not receive this confirmation.

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.

DAC NOMINAL SPECIFICATIONS

Conventions Supported:

SP-DIF
AES-EBU professional

Sampling Rates:

32 kHz
44.1 kHz
48 kHz

Inputs:

2 coaxial
1 optical, AT&T type

Outputs:

1 coaxial digital
1 set coaxial audio (unbalanced)
1 set XLR audio

Output Voltage:

8 volts at 0 VU from unbalanced outputs

Distortion:

.18% at 0 VU, 1 kHz, unbalanced
.04% at -9 VU, 1 kHz, unbalanced

Tube Compliment:

2 E83CC/ECC83/12AX7A (Golden Dragon preferred)
2 E82CC/ECC82/12AU7A (Golden Dragon preferred)

Matched tubes are preferred.

The VAC was voiced specifically with the Golden Dragon range of premium tubes. It is recommended that this range be used when replacing tubes. Other brands will function but likely will not sound as good.

AC Power Requirements (US market):

120 VAC nominal. Adaptable for worldwide operation from 100 to 240 VAC.

Options:

BNC coaxial input connectors
XLR balanced input connectors (AES-EBU)
XLR balanced digital output connector (AES-EBU)

About the VAC DAC

The culmination of three years' development, the VAC DAC one-bit converter is designed to provide sonic performance comparable with the best analogue LP recordings. With the VAC DAC, a good transport, and proper cables, many well transferred CDs will actually rival or surpass their LP counterparts.

In stark contrast to current trends in digital design the VAC contains *no microprocessor, no EPROMs, and no Programmable Logic Arrays*. Instead only *passive logic* (a more expensive process) is employed, resulting in minimal processing all of which is under the sole control of the music input signal.

Programmable Logic Arrays and/or EPROM storage techniques are avoided because they are inherently prone to timing errors and call for the use of a high power microprocessor which produces wideband noise at odd and varying frequencies quite unrelated to the music. Essentially these devices are to digital technology what P-mount cartridges were to LPs, less expensive and more convenient to manufacture but inherently flawed. Nevertheless, VAC has ensured that upgrades may be accomplished if the future produces any significant sonic improvements.

Only passive logic is used: *no processing is performed unless the music itself calls for it*. Roughly speaking this is analogous to hard wiring an analogue stage, keeping the signal path simple and uncorrupted. The proprietary filtering algorithm completes the accurate reproduction of the music. The Finite Impulse Response filter pushes the limits of frequency response to the highest possible heights, to *beyond 24 kHz*. Very high amplitude resolution is assured by the 128 tap 24 bit capable design. Jitter has been reduced to the trivial order of *picoseconds*.

D-A conversion is accomplished using *two separate dual channel dacs* in a technique we call *Direct Coupled Cross Reference Differential*, a form of push-pull that results in a natural cancellation of noise products and digital processing artifacts. Internal dither signals are handled by a separate bit, thus avoiding the limitations of previous generations. Stereo processing occupies 34 bits (16 (audio) + 1 (dither) x 2 (differential) = 34 bits per channel internal). Separate premium one-bit (Bitstream) differential dac systems are provided for each channel for the greatest accuracy. In addition, special techniques maintain tight and total control over the timing of both data and clock signals to the dacs.

The one-bit (Bitstream) system provides performance inherently superior to conventional ladder dacs. The use of a *single* reference voltage rather than sixteen (or more) results in an *internal consistency and stability* that guarantees superior sound today *and* tomorrow without the need for complex recalibration and adjustment. Of course, one-bit requires an all new design, and thus can not be adapted into the existing ladder dac designs used by most other manufacturers.

Three digital inputs are provided, supporting *standard SPDIF input, professional AES-EBU input* (XLR connector optional), *and optical*. Sampling rates of 32 kHz, 44.1 kHz, and 48 kHz ensure compatibility with all existing and projected digital transmission and storage systems for music. The optical input is implemented with a proprietary receiver compatible with *the AT&T ODL50 standard*. A digital output provides compatibility with CD-R and R-DAT recording systems.

The analogue output stage is *all triode tube, pure Class A, zero global feedback, point-to-point wired by hand, with both balanced and standard outputs*. All components are selected based on careful listening tests.

Front panel indication of sync and de-emphasis is made via an *electron ray tube*, the glowing green 'eye' familiar to collectors of antique radios. Visually stunning, this indicator is superior to both LEDs and matrixed numeric displays because *it does not generate and radiate noise*.

SPECIAL INSTRUCTIONS FOR AT&T GLASS OPTIC USERS

For proper function with AT&T systems, special “air gap attenuators” must be used. These devices, which resemble colored washers, are provided in various sizes. The thinnest provides the least attenuation, the thickest provides the greatest attenuation. The correct size for your particular application must be found by trial, much like fine tuning a turntable.

If your transport has a metal bezel on the ST jack, start with a middle thickness attenuator. This is to be placed over the ferule (the thin shaft that sticks out of the connector) of the ST connector at the transport end of the AT&T cable before the cable is attached to the transport. If your transport has a plastic bezel on the ST jack, start with yellow and red attenuators at the transport end and a green attenuator at the DAC end.

Alternatively, you may employ a very long optical cable. Many users prefer this.

The correct attenuator provides clear, detailed sound with no ticks or noise spikes. With incorrect values you will hear less detail and, in extreme cases, digital no-sync noise.

These special steps are required with the VAC DAC because of the special quality high resolution wide bandwidth optical receiver employed.