

WD Series 3 Modular

Part 2

World Designs PRE3 is not just a new preamplifier in our modular PRE/PSU/PHONO stage kits, it is a complete rethink of how best to realise the concept of a hi-fi

Normally a line level integrated amplifier includes input switching and a volume control, so for CD, tape and tuner you don't need a preamp at all. At best you need a phono stage to boost and equalise the output of your MC or MM cartridge, and this can feed the line level input direct. We'll be introducing just such a valve phono stage later on in this series.

However there are those who prefer to have the preamp section removed from the power amplifier. The justification for this used to be that the high current and magnetic field levels floating round a power amplifier were no place to house a preamp circuit controlling the lower, input, signal levels. To this we can add that a sensibly designed preamplifier will do a better job of input switching and signal control than a power amp can.

At this stage who better than the WDPRE3 designer, Andy Grove, to describe exactly how such a preamplifier can be designed.

'This preamp line stage is essentially a small S.E. triode power amp, it has a voltage amplifier, and a power output valve, which drives a load via a transformer. The valve used here is the ECC82 double triode; it's a commonly available, low gain, low impedance type. One ECC82 section is used as the input stage, and is arranged as a plain anode loaded voltage amplifier and is capacitor coupled to the power amp stage, another ECC82 triode, and this section has the output transformer as its load.

Usually it is an advantage for a line stage to have a low output

impedance. Long cables and power amplifiers with transistor type input impedances (around 10k), for example, require a few milliamps of real current, even at line level voltages. One of the most common ways of achieving a low output impedance is to use a cathode follower.

There is a potential flaw with this approach however. Briefly its output impedance is "small signal" as it is generated by feedback. In some circumstances this feedback generated output impedance is useful, but if the load is potentially highly capacitive (such as a few metres of cable) then there is the possibility of slew limiting, and some possibility of oscillation. The new WDPRE3 line stage uses a high ratio output transformer, approximately 20:1. A quick calculation illustrates that, even if the transformer secondary were loaded with a 10k transistor amp input, the power amp stage would see a load of 4 MOhms. Compared to the ECC82's 10k (approximately) anode impedance this load is insignificant. Even if the load were 600 Ohms the valve's load equates to

about 240k, which is still very high.

In itself the design of the output transformer was an interesting exercise. There is an interwinding screen between primary and secondary. This isolates the secondary from the primary, and means that the secondary can be floated with respect to ground, or grounded via a 10 ohm resistor. This enables ground loops between two power amps, and between the power amps and the preamp to be broken resulting in less hum.

If there is any disadvantage to this type of linestage it's the very fact that the transformer has such a high ratio. To get 2V_{rms} at the transformer secondary requires 20 times that on the primary, so the output valve has to swing quite a lot of volts at its anode. However, because the load is so high (usually



Preamplifier



transformer at the other end, at the power amp input, and achieve a fully balanced link.

Apart from the purely electrical arguments, after trying many different line stage topologies I found this type to be the best sonically. The high ratio line stage was one of those “slightly bizarre” ideas I had a few years ago, I tried it and it worked. There are more “technical” topologies such as SRPP, Mu followers, cathode followers, 10 6DJ8s in parallel and whatever else, but my argument is always; “What are you looking for? If you want transistor-like specifications

then use transistors, they are better at it. If you want good sound, then look somewhere else.”

more or less infinite), distortion remains fairly low and is innocuous. The maximum output voltage is limited too; 6 or 7Vrms is the maximum. This is something which must be borne in mind, not so much when using a power amplifier, if you have a power amp which requires 7Vrms for full power there’s something wrong with it, it’s when using a line integrated as a “power amp”. A line integrated amp has a volume control at its input, turning down the volume effectively reduces the input sensitivity, so it’s best to set the volume on the power amp in this case to maximum, or nearly so.

It’s not such a big issue in practice as I’ve said, no power amp has an input sensitivity of 7Vrms - usually it’s around 2V or less. The volts this line stage can deliver are REAL; if you want a laugh, connect a speaker to the linestage output, it will play. It opens up possibilities in power amp design, it means that you can drive the cable hard, and put a

So there we have it, a preamplifier capable of driving any load and maintaining its linearity no matter what cables or partnering equipment you prefer to use. The preamp does, of course, include our relay switched input board for the shortest, and cleanest, signal path, and is powered from a separate PSU in its own, matching, case. The output can be taken from the phono sockets via twin core and screen cables for pseudo-balanced operation, grounded at the power amplifier for optimum signal transfer and to minimise the effects of interference. Breaking the ground loop between preamplifier and power amplifier, and utilising an output stage capable of driving any cable and load, ensures the cleanest possible transfer of music from your source, whether it is CD, radio or vinyl. The WDPRE3 does exactly what our concept of the perfect preamplifier says it should.

Next month – Layout, construction and the PSU.

