



Valve versus transistor amplifiers

It is not possible within the scope of this short article to consider all of the variables that contribute to the various design criteria. For an exhaustive review of the subject, one of the best sources is http://en.wikipedia.org/wiki/Tube_sound. This article represents an overview of the subject.

From the early 1940s to around the mid 1970s virtually all amplifiers used vacuum tubes (also called valves) before they were replaced in most designs by solid state components. The reasons for changing included the routine failure of the valves, the amount of heat generated, the space required to contain them, also the lower manufacturing cost of transistors.

Early solid state amplifiers had their problems due to the types of transistors used in the circuitry often producing a flat and rather harsh sound. This of course was later overcome by the adoption of more sophisticated designs and components. Also of recent times, designers have successfully developed transistor amplifiers that produce a sound very similar to that of a tube amplifier. The solid state circuitry typically generates less distortion than a valve amp and from a cost-of-production perspective, an amplifier manufacturer can include integrated pre-amps, tone controls, cross-feed circuits, balance and volume controls at a price lower than the cost of producing an equivalent valve amplifier.

Regarding distortion, however, for a guitar amplifier it may be desirable to allow deliberate distortion but even in these cases, specialised solid state designs can get very close to the characteristics of a valve amplifier.

Hybrid amplifiers combine valve and transistor stages. These usually have solid state front-end features and solid state linear output, with a tube stage between at least in theory to produce a "warmer" sound.

Ultimately, most comparisons are subjective, also mostly affected by the other components in the overall system. For the reproduction of recorded music the input source has a major effect and in particular, the type and design of the loudspeaker system will be the most significant factor. A poorly matched amplifier/speaker combination will defeat the best of design intentions. This is especially true where underpowered amplifiers are used. Trying to reproduce the dynamics of a symphony orchestra or a pipe-organ through a cheap mass-produced amplifier and/or low efficiency speakers is an exercise in futility.

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