

# MAILBAG

## Valve preamplifier won't have "valve" sound

Early valve amplifiers did produce a significant amount of distortion, as did transistor amplifiers of a similar vintage. But it is the type of distortion that these valve amplifiers produced that made them sound better.

Simple valve amplifiers introduce even order harmonics so the distortion is similar to a musical chord. On the contrary, simple transistor amplifiers produce even and odd order harmonics. The odd order harmonics were introduced by the simple class B power section of these amplifiers. A human brain is good at noticing small amounts of odd-order distortion generated by transistor amplifiers but it will ignore even order distortion generated by valve amplifiers.

So let's forget about the history and think about why somebody would want to add a valve preamplifier to their relatively non-distorting transistor amplifier. One of the main reasons is to experience the added effect of even order harmonics. Notice that I called it an "effect" rather than distortion. In particular, it must be noted that valve guitar amplifiers were around before transistor amplifiers ever existed. The sound with this added effect is the sound expected from an electric guitar!

The valve amplifier you published in the November 2003 issue employs negative feedback to remove some of the very effect that you were trying to generate. If you look at the Vintage Radio section of your magazine, you will find many examples of valve amplifier stages that employ little or no negative feedback. There is even one example of a stage with no negative feedback in the Vintage Radio section of the same issue that you published the valve preamplifier in!

Our own valve preamplifier (K188) is based on a single subminiature pentode with flying leads. The pentode has a maximum plate voltage of 30V and needs 1.2V at 10mA to power the filament. The gain is adjustable from 0 to 4 times and the output impedance is about 10k $\Omega$  and the frequency response

extends from 6Hz to 600kHz; perfect for inserting in-line with an amplifier system to simulate valve sound. Best of all, since no negative feedback was used you would get to experience true valve sound, as it used to be.

**Branko Justic,**

**Oatley Electronics.**

*Comment: while it is true that virtually all the circuits featured in Vintage Radio did not employ negative feedback, most good quality amplifiers produced at the end of the valve era did feature negative feedback, particularly in push-pull power amplifiers, and that includes virtually all guitar amplifiers.*

*Sadly, no simple valve circuit, whether it features negative feedback or not, can hope to simulate the overall sound of a valve guitar amplifier, particularly when it is driven into overload. The controversy rolls on!*

## Developing the valve theme

Well, you said you would never do it but you did. Congratulations! As a keen hifi advocate and electronic DIYer, I believe that for a magazine such as SILICON CHIP this is a great opportunity to open up and maintain a new following of persons interested in hifi/guitar and also valves. As an instance, take a look at <http://tubesall.hihome.com/tube.htm> which gives some idea of the interest in valve-based audio equipment, particularly for DIYers.

Here are a couple of ideas for development.

(1). Take your existing valve preamp design and the principles of your recent guitar effects unit to provide a guitar preamplifier based on valves that provides pre-distortion (that guitar players love) and combine this with your SC480 50W power amplifier to provide a valve sound with solid-state reliability in the output stage.

(2). Develop your existing valve preamp design into a stereo RIAA equalised preamp for magnetic cartridges. Recent developments in valve quality, component tolerance and noise figures allow a very respectable amplifier to be built. Your exist-



ing power supply, properly screened, could be utilised and you already have DC for the heaters.

I use three 12AX7s (ECC83) in my preamp and I am very happy with the performance/background noise compared to solid state designs. And it sounds better!

(3). A valve power amplifier. Jaycar are selling EL34s (6CA7s) which are good for about 30W in push-pull mode and the 12AX7 could be an amplifier/phase splitter (OK, you may struggle with gain with only one per channel).

Of course, the output and power supply transformers may be the "killer" of this idea – both the availability and the cost – which you note in your valve preamp article but perhaps there are some possibilities with existing manufacturers if there was enough interest from your readers.

Looking forward to more "tubes" in SILICON CHIP.

**Dean Brookes,**

**via email.**

## Valve days long since gone

Paul Rohde (Mailbag, January 2004) seems to have worked himself into a bit of a frenzy over your "valve philosophy", if there is such a thing.

Sound quality is a very elusive animal and, in spite of many advances, there is still not much really good quality sound available, due mainly to the difficulty and expense of producing really good loudspeakers. Since the advent of CDs, there is no technical reason for recorded sound not to be nigh on perfect although many sound recordists or the acoustics of the recording studio still manage to wreak

havoc on the final result.

When transistors first became available, I was rather suspicious of these new-fangled devices which then had many limitations and, as I thought at the time, could never replace valves. However, when I built my first complete transistor amplifier in about 1968, I could not believe the absence of intermodulation distortion and the overall goodness of the sound. I might add that the valve amplifier I had been using was one of the better designs with a claimed distortion of 0.1%. I would never now consider the use of valve amplification for one moment.

As you so rightly say, they "were great in the past (when there was no other choice) but their day is long since gone".

Loudspeakers still influence the final sound quality far more than source and amplifier and even very expensive speakers can be a disappointment. Most have colouration and most dealers seem to think that is what the buyers want. The attraction to valves is a bit like the attraction to "quack" medicines and other such fads. People are always attracted to off-beat solutions even though there is no cogent evidence of any advantage over scientifically proven procedures.

I think your philosophy on valve amplifiers is quite clear and correct but you have a magazine to produce and you must consider the requirements of your readers no matter how misguided some of them may be!

**Alan March,**  
via email.

### Miller effect was a problem

Well, well! I thought that curiosity would finally persuade your design team, even if nothing else did, to have a go at valves! I have been making projects since the mid-1950s and I have to say that "FETs with lamps inside" haven't entered the scheme of things for me since David Tillbrook produced his brilliant amplifier design using Mosfets in the early 1980s.

On a more serious note, I recall that "Radio and Hobbies" struggled with the problems surrounding "Miller Effect" in triode stages, with some of their control units in the "Playmaster" series of the 1950s. This I think,

led them to concentrate on the EF86 pentode (which had a "coiled coil" filament for hum reduction), where gain and equalisation was the aim. This valve also had its problems, noise being the main one. In a low-noise application, one sometimes had to sample several valves before satisfaction was achieved.

Where impedance conversion rather than pure stage gain was the aim, "Radio and Hobbies" chose on at least one occasion (I think it was a control unit for crystal and ceramic pickups in the early days of domestic stereo) to use a 12AU7 twin triode. "Miller Effect" with high input impedances was a lesser problem with this valve, although I believe the stage gain achievable was much less than with the 12AX7 or the 12AT7.

**Bruce Bowman,**  
via email.

*Comment: the biggest problem with EF86 valves was their tendency to become microphonic, after which the slightest tap would make them "sing".*

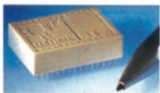
### Multi-element TV antennas can be fakes

It was interesting to read about your Penrith reader's experiences with henri-damaged TV antennas in Mailbag in the December 2003 issue. I live in Riverstone which probably copped the worst of that same storm. My backyard went from English Country Garden to Arctic Wilderness in about five minutes! I had a similar antenna arrangement, with a VHF/UHF job pointed at Artarmon and a 96-element UHF antenna pointed at Woolongong, but I didn't get any sort of picture afterwards; not surprising with the masthead amplifier lying on the ground in four pieces and buried under six inches of solid ice!

The UHF antenna was reduced to a single piece of aluminium box section sitting forlornly at the top of the pole, and the VHF antenna looked like someone had attacked it with a meat cleaver.

Well, a new antenna system, complete with a brand-new masthead amplifier has just been installed and works a treat. I've now got the most common replacement out here: a Band III VHF antenna pointed at Artarmon

## The Tiger comes to Australia



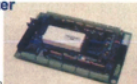
### The BASIC, Tiny and Economy Tigers are sold in Australia by JED, with W98/NT software and local single board systems.

Tigers are modules running true compiled multi-tasking BASIC in a 16/32 bit core, with typically 512K bytes of FLASH (program and data) memory and 32/128/512 K bytes of RAM. The **Tiny Tiger** has four, 10 bit analog ins, lots of digital I/O, two UARTs, SPI, I<sup>2</sup>C, 1-wire, RTC and has low cost W98/NT compile, debug and download software.

**JED makes four Australian boards with up to 64 screw-terminal I/O, more UARTs & LCD/keyboard support. See JED's www site for data.**

### TIG505 Single Board Computer

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