



*In its revised form, the
606 power amplifier
offers good value – and
includes a number of
improvements*

by **PETER J COMEAU**

QUAD 606 REVISED

Quad got off to an indifferent start with its first current dumping amplifier, the 405. Breaking new ground in affordable amps, delivering high power via a cheap, yet inspiringly designed output bridge, the 405 should have been the darling of the solid-state amplifiers of the time. That it wasn't was purely the fault of its reaction to a real speaker interface. Designed to match an 8ohm load, the power output fell dramatically when faced with the dynamic variations that many loudspeakers present during music transients.

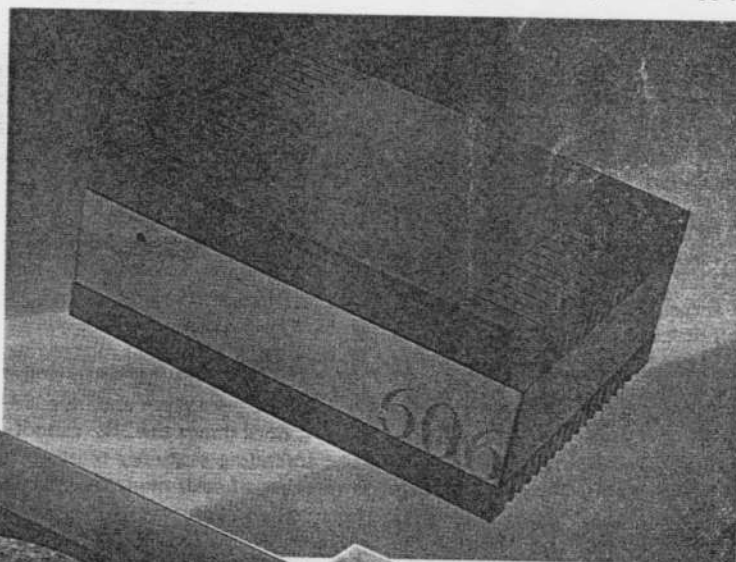
Later 405 implementations began to take this into account, and the behaviour of the current dumper protection circuit was widened, allowing high current peaks and making the amplifier more tolerant of speaker load variations.

The introduction of the original 606 should have helped matters, with its higher rated output of 140W per channel/8ohms. Maximum power was then measured at 270W peak programme, this time into 4-5ohm resistive loads, showing that the 606 behaves perfectly well when confronted with a dynamic, nominal

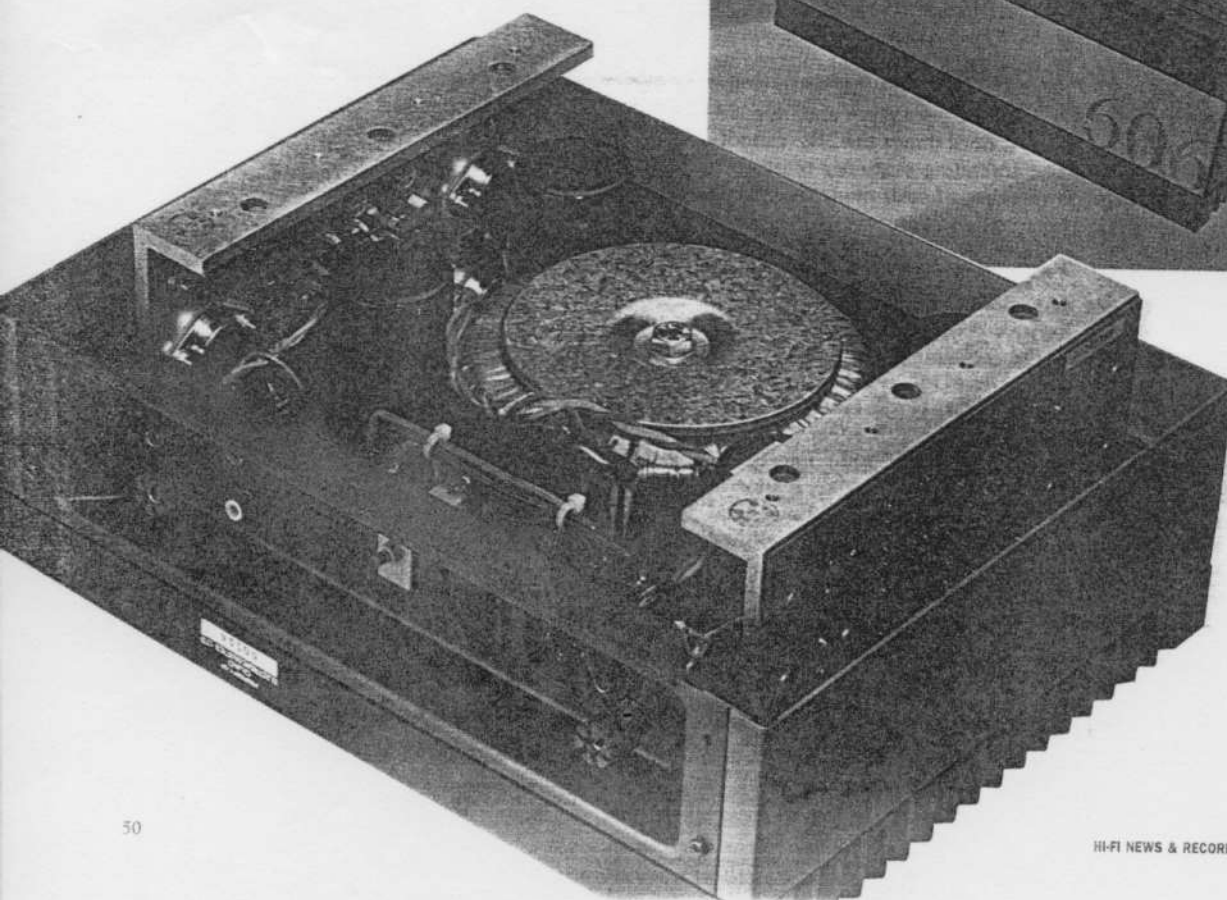
6-8ohm, loudspeaker.

One of the design points that MC raised in his review [HFN/RR Sept '89] was the type of power supply capacitors which, with a 63V rating, were considered to be sailing rather close to the wind, given the idle voltage of 60V available from the transformer with a 245V AC input. The revised 606 includes a new power supply with various 'uprated' components that should ensure greater reliability. As always with Quad design changes, the uprating of components is undertaken purely from the engineering standpoint. A company spokesman was quick to point out that the alterations, though measurable, would not be audible, and he retains the view that all good amps, run within their design limitations, will sound the same.

Such conservative and, in the face of review findings by various HFN/RR contributors, contentious views on electronic design cannot be passed over lightly. This review therefore concentrates on the *sound quality* of the amplifier as much as the technical evaluation of its electronic behaviour. With this in mind, we are grateful to Quad for supply-



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ing an original 606 as well as a 66 pre-amplifier (not forgetting the 67 CD player which was rated highly in May). The system context is an important consideration for those aspiring to Quad ownership, as the usual mix-and-match approach to system building is unattractive, due to the soft grey finish and midi width of the Quad components.

TECHNICAL DESCRIPTION

Central to any power amplifier is its power supply. Quad has not skimped on quality in this latest edition of the 606. The 'C' core transformer has been replaced by a truly massive toroid, with vastly improved regulation that doesn't threaten the 63V supply capacitors. These, too, have been replaced by a more sensible 15,000µF per voltage rail, to give a total of 30,000µF per channel in place of the earlier 13,600µF. Each channel has its own high powered rectifier, all these components being mounted on an easily removable board to improve the serviceability of the unit.

Quad's current dumping technology places little reliance on the output transistors that provide the beef: these simply top-up the current above that provided by the Class A amplifier. Quad is now using an array of six Motorola high current TO3 metal can transistors per channel; the older unit supplied was fitted with RCA devices. Modest push-on tinned connectors with skinny cables are still used for signal connection to and from the output boards, presumably so that the modules can be quickly replaced in studio situations. Output protection is mainly via electronic current limiting; severe and sustained overload will trip the resettable AC current input circuit-breaker.

The high sensitivity of 600mV for full output is suitable for use with a passive pre-amplifier and CD as a source. No provision is made for speaker switching or bi-wiring, as only one set of speaker terminals is provided. These take both 4mm plugs and bare wires, and the new terminals are easy to use with the latter. In any case, given the current drive limitations of the amplifier, using a second pair of speakers is better accomplished via the incorporation of a second 606, or a 306 if high output levels are not required. It would be nice to see a second set of output sockets on the 66 pre-amp to facilitate this.

Other rear panel features are the on/off switch, reset switch for the power supply protection, and two IEC sockets for AC supply-in and feedthrough to the Quad system 'stack' components. The rest of the

case is devoid of switches and so forth, with only a green LED indicator showing power connection. Heatsinks are included in the case styling, becoming only marginally warm even after prolonged high level listening. The only clue to the 'new' 606 is the subdued, large figure 606 on the front panel compared to the blocky typeface of the original.

SOUND QUALITY

Basically, the sound of the 606 is as soft as it looks – no hard or sharp edges are apparent on either. On the positive side, one could regard this type of performance as euphonic, yet nowhere is there any evidence of coloration as can be found in the warm sound of some amps (usually of the valve variety). Instead, the Quad is ideally neutral in its balance, unruffled by the dynamics of full orchestra at high peak power levels, and covers a wide frequency range with admirable coherence.

For the undemanding listener this may be all that he or she requires from a piece of hi-fi equipment. It certainly is a refreshing change after listening to the idiosyncracies of many of the Quad's competitors. Unfortunately, although such 'niceness' and dependable consistency is immediately likeable, there is little that makes the 606 stand out as an audiophile product. The requirement here is that the listener should be inspired by the musical transmission of the equipment, and this can only come from a high degree of transparency.

The Quad 606 is something of an enigma where musical results are concerned. While, on one hand, there is no doubt that much of a musical performance can be thoroughly enjoyed, on the other there is always a veil between the listener and performers. There is little wrong with the midband resolution, and indeed this is where most of the musical satisfaction comes from, especially at low to medium listening levels. The music ebbs and flows from the 606 in correct proportion, and it is always possible to nod one's head, tap one's foot or wave the arms about, however, the music takes you. This is not dependent on style either: like a good loudspeaker, the amplifier performance is not 'fixed' to suit particular types of music.

Bass and treble detail do not stand out as well as in the midband, though even here there is little to complain about. One can follow bass tunes with relative ease, as the good bass extension still retains control of the speakers. Similarly the treble is properly wedded to the midrange, so that sibilance is smooth and fully associated with the output of the

vocal cords. Both these areas have improved over the earlier 606, and show the marginal but clearly audible gains that are often due to the restructuring of a power supply. Indeed it is at the frequency extremes that an amplifier is most often stressed, with moving-coil bass units demanding as much current delivery to stop the cones as they do to start them accelerating. The upper crossover area, too, is a point at which some of the greatest phase changes occur in the speaker's impedance curve, so that high frequency transients tax the amplifier's capability to maintain the accuracy of its output signal.

With smaller speakers, the differences between the power amplifiers are scarcely noticeable, but when linked to a pair of ATC SCM20T speakers the new version began to show its superiority. Best results were obtained using a custom passive pre-amplifier with 5k-ohm DNM pots fed from an AVI S2000MC CD player via Cable Talk and Audioquest leads. Here the 'new' 606 showed a clean pair of heels to the old, handling musical transients with greater aplomb and losing the thickening of midrange that was the only note of coloration in the original unit.

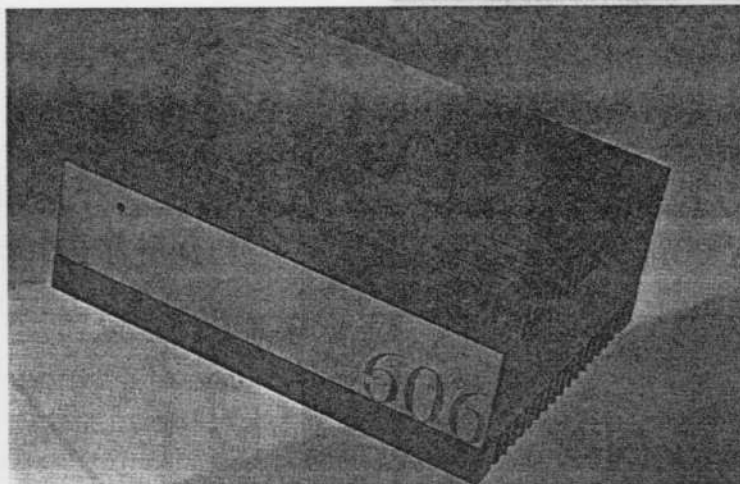
The 606 is rather sensitive to both pre-amplifier and interconnect choices; a comment I imagine will cause a wry smile to cross the face of Ross Walker at Quad. Nevertheless, it was quite easy to produce an overwarm and excessively soft sound by linking to a Musical Fidelity F22, despite the latter's equability when partnered with its own F15 power amp. Alternatively, AVI's pre-amplifier hardened the midband excessively, even though it shows no such traits with most other power amplifiers. None

This, then, is the flaw in the glaze of the 606. The softening of sound from the power amplifier is largely due to a haze that obscures minor detail, so reducing the spaciousness of the recorded acoustic by masking the reverberant clues encapsulated in a natural recording. While stable, stereo images do not break free of the speakers; indeed, anything to the left and right of the soundstage appears firmly locked into the loudspeakers, and central images seem to coalesce into a pool lying in the plane of the transducers. Focus on individual performers is thus rather poorer than one might expect in this class of amplifier.

As the 606 stops well short of the ultimate in transparency, it is difficult to plumb the depths of a recorded performance; and some nuances of instrumental technique are unavoidably lost. The effect of such masking is to reduce the thrill that comes from an awareness of a musician's capabilities – the emotional impact of the music is never fully developed if the presentation is veiled. In this respect the 606 clamps down on the majesty of a Bach fugue, the expressionism of a Ravel concerto, or the drive and throb of Marley, whether Ziggy or Bob. This restraining action becomes more obvious as the volume level rises and the amplifier moves towards its current limit. With such typically high steady-state power one could wish for a higher peak output that allows musical transients to pass without the feeling that they are being suppressed. While Quad's designers may have been intent upon making sure the amplifier does not clip with gross distortion, they could have allowed a little more free reign for the current drive. It is disappointing that transient attack loses its edge, and the performers clump together miserably just as they reach the climax of a crescendo.

CONCLUSION

One is left with the feeling that Quad has set out to produce a comfortable sound, one that will not put a foot wrong by disturbing the listener with any hint of the electronics in the signal path. However, I became frustrated that the musical abilities of the 606 could not break free of the restraints put on its output. Given the undoubted qualities of the 67 CD player, it seems a shame that Quad aficionados will not be able to hear everything it can do. The 606 is undoubtedly good value for money in the power department, and will drive any nominal 6 or 8ohm loudspeaker it is presented with. But that doesn't make it an audiophile aspiration. +



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LAB REPORT

With the new power supply the specified output of 140W/channel into 8 ohms is met comfortably with both channels driven. Output is maintained well down to 5 ohms and only just starts to drop into our 4ohm resistive load. The 2.2ohm result, however, shows how the current bridge in the output stage is not suited to the load variations found in many nominal 4ohm loudspeakers. The 6dB drop in level is typical for steady-state or transient signals.

Excellent power supply regulation ensures full power is available at 20Hz and 20kHz. Note, however, that the frequency response is only curtailed at high frequencies, beginning a gradual fall from an early 5kHz. This should not have serious subjective implications as the response is only -0.5dB at 20kHz; and sensible bandwidth control has been found to improve coherency of behaviour across the frequency spectrum in many

power amplifiers. The effects on transparency of such a filter slope are more difficult to define, but may be a clue as to why the 606 does not have as good a 'hear-through' performance as one might expect.

The power response, taken at 100W/8 ohms, only compromises the spectral balance with a mild reduction in extension of -0.5dB at 20Hz. Intermodulation results are nearly perfect, with only a small trace of difference tone. Overall distortion and noise are low, with second, fifth and seventh harmonics dominating the spectrum, at -88dB relative to specified power. Peak current is an improvement over the earlier model, with swings of 14A available. This is still lower than one would expect, and perhaps require, from such a high power specification. With the new power supply and output transistors, it might be sensible to reduce the effects of such apparently severe current limiting.

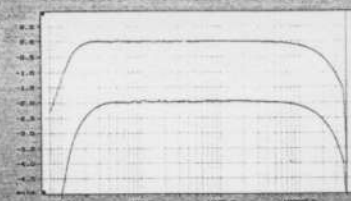


Fig 1: Quad 606: frequency response (above), power response at 100W/8 ohms (below)

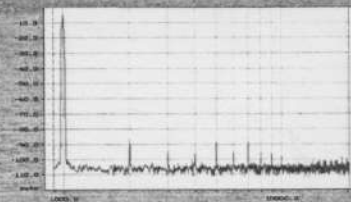


Fig 2: Quad 606: distortion spectrum at 140W into 8 ohms

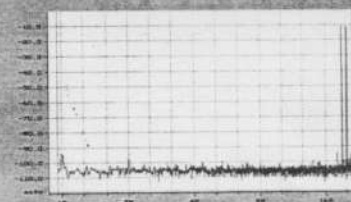


Fig 3: Quad 606: intermodulation 19/20kHz at rated power

Test results	Quad 606 amplifier
Power output	
Rated power into 8 ohms	140W 21.5dBW
20Hz 1kHz 20kHz	
Both channels 8 ohms (dBW)	21.5 21.5 21.5
Both channels 4 ohms (dBW)	20.8 20.8 20.8
Both channels 2.2 ohms (dBW)	16.5 16.5 16.5
Distortion at rated power (dB)	-92 -8