

Disc preamplifier

by Richard Brice

This valve design with no overall feedback uses passive equalization and a cascode input stage.

I designed this disc preamplifier working on three assumptions. The first is that good valve amplifiers sound better than good solid-state ones. Secondly, records sound better when passive equalization is used and lastly, amplifiers sound better when loop feedback is not used and linearity is an inherent part of the gain block.

The only problem with passive equalization is overloading of the first stage due to high-level treble signals. A valve with a high-voltage supply handles high-level signals and provides good linearity but the first stage must also have high gain to

reduce the effect of noise in the following RC network.

For a high-gain stage, the obvious choice of valve is a pentode but these valves generate more shot noise than triodes because the cathode current splits between the anode and screen. The amount of shot noise depends on valve construction. Good low-noise pentodes are expensive so I chose a cascode circuit.

The second valve, V_{1b} contributes little to noise; total stage noise is substantially that of V_{1a} . Gain obtainable is approximately the product of the anode V_{1b} and the working mutual

conductance of V_{1a} .

Equalization components are shown boxed. You may want to calculate values for the network more accurately than I have. At the expense of the convenience of using easily obtainable high accuracy capacitors, the network could operate at a lower overall impedance which would thus reduce the noise contribution of R_c .

Current consumption is low, at around 11mA for both channels, so a very smooth h.t. supply can be obtained using simple RC filtering. To keep hum to a minimum, a 6V d.c. supply feeds the heaters as shown in

the upper diagram. A complete valve is used for V_{1c} . Of the remaining three valves, one half is used for one channel, the other half for the other channel.

Total gain is around 40dB and distortion is calculated as well below 0.1% for 10mV r.m.s. input a 1kHz. Distortion is mainly produced by the triode directly following the equalizing network.

It's all too easy to jump to conclusions but I, together with interested friends and musicians, consider this circuit to be as good as or better than my previous design using a frequency-dependent shunt 5532 op-amp. In turn, this circuit had proved better than any series feedback equalization circuit and better than shunt-feedback circuits using simple transistor triples.

A d.c. regulated supply feeds the valve heaters to reduce hum, top.

The cascode input circuit feeds a passive equalization network, tinted area, whose component values are a compromise, bottom.

