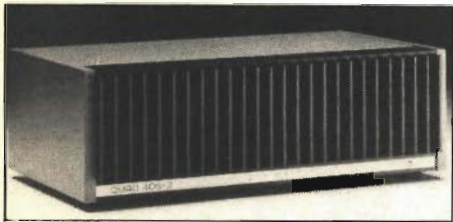


AUDIO 6

Quad 405-2 stereo power amplifier

Manufactured by The Acoustical Mfg. Co. Ltd., Huntingdon, Cambs. Price: £247.



It certainly does not seem eight years since Quad's Peter Walker and Michael Albinson presented a paper to the London Audio Engineering Society Convention delegates about a new approach to power amplification, which they had christened 'Current Dumping'. The Quad 405 100 watts-per-channel amplifier which resulted from their work (reviewed in June 1976, page 108) earned them the Design Council Award the next year, and the very prestigious Queen's Award for Technology in 1978. It has gone on to become one of the accepted world standards; by virtue of its very simplicity, versatility, reliability and small size it is equally suited to broadcasting, recording or domestic applications and 62,000 have been made of which some 60% have gone overseas to help our export trade.

There can be no doubt that a major factor in Quad's success story is the inherent safety of their designs; right back to the valve days, all their amplifiers have boasted "Unconditional stability" and to this day their provision of adequate current limiting, to protect the output transistors, together with clamp loudspeaker protection against random component failure has built up an enviable reputation for keeping going in the most adverse circumstances—and prevented 'knock on' damage to other equipment in *extremis*. However, current limiting in particular is a complex problem which has hitherto also restricted the power available to feed 'awkward' loads, particularly those of a reactive nature. When the 405 first appeared, the labelled '8 ohms' on a loudspeaker usually meant what it said; nowadays it is more often 'nominally 8 ohms' and this can often mean values varying from less than 5 ohms to more than 80 ohms, depending on frequency, and with considerable time displacements between maximum current demand and maximum voltage in each cycle. This situation can push the output devices outside their safe operating area into sudden death, if they are not otherwise protected. Unfortunately, provoking the protection mutilates the music and so the poor amplifier designer soon finds himself confronted with half a dozen variables, and must weight his decisions according to cost and conscience.

So, on the one hand, we now find highly-priced products (because they need to be overspecified) with negligible protection and apparent indifference to loads—but always open to the risk of failing expensively and taking costly loudspeakers with them; on the other hand, we have the safety-first Quad approach. Professional users will always go for the latter; to them safety and economy outweigh the odd risk of clipping, and the company accountants use £1 per watt as their guideline. But must this design dichotomy continue indefinitely? Quad are originators, and such established bastions as we have described are there to be stormed by the troops at Huntingdon. So we now have the 405-2 with a new Quad-designed protection circuit. That there should be a worthwhile prize for anyone who can think up a better name for it should be obvious, as I quote briefly from Quad's description of how it works:

"A Load-sensitive, Time-dependent Current limiter overcomes the problems associated with conventional 'load-line' circuits. The amplifier will deliver an instantaneous maximum current of 8.5 amps into any load. If the load is too reactive,

or of a resistance substantially below 4 ohms, the current limit is smoothly and progressively reduced to a value which enables the output transistors to remain within their safe operating area. In the extreme case of a short-circuit, this value is 3.1 amps. When the signal level falls or the short-circuit is removed, the current limit gradually returns to its initial level. This enables the amplifier to deliver high peak currents into almost any load when handling a normal music programme, while fully protecting the output devices from sustained overloads into short-circuit or purely reactive loads."

The necessary handful of transistors and other components have been incorporated in a thick-film circuit which mounts on to a new version of the Quad 405 printed-circuit boards (one for each channel). So, by installing a new pair of boards, it is possible to update one's 405 to the latest version. I understand that a number of Quad dealers will be able to carry this out, when adequate supplies of the boards become available in the next few weeks, at a cost likely to be £80-90 including VAT. Alternatively it can be carried out at the factory, and overseas readers should consult their agent. Obviously all 405 production is now of the new version and had been so for some weeks before the 405-2 labelling was applied at the start of 1983, when news of the improved design was released.

The question which must be in many Quad owner's minds is whether they would gain significantly from an update, although I know that many will want it done anyway. I have been using the 405-2 for a couple of months now, and really putting the amplifier through severe tests at every opportunity. There is no doubt that this new version is a very much more potent animal and, even on loudspeakers whose loads I have never considered as difficult, there seems to be a very noticeable increase in loudness before distress. On the other hand, if you are the owner of a pair of Quad ESL63 loudspeakers, it is unlikely that you will notice anything. It should be stressed that there have been no changes in the amplifier or power supply; and so the justly renowned qualities of the 405 remain, plus this added bonus of considerably enhanced independence of load which really does seem to have put this sterling design in the top league. In spite of the small price increase, the 405-2 must now be far and away the best buy in 2 x 100 watt power amplifiers.

GEOFFREY HORN.

Aurex FM-01 FM aerial

Manufacturer: Toshiba (UK) Ltd., Toshiba House, Frimley Road, Frimley, Camberley, Surrey GU16 5JJ. Price: £30.



There are many homes where, due to local council restrictions, householders are not permitted to put up an external FM aerial. Thus they often use a simple insulated wire dipole mounted on the wall near the receiver or, as with simple

portable FM receivers, a single length of wire. Such arrangements will work reasonably well under strong signal conditions, but often the orientation of the indoor aerial limits the signal-to-noise ratio.

One solution to this problem can be found in this new Aurex aerial. It consists of an attractive plastic moulding finished in matt silver and blue, with a base diameter of 130mm and 170mm high. As will be seen from the photograph, the lower section is a cone and above this is a disc carrying a rotatable tuning scale calibrated from 76 to 108 MHz. At the front there is a triangular recess fitted with two press-button switches. Under strong signal strength conditions they are not used but, for more difficult areas or for more distant reception, one presses the left-hand button which introduces a wide-band amplifier into the circuit. The right-hand button simply checks the state of the two 1.5-volt alkaline batteries mounted in the base of the unit, a small bar-lamp being illuminated when the batteries are in good condition.

At the rear of the cone is a high-quality screwed aerial socket and supplied with the unit is a 210cm (82 inch) aerial feeder terminating in two spade terminals. Also there is a socket into which one can plug an external 3-volt supply or possibly a mains adaptor. The unit is designed to be free-standing, having a soft rubber base, or it can be mounted on the wall. The power consumption from the batteries is 3mA when using the internal amplifier. The output is designed for use with a tuner requiring a 75-ohm aerial input, yet the aerial lead supplied has spade terminals which are usually associated with 300-ohm feeders. However there is no problem in terminating the lead with a conventional 75-ohm coaxial plug.

How it performed

Using a tuner with an accurately calibrated signal strength meter, it was possible to compare the Aurex FM-01 against a simple dipole, which consisted of two 90cm aluminium tubes and a 75-ohm feeder. Positioning the dipole to give the highest reading on the meter produced the equivalent of 20 microvolts input. The Aurex, carefully positioned and tuned with the rotary control, gave a signal equivalent to 9µV without and about 22µV with the amplifier in operation. These measurements were made on a low-power distant station and, whilst the simple straight dipole is fairly directional and had to be positioned in an unacceptable attitude in my lounge, the Aurex unit is omni-directional and therefore is less sensitive to positioning. It was noticed that hand capacity does slightly effect the tuning of the Aurex aerial, and it was more sensitive whilst standing on its base compared with mounting it on a wall. Under practical reception conditions in a ground floor position in mid-Surrey, it was possible to receive noise-free reception from the main BBC transmitters at Wrotham without the use of the amplifier, and more distant local stations such as Medway and Oxford were possible using the amplifier and accurately tuning the rotary dial, the calibration of which was pretty accurate.

The Aurex unit is not a substitute for a good outdoor aerial, nor would Toshiba claim it to be but, where circumstances prevent the use of an efficient external aerial (which would be directional and therefore limit the reception of stations well away from the line-of-shoot) the omni-directional Aurex will solve several problems. Obviously dependent on the sensitivity of the FM tuner used, the Aurex aerial is capable of first-class results from local transmitters and, with sensitive tuners, from stations farther afield. With a Yamaha CT-7000 tuner it was possible to receive a few stations in France and Holland, plus a sprinkling of BBC and IBA local stations, but the tuning of the Aurex aerial with its amplifier in operation was fairly critical. For the normal high-power BBC transmitters, it was not found necessary to tune the Aurex control, leaving it set around 94MHz. Attractive in appearance, although rather expensive, it could be useful in difficult reception conditions. JOHN GILBERT.