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No. 50

HI-FI CHOICE

AMPLIFIERS AND TUNERS 1987

BY MARTIN COLLOMS AND PAUL MESSENGER

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WHAT'S IN A NAME
The more eagle eyed amongst our readers may notice that the name of the company publishing this magazine has changed in the credits. What was Sportscene has now become Dennis Publishing Limited. This doesn't mean that Hi-Fi Choice has changed hands, merely that our group has undergone a little restructuring from six companies down to one, and has changed its name to Dennis.

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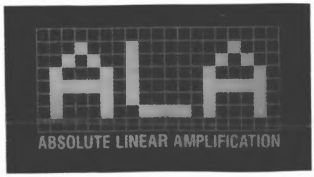
All the current volumes in the Hi-Fi Choice Series are available direct from our Mail Order Service. See page 32.

Producing an amplifier with all these quality features for under £120 takes a wealth of experience

YAMAHA 1887-1987

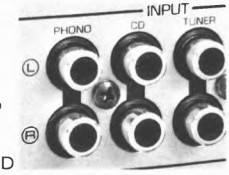
Back in 1887 Torakusu Yamaha built Japan's first reed organ and Yamaha's first product. The rest, as they say, is history. Now Yamaha celebrates 100 years of involvement with music. An involvement that has given the company a wealth of experience. The sort of experience that has enabled Yamaha to produce Hi-fi equipment for the digital age that is unmatched in quality. The new Yamaha AX-300 integrated amplifier is one such product. A pleasing return to the basics. Basic power, basic purity and high dynamic power that delivers sound with stunning accuracy. And despite its modest cost this amplifier has real quality features.



Yamaha ALA (Absolute Linear Amplification) This new circuitry guarantees zero signal distortion making the AX-300 a singularly dynamic amplifier with greatly improved ability to drive loud-speakers effectively. The ALA design provides perfectly linear signal transmission from input to the physical speaker interface with absolutely zero distortion in the amplifier stage. The result of this new circuit, complex in configuration but simple in theory, is a pure and dynamic sound quality rarely heard in amplifers at this price.

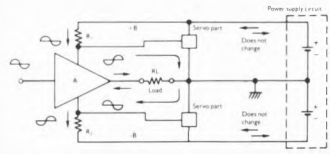
Designed for Digital Audio

The combination of Absolute Linear Amplification and high dynamic power makes the AX-300 uniquely prepared to drive the digital audio source. The rear panel inputs for CD source are gold plated, eliminating the chance of signal degradation, keeping the signal clean.



Higher Purity in Phono Reproduction

As well as being digital ready the AX-300 incorporates carefully designed circuitry for maximum phono reproduction. The phono inputs are also gold-plated and the amplifier's phono equalizer amp itself employs Yamaha's Pure Current Servo circuit for a highly stable, regulated current supply with an absolute minimum of noise. Again, the result is audibly improved musical clarity and imaging in phono reproduction.



With these features, high dynamic power, low impedance drive, tone controls with defeat, quality speaker connections and the usual Yamaha sleek, stylish appearance, the AX-300 is the result of Yamaha's vast experience in musical reproduction. It may have taken a wealth of experience to have produced the Yamaha AX-300. But you don't have to be wealthy to own one.

Send for full literature on Yamaha Hi-Fi and details of your local stockist to Yamaha Electronics (UK) Ltd., Yamaha House, 200 Rickmansworth Road, Watford, Herts WD1 7JS. Tel: 0923 33166.

EDITORIAL INTRODUCTION

It is about six years since I was last closely involved in a *Choice: Amplifiers & Tuners* edition. At that time I was both editor and author (assisted on measurement and additional auditioning by Dave Watson of Russ Andrews Hi-Fi) — a role adopted somewhat reluctantly in an age when the consensus view was that amplifiers all sounded more or less the same. (Ah nostalgia! This view I didn't, and still don't share). Subsequent *Amplifiers & Tuners* projects have been handled (very capably) by Martin Colloms, but my return to *Choice* last year presents the opportunity to become more closely involved, as I am currently taking a co-authorship role in MC's projects.

The Changing Marketplace

A five years' perspective on amplifiers is fascinating, as the whole marketplace has shifted dramatically. In 1980 there were far fewer British models around, so there was precious little alternative to the standard, full-featured oriental offerings. The 'valve revival' had gone into a temporary lull, and the 'high end' market as we know it today had scarcely begun to develop.

Since that time specialist models have flourished across a broad front. Imported exotics have established a foothold at prices that would have seemed absurd five years ago. There are now some half a dozen UK valve amplifier manufacturers, producing a range of alternatives from mid-priced integrated models up to high priced monoblocks. And UK transistor models offer steadily improving quality at steadily reducing prices.

Several of the mass market oriental manufacturers have woken up to the fact that the UK market demands sound quality as well as attractive, well-finished visual packages — some even to the point of leaving out frills like 'loudness' contours, tone controls, speaker switching and the other peripheral facilities that prejudice sound quality.

As ever at *Choice* we have assembled a group that attempts to cover all bases as fairly as possible. Inevitably some manufacturers get a better crack of the whip than others, and some have chosen to remain on the sidelines. But we have tried to be as evenhanded as possible in selecting new models for review, and have devoted substantial resources to incorporating updated information on many existing popular models. (Regular 'tweaking' is a particular vice of amplifier manufacturers.)

Objective Vs Subjective

Despite years of searching for more effective objective indicators, the relationship between measured performance and sound quality remains substantially elusive. Measurements provide indicators that may relate to subjective observations, but it is virtually impossible to establish precise cause and effect relationships, that relate either to perceived sound quality or loudness levels.

Furthermore the notion of amplifier sound quality remains ephemeral, controversial, and downright difficult to pin down. Some still hold the opinion that there are no real differences as long as the amplifier is operating within its design limits, and that such differences that are perceived are due to small differences in measured frequency response. Such a position has proved difficult to challenge under controlled conditions, but no longer represents more than a minority view in the marketplace. For the majority, amplifier sound now plays a crucial role in the overall performance of the hi-fi system.

A Question Of Taste

However, the term 'amplifier sound' can cover a multitude of value judgements, to which different listeners under different conditions will react in different ways — in much the same way that elaborate loudspeaker systems produce strongly polarised opinions amongst enthusiasts, due to their alternative blends of conflicting compromises. ▶

This point was brought home forcefully during our initial informal listening tests. During the presentation of the Creek *4040* I commented to Martin and his assistant Chris Bryant that it was nice to hear some real musical communication despite a few 'rough edges'. Both looked mildly thunderstruck in response, having themselves found the *4040* a major disappointment. Out came *Cyrus One* for comparison, and the sonic differences were quite dramatic — much greater than could be accounted for by measurement. And although I think we managed to achieve some perception and understanding of each others' contrasting views, none found it easy to come to terms with what amounts to alternative philosophical perceptions of the role of the amplifier/system.

Where such distinct differences of opinion can arise — even without changing variables such as the room and the other system components — it would be arrogant to assume that *Choice* (or any other agency for that matter) can provide the definitive guide to amplifier sound quality. We have endeavoured to come up with a balanced and informed opinion — one which is based on considerable experience and which is probably nearer to a hi-fi consensus than any alternative. But hi-fi enthusiasm is not a matter of consensus — it is essentially a matter of extremism, pursuing an (often blinkered) obsession to its logical conclusion, irrespective of alternatives. (Again the analogy between high end amplifiers and loudspeakers is most apt).

The Sound Quality Quest

Though they lack economies of scale and so on, one strength the small specialist manufacturer has over the large consumer electronics brand is the freedom to pursue a personal vision of hi-fi sound quality. Any such amplifier will consist of a particular blend of sonic and aesthetic taste, presentation and build quality, at a specific price. And will succeed just as long as dealers and enthusiasts are keen to share that same vision by parting with hard cash. But the crucial component is invariably the sound quality. Ultimately, this is the key factor that distinguishes the hi-fi amplifier from the cassette radio or midi-system.

Speaking from personal observation, there appear to be certain distinct 'flavours' of sound quality, within which every single designer/manufacturer creates his own individual blend. For example, Tim de Paravacini is known for his valve designs, but has also been active behind the scenes for both Musical Fidelity and Heybrook — and yet in each case the result has its own distinct recognisable 'flavour', reflecting the manufacturer as well as the designer. One can make a similar case with Stan Curtis' involvement in Rotel and Cambridge Audio designs.

Though it is dangerous to stereotype too rigidly, certainly some models represent distinct examples of UK or US strains of development. There is little if any, common ground between the Naim/Exposure/AR/Creek/Meridian/Linn UK-type sound with active-upgradeable but comparatively low cost packages, stressing musical communication ahead of sonic transparency, and the Counterpoint/Quicksilver/PS Audio/Audio Research/Krell/Conrad Johnson, passive but pricey US tradition — and we are gradually starting to see evidence of a Japanese 'high end' influence in certain quarters too. What is particularly impressive is the way UK manufacturers such as Mission, Audiolab and Musical Fidelity are proving adept at creating a 'budget' version of the US 'high end' sound.

While I dislike the oversimplication that links certain devices or techniques with specific sonic characteristics, it is irrational to deny that there is not an unmistakeable qualitative difference between valve and transistor designs, or that the latter in Class A mode can provide something of a middle ground. However, it is just as important for the reader to bear in mind that the amplifier is a key component in a complete system. Achieving sympathetic harmony with the bandwidth and resolution characteristics of the disc playing front-end and the partnering loudspeakers — not to mention your own particular pair of ears and taste in music — can turn out to be more important than the inherent qualities of the device in question. As I noted earlier, we've done our best, but it would be arrogant to assume that that is good enough. To some extent you are on your own so I hope you find a good dealer to help you along.

Paul Messenger

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AMPLIFIERS

Cliché or not, the amplifier is the heart of the hi-fi system. Its purpose is to accept the different signals from the various sources, conform and order them as necessary, and then provide the power to drive and control the loudspeakers. In what is known as an integrated amplifier, the first part of this task is carried out in the pre-amplifier section, while the power amplifier part deals with the loudspeakers, but the whole is contained within a single box. In more costly systems these two sections are often separate units, and power supplies may also be separately cased. The tasks are quite distinct, so integration is only a matter of cost, convenience and compactness.

Twenty years ago amplifiers were mostly low powered, using Class A circuitry with valves and output transformers. Then the transistor took over rapidly, offering higher specification power, lower cost, and improved longevity. So far, so good, but the valve amplifier — like the moving coil cartridge — never quite died. And after a couple of false starts it is currently enjoying its strongest revival yet, albeit at prices which will make many readers blanche. The valve versus transistor debate is a fascinating one, though too rarefied for much of an airing in this introduction. Where cost-effectiveness is king, the transistor still rules.

The other historical trend concerns the complexity of the pre-amplifier section. When hi-fi had to make the best of barely adequate source quality, a complicated and flexible pre-amplifier section was a useful means of making the best of a bad job. During the Japanese invasion of the '70s, rival manufacturers vied with each other to invent and incorporate more and more extensive features: tone controls became graphic equalisers, and the often baffled user was encouraged to fantasise that he was on the bridge of the Starship Enterprise. However, improvements in sources have since started a 'simply better' backlash. Ten years ago a fledgling Naim Audio abandoned tone controls on the grounds that they degraded sound quality. This was a major heresy at the time, but the trend is now firmly established, and even some of the Japanese manufacturers have since followed suit.

Two Markets

There are now two distinct types of hi-fi amplifier. The so-called 'bells and whistles' models still exist, though they now tend to be down- rather than upmarket products. Those who appreciate the flexibility of extensive switching and tone shaping can now take advantage of the low prices which derive from highly efficient manufacture for a mass market.

However, the real hi-fi amplifier action has been towards improvements in sound quality, much of which has been due to simplifying the circuitry by eliminating as many frills as possible, and even in some cases omitting a complete gain stage through the use of the latest transistors. The ear has proved a more subtle tool than any spectrum analyser in adjusting circuit topography, simplifying earth patterns, beefing up power supplies, and selecting key passive components, all in the interests of improving sound quality.

Pre-amplification

As hi-fi amplifiers become increasingly minimalist, the pre-amp now only retains two key functions: the sorting out of the signals from the vinyl disc source, and the switching of the various inputs and outputs. Tuners, cassette decks, CD players, and what-have-you all put out more or less the same sort of signal, which is already equalised to 'flat'. Vinyl disc apart, the pre-amp then becomes little more than a glorified switch with volume and balance controls. Which explains why suchlike devices — using purely passive components and hence inherently simple — are now becoming available in the most specialist end of the marker.

Vinyl disc replay is quite a different kettle of fish. The pre-amp is connected directly to the transducer itself, with no intervening electronics, and this introduces all sorts of difficulties. Furthermore, the signal from the cartridge is very small, and requires two distinct stages of equalisation to get a 'flat' end result. To add insult to injury, there are now two popular kinds

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of cartridge, the high(?) output moving magnet and low output moving coil (plus a few odd permutations), and they are different enough to need quite separate treatment. There's not even a standard for the source or input impedance of low-output cartridges.

For the future, it is quite possible we will see wider use of turntables with built-in cartridge pre-amps, so that each source feeds a 'flat' signal at line level to a simple switching and attenuating pre-amp. But now that the first digital signal source (CD) is becoming accepted, with others planned for the future, we will also shortly be seeing a new type of pre-amp which accepts digitial signals directly, carrying out various functions by means of an on-board microcomputer before finally converting the signal back to analogue before feeding to the power amplifier. Such a system should theoretically be immune from the signal degradation which has been leading the market towards simpler analogue amplifiers, and could lead to a revival of more complex pre-amps, though progress will be slow because any pre-amp section will need to handle conventional signals alongside digital for many years to come.

Power Amplifiers

This is the part of the amplifier whose job it is to drive the loudspeakers — and a right old job that can turn out to be. Like the cartridge, a loudspeaker is a transducer, and the task is to turn the electrical model of the music signal back into a mechanical (acoustical) signal for the benefit of the ears. The loudspeaker is a form of motor, but its task of covering the whole range of audio frequencies is mechanically almost intolerable, and there is an inevitable lack of control at various resonance points. While the amplifier provides the loudspeaker with a voltage which corresponds to the amplified music signal, it is the characteristics of the loudspeaker itself which determines the current demand. This current demand can be very unpredictable, particularly at resonance points, which is why serious hi-fi amplifiers are usually designed with plenty of surplus current capacity, and with an eye on the stability of the voltage signal whatever the current demand.

The main measurements on amplifiers relate to power output and distortion. Power is normally expressed in Watts, but we translate this into a measure of relative loudness, the dBW, which is far more meaningful. More important than the maximum power output itself is the way the power is maintained into different loads, and this is analysed in the reviews. The various distortion measurements also help explore the limits of the amplifier, but paradoxically, striving for very low distortion seems to prejudice sound quality.

Choosing

There are a number of criteria one could use when selecting an amplifier, and the most valid is probably sound quality. Despite the attention it attracts, power output comes much further down the list, because the differences between most models is not in fact that great, and measured power is by no means a reliable indicator of subjective loudness capability. At the top end of the market, upgrading is less likely to involve an increase in power than improvements in sound quality gained through changes in power supplies for pre- and power amplifiers.

The range of facilities required should naturally be taken into account, paying particular attention to the type of cartridge being used. But it should also be borne in mind that every unused feature contributes nothing and will probably have a negative effect upon the potential sound quality. While some people seem more sensitive than others to the sound of amplifiers, both pre- and power sections are fundamental to the system as a whole, simply because all signals pass through them *en route* to the loudspeakers.

The reviews provide an excellent guide to shortlisting some of the better sounding bargains in amplifiers around. But as ever they cannot replace an individual's selection to his or her own tastes, preferably in the correct system and ideally in an 'own room' context. Once again, the conscientious specialist dealer provides a vital link.

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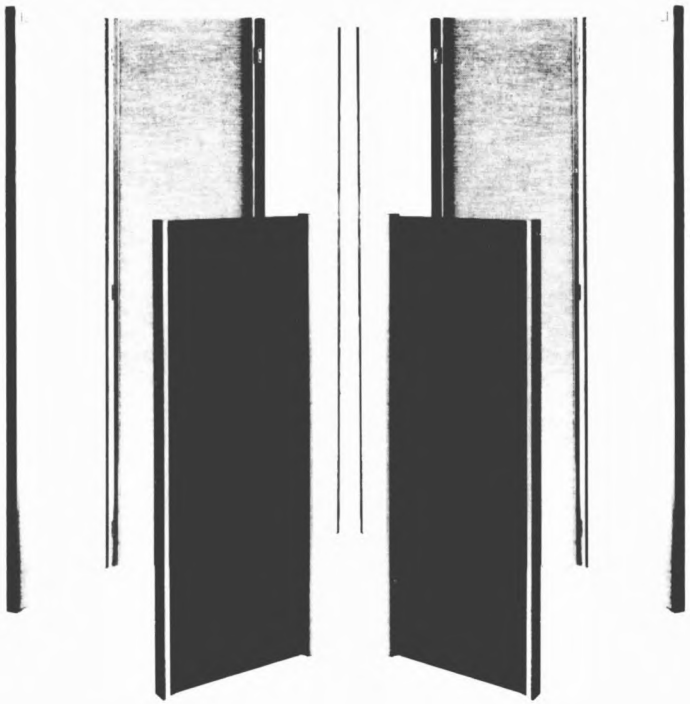

The world of high-end hi-fi equipment is crowded with questionable components. However, within this realm there exists a valid sonic hierarchy. It is difficult, without expert assistance, for the music lover to make selections from this electronic jungle: Absolute Sounds was created for the purpose of making your choice a wise one. To provide equipment worthy of the connoisseur, Absolute Sounds has searched the world for components without equal and tested them for their total excellence. We would like to introduce to you the range of Magneplanar loudspeakers from the United States.

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The MG-III: "These speakers can create an exceptionally holographic soundstage, that defies the physical boundaries of the two panels." ***Hi-Fi Answers*, July 1985.**

"It is as if the transducing mechanism perpetually takes a back stage position relative to the program." ***Hi-Fi News & Record Review*, June 1984.**

The SMGa: "The SMGa is a little gem." ***Hi-Fi News & Record Review*, February 1985.**

The MGI-B: "This 'hanging together', or coherence of the sound is the quality that is going to make the Magneplanar MGI-B a hard act to follow." ***Hi-Fi Answers*, December 1984.**

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TECHNICAL INTRODUCTION

In the test programme for this edition, comprehensive laboratory testing was combined with carefully-controlled listening tests. This Technical Introduction explains the methods and relevance of the various lab tests and approach used in the subjective assessment.

LABORATORY TESTS

In general the tests conform to IHF A202 practice which makes comparison between units straightforward. Where possible, dB rather than percent of linear scaling is used, which again makes comparison of performance rather easier.

For example, dB scaling of power output shows the subjective capability far better than (linear) watts ratings. For reference purposes 0dB is set at 1 watt, and the typical 100W amplifier output is thus 20dBW. The next higher power to give a worthwhile subjective power increase is 23dBW, 200 watts. When quoted in watts this gives the impression of being a lot louder, whereas in reality it is not that great an increase.

Average amplifer outputs are around 17dBW (50W), which in fact is not a lot less subjectively than the levels produced by 100/20dBW models. It is worth remembering that 3dB is only a little greater than one notch on a typical volume control.

While power output may be the most often quoted specification for amplifiers, in fact it is not the most important. Indeed the test programme demonstrated that some 50W-specified models could get louder under real use conditions than some 120W-specified units.

With a typical loudspeaker sensitivity of 88dB for 1W, a 100W undistorted programme input will raise an in-room stereo sound level of around 102-104dBA, which is pretty loud. A 25W model will still achieve 98-100dBA, and more if allowed to clip occasionally, while a 250W model, assuming the speakers are able to tolerate it, will raise only 4dB more, giving 106-108dBA.

With modern speakers in average rooms 30-60W is all that most users will require for decent maximum sound level. A low sensitivity model such as the BBC *LS3 5A* (at 83dB for 1W) will need 100W plus for highish volumes, while those users who want the potential for really loud sounds will need a combination of 100+W per channel and speaker sensitivity of 90dB/W or more; alternatively, an active speaker system might give them what they desire, employing multiple power amplifiers to do this.

OUTPUT POWER AND CURRENT

Output power is referred to output level, on the basis that a good amplifier represents a voltage source. Zero reference, 0dB, is equal to 1W, that is 2.83V across the standard 8ohm load. The scaling of level is not adjusted in power terms to account for the various load regimes, however. The objective is to explore the 'stiffness' or load tolerance of the amplifiers, and the theoretically correct addition of 3dB for 4ohms and a further 3dB for 2ohms only serves to confuse this fact. In reality many of the more sophisticated 8ohm speakers provide a complex and variable load impedance which can fall as low as 2ohms under dynamic music-related drive conditions. The matching amplifier is likely to have been purchased for its specified 8ohm output level, but we need to know how that level is sustained under possible real load variations.

Accordingly, the output level was examined for 8ohms, one channel driven to less than 1% clipping distortion, as well as with 4ohms into both channels driven and into 2ohms pulsed, 20Hz to 20kHz. For pulsed and peak analysis an impulse 1ms wide was used interspersed with 500m rests.

In addition, peak output level readings for 8, 4, and 2ohms impedance are shown for comparative purposes. A further test served to explore momentary peak, current capability and its symmetry. To achieve this a 1ohm (or when necessary 0.5ohm), load was used. Short pulses of 1kHz repetition rate are used here, current excursion being read from an oscilloscope trace.

SANSUI PURE HI-FI

SEE THE REVIEW INSIDE THIS ISSUE!

AU-G 11 Mk2 Integrated Amplifier

TU-D99X SLDD Quartz-PLL Digital Synthesizer Tuner

AU-G30X Integrated Amplifier

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The peak current figures should be judged with some discretion since the required capability must logically depend on the available power rating as well. Thus a small amplifier of up to 15dBW is unlikely to need more than ±9 amps, while ±25A would be more appropriate, for a 20dBW (100W) model. With really large amps of 23dBW and more, 35A would be regarded as a generous peak current capability.

Total Harmonic Distortion

The figures recorded for total harmonic distortion include the noise within the measuring bandwidth of 400Hz to 80kHz, and for the 20Hz results they also include hum. The amplifier is set with one channel driving 8ohms to rated output, and the results provide a check on sample quality and give a general idea of linearity.

Intermodulation Distortion

This is a more sensitive indicator of performance. The test is carried out with 19kHz and 20kHz input frequencies, the sum of the difference tones being recorded using an *HP3582a* spectrum analyser with a resolution of 80dB. Where no products were visible the result is given as better than 95dB −80dB. *Via* auxiliary input the peak composite input level was 1V, *via* moving magnet 200mV, and *via* moving coil 20mV. These are strong signals but are within the normal expected dynamic range. For example, 50cm/sec peak disc modulation, 15kHz to 20kHz will typically raise 250mV peak from a moving magnet cartridge and 10-40mV from a moving coil model.

Supply Modulation

This test assesses the supply rejection of the amplifiers under load. Run at two-thirds of their rated output level, with a 4ohm load, a spectral analysis was made from 0-500Hz to assess the degree of supply hum modulation and breakthrough to give a sort of 'mud' index. Analyser resolution extends to — 90dB relative to the fundamental.

Noise

An average of left and right channels was recorded, with the input appropriately loaded — for example, with equivalent cartridge sources for mm and mc (200ohms, 100ohms). The noise contribution of the termination has been deducted, leaving weighted CCIR/ARM readings. Residual noise was also noted over a 20Hz to 20kHz bandwidth, with the volume control at zero. A 1kHz reference frequency was used.

Dc Offset

This was measured with inputs and outputs terminated and when the equipment was well warmed up.

Input Overloads

These referred to IHF input levels of 0.5mV for mc, 5mV for mm and 500mV aux at 1kHz. Note that for practical purposes the maximum recorded disc modulation remains pretty constant above a few kHz. In consequence an amplifier does not require a much increased disc input overload at high frequencies. More than 15dB at 20kHz will be ample for disc headroom.

Input overload for auxiliary/line input was also checked; if it exceeded 20dB (5V) >20dB figure is recorded.

Channel Separation

Using a sensitive spectrometer, stereo channel separation was measured with the inputs terminated.

Output Resistance (Damping Factor)

At 0dBW a 2ohm load was applied and the drop from open circuit output voltage noted. This loss represents the amplifier output resistance and is converted to ohms. The notion of damping factor is considered irrelevant in the light of cable and loudspeaker resistance. A simple figure for the amplifier's resistance contribution is much easier to judge.

Disc Sensitivity

This and the other sensitivities were measured using a computer DVM to compare input and

output voltage at a decent signal-to-noise ratio, providing the voltage gain. This is converted to IHF sensitivity for a rated 0.5V in the case of a pre-amp, or to a 0dBw output for a complete amplifier.

Input Impedance

In general these were checked using an automatic RLC bridge, but where the input conditions (biasing, overload etc) gave erroneous results, the loss produced *via* a 600ohms source resistance was computed to a loading factor for 1kHz and 20kHz.

Disc Equalisation

For moving magnet this was measured using an *HP200* computer *via* reference to a table of exact RIAA equalisation values which were then used to plot the final curve. A 600ohm source impedance generator (6ohm m-c) was employed, representative of a cartridge source; hence some high frequency loss would be experienced in the response where substantial input capacitance was present, as would be the case with a real cartridge.

General Appraisal

In addition to the above lab tests where practical the products were opened up for an engineering design appraisal as well as an assessment of safety and constructional quality.

Some of the test result figures in the reviews may cause readers some confusion if they are compared with manufacturers' specifications. With the latter, for example, the sensitivities are usually related to full output, but with IHF practice they are referred to a standard 1W (0dBW) output for all amplifiers, thereby allowing better comparisons to be made. A 100W (20dBW) amplifier with a 0.28mV IHF disc sensitivity will have a sensitivity figure of 2.8mV for full output.

Listening Tests

A two-tier system of listening tests was employed, whereby the procedure was divided into two parts. A/B full blind listening was found to be impractical for all the models in such a large scale project. Instead, using listening techniques developed by the author and his assistant, the products were carefully assessed on an individual basis. Many of the products were subjected to repeat assessments, and a number were monitored under blind conditions to ensure that the panelists were not subject to significant errors or indeed prejudice.

Key factors involved in arriving at satisfactory judgements included the author's personal experience of over 200 models over the past two years; the use of an acoustically controlled and neutral listening room; ancillary equipment of good accuracy, and the use of both analogue and digital programme. Typical listening levels were around 95dBA, which was within the compass of the smaller models. Following analytical auditioning *via* the disc inputs, (both mm and mc where applicable) and the auxiliary input, the amplifier's volume was increased to the onset of audible distortion under two conditions, namely on '8ohm' speaker load and a '3ohm' simulated speaker load. Peak programme power levels were also monitored to assess subjectively the adverse load capability. The dynamic possibilites of the larger amplifiers were explored.

Where the pre- and power-amps from a given manufacturer could logically be separated, these were assessed as individual components, and if appropriate individual ratings appear in the conclusions.

The latest 1987 auditioning mainly involved using special bi-wired Celestion *SL600s* on Cliff Stone π stands, with various exotic Van den Hul cables. Sources were Pink Triangle *PT Too*, SME *Series V* and Van den Hul MC *One*, and Cambridge Audio *CD1*. Reference amplification included Cello *Audio Suite* (premium) and Krell *KMA100 II*, plus Naim *NAT 01* for the tuners assessments, and a broad range of programme material, from Grandmaster Flash to Vivaldi was used.

Acknowledgements

Thanks are due to Paul Crook and Chris Bryant, for general assistance on auditioning and measurement throughout the projects.

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Amadeus GOLD. La nouvelle REVUE DU SON. November 1986.

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Though now rumoured to carry a 'Plus' suffix, there was no sign of such designation upon either the amplifier or its carton, though a number of changes have been made over the original *Alpha* which was first introduced three years ago. Our 1987 sample was now in an all black finish, emphasised rather effectively in pale blue legends and highlights. We carried out full re-auditioning and updated the measurements where necessary, most of the changes relating to the power supply and detail component selection for enhancing sound quality.

The *Alpha* shows a slight but worthwhile increase in power over its predecessor, maintaining its good load tolerance and power bandwidth, and with a significant increase in peak current capability.

A compact integrated design, *Alpha* is distinguished by a good finish and appearance which result from A&R's professional view of engineering design. The five inputs include moving magnet disc, and the well-laid out controls incorporate bass and treble. Ergonomically, however, the five identical knobs do not make for the easiest, most instructive operation.

Output power is 30W per channel, with an output stage rated to take account of some of the more difficult loudspeaker loads. The disc input comes with a standard 47kohms/100pf characteristic, but additional loading may be retro-fitted with options down to 8kohms and up to 420pF.

The price is modest but A&R have not skimped on quality details, such as the custom silver-plated 4mm speaker cable sockets, which provide 'direct' and headphone-switched options. All inputs are the usual RCA phono jacks, with the headphone outlet a standard ¼in socket on the front panel.

LAB REPORT

Inside, the construction quality is exemplary. The unit is built on a single board with clean, simple signal paths and optimised 'star' grounding. Internal wiring is virtually non existent. The output stage is complementary bipolar direct coupled, and the earlier stages use high quality (and improved) integrated circuits. Coupling components have been reduced to a minimum in order to maximise sound quality and some top grade polypropylene capacitors have even been included.

Attaining a comfortable 101dBA maximum loudness on test, the peak 8ohm power delivery reached 17dBW (50W) and rated power was comfortably achieved into 2ohms on peaks. Power bandwidth was fine with a healthy peak current averaging 9A.

Distortion levels were moderate, particularly with respect to high frequency intermodulation. Noise levels were fine, with the DC offsets satisfactorily low. Input overload margins were ample and the stereo channel separation results were rather better than average. Power supply modulation was respectable for the type, while all other aspects conformed to a well balanced competent design.

Sound Quality

Rating a solid above average, the *Alpha* continues to maintain its competitiveness on sound quality. Unanimously described as 'nice-sounding', this is both praise and criticism, but more than most it should fit unobtrusively into almost any system context. The sound was a little 'small', somewhat 'softened' and lacking a little speed, 'sparkle' and transparency. But it was also refreshingly free of 'hi-fi-ish' qualities in the perjorative sense, staying well under control and giving good musical involvement.

Conclusions

Comfortably continuing to merit recommendation, the *Alpha* is a fine and essentially musical allrounder, with sound lab performance, sensible facilities, fine build quality and attractive presentation. Though it showed some sonic limitations in the context of the very highest quality ancillaries, the overall balance has been very well judged to make the most of the lesser components its price indicates will be likely partners.

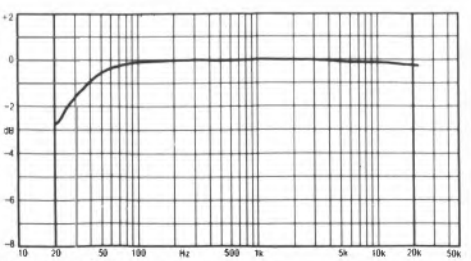
Test measurements

To show how well the amplifier sustains its 8ohm output into real loudspeaker loads, the level into 4ohms and 2ohms is given in dBW (where 0dB=1W), without adding 3dB or 6dB respectively, as in usual 'power' ratings.

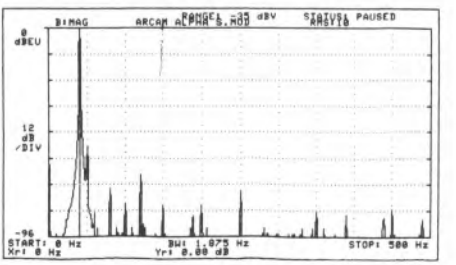
Test Results

Power output			Integrated amplifier
Rated power into 8ohms, maker's spec			30W(=15dBW)
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	16.4dBW	16.8dBW	16.8dBW
Both channels, 4ohm load	13.1dBW	14.1dBW	14.1dBW
One channel, 2ohms, pulsed	–dBW	14.9dBW	–dBW
Instantaneous peak current		+13A	–12.5A
Distortion			
Total harmonic distortion,	20Hz	1kHz	20kHz
at rated power, aux input	–73.7dB	–73.1dB	–66.2dB
Intermodulation, 19/20kHz, rated power, aux input			–77.9dB
Intermodulation, 19/20kHz, at 0dBW, disc (mm)			–73.7dB
Noise			
Disc (mm) input (IHF, CCIR weighted)			–73.0dB
Aux/CD input (IHF, CCIR weighted)			–76.9dB
Residual, unweighted (volume control at min)			–78.9dB
DC output offset		left –8mV, right +6mV	
DC offset, pre-amp		left n/a mV, right n/a mV	
Input overload	20Hz	1kHz	20kHz
Disc (mm) input (IHF)	27.0dB	27.1dB	27.6dB
Disc (mc) input (IHF)	n/a dB	n/a dB	n/a dB
Aux/CD input (IHF)	>20dB	>20dB	>20dB
Stereo separation			
Disc input (mm)	68.2dB	71.8dB	56.3dB
Aux input	69.2dB	70.3dB	64.3dB
Output impedance (damping)	0.27ohm	0.27ohm	0.33ohm
Channel balance, disc, at 1kHz			1dB
Volume/balance tracking	0dB	–20dB	–60dB
Aux input	0.06dB	1.05dB	1.07dB
Input data	socket type	sensitivity	loading
Disc (mm) input	Phono	0.42mV	46kohms 110pF
Disc (mc) input*	n/a	n/a mV	n/a kohms n/a nF
Aux input	Phono	36.0mV	23.0kohms 36pF
Power amp	n/a	n/a mV	n/a kohms n/a pF
Output, pre-amp (tape)		10.0V max.	180ohms
Disc equalisation error, 30Hz-15kHz			+0dB, –1.5dB
Size (width, height, depth)			40×8×22cm
Typical price inc VAT			£140

Reauditioned



Disc input, RIAA equalisation accuracy



Power supply rejection, 40Hz input

ARCAM DELTA 90

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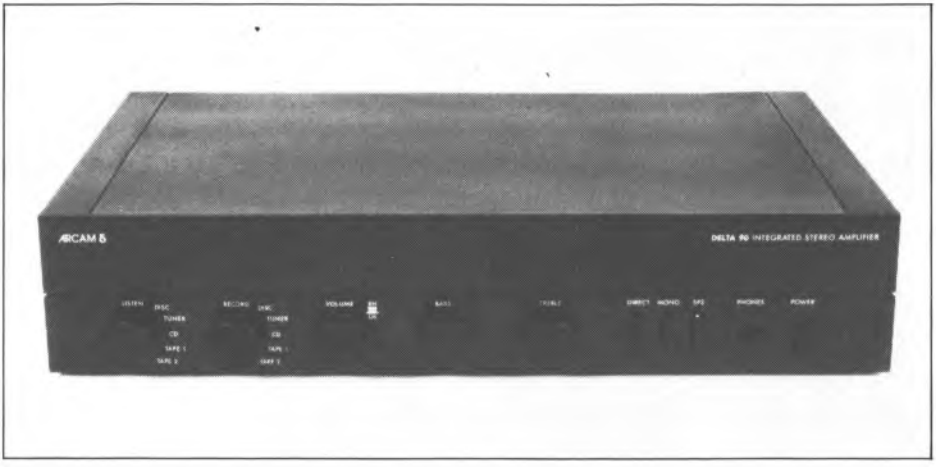


Highly restrained in appearance, the *Delta* 90 may be seen as a step up from the deservedly popular *Alpha*, adding the capability of accepting moving-coil cartridges plus a worthwhile increase in power — at a substantial price premium nonetheless, as the *Delta* costs more than twice the *Alpha*.

Finished in matt black throughout and with very restrained legends, the user will presumably get used to the fact that the middle of the five identical rotaries controls the volume (with concentric balance adjustment). Those to its left select the listening and record output sources, those to its right the bass and treble tone controls. A series of three pushbuttons provides tone defeat (direct), mono/stereo, and selects a second pair of loudspeakers. The latter deliberately keeps the main pair connected — disconnection may of course be done manually — to avoid compromising their sound quality with signal path switches. The headphone socket has a similar connection arrangement, so regular headphone users can connect their loudspeakers to the 'SPL' terminals for convenient 'plug-in' muting, accepting the mild compromise involved. The rear panel has phono sockets and substantial loudspeaker sockets/binding posts, and incorporates a switch which selects between MM and MC cartridge inputs.

LAB REPORT

Closely following the pattern established with the *Alpha*, the *Delta* shows neat construction on a single main PCB. The main circuitry is again clearly *Alpha*-derived, but with uprated power supply and output stages in addition to the extra moving-coil stage.

The power delivery comfortably beat spec with single channel 8ohm drive, showing a significant 3.5db extra output over the *Alpha*. Power was respectably maintained into lower impedances, though the overall current availability was somewhat less than might have been expected. The power supply behaved very well during the modulation test, the spectrogram remaining free of mains-related spuriae despite some harmonic distortion products.

The distortion results were generally good, though the 21dB difference between mm and m-c cartridge input intermodulation figures does attract attention. Notice also that the high frequency overload margin available on the m-c input is significantly below the average and

that shown by the mm input, though it should be adequate nonetheless.

However, taken as a whole the measurements look pretty good, with sensible input parameters and very good stereo separation throughout. The 0.4dB disc input imbalance in our sample could certainly have been better, but the RIAA equalisation is to a high standard, the moving-coil input showing rather tight bandlimiting particularly at low frequencies.

Sound Quality

The overall sound quality ratings for the *Delta* 90 did not differ too greatly from those achieved by the *Alpha*, which is something of a disappointment, though of course the 90 will go significantly louder. Somewhat lacking in both impact and transparency, the overall sound was essentially well-balanced in every respect, drawing little adverse comment but failing to raise particular enthusiasm as well. Generally neutral, there was some criticism of a slight upper-mid harshness, and a slight lack of low frequency 'weight' and 'scale'. Instruments gave convincing integration, but focus and stereo placement was a touch vague.

Conclusions

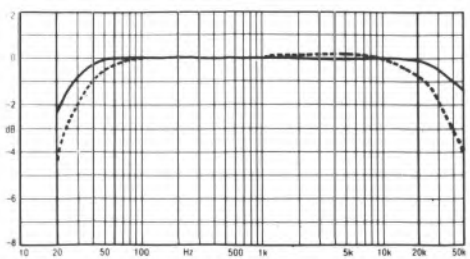
The *Delta* 90 is a very well balanced, sweet-natured amplifier that is almost certain to work well in just about any given system, offering decent power output plus a moving-coil cartridge option. However, the cost premium over the *Alpha* does seem a little steep, £300+ taking the *Delta* 90 into a price band where the competition is rather tougher. The *Delta* is certainly worth considering, though it falls a shade short of formal recommendation.

Test measurements

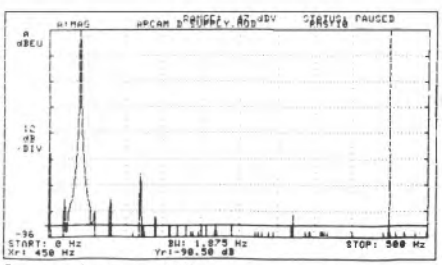
To show how well the amplifier sustains its 8ohm output into real loudspeaker loads, the level into 4ohms and 2ohms is given in dBW (where 0dB=1W), without adding 3dB or 6dB respectively, as in usual 'power' ratings.

Test Results

Power output			Integrated amplifier
Rated power into 8ohms, maker's spec			70W(=18.5dBW)
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	19.8dBW	19.8dBW	19.1dBW
Both channels, 4ohm load	17dBW	17.8dBW	18dBW
One channel, 2ohms, pulsed	–dBW	18.4dBW	–dBW
Instantaneous peak current		+11.6A	–9.2A
Distortion			
Total harmonic distortion,	20Hz	1kHz	20kHz
at rated power, aux/CD input	–71dB	–72dB	–67dB
Intermodulation, 19/20kHz, rated power, aux input			–80dB
Intermodulation, 19/20kHz, at 0dBW, disc (mm)			–76dB
Intermodulation, 19/20kHz, at 0dBW, disc (mc)			–55dB
Noise			
Disc (mm) input (IHF, CCIR weighted)			–70dB
Disc (mc) input (IHF, CCIR weighted)			–67dB
Aux/CD input (IHF, CCIR weighted)			–71dB
Residual, unweighted (volume control at min)			–78dB
DC output offset			left –2mV, right –2mV
Input overload	20Hz	1kHz	20kHz
Disc (mm) input (IHF)	35.2dB	33dB	32.1dB
Disc (mc) input (IHF)*	31.4dB	26.4dB	20dB
Aux/CD input (IHF)	>20dB	>20dB	>20dB
Stereo separation			
Disc input (m-c)	67dB	72dB	51dB
Aux/CD input	68dB	73dB	50dB
Output impedance (damping)	0.06ohm	0.06ohm	0.13ohm
Channel balance, disc, at 1kHz			0.4dB
Volume/balance tracking	0dB	–20dB	–60dB
Aux/CD input	0.15dB	0.34dB	1.48dB
Input data	socket type	sensitivity	loading
Disc (mm) input	Phono	0.30mV	46kohms 76pF
Disc (mc) input*	Phono	0.015mV	88ohms n/a pF
Aux/CD input	Phono	24.8mV	8.4kohms 30pF
Output, pre-amp (tape)			10.2V max, 2.7kohms
Disc equalisation error, 30Hz-15kHz			+0.1dB, –2.0dB
Size (width, height, depth)			43×9×29cm
Typical price inc VAT			£330



Disc input. RIAA equalisation accuracy



Power supply rejection, 40Hz input

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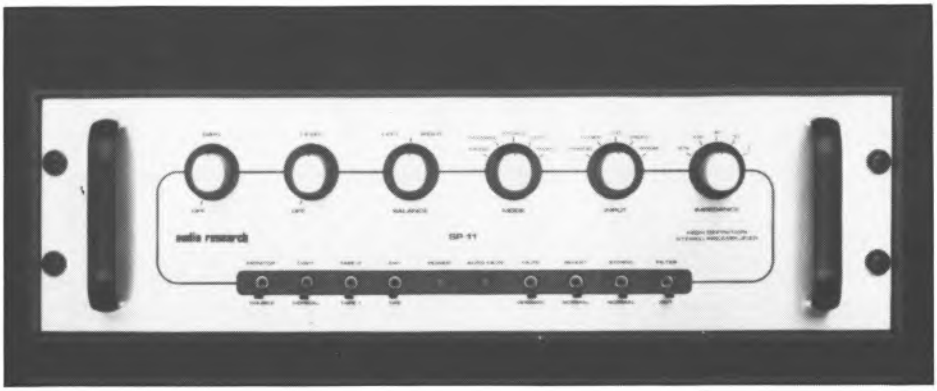


These true 'high end' products are extremely expensive, and together with matching cables will cost in the region of £10,000. Excepting the odd regulator, tubes (valves) are used throughout, and the basic specification is 100W, 20dBW per channel. Since something of comparable power may be purchased for a fraction of the cost of the Audio Research units, we have to be talking of some pretty substantial sound quality advantages to justify the differential. In fact these products are close to the state of the art, with advanced circuit design reflected by exceptional sound quality.

In a sense the *M100* monoblock power amplifiers can be seen as a similar logical development. The excellent *D115 II* power amp represents a practical high performance stereo chassis; in the *M100* a *D115* frame becomes a mono power amp, with all its resources devoted to just one channel.

Left at this point, such an amplifier would have certain advantages, but ARC have gone further. New generation circuitry lifts the performance well beyond the previous, already very good, standard. High current output drivers have been fitted, while the output biasing scheme has been improved with the advantage of easier setting up. Capacitors have been eliminated from earlier stages by using DC coupling, augmented by an additional servo amplifier to stabilise the correct operating points, dynamically and statically. ARC's balanced cross-coupled circuit technology is retained including the special coupling for the output tubes, both to the primary and secondaries of the superb output transformers.

The *SP11* pre-amplifier is a two-box affair, the second box containing the solidstate power supply. Comprehensive inputs include a disc input suitable for moving-coil cartridges of healthy output, and the ideal loadings may be selected conveniently by a front panel switch. A 'straight line' design, no tone controls are present, and the signal paths are wideband. A bypass switch routes the disc signal direct to the output stage, avoiding the 'balance' and 'mono-stereo' selector sections.

Pre-amplifier circuitry includes advanced cascode configurations combining low noise FETs and valves at the input to improve the overall dynamic range. Good channel separation is assured by the separated internal design and the extensive use of regulated supplies to isolate the channels and separate stages. ARC have long made it a policy to devote as much attention to the sound quality effects of their power supplies as to the amplifying circuitry.

On matching, the *SP11* is capable of driving quite long cables — up to 15 metres if required.

On the *M100* power amplifiers, output taps are provided for 16, 8 and 4ohm loads, but the *Scintilla* speaker (by the same importer) is a special case.

Sound Quality

These are both truly exceptional products. They worked superbly as a pair, effortlessly delivering musical dynamic sound stages, and at the end of the review it proved hard to part with them! The new *SP11* pre amp provides still further improvement on the already exceptional *SP10*. It is clearly one of the world's finest, capable of superbly focused, stable stereo images, finely textured and virtually grainless.

Essentially neutral with only mild coloration, all areas of the audible frequency range were reproduced very well. A particular strength concerned subjective dynamics, where the *SP11* drew and held one's attention by maintaining the 'drive' and 'life' in the programme. This proved true of both classical and popular material over a wide range of programme quality.

The *M100* power amplifier initially left us speechless. It was one of those great products that can genuinely expand one's horizons and point to the way ahead. One of the finest amplifiers I have ever had the pleasure to hear, its tonality was extraordinarily rich — one might think too much so if one did not know better. The treble was devoid of grain and false projection while the bass was immensely deep and powerful, suggesting that the loudspeakers had been set in a concrete sub-floor. Against this authoritative, pure musical character, the amplifier displays a sparkling lively transient performance with thrilling dynamic impact. Dynamic contrasts took me by surprise, so revealing was this amplifier's performance in this particular area. It was highly transparent over a very wide frequency range, and produced excellent subjective depth in the stereo image. The latter was of huge scale, yet remained superbly and stably focused.

Lab Report

We experienced no headroom problems with the *SP11*, since it could produce more than 80V output from a moderate 240ohm output impedance. At nominal 0.5V outputs, with an IHF standard input the harmonic and intermodulation distortion figures were very good over the whole frequency range, for example 0.003% at 1kHz. An increase in intermodulation was noted via disc. Noise levels were very good for the nominally moving-magnet disc input and when this was used as a moving-coil compatible input with the appropriate loading, noise levels were just satisfactory; but this is a technical qualification only, and in practice, many owners use Koetsus and other similar cartridges with fine results.

Figures for input overload relate to two gain conditions, set to 'high' for moving-coil and 'low' for moving-magnet. Good overload margins were shown for both conditions, while the reducing margin at high frequencies is not uncommon with valve pre-amps. Channel separation varied depending on whether the crosstalk was measured right on left or left on right, and was fairly unimpressive at high frequencies. However, no adverse subjective effects were noted as a result of this. The RIAA equalisation was highly accurate.

The *M100* power amplifier comfortably met its 20dBW specification when working into a correctly matched 8ohm load. Output impedance was a moderate 0.46ohms, and it showed a good power bandwidth provided that the appropriate load tap was used. Current delivery was pretty good for a valve amplifier and it also proved surprisingly load tolerant. Distortions were satisfactory at full power and improved markedly at more realistic, lower powers. For example, by 0dBW, 1 watt, the 19/20kHz intermodulation distortion had fallen to −72.3dB compared with −47.6dB at full level.

Noise levels were satisfactory while the frequency response was very wide, extending from less than 0.5Hz to 33.5kHz for small −0.5dB limits. Within the audio range it was almost perfectly flat though some variation will be imposed on the output impedance by speaker loading differences. A good result was obtained for the power modulation test, producing a graph dominated by pure harmonics of the input frequency.

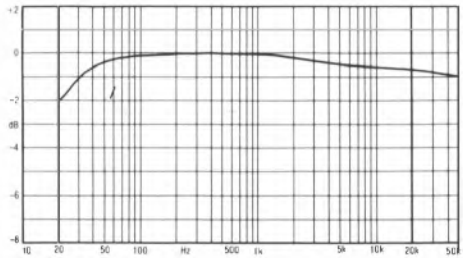
Conclusions

Both these products are currently secure at their respective price points. Given good matching to the source, the *SP11*'s performance was very ▶

Audio Research SP11/M100

continued from previous page

good indeed. Such review approval is extended still further in the case of the *M100* power amplifier, whose performance bordered on the magical within the current power limits of this transformer-coupled valve design. The comments were all highly positive for an amazing product which is destined to make its own audio legend.



Disc input. RIAA equalisation accuracy

Test measurements

To show how well the amplifier sustains its 8ohm output into real loudspeaker loads, the level into 4ohms and 2ohms is given in dBW (where 0dB=1W), without adding 3dB or 6dB respectively, as in usual 'power' ratings.

Test Results

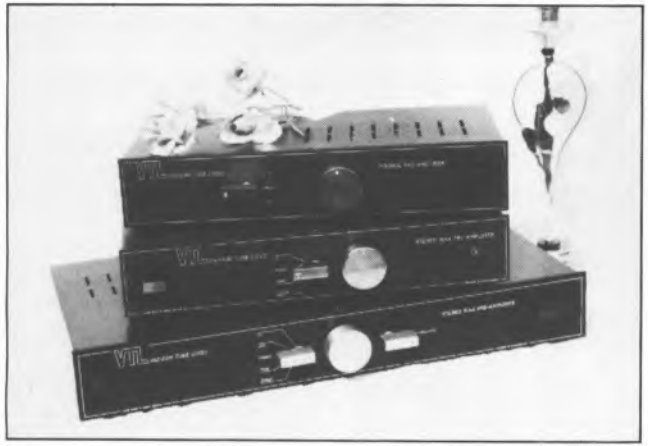
Rated power into 8ohms, maker's spec		100W(=20dBW)	
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	16.6dBW	21.1dBW	20.4dBW
Both channels, 4ohm load	—	17.6dBW	—
One channel, 2ohms, pulsed	—	16dBW	—
Instantaneous peak current		+12A	−12A
Total harmonic distortion,	20Hz	1kHz	20kHz
at rated power, aux input	−47.9dB	−52dB	−41.8dB
NOISE*			
Disc (mm) input (IHF, CCIR weighted)		−80dB	
Disc (mc) input (IHF, CCIR weighted)		−64dB	
Aux/CD input (IHF, CCIR weighted)		−89dB	
Input overload	20Hz	1kHz	20kHz
Disc (mm) input (IHF)	25dB	25dB	31dB
Disc (mc) input (IHF)	45dB	45dB	51dB
Aux/CD input (IHF)	>20dB	>20dB	>20dB

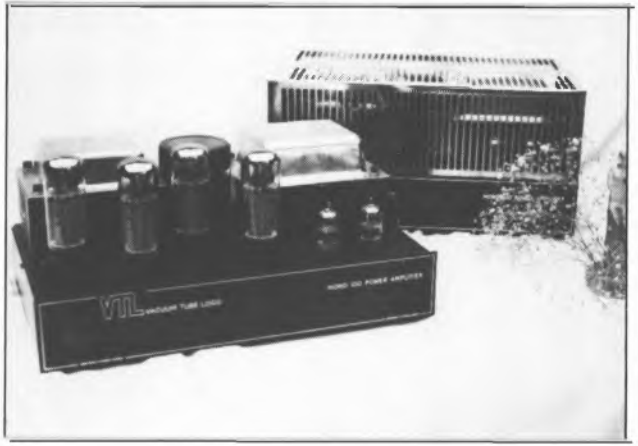
Input data	socket type	sensitivity	loading	
Disc (mm) input	Phono	0.09mV	47kohms	500pF
Disc (mc) input	Phono	0.09mV	100ohms	150pF
Aux input	Phono	29mV	4.7kohms	50pF
Power amp	Phono	69.5mV	100kohms	—

Output, pre-amp (tape)	94.8V max, 240ohms
Disc equalisation error, 30Hz-15kHz	+0.03dB, −0.04dB
Size (width, height, depth)	48 × 14 × 34cm*
Typical price inc VAT	£1,150, £2,850

First reviewed: The Collection 1986 and 1987

VTL VACUUM TUBE LOGIC The audible difference is not subtle.





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AUDIOLAB 8000A

CAMBRIDGE SYSTEMS TECHNOLOGY LTD, 26 ROMAN WAY, GODMANCHESTER, HUNTINGDON, CAMBS PE18 9LN. TEL: (0480) 52521

Now a well established model, the 8000A has undergone extensive sound quality revisions for 1987, through subtle development and refinement. It is conservatively rated at 50W per channel.

In contrast to much UK equipment today, which is of 'straight line' design, the Audiolab does have tone controls; however these are said to be specifically designed to have a negligible effect on sound quality. Comprehensively equipped, the input facilities are all phono, and include disc (mm and mc), tape 1 and 2, plus tuner and CD/aux. A proper 'record out' selector matches the input selector. A headphone socket is provided, which mutes the two sets of speaker outputs *via* a high-quality relay. A small dealer modification provides for separate pre/power amp use if this is required by the user, but in this mode the circuitry which prevents switch-on thumps will not operate.

As well engineered internally as it is finished externally, the amplifier uses a large 250VA toroidal transformer specially mounted to reduce mechanical hum. The output stages are high-current, direct-coupled complementary, with a DC servo to rolloff the extreme subsonic response without need for the usual decoupling capacitor in the feedback loop. Full electronic protection is designed to allow adverse load drive. All discrete circuitry is employed, The mc headamp is a particularly careful design, and; in fact many of the design features are more commonly associated with more costly models.

LAB REPORT

Specified at 50W (17dBW) the amplifier demonstrated a fine power bandwidth at 19dBW into 8ohms. The 4ohm continuous delivery was also pretty good, while its ±28A peak current capability was more than sufficient for the rated power. Peak level approached 100W per channel (19.8dBW) holding well into 4ohms at 18.6dB and still very strong at 18dBW, 2ohms.

Harmonic and particularly intermodulation distortions were at negligible levels, in a sense showing that high-linearity circuits are not in themselves a barrier to good sound quality. Noise levels were fine, and the DC output offsets negligible. Input overload levels were ample, and stereo separation up with the best, bar the special double-mono amplifier types. Output impedance was low and channel balance very accurate, except at the lowest volume settings. Input sensitivities were sufficient for all classes of source, and the input characteristics can be changed *via* optional loading plugs. RIAA equalisation followed the IEC rolloff, hence the subsonic fall shown here, while the tone controls were suitably mild in action. The pre-amp out-

put also offered a decent level at low impedance for other power amplifiers. Subjectively, no change in sound quality could be heard with the tone controls engaged.

Sound Quality

This amplifier surprised all those who heard it. On moving-coil input the overall subjective rating was 'good plus', which is ahead of the competition. Its character was highly neutral, if very slightly 'clinical', with an open, wide frequency range and very presentable bass, the latter offering power, precision and extension. The midband was well defined, articulate and well-focused while the stereo image showed decent depth and ambience.

A marginal improvement of depth was noticed *via* moving-magnet input, while the treble remained slightly imperfect; here a hint of 'fuzziness' and 'grain' was a little sweeter than on moving-coil, with some further advance in treble quality and a touch more clarity.

The sound remained very good *via* aux dominated by a fine transparency and with additional, admittedly minor, improvements in stereo staging, depth, bass power and detail. It could get pretty loud, and sounded very tolerable into clipping, with 103dBA possible into the normal loudspeaker. A fine load tolerance was also evidenced by the 102dBA produced into the severe load.

Conclusions

For '87, Audiolab have further enhanced the sound quality, by subtle improvements to the interior circuitry, so fully maintaining the model's keen competition. The *8000A* is a fine integrated amplifier of very good power delivery with excellent finish and build quality. The tone controls do not detract from the performance, while its load tolerence is exceptional. A highly versatile model, this superior quality design remains firmly recommended.

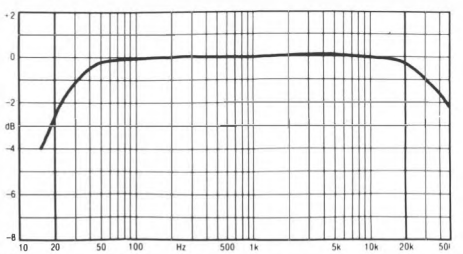
Test measurements

To show how well the amplifier sustains its 8ohm output into real loudspeaker loads, the level into 4ohms and 2ohms is given in dBW (where 0dB=1W), without adding 3dB or 6dB respectively, as in usual 'power' ratings.

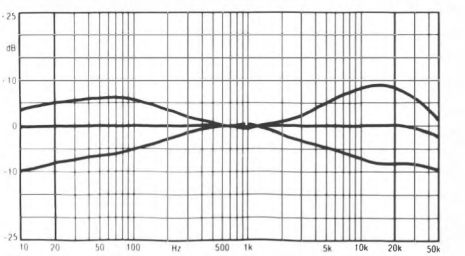
Test Results

Power output			Integrated amplifier
Rated power into 8ohms, maker's spec			50W(=17dBW)
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	19.4dBW	19.5dBW	19.0dBW
Both channels, 4ohm load	17.2dBW	17.6dBW	17.0dBW
One channel, 2ohms, pulsed	17.8dBW	18.0dBW	17.3dBW
Instantaneous peak current		+27A	−28A
Distortion			
Total harmonic distortion,	20Hz	1kHz	20kHz
at rated power, aux input	−90dB	−95dB	−80dB
Intermodulation, 19/20kHz, rated power, aux input			−85dB
Intermodulation, 19/20kHz, at 0dBW, disc (mm)			−85dB
Intermodulation, 19/20kHz, at 0dBW, disc (mc)			−80dB
Noise			
Disc (mm) input (IHF, CCIR weighted)			−78dB
Disc (mc) input (IHF, CCIR weighted)			73dB
Aux/CD input (IHF, CCIR weighted)			−82dB
Residual, unweighted (volume control at min)			−78dB
DC output offset			left 2mV, right 3mV
Input overload	20Hz	1kHz	20kHz
Disc (mm) input (IHF)	29dB	30dB	30dB
Disc (mc) input (IHF)*	26dB	26dB	26dB
Aux/CD input (IHF)	>20dB	>20dB	>20dB
Stereo separation			
Disc input (mm)	−90dB	−72dB	−50dB
Aux input	−78dB	−77dB	−56dB
Output impedance (damping)	0.03ohm	0.04ohm	0.12ohm
Channel balance, disc, at 1kHz			0.04dB
Volume/balance tracking	0dB	−20dB	−60dB
Aux input	0.04dB	0.0dB	3.6dB
Input data	socket type	sensitivity	loading
Disc (mm) input	DIN	0.3mV	47kohms 35pF
Disc (mc) input	DIN	0.007mV	100ohms 4.7nF
Aux input	DIN	12mV	20kohms 70pF
Output, pre-amp (tape)			7.7V max, 600ohms
Disc equalisation error, 30Hz-15kHz			+0.1dB, −2.2dB
Size (width, height, depth)			44.5×7.4×34cm
Typical price inc VAT			£299

First reviewed: 1983. Retested 1985.



Disc input: RIAA equalisation accuracy

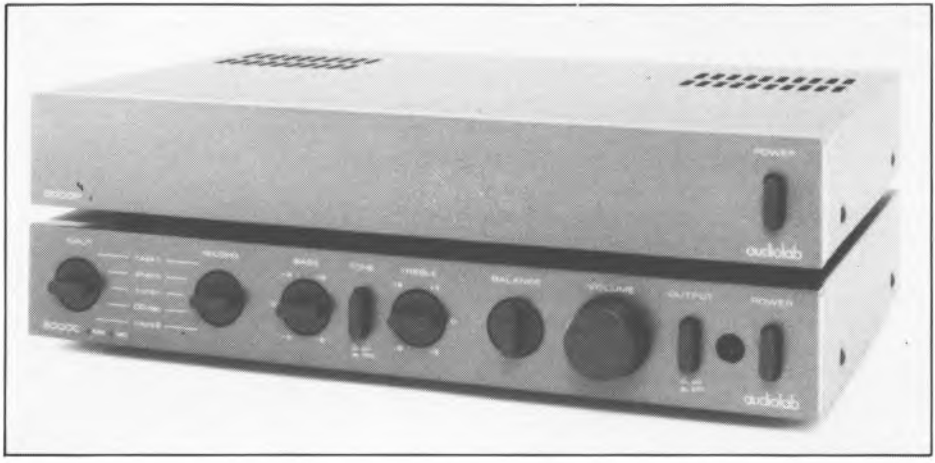


Tone control/filter responses

RECOMMENDED

AUDIOLAB 8000C/8000P

CAMBRIDGE SYSTEMS TECHNOLOGY LTD, 26 ROMAN WAY, GODMANCHESTER, HUNTINGDON, CAMBS PE18 9LN. TEL: (0480) 52521



These modern transistor designs offer impeccable specifications, yet much care has also been devoted to how they sound. The 8000C pre-amp is extremely versatile, including quality moving-coil and moving-magnet inputs, plus sensible tone controls which are virtually inaudible in terms of sound quality degradation when not in use; two tape decks and many other inputs may also be accommodated. A headphone outlet fed by its own small power amplifier is also provided.

The 100W (20dBW) per channel power amplifier has no controls bar the on/off switch. Speaker connection is *via* standard 4mm socket/binding posts.

SOUND QUALITY

Used with good cable, the Audiolab separates provided an impressive standard of sound quality, proving tidier, more refined and also more powerful than the 8000A integrated amp. High levels were produced into both loadings: 105dBA into 8ohms and 104dBA into 4ohms.

The good standard of stereo depth was maintained, while that slightly cold 'clinical' character of the integrated 8000A was again noted, indicating that the combination is again best suited to mildly rich speakers and cartridges. Precise and detailed with a clean articulate bass, the Audiolabs' competitive scores set them apart in their price territory.

LAB REPORT

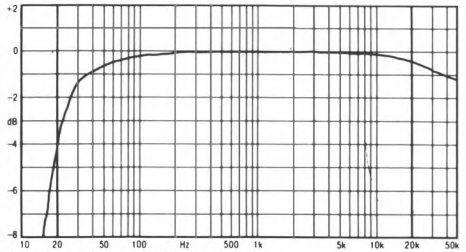
The power amplifier first, is clearly a very 'gutsy' performer with immaculate figures for power bandwidth, adverse load delivery and peak current — to the test limit of ±40A! The pulsed delivery into 2ohms corresponded to 400W per channel into this load. All distortions were very low, negligibly so in fact, while DC offsets were also microscopic, thanks to the special DC servo in the amplifiers.

The pre-amp also measured very well, with flat frequency responses, good noise levels, sensible sensitivities and impedances, plus fine overload margins. Stereo separation was very good. The pre-amp could provide up to 10V output, from a low source resistance of 100ohms.

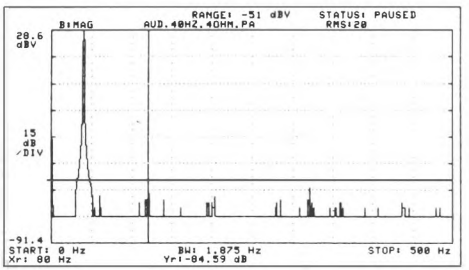
CONCLUSIONS

A new round of detail improvements introduced at the end of 1986 have resulted in further significant subjective improvement. As a result,

both components fully maintain highly competitive performance in their respective price categories.



Disc input. RIAA equalisation accuracy



Power supply rejection, 40Hz input

Test measurements

To show how well the amplifier sustains its 8ohm output into real loudspeaker loads, the level into 4ohms and 2ohms is given in dBW (where 0dB=1W), without adding 3dB or 6dB respectively, as in usual 'power' ratings.

Test Results

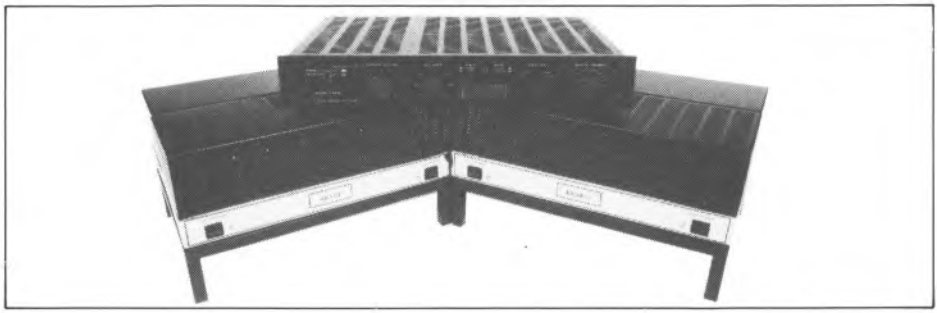
		Pre- and power amplifier	
Rated power into 8ohms, maker's spec		100W(=20dBW)	
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	21.6dBW	21.8dBW	21.4dBW
Both channels, 4ohm load	19.6dBW	20.0dBW	19.6dBW
One channel, 2ohms, pulsed	–dBW	20.3dBW	–dBW
Instantaneous peak current		+40A	–40A
Total harmonic distortion,	20Hz	1kHz	20kHz
at rated power, aux input	<–90dB	–93dB	–74dB
NOISE			
Disc (mm) input (IHF, CCIR weighted)			–70dB
Disc (mc) input (IHF, CCIR weighted)			–67dB
Aux/CD input (IHF, CCIR weighted)			–70dB
Input overload	20Hz	1kHz	20kHz
Disc (mm) input (IHF)	26dB	31dB	30dB
Disc (mc) input (IHF)	30dB	26dB	25dB
Aux/CD input (IHF)	>20dB	>20dB	>20dB
Input data	socket type	sensitivity	loading
Disc (mm) input	Phono	0.28mV	47kohms 50pF
Disc (mc) input	Phono	0.018mV	10ohms –nF
Aux input	Phono	15/52mV	20kohms –pF
Power amp	Phono	1100mV	47kohms 320pF
Output, pre-amp (tape)			>5V 100ohms
Disc equalisation error, 30Hz-15kHz			+0dB, –2dB
Size (width, height, depth)	45 × 8 × 34cm, 45 × 8 × 34cm		
Typical price inc VAT			£275 £450

First reviewed: 1985 (restested, 1986). Rating: Recommended.

RECOMMENDED

BEARD 506/M70

BEARD AUDIO, INDUSTRIAL UNIT B1, ASKEW CRESCENT WORKSHOPS, LONDON W12 9DP.
TEL: 01-749 4258



This very substantial British valve amplifier combination is beautifully finished and clearly designed to be seen as well as heard. The £1600 per pair monoblock power amplifiers have distinctive gilt chassis, and each is supplied with its own metal frame stand. Large ventilation slots add a touch of individuality to the covers of both pre- and power units. But in the case of the pre-amp these may be questionable with regard to electrical safety.

Unlike so many modern valve designs which tend to ignore all but the most basic facilities, the £1000 506 pre-amplifier is a quite complex affair, with a variety of esoteric features such as separate active and passive volume controls, AC/DC coupling, and high/low gain, in addition to the familiar balance and input selection. The rear panel carried high quality phono sockets, and has switches for the inbuilt step-up transformer to handle moving-coil cartridges, and for completing the active/passive switchover.

The power amplifiers take up rather less height than many valve devices because they use comparatively small EL84 valves, in comparatively large quantities — a dozen per channel in this case. Fuses, phono inputs and Michell speaker plug/screw terminals are the only visible features here. A halt power mode adequate for low level listening gives extended valve operating life.

LAB REPORT

The large pre-amp case is well packed with quality components including high quality polypropylene capacitors etc., with extensive power supply reservoirs and complex regulation at each stage. The active sections use ten double triodes, while the passive option bypasses the line stage with a passive volume control. There is one large main PCB, and the toroidal mains transformer is in a screened compartment. Price notwithstanding, there is a lot of engineering for the money. The *M70* uses twelve small EL84 tubes — effectively a doubling up of the *P35* configuration — and these are relatively cheap and easy to replace. Again following the *P35* pattern, the *M70* has superior, wider bandwidth, larger output transformers. Individual solid state regulators supply the cathodes from a low hum transformer, and the circuitry is simple and direct.

Power output just met its fairly modest specification midband, 8ohms, but for its type was quite well maintained at the frequency extreme. Lower impedances were less well served, but not seriously so and again with good power bandwidth. The instantaneous peak current was respectable enough, and the rather alarming looking power supply modulation in fact consists mainly of simple harmonic distortion — mains components are quite well controlled.

Harmonic and intermodulation distortions were rather indifferent, but with no obvious

weakspots. Signal-to-noise ratios are satisfactory. Input overload margins are fine, though the m-c input deteriorated at high frequencies, and stereo separation at HF was also rather poor. Though the volume control tracked well, a 2.45dB disc input imbalance should not have slipped past quality control.

High sensitivities on all inputs including moving-coil will give no compatibility problems. The RIAA moving-coil disc equalisation curve is even enough through the audio band, with no LF bandlimiting and a slightly 'warm' lower midband, but also has a rising characteristic at ultrasonic frequencies.

Sound Quality

Both pre- and power amplifiers were rated 'good plus' on sound quality, sounding detailed and well focused, with fine stereo imagery. Though 'lively', the bass was a touch softened and thickened, while the treble lacked a little 'sparkle' and 'air', vocals slightly 'pinched'. The moving-coil transformer stage lacked a little of the resolution of the moving magnet input. CD certainly sounded clearer *via* the passive route than through the line stage, though this option is only really viable with valve power amplifiers. The power amplifiers had good balance and 'bounce' but added some congestion and lacked 'slam'.

Conclusions

Despite its complexity the pre-amp sounded good, and the corresponding versatility is the major plus point that justifies recommendation despite a highish price tag. The *M70* monoblocks are less clear cut — their beautiful build is expensive and the only sonic advantage over the *P35* seems to be a couple of dB extra loudness, but they are still clearly worth considering.

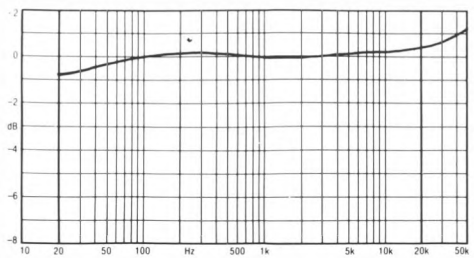
Test measurements

To show how well the amplifier sustains its 8ohm output into real loudspeaker loads, the level into 4ohms and 2ohms is given in dBW (where 0dB=1W), without adding 3dB or 6dB respectively, as in usual 'power' ratings.

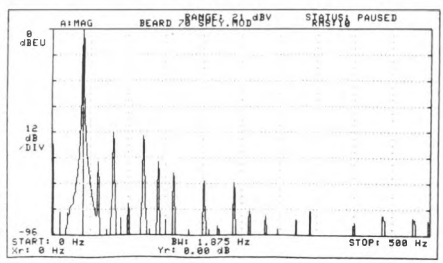
Test Results

Power output			Pre/power amplifier
Rated power into 8ohms, maker's spec			70W(=18.5dBW)
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	18.0dBW	18.5dBW	18.1dBW
Both channels, 4ohm load	14.7dBW	15.2dBW	13.9dBW
One channel, 2ohms, pulsed	–dBW	13.0dBW	–dBW
Instantaneous peak current		+9.0A	–9.0A
Distortion			
Total harmonic distortion,	20Hz	1kHz	20kHz
at rated power, aux/CD input	–44dB	–52dB	–46dB
Intermodulation, 19/20kHz, rated power, aux input			–52dB
Intermodulation, 19/20kHz, at 0dBW, disc (mm)			–43dB
Intermodulation, 19/20kHz, at 0dBW, disc (mc)			–52dB
Noise			
Disc (mm) input (IHF, CCIR weighted)			–70dB
Disc (mc) input (IHF, CCIR weighted)			–61dB
Aux/CD input (IHF, CCIR weighted)			–72dB
Residual, unweighted (volume control at min)			–81dB
DC output offset			left n/a mV, right n/a mV
DC offset, pre-amp			left n/a mV, right n/a mV
Input overload	20Hz	1kHz	20kHz
Disc (mm) input (IHF)	34.4dB	43.5dB	33.2dB
Disc (mc) input (IHF)*	40.3dB	52.6dB	23.9dB
Aux/CD input (IHF)	>20dB	>20dB	>20dB
Stereo separation			
Disc input (mc)	64dB	52dB	28dB
Aux/CD input	89dB	57dB	31dB
Output impedance (damping)	1.0ohm	0.98ohm	0.94ohm
Channel balance, disc, at 1kHz			2.45dB
Volume/balance tracking	0dB	–20dB	–60dB
Aux input	0dB	0.28dB	0.17dB

Input data	socket type	sensitivity	loading	
Disc (mm) input	Phono	0.18mV	47kohms	110pF
Disc (mc) input*	Phono	0.037mV	530ohms	n/a nF
Aux/CD input	Phono	20.4mV	250kohms	80pF
Power amp	Phono	910mV	340kohms	530pF
Output, pre-amp (tape)			>30V max,	105ohms
Disc equalisation error, 30Hz-15kHz (mc)			+0.31dB,	–0.62dB
Size (width, height, depth)			53×9×37cm pre- & power-	2×(44.5×15×33.5)
Typical price inc VAT			£995,	£1595



Disc input. RIAA equalisation accuracy

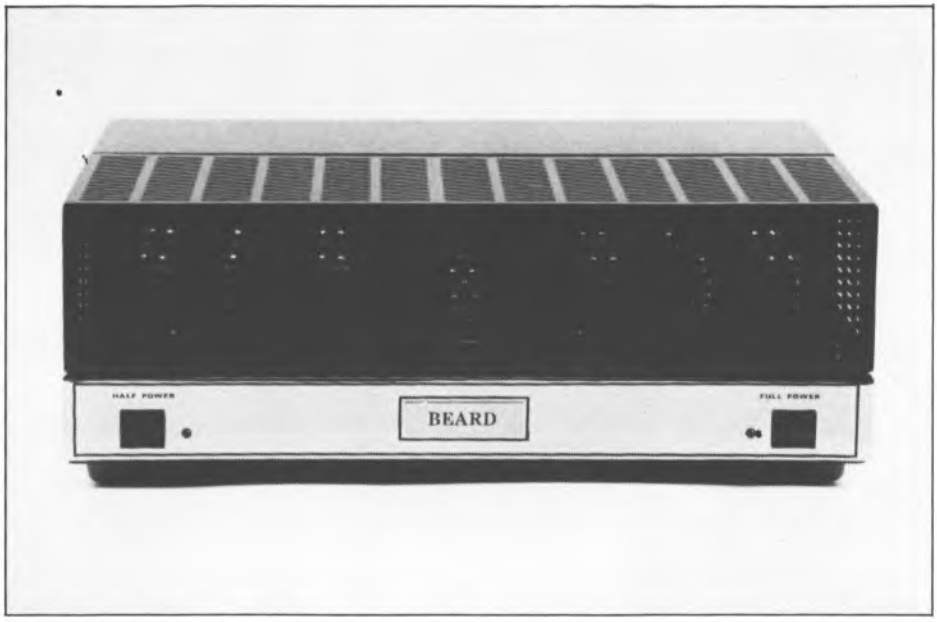


Power supply rejection, 40Hz input

RECOMMENDED

BEARD P35 POWER AMPLIFIER

BEARD AUDIO SYSTEMS LTD, UNIT B1, ASKEW CRESCENT WORKSHOPS, LONDON W12 9DP.
TEL: 01-749 4258



Built superbly, on a massive chrome chassis, this Beard power amplifier uses a simple straightforward circuit design, with high quality components, plus a substantial reservoir capacity. Six EL84 output valves per channel give a 35W rating in ultralinear configuration.

A large central toroidal transformer supplies the two channels, which have independent rectification and storage. 'Floating' biasing simplifies the construction, though each valve needs to be individually set in production after 'bum in' at the factory. An alternative standby mode may be used providing half power with a vastly increased valve operating life. Speaker connection is *via* Michell gold plated binding posts which take cable or plugs up to 4mm.

SOUND QUALITY

Beard's best yet, this amplifier proved capable of higher sound levels than its rating suggested, and could reach 102dBA on the 8ohm load. Mild transformer hum suggests it should preferably be sited away from the listener.

Reauditioned for 1987 in the light of certain detail modifications, the high rating established the year before was fully maintained. Stereotypically valve in sound, it was sweet and slightly 'soft', a little on the 'rich' side but engagingly rhythmic and 'bouncy'. Lacking some of the low frequency scale and dynamic drama of other designs, string tone and orchestral perspectives were both very convincing.

LAB REPORT

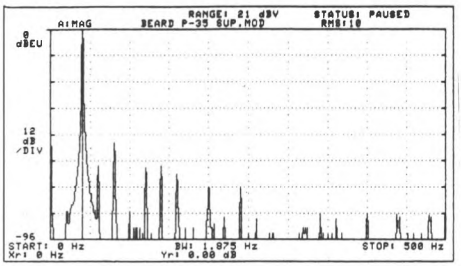
Our clipping limit of 1% distortion was relaxed to 3% to accommodate the high frequency harmonic distortion of this model: At rated power, the 20kHz harmonic distortion approached 3% but improved at lower power levels. Conversely, the more important high frequency intermodulation result was pretty good,

and better still at lower powers.

Stereo separation was predictably excellent, due to the virtual double-mono construction. Rated as satisfactory for load tolerance, this low feedback design gave a consistent output impedance of 1ohm, which would slightly modify the perceived tonal balance of some speakers.

Conclusions

While this amplifier will need some care in matching it to a given system, it offered a genuinely high sound quality, with that distinctive and valued transparency associated with better valve designs. Considering the high build quality it is competitively priced, and continues to be confidently recommended.



Power supply rejection, 40Hz input

Test Results

Rated power into 8ohms, maker's spec			35W(=15dBW)
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	16.3dBW	16.5dBW	15.7dBW
One channel, 4ohm load	11.7dBW	11.8dBW	7.7dBW
One channel, 2ohms, pulsed	–dBW	12.4dBW	–dBW
Instantaneous peak current		+6.5A	–6.5A
Total harmonic distortion,	20Hz	1kHz	20kHz
at rated power, aux input	–57.1dB	–58.2dB	–33.3dB
Intermodulation, 19/20kHz, rated power, aux input			–60.4dB
NOISE			
Aux/CD input (IHF, CCIR weighted)			–86.0dB
Residual, unweighted (volume control at min)			–70.0dB
Output impedance (damping)	0.88ohm	0.88ohm	0.84ohm
Input data	socket type	sensitivity	loading
Power amp	Phono	160mV	650kohms 320pF
Size (width, height, depth)			44.5 × 15 × 33.5cm
Typical price inc VAT			£695

First reviewed: 1986. Rating: Recommended.

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CAMBRIDGE AUDIO P40

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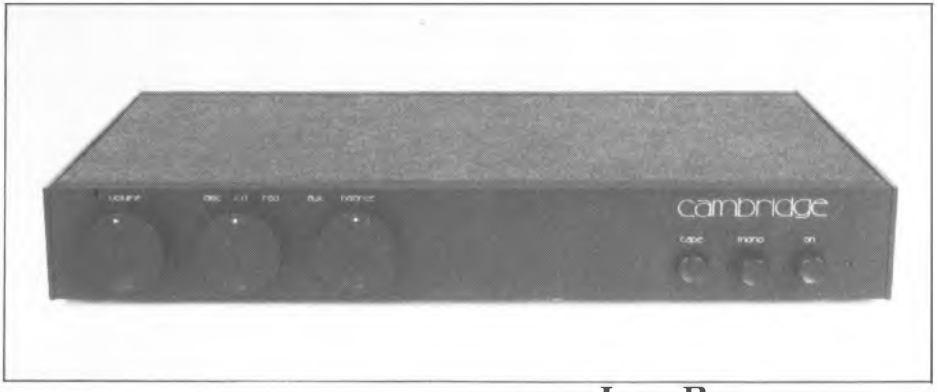


Though the name stretches back nearly two decades, Cambridge Audio products have only been intermittently available, the company changing hands and lying dormant on occasion. Now owned by an engineer who was involved back in those early amplifier years and having conspicuous current success with a state-of-the-art CD player, after some hesitancy the amplifier range is beginning to re-establish itself too. Last year's *Integer* has evolved into a *P55*, at a slightly higher price and power rating than the new £200 *P40* integrated amplifier reviewed here, itself reviving one of the names from Cambridge's past.

This being the 'eighties rather than the 'sixties, *P40* is now a simple 'straight line' design with minimal facilities to clutter the signal path. Housed in a simple slimline black enclosure, finish has been significantly improved over earlier Cambridge production and is now to a high standard, though one could still pick a nit or two over the 'feel' of the controls. There are just three large control knobs and three push-buttons, the former for volume, balance and input selection, the latter for power on/off, mono/stereo and tape monitoring. The rear panel has a single row of phono plugs for interconnection, plus 4mm sockets for loudspeakers; between the disc inputs a switch selects the extra gain needed for moving-coil cartridges.

LAB REPORT

The *P40* has a particularly clean and direct layout, construction being based on a single printed circuit board that has an 'audio quality' substrate. The output stage is conventional complementary direct coupled bi-polar, and high quality ICs are used for the disc input. The passive line stage provides lower sensitivity on line inputs. A generous toroidal transformer with plenty of reservoir gives shared supply to the two channels; build quality is good, and high current fuse protected transistors are used.

The *P40* comfortably beat its rated 40W/16dBW, but the 3dBW loss when driving both channels into 4ohms is a little severe, indicative of the shared supply. Power bandwidth is very good, and peak current capability a fine +/−20A, so there is plenty of reserve 'urge'. The power supply modulation test showed that spuriae were at a low level, but the background was a little 'dirty' in terms of the number of components generated at low level in the power supply.

Distortions were pretty good except at high frequencies where there was some significant deterioration: there was some question about high frequency stability when rigged up using short low inductance wiring in the lab, but this was not encountered during normal use with cables. The noise figures were reasonable except on the moving-coil input, where −55dB is

barely adequate and was gently audible. Stereo separation was reasonable enough, and overload margins adequate, if a little suspect at high frequencies on the moving-coil input. Sensitivities were a little lower than average, and volume/balance tracking could have been improved at low levels. The RIAA disc equalisation curve showed quite sharp bandwidth curtailment at low frequencies, −20dB at 50Hz and −7dB at 20Hz, but a smooth, neutral characteristic elsewhere.

Sound Quality

Our first sample delivered only mono, but still sounded very promising nonetheless: its replacement rated good overall, a fine result for the price. Particularly impressive was the subjective 'speed' and 'grip', giving a fine impression of coherence and integration with excellent dynamics. There was some criticism of a treble 'untidiness', and a certain lack of sweetness here, with some sibilant emphasis, but the soundstage was open and clear with good transparency and reasonable depth portrayal. The quality improved with CD, suggesting that the power amplifier is more capable than the pre-amp section.

Conclusions

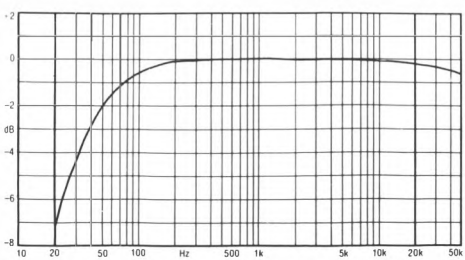
Subjectively one of the better integrated amplifiers around, the *P40* still shows room for improvement, particularly on the moving-coil disc input, But at least it has this option available, and produced a sound quality which justified the step-up in price from popular £150 models, particularly for rock music listeners. The sample fault we encountered was clearly just that (late as usual, they rushed us a sample diverted from an export batch, modifying it without proper checking!), and some caution should be taken avoiding exotic loudspeaker cables and/or very short runs, but the *P40* is clearly a welcome new Best Buy, even if it is still a little wet behind the ears.

Test measurements

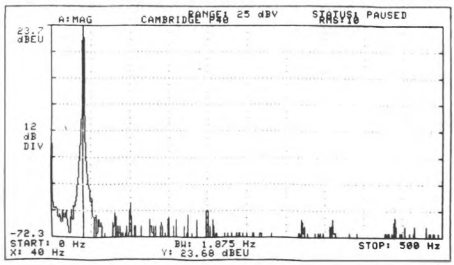
To show how well the amplifier sustains its 8ohm output into real loudspeaker loads, the level into 4ohms and 2ohms is given in dBW (where 0dB=1W), without adding 3dB or 6dB respectively, as in usual 'power' ratings.

Test Results

Power output			Integrated amplifier
Rated power into 8ohms, maker's spec			40W(=16dBW)
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	17.5dBW	17.86dBW	17.65dBW
Both channels, 4ohm load	14.5dBW	15.2dBW	14.9dBW
One channel, 2ohms, pulsed	−dBW	15.5dBW	−dBW
Instantaneous peak current		+20.0A	−20.0A
Distortion			
Total harmonic distortion,	20Hz	1kHz	20kHz
at rated power, aux input	−75.0dB	−74.0dB	−51.0dB
Intermodulation, 19/20kHz, rated power, aux input			−75.0dB
Intermodulation, 19/20kHz, at 0dBW, disc (mm)			−71.0dB
Intermodulation, 19/20kHz, at 0dBW, disc (mc)			63.0dB
Noise			
Disc (mm) input (IHF, CCIR weighted)			−73.0dB
Disc (mc) input (IHF, CCIR weighted)			−55.0dB
Aux/CD input (IHF, CCIR weighted)			−75.0dB
Residual, unweighted (volume control at min)			−78.0dB
DC output offset			left 25mV, right 10mV
Input overload	20Hz	1kHz	20kHz
Disc (mm) input (IHF)	31.0dB	30.0dB	30.0dB
Disc (mc) input (IHF)*	31.7dB	30.6dB	22.7dB
Aux/CD input (IHF)	>20dB	>20dB	>20dB
Stereo separation			
Disc input (mm)	67.0dB	67.0dB	50.0dB
Aux input	76.0dB	72.0dB	50.0dB
Output impedance (damping)	0.122ohm	0.116ohm	0.118ohm
Channel balance, disc, at 1kHz			n/a dB
Volume/balance tracking	0dB	−20dB	−60dB
Aux CD input	0dB	0.7dB	5.0dB
Input data	socket type	sensitivity	loading
Disc (mm) input	Phono	0.56mV	47kohms 115pF
Disc (mc) input*		0.062mV	47kohms 115pF
Aux input	Phono	42.5mV	7.0kohms 410pF
Output, pre-amp (tape)			10.25V max, 7.7kohms
Disc equalisation error, 30Hz-15kHz			+0dB, −5dB
Size (width, height, depth)			43.6×6.25×28.2cm
Typical price inc VAT			£200



Disc input. RIAA equalisation accuracy



Power supply rejection, 40Hz input

RECOMMENDED

CAMBRIDGE AUDIO C75/P75

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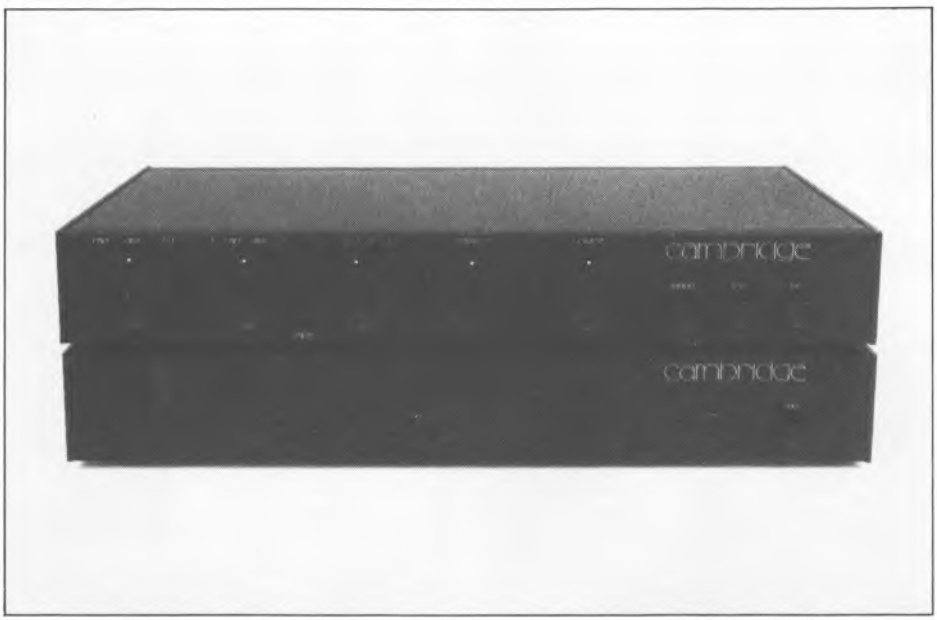


Though the name stretches back nearly two decades, Cambridge Audio products have only been intermittently available, the company changing hands and lying dormant several times. Now owned by an engineer who was involved back in those early amplifier years and having conspicuous current success with a state-of-the-art CD player, after some hesitancy a new line of amplifiers is also beginning to re-establish itself. The combination of C75 and P75 pre- and power amplifiers is near the top of the range, priced at £260 and £280 respectively, though more powerful monoblock power amplifiers are also available.

Housed in two similar slimline black enclosures, finish has been significantly improved over earlier Cambridge production and is now to a high standard. The units could hardly be more discrete in appearance, the control unit distinguished by five large identical rotaries which look neat enough even if they do not make for the most self-explanatory layout. This is effectively a 'straight line' design, so there are no tone controls, let alone speaker switching and suchlike paraphernalia, merely volume and balance plus input, tape monitoring, and record output switching. The pre-amp socketry is gold plated phonos throughout, while the power amplifier rear panel has 4mm speaker sockets plus a couple of heatsinks.

LAB REPORT

The C75 pre-amp uses carefully selected ICs throughout, but with Cambridge's shunt feedback equalisation technique using a buffer at the disc input. With a generous 50VA transformer, the overall layout and construction is clean. The power amp is a pure double-mono design using two 250VA toroids, one for each channel, with generous 48,000μF reservoirs. It uses carefully trimmed custom thick-film hybrids

for the driver stages, and parallel pairs of quasi-complementary bi-polars (with good linearising circuits) for the outputs. Good quality components are used extensively.

Comfortably exceeding its rated 20dBW specification to 8ohms, the *P75* showed a realistic delivery into 4ohms plus a fine power bandwidth and very generous peak current capability. The power supply modulation spectrogram was not too clean, showing mains components at −70dB.

Harmonic distortion was rather poor, particularly at low frequencies, and noise on the moving-coil input could have been better, but intermodulation and overload margins were fine. Stereo separation deteriorated at high frequencies, and volume/balance tracking was poor at low levels. The RIAA equalisation was smooth and fairly flat, with little bandwidth limitation.

Sound Quality

Both pre- and power amplifiers were rated 'good plus' overall. The power amplifier is a particularly strong performer, sounding open and effortless with good transparency and stereo staging, fine bass 'drive' and dynamics, if a touch 'grainy' and harsh at high frequencies. The pre-amp too provided excellent stereo imagery and an open 'big' sound with good, powerful bass, if a touch 'heavy' in character, lacking a little 'sparkle'.

Conclusions

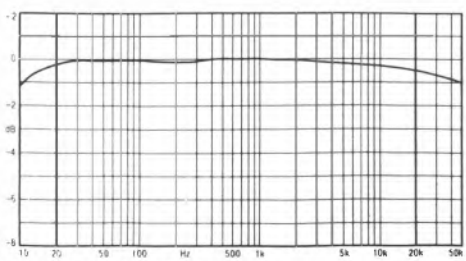
Clearly deserving firm recommendation, this combination performs well in combination or separately, measures pretty well and delivers a sound quality which more than justifies prices which are far from extravagant. Accepting the lack of tone controls and suchlike, the inputs and outputs are sufficient even for complicated systems, and finish and construction are both good.

Test measurements

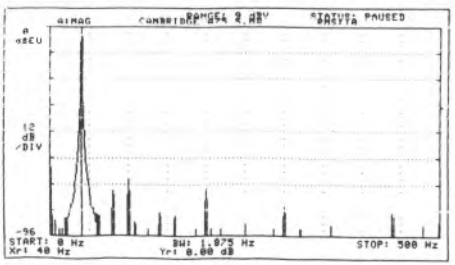
To show how well the amplifier sustains its 8ohm output into real loudspeaker loads, the level into 4ohms and 2ohms is given in dBW (where 0dB=1W), without adding 3dB or 6dB respectively, as in usual 'power' ratings.

Test Results

Power output			Integrated amplifier
Rated power into 8ohms, maker's spec			100W(=20dBW)
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	21.1dBW	21.1dBW	20.9dBW
Both channels, 4ohm load	19.1dBW	19.2dBW	19.1dBW
One channel, 2ohms, pulsed	−dBW	23.0dBW	−dBW
Instantaneous peak current		+40.0A	−39.0A
Distortion			
Total harmonic distortion,	20Hz	1kHz	20kHz
at rated power, aux input	−56.0dB	−70.0dB	65.0dB
Intermodulation, 19/20kHz, rated power, aux input			−73.0dB
Intermodulation, 19/20kHz, at 0dBW, disc (mm)			−71.0dB
Intermodulation, 19/20kHz, at 0dBW, disc (mc)			−69.0dB
Noise			
Disc (mm) input (IHF, CCIR weighted)			−77.0dB
Disc (mc) input (IHF, CCIR weighted)			−63.0dB
Aux/CD input (IHF, CCIR weighted)			−83.0dB
Residual, unweighted (volume control at min)			−84.0dB
DC output offset			left 25mV, right 27mV
DC offset, pre-amp			left n/a mV, right n/a mV
Input overload	20Hz	1kHz	20kHz
Disc (mm) input (IHF)	32.0dB	31.0dB	30.5dB
Disc (mc) input (IHF)*	32.0dB	31.5dB	31.0dB
Aux/CD input (IHF)	>20dB	>20dB	>20dB
Stereo separation			
Disc input (mm)	71.0dB	73.0dB	47.0dB
Aux input	100.0dB	65.0dB	39.0dB
Output impedance (damping)	0.1ohm	0.1ohm	0.15ohm
Channel balance, disc, at 1kHz			0.1dB
Volume/balance tracking	0dB	−20dB	−60dB
Aux CD input	0dB	0.3dB	5.5dB
Input data	socket type	sensitivity	loading
Disc (mm) input	Phono	1.5mV	47kohms 120pF
Disc (mc) input*	n/a	0.16mV	100ohms 1nF
Aux CD input	Phono	111mV	15.0kohms 70pF
Power amp		700.0mV	47kohms n/apF
Output, pre-amp (tape)			12.7V max, 80ohms
Disc equalisation error, 30Hz-15kHz			+0dB, −0.35dB
Size (width, height, depth)			44×6.5×28cms
Typical price inc VAT			£260+£280



Disc input. RIAA equalisation accuracy



Power supply rejection, 40Hz input

RECOMMENDED

CELLO AUDIO SUITE

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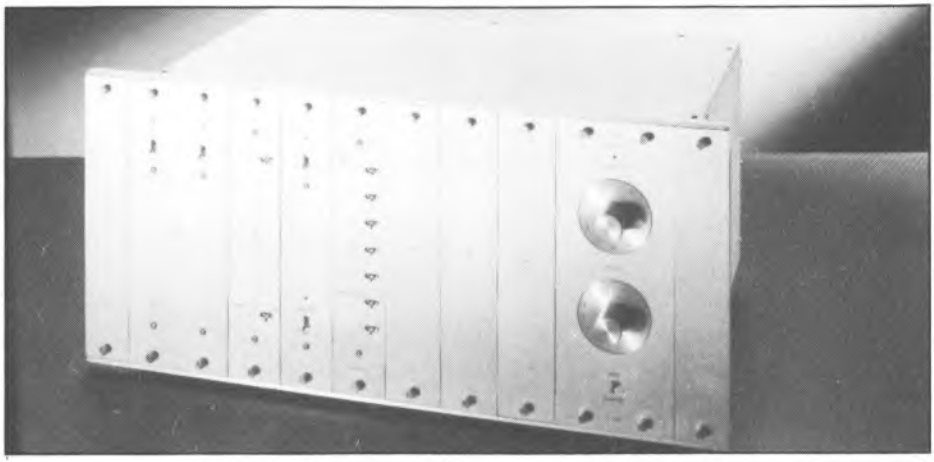


Cello (by Mark Levinson) are a fairly new company that brings the legend himself back into high end audio manufacture. The original *ML* amplifiers created their reputation almost as much for their extravagant prices as undoubtedly fine performance; they are still manufactured and marketed by Mark Levinson Audio Systems (MLAS), and still command considerable respect.

Cello represents a whole new ball game. It is unique in a number of respects — and on this occasion challenges the well-heeled to put down the price of a Porsche for his amplification! Or you can start with a Golf GTI's worth of *Audio Suite* pre-amp, which is the specific subject of this review. But for interest's sake we'll also run through the other goodies lurking under the Cello banner.

In fact Cello is conceived as a complete end-to-end system, in the belief that this is essential in avoiding frustration and disappointment. Signal source components are planned, but are so far limited to the *Chorale* cartridge (see p85), but the *Audio Suite* combines with the tone-shaping *Palette*, *Performance* power amplifiers, and *Amati* loudspeakers to create the rest of the chain. Each component is essentially modular, allowing flexibilty in configuration to match changes in circumstances.

AUDIO SUITE

The *Suite* itself does a pre-amp's job, but is something of a system in its own right. Fed from a massive external, fully regulated power supply the size of many power amplifiers, it is a large full-width rack to which the desired pre-amp modules are fitted, and can accommodate any desired selection of inputs and outputs from a wide (and planned wider) selection.

Unused sections of the rack are fitted with blanking plates until such time as they are needed. Furthermore, the various modules are available at different quality/price points (from the very expensive to the faintly ludicrous, it's true). This exceptional flexibility naturally ensures that the entire system is 'future ready', able to accommodate any new requirements or performance upgrades. The rack itself is a passive device without electronics, which consists of a dozen substantial copper buss bars which provide signal and power supply paths between the modules and power supply, the requisite contacts

being made automatically when the module is screwed into place. This buss bar system acts like the 'virtual earth' system often used in studio mixing desks: the output module simply reads the buss, while the input modules may be assigned as required (severally or one at a time, according to taste!). Balanced line operation is available on some of the modules and extends through the power amplification.

One key element of the *Suite* is its remarkable 'volume control', probably the least compromised and most expensive such device ever produced, and clearly the product of frustration with a component that was increasingly becoming the limiting factor in the signal path. The Cello control is a 59 position rotary attenuator, using discrete high quality metal film resistors throughout. It is fully calibrated, typically holding 1dB steps with an accuracy of 0.1%. 'Feel' is enhanced by the low torque shaft running in ballbearings, with positive detent action.

The quality of components and construction is completely beyond criticism — a glance inside is guaranteed to stimulate the salivary glands of any red-blooded electronics engineer. A major design consideration is longevity and longterm reliability — which accounts for the exotic connectors that are used, simply because most standard types show some deterioration over an extended period. Fischer (3-wire) connectors are preferred for balanced work, and Tiffany phonos for unbalanced applications, though any connectors may be specified.

Options

The *Audio Suite* shopping list is formidable. You've got to start with the £1270 *Master Supply* and £1575 *Mainframe*. You then need to add at least one but probably more input modules and an output module. These modules are currently offered in *B* (basic) and *P* (premium) forms, the former combining discrete components with ICs and costing around £1,000, the latter being constructed entirely in discrete components and retailing at nearer £3,000 each.

A typical configuration would include premium m-c cartridge, premium output, and basic line input (a passive unbalanced switcher for up to five general sources), and this would add up to a total price close to £10,000. Additional balanced premium line inputs cost around £1,000 a time.

Lab Report

Mildly exhausted by the general description, what can one say? The prospect of finding any technical flaws in a system of such pretension and price is risible, and testing bound to be largely going through the motions. We analysed both premium and basic inputs, the printed data referring to the former. There was not much difference, and nothing worth criticising on either of them.

One interesting observation is that although the disc RIAA response is very flat from 20Hz-20kHz, distinct rolloffs commence immediately beyond that range. This is probably a good thing, but it could be described as a little conservative in the light of current trends in 'high end' pre-amps.

Sound Quality

After the foregoing it would be disappointing if the *Audio Suite* didn't deliver the sonic goods. Happily quite the reverse, the *Suite* comfortably established new standards of reference in a number of performance areas. The combination of relaxing high resolution across a wide bandwidth and through a deep and 'fast' dynamic range was entirely seductive.

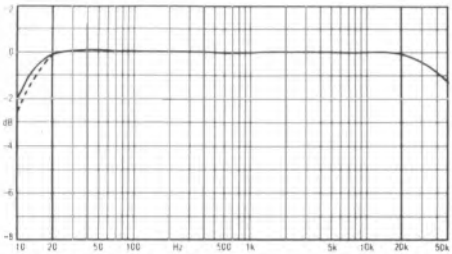
Delicacy, transparency, and 'bounce' were all notable characteristics, while the stereo staging was handsomely extended every which way with focus, depth and precision. The *Suite* is to some extent only as good as its sources, but can be relied upon to make as good a job as possible with whatever it receives — vinyl surface noise ▶

continued from previous page

effects seemed less inclined to get in the way than is usually the case.

Conclusions

The *Audio Suite* may be a silly price, but it is a far from silly product. Anyone who is really searching for the best ought to make a serious effort to check this one out. The aesthetics may not be to everyone's taste, but the operational feel and constructional standards match a superb sound quality. The unique architecture makes conventional pre-amps appear a little conceptually dated, ensuring a freedom from the old bugbear of regular obsolescence. With Cello you just upgrade a module (granted that said module can cost as much as most pre-amps). Recommendation is mandatory.



Disc input. RIAA equalisation accuracy

Test Results

Power output			Pre-amp
Distortion			
Total harmonic distortion:	20Hz	1kHz	20kHz
at rated level, disc	<–90dB	<–88dB	<–90dB
Intermodulation, 19/20kHz, rated power, aux input			<–90dB
Intermodulation, 19/20kHz, at 0dBW, disc (mm)			–73dB
Intermodulation, 19/20kHz, at 0dBW, disc (mc)			–63dB
Noise			
Disc (mm) input (IHF, CCIR weighted)			n/a
Disc (mc) input (IHF, CCIR weighted)			–64dB
Aux/CD input (IHF, CCIR weighted)			–84dB
Residual, unweighted (volume control at min)			–97dB
DC offset, pre-amp			left 0mV, right 0mV
Input overload	20Hz	1kHz	20kHz
Disc (mm) input (IHF)	n/a	n/a	n/a
Disc (mc) input (IHF)*	30dB	28dB	28.4dB
Aux/CD input (IHF)	>20dB	>20dB	>20dB
Stereo separation			
Disc input (mm)	>110dB	86dB	64dB
Aux input	<–110dB	76dB	56dB
Channel balance, disc, at 1kHz			0.01dB
Volume/balance tracking	0dB	–20dB	–60dB
Aux input	0dB	0.03dB	0.01dB
Input data socket type sensitivity loading			
Disc (mc) input*	Fischer bal.	0.15mV	992ohms 50pF
Aux input	Fischer bal.	165mV	10kohms 480pF
Output, pre-amp (tape)			16.8V max, 91ohms
Disc equalisation error, 30Hz-15kHz			+0.1dB, –0.05dB
Size (width, height, depth)			48×23×30
Typical price inc VAT			from £6,000 (typically £10,000)

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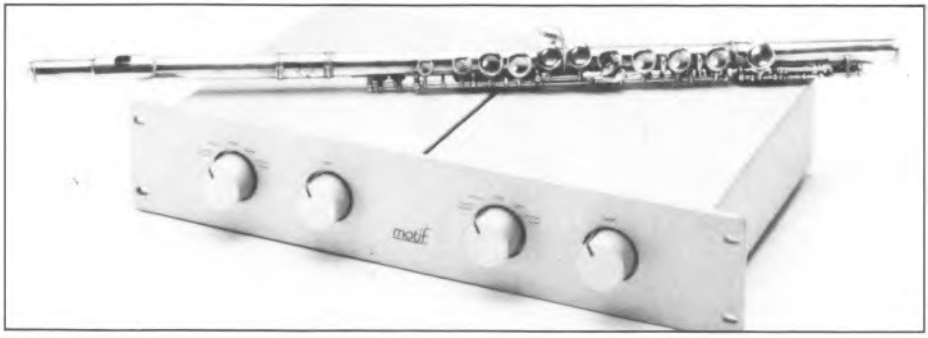


The Motif series of products are Conrad Johnson's transistor alternative to their renowned valve amplifiers, and use FET technology in place of valves. There are currently two such 'minimalist' pre-amps on the UK market, the MC-8 being the cheaper (c£2,500), newer version which is a cost-pared version of the original £4,000 MC-7. This review concentrates on the MC-8, but with subjective and objective comparison to the '7.

Whereas the MC-7 has a determinedly double-mono construction, the MC-8 has a conventional stereo layout, complete with such luxuries as a balance control. Economies have been achieved through the single case and on-board power supply, but not on the quality of internal componentry.

The simple, substantial, almost featureless design is beautifully finished in brushed 'silver', with just the selectors, volume and balance controls on the front panel, while the rear carries a switch to choose between the separate moving magnet and moving coil inputs — the latter inverting absolute phase, which can prove misleading during subjective comparisons. Sockets are high quality Tiffany phonos, and no on/off switch is provided, as the unit is designed to be left on more or less permanently.

The circuitry is very simple, using a minimum of components many of which are exclusive to C-J. There are no electrolytic capacitors whatever, the power supply using small but good quality polystyrene types. The basic construction is largely symmetrical between channels, operating in class A with single-ended FET devices throughout.

LAB REPORT

The frequency response was flat, showing a slight improvement over a '7 sample measured some months ago and confirming that the slight error has now been corrected for all *Motifs*. Though designated mm and m-c, the former is sufficiently sensitive for some of the higher output 'low output' cartridges.

The distortion characteristics were a trifle disappointing considering the price level: following the figures obtained for the '7 very closely, high frequency intermodulation and overload could both have been improved, while the '8 showed similar mild weakness on channel separation at high frequencies. In other respects the technical performance was first class, with high quality construction standards throughout.

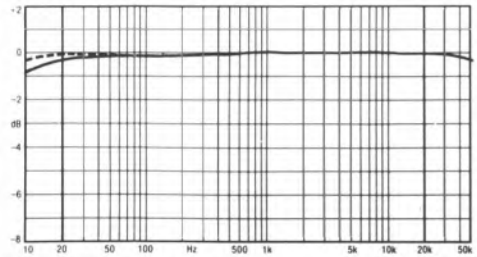
SOUND QUALITY

The *Motif 8* suffers from one significant disadvantage — comparison with the '7. In isolation it is recognisably a very refined device, one of the best around and fully capable of justifying its not inconsiderable price. It sounded fast yet polite, fundamentally neutral yet with a slightly 'light', 'bright' balance, lacking a little

'weight'. Stereo space and depth were very good, as were transparency, focus and dynamics. Whereas the '7 sounded remarkably similar in character, it delivered a significantly more solid image and sense of space, with all-round greater precision and control.

Conclusions

The *Motif 8* is an undoubted success in maintaining the essential character of the *Motif* sound at a significant reduction in cost. At the same time it sits a trifle uneasily in the marketplace, inasmuchas people prepared to pay £2,500 for a pre-amp are quite likely to be in a position to spend £4,000 — and are consequently better advised to go for the '7. This aside, the fine sound quality demands recommendation.



Disc input, RIAA equalisation accuracy

Test Results

Distortion

Total harmonic distortion,	20Hz	1kHz	20kHz
at rated power, CD input	–83dB	–83dB	–80dB

Intermodulation, 19/20kHz, rated power, aux input –71dB
Intermodulation, 19/20kHz, at 0dBW, disc (mm) –24dB
Intermodulation, 19/20kHz, at 0dBW, disc (mc) –30dB

Noise

Disc (mm) input (IHF, CCIR weighted) –72.0dB
Disc (mc) input (IHF, CCIR weighted) –64dB
Aux/CD input (IHF, CCIR weighted) –80dB
Residual, unweighted (volume control at min) –88dB
DC offset, pre-amp 0, 0mV

Input overload	20Hz	1kHz	20kHz
Disc (mm) input (IHF)	32dB	31dB	17.8dB
Disc (mc) input (IHF)*	31dB	30dB	20dB
Aux/CD input (IHF)	>20dB	>20dB	>20dB

Stereo separation

Disc input (mc)	64dB	66dB	38dB
CD input	88dB	63dB	37dB

Channel balance, disc, at 1kHz 0.04dB
Volume/balance tracking 0.02(0dB) 0.2dB(–20dB) 0.26dB(–60dB)

Input data	socket type	sensitivity	loading	
Disc (mm) input	phono	0.82mV	36kohms	120pF
Disc (mc) input*	phono	0.07mV		0.3nF
CD input	phono	41.5mV	20kohms	60nF

Output, pre-amp (tape) 6V, 130ohms
Disc equalisation error, 30Hz-15kHz +0, –0.18dB
Size (width, height, depth) 48×33×9.5cm
Typical price inc VAT £2,500
First reviewed: The Collection 1987

COPLAND

AUTOMATION SCIENCES CO, 20 LITTLE GADDESDEN, BERKHAMSTEAD, HERTS HP4 1PA.
·———TEL: (044284) 2786———·

The arrival of a valve amplifier combination from Denmark of all places is further evidence that enthusiasts throughout Europe are starting to get into small scale manufacture despite a much weaker tradition than the US or UK. The *Coplands* are priced at £589 for each bit, amounting to a substantial £1,178 for the complete system — on the high side for a modest 12W/channel rating!

The pre-amp is tersely simple, apart from the full width name '*Copland Tube Control Amplifier*'. The unit has a solid, quality feel, finished in matt black aluminium fabricated panels with a ventilated top panel, and has just three toggle switches for input selection, plus unlabelled volume and balance controls. The rear panel consists of phono sockets throughout (moving magnet matching only on the disc input), plus a pushbutton power on/off switch.

The similarly eponymous power amplifier is neat and quite compact with the usual ventilated grille over a basic metal chassis, the whole taking up less height than most valve devices. The output valves are four of the fairly small EL84 pentodes, with silicon-carbon high symmetry transformers.

LAB REPORT

The pre-amp uses a simple single board construction and has extensive track lengths. Using four selected double triodes, there is a regular main power supply and unregulated heaters. Components are of medium grade, and build is neat enough if a trifle microphonic, following traditional valve practice. Again based on a single board, the power amplifier has rather small output transformers (reflected in the rather weak LF power delivery). Output tubes are EL84s, construction is sound, with good service provisions using decent normal grade components — in some senses it is a little old-

fashioned.

Despite its very modest rating, the *Copland* struggled to meet 11dBW, the power ratings at high and low frequencies severely limited by harmonic distortion. Peak current delivery was very restricted, though the spectrogram for power modulation is not as bad as it looks, the most obvious lines being simple harmonic distortion.

Even at lower power levels, distortion results were not up to much. Noise levels were fine, but input overload margins and stereo separation were distinctly mediocre. Volume/balance tracking showed some room for improvement, but inputs should be compatible enough. The RIAA equalisation was reasonably flat, with a slight lower bass emphasis.

Sound Quality

Despite, and taking account of its limited output, the power amplifier was well liked, rating 'good' on audition. The sound was pleasant, easy and airy, slightly soft and slow but essentially musical. The stereo image was well defined with good focus and width. However, the pre-amp was a disappointment considering the price, rating only average. The sound was a little scrappy and brittle at high frequencies, and rather flat and lifeless elsewhere. Focus and depth were quite good, but the low bass sounded a little plodding.

Conclusions

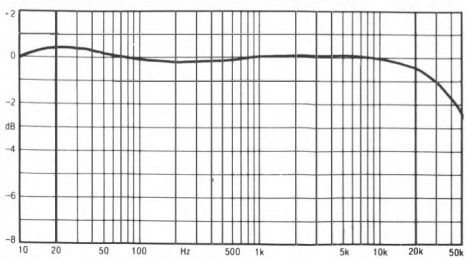
Though not without its attractive qualities — the power amplifier was particularly easy on the ear — the *Copland* pre- and power amplifiers do not really deliver the measured or subjective performance necessary to justify their highish UK prices.

Test measurements

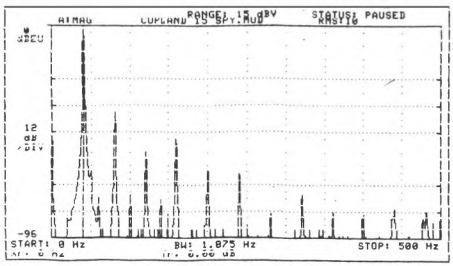
To show how well the amplifier sustains its 8ohm output into real loudspeaker loads, the level into 4ohms and 2ohms is given in dBW (where 0dB=1W), without adding 3dB or 6dB respectively, as in usual 'power' ratings.

Test Results

Power output			Integrated amplifier
Rated power into 8ohms, maker's spec			12W(=11dBW)
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	2.0dBW	11.2dBW	10.5dBW
Both channels, 4ohm load	0.4dBW	6.9dBW	3.5dBW
One channel, 2ohms, pulsed	–dBW	3.8dBW	–dBW
Instantaneous peak current		+3.4A	–3.3A
Distortion			
Total harmonic distortion,	20Hz	1kHz	20kHz
at clip power, aux/CD input	–40dB	–44dB	–44dB
Intermodulation, 19/20kHz, rated power, aux input			–52dB
Intermodulation, 19/20kHz, at 0dBW, disc (mm)			–38dB
Intermodulation, 19/20kHz, at 0dBW, disc (mc)			n/a dB
Noise			
Disc (mm) input (IHF, CCIR weighted)			–71dB
Disc (mc) input (IHF, CCIR weighted)			n/a dB
Aux/CD input (IHF, CCIR weighted)			–75dB
Residual, unweighted (volume control at min)			–81dB
DC output offset			left n/a mV, right n/a mV
DC offset, pre-amp			left n/a mV, right n/a mV
Input overload	20Hz	1kHz	20kHz
Disc (mm) input (IHF)	15dB	27dB	20dB
Disc (mc) input (IHF)*	n/a dB	n/a dB	n/a dB
Aux/CD input (IHF)	>20dB	>20dB	>20dB
Stereo separation			
Disc input (mm)	32dB	37dB	22dB
Aux input	39dB	38dB	19dB
Output impedance (damping)	0.22ohm	0.22ohm	0.41ohm
Channel balance, disc, at 1kHz			0.4dB
Volume/balance tracking	0dB	–20dB	–60dB
Aux input	0.0dB	0.65dB	3.9dB
Input data	socket type	sensitivity	loading
Disc (mm) input	Phono	0.73mV	46kohms 10pF
Disc (mc) input*	n/a	n/a mV	n/a kohms n/a pF
Aux/CD input	Phono	85mV	117kohms 60pF
Power amp	Phono	1,240mV	97kohms 40pF
Output, pre-amp (tape)			16.4V max, 1.7kohms
Disc equalisation error, 30Hz-15kHz			+0.4dB, –0.2dB
Size (width, height, depth)			42×12.5×29cm
Typical price inc VAT			£589,£589



Disc input. RIAA equalisation accuracy



Power supply rejection, 40Hz input

RECOMMENDED

CREEK 4040

CREEK AUDIO SYSTEMS, 2 BELLEVUE ROAD, FRIERN BARNET, LONDON N11 3ES.
TEL: 01-368 4425

Fully re-auditioned and partly re-tested for 1987, Creek's UK-built budget amplifier is specified at 35W (15.5dBW) per channel, and while features are fairly basic, it does provide tone controls as well as a headphone socket, not to mention a black wooden sleeve. Loudspeaker connection is via 4mm socket/binding posts, while the input connectors combine DIN sockets with a phono disc input.

The 4040's low-level stages use top quality integrated circuits, with the RIAA effected in two stages. The treble rolloff section is passive, with a separate switchable rumble filter to add the final low-frequency rolloff, this -3db at 45Hz.

LAB REPORT

The tone controls are incorporated in the feedback loop of the power amplifier section, this a high loop gain design. The strong negative feedback is necessary to reduce the otherwise high level of distortion that results from the use of an unbiased pure Class B output stage with, further assistance given by the Class A driver, which is run at higher than usual current.

Some weakness was exposed by the lab tests. The output specification was just met over the power bandwidth, 8ohms, one channel driven. The small power supply was reflected by the loss into 4ohm on continuous drive, but it made a good try at the 2ohm load on peaks, the level here falling by a reasonable 4.5dB below the 8ohm peak level. The peak current capacity was satisfactory at +10, −9A.

Since our previous review the harmonic and intermodulation distortions have improved markedly, at least partly redressing one of our earlier criticisms, though there is still room for improvement nevertheless. The RIAA equalisation continues to show a rather 'rollercoaster' profile, which will play some part in the subjective balance, while remaining within

+/−0.4dB limits.

Stereo separation was about average and channel balance good except at very low volume settings where a 5dB error appeared. Input sensitivities were rather low, particularly auxiliary, this measuring 70mV as opposed to the usual 20mV or so. Disc equalisation had significant error in the treble.

Sound Quality

The Creek proved a most controversial performer during the listening tests, splitting the panel between those who found its failings unacceptable and those who rated its strengths as more important than its limitations. Sonically it was rather coloured, but the slightly 'forward' midband showed fine focus and projection. The treble was rather grainy and coarse, but restrained in terms of the balance, while the bass had good 'life' if rather 'thickened' textures. Though short on transparency and stereo subtleties, there was a good sense of timing, 'speed' and integration which was found musically involving. Certainly it is rather different from the norm — something of an acquired taste perhaps?

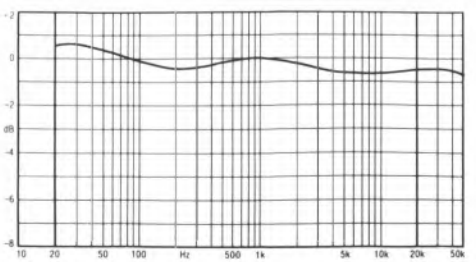
Conclusions

This model is difficult to sum up, as individual reactions varied significantly. Though the 'averaged' mark is sufficient to rate recommendation, our advice must certainly be to try it for yourself. Subjectives aside, it is encouraging to note the improvements in our measured findings this time around. Though still not a Creek strength, there are certainly now fewer grounds for criticism in this respect.

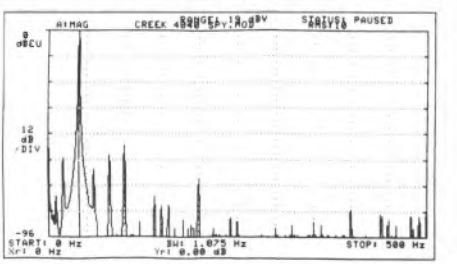
Test Results

Power output			Integrated amplifier
Rated power into 8ohms, maker's spec			35W(=15.5dBW)
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	15.5dBW	16.1dBW	16.0dBW
Both channels, 4ohm load	11.0dBW	13.9dBW	13.2dBW
One channel, 2ohms, pulsed	8.5dBW	12.0dBW	12.6dBW
Instantaneous peak current		+10A	−9A
Distortion			
Total harmonic distortion,	20Hz	1kHz	20kHz
at rated power, aux input	−60dB	−69dB	−51dB
Intermodulation, 19/20kHz, rated power, aux input			−57dB
Intermodulation, 19/20kHz, at 0dBW, disc (mm)			27dB
Noise			
Disc (mm) input (IHF, CCIR weighted)			−74dB
Aux/CD input (IHF, CCIR weighted)			−75dB
Residual, unweighted (volume control at min)			−61dB
DC output offset			2mV
Input overload	20Hz	1kHz	20kHz
Disc (mm) input (IHF)	23.6dB	22.9dB	−16.3dB
Aux/CD input (IHF)	>20dB	>20dB	>20dB
Stereo separation			
Disc input (mm)	69dB	−67dB	−43
Aux input	−65dB	−65dB	−40dB
Output impedance (damping)	0.03ohm	0.04ohm	0.09ohm
Channel balance, disc, at 1kHz			0.04dB
Volume/balance tracking	0dB	−20dB	−60dB
Aux input	0.6dB	0.2dB	5.1dB
Input data	socket type	sensitivity	loading
Disc (mm) input	Phono	0.47mV	47kohms 220pF
Aux input	DIN	70.4mV	54kohms −pF
Disc equalisation error, 30Hz-15kHz			+0.4dB, −0.4dB
Size (width, height, depth)			42×6×18cm
Typical price inc VAT			£145

Reassessed



Disc input. RIAA equalisation accuracy

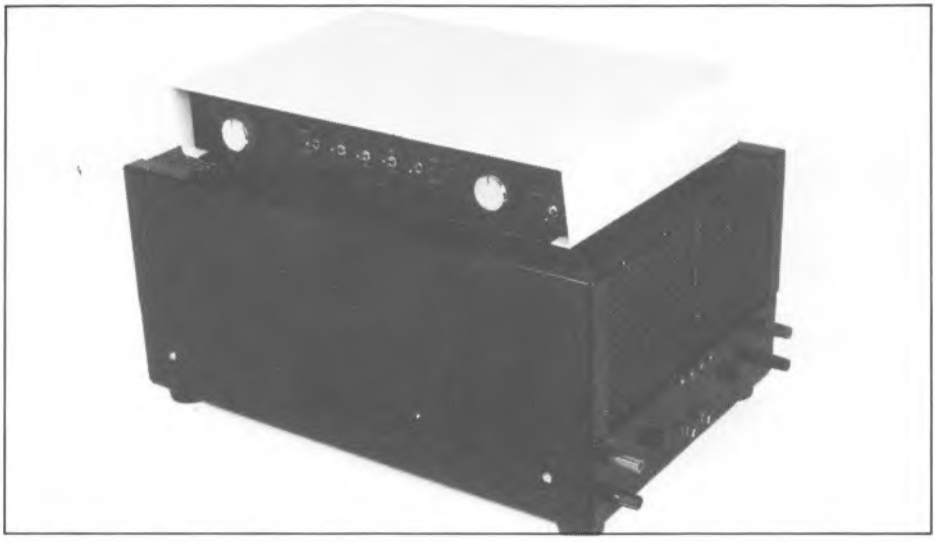


Power supply rejection, 40Hz input

RECOMMENDED

CROFT SUPER MICRO/SERIES IVS

CROFT ACOUSTICS, 15 HARRISON ROAD, ERDINGTON, BIRMINGHAM B24 9AB.
TEL: (021) 373 1442



It is arguably taking subjectivity too far to comment adversely upon the aesthetics — as distinct from the ergonomics — of a piece of hi-fi equipment, but adverse reaction to the *Super Micro*'s appearance was so universal that we feel bound to mention it at least. This pre-amp more closely resembles a rudimentary kit-build package of a decade or two ago than anything currently available, though that does not mean the performance or sound quality are in any way compromised (possibly the reverse), and certainly the £250 price is very modest. The basic configuration of this all-valve device is simplicity itself: it is a double-mono design; the only knobs are separate channel volume controls; simple toggle switches provide 'mute' plus separate input selection for each channel.

The £730 *Series IVS* power amplifier with which the *Super Micro* was tested is a much more impressive-looking beast — quite enormous in size compared to most others of a similar price, and as heavy as it looks. Inside the ventilated case valves glow invitingly, reflected in chrome-finished transformers.

LAB REPORT

The pre-amp has a unity gain line stage using cathode followers, so some lower output ancillaries like tuners and cassette decks may underdrive the system. Built as double mono, it uses high quality components and an unusually sophisticated high voltage regulator, with triode/pentode ECL85 and three successive stages of main reservoir capacitors, plus regulated heaters. The substantially built 'ultralinear' power amplifier has generous transformers and reservoirs, with valve regulators and EL34 output tubes. Construction uses single strand PTFE coated hardwiring throughout, with no printed circuit boards. Craftsman built, greater care could be taken over the insulation of some of the internal wiring.

Though it met the modest specification in the midband into 8ohms, the usual valve power amplifier characteristics of limited power bandwidth and restricted low impedance drive are inescapable here, though the +/−5.5A peak

current value is reasonably healthy. The power supply modulation spectrum consists mainly of simple harmonic distortion — spurious mains components are under good control.

Harmonic distortion was very ordinary, even at lower power levels, but intermodulation was distinctly poor, as was the high frequency input overload margin on the disc input. Noise was fine, and stereo separation quite respectable, while separate channel volume controls render tracking checks irrelevant. The RIAA disc input equalisation was reasonably even through the audio band, with no low frequency limiting and a slightly 'warm' upper bass region, but the rising characteristic at ultrasonic frequencies looks a little alarming, and could give unpredictable results with, say, high output moving-coil cartridges. Sensitivity is low on both disc and auxiliary inputs, so some care needs to be taken matching ancillaries.

Sound Quality

Despite the measurement characteristics, the Croft items rated 'good plus' on sound quality. This was particularly liked on the disc input for its fine focus, wide staging and good 'foot-tapping' speed. The balance was a little forward and bright. CD reproduction proved a trifle disappointing in comparison, sounding rather more 'shut in'. Once a first-sample stability problem had been sorted out, the power amplifier sounded lively and 'fast', with good space and depth, and some decent scale and 'power', coupled with a pleasing classical tonal quality.

Conclusions

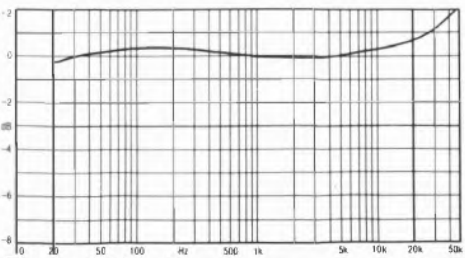
The oddly-styled *Super Micro* demands recommendation for a sound quality which is exceptional for the price, but the measurements suggest that prospective owners should try it in their system prior to purchase, and the lack of moving-coil facilities is an obvious handicap. The power amplifier also sounds very good and is recommended.

Test measurements

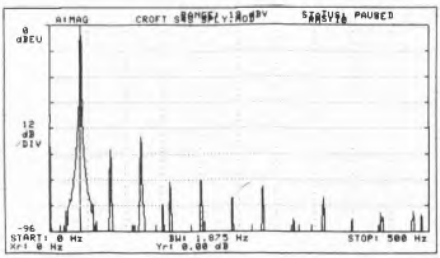
To show how well the amplifier sustains its 8ohm output into real loudspeaker loads, the level into 4ohms and 2ohms is given in dBW (where 0dB=1W), without adding 3dB or 6dB respectively, as in usual 'power' ratings.

Test Results

Power output			Integrated amplifier
Rated power into 8ohms, maker's spec			40W(=16dBW)
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	11.5dBW	16.4dBW	10.2dBW
Both channels, 4ohm load	11.1dBW	12.4dBW	2.6dBW
One channel, 2ohms, pulsed	–dBW	10.2dBW	–dBW
Instantaneous peak current		+5.5A	–5.5A
Distortion			
Total harmonic distortion,	20Hz	1kHz	20kHz
at rated power, aux input	–48dB	–52dB	–42dB
Intermodulation, 19/20kHz, rated power, aux input			–25dB
Intermodulation, 19/20kHz, at 0dBW, disc (mm)			–11dB
Noise			
Disc (mm) input (IHF, CCIR weighted)			–76dB
Aux/CD input (IHF, CCIR weighted)			–90dB
Residual, unweighted (volume control at min)			–90dB
DC output offset			left –mV, right mV
DC offset, pre-amp			left mV, right mV
Input overload	20Hz	1kHz	20kHz
Disc (mm) input (IHF)	24.5dB	24.3dB	4.9dB
Aux/CD input (IHF)	>20dB	>20dB	>20dB
Stereo separation			
Disc input (mm)	64dB	59dB	34dB
Aux/CD input	97dB	88dB	60dB
Output impedance (damping)	0.93ohm	0.90ohm	0.95ohm
Channel balance, disc, at 1kHz			0.1dB
Volume/balance tracking	0dB	–20dB	–60dB
Aux input	0.03dB	n/adB	n/adB
Input data	socket type	sensitivity	loading
Disc (mm) input	Phono	1.19mV	47kohms 110pF
Aux/CD input	Phono	555mV	100kohms 45pF
Power amp	to clipping	345mV	100kohms 90pF
Output, pre-amp (tape)		20.5V max,	480ohms
Disc equalisation error, 30Hz-15kHz		+0.42dB,	–0.10dB
Size (width, height, depth)		Pre-amp 38×7.5×26cm	
Typical price inc VAT		Pre £250; Power £730	



Disc input, RIAA equalisation accuracy



Power supply rejection, 40Hz input

RECOMMENDED

DELTEC

DELTEC LTD, 16 CLAUDE ROAD, ROATH, CARDIFF CF2 3PZ.
TEL: (0222) 482818

Though Deltec are still a tiny operation, one would not have guessed it from the quality of construction and finish evident in this new high performance power amplifier, which costs nearly £2,000 for a modest 80W/channel rating. It is a slim unit, though very deep and heavy enough to need a substantial shelf. The front panel is diecast and the sides rounded off in a generally successful attempt at styling, while the battleship grey finish lends a further distinctive touch.

Internal constructional details are to the highest standards, with no expense spared on components. The substantial pricetag is to some extent justified by the high frequency grade printed circuit boards, heavy RF power supply filtering, and nice touches like the Vishay bulk foil resistors which define the feedback performance.

Regulated power supplies are driven from a single large toroid. Star grounding is adopted and close coupling maintained to the complementary bi-polar output stage, which includes extra devices that impart a 'pseudo class A' characteristic, keeping the transistors permanently on, but with the heat dissipation of a normal class A/B design.

The input is balanced to reduce ground noise, and very heavy special loudspeaker cables are used. Cannon sockets are used in non-standard configurations. An interesting design 'wrinkle' is a 'four-wire' loudspeaker connection which extends the feedback loop around the loudspeaker cables, so neutralising their influence. The unit was supplied with made up leads which tightly packed the four conductors, and our suspicions were aroused by certain oddities in the sound quality as to whether the main signal in the wire could be directly inducing signals within the feedback wire resulting in misleading error correction. Deltec checked this and con-

firmed this finding, so the feedback wires have now been separated from the other two.

Lab Report

The power output met specifications precisely, and showed that delivery was very well maintained into lower impedances, the unit delivering 19A peak current symmetrically. The fact that it was impossible to draw additional 'burst' power is merely evidence of the heavy power supply regulation, rendering further protection circuitry unnecessary. All the distortion, noise, channel separation and balance measurements were fine. Supply modulation and distortion residuals were both very low, though there was a slight hum from the transformer and the DC offset showed a mild drift of around +/−10mV. Absolute phase is inverted when signal is passed through the amplifier, a factor that can influence subjective comparisons.

Sound Quality

Despite the 'odd' quality encountered during the initial listening sessions due to the above-mentioned feedback/wire induction problems, the Deltec still managed to rate 'very good' overall, and the sound was further improved after the loudspeaker wires were changed. The sound gave the typical characteristics of a top quality transistor power amp — essentially 'fast', with tight 'dry' bass and excellent midrange transient resolution, dynamics and focus. Extreme treble was very sweet and unexaggerated, but the overall balance was considered a touch 'clinical'. Control was exceptional — perhaps too much so for some palates.

Conclusions

Once the four-wire configuration had been sorted out, the Deltec came through as an exceptionally fast, clean-sounding amplifier — distinctly solid state in character but fundamentally accurate and quite transparent. Engineering and construction quality is truly exceptional throughout, but this is inevitably reflected in a price which is on the high side, bearing in mind the unexceptional power rating. Nevertheless the subjective rating alone deserves recommendation.

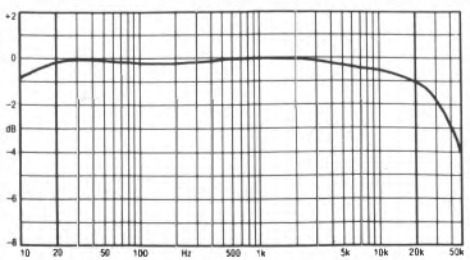
Test measurements

To show how well the amplifier sustains its 8ohm output into real loudspeaker loads, the level into 4ohms and 2ohms is given in dBW (where 0dB=1W), without adding 3dB or 6dB respectively, as in usual 'power' ratings.

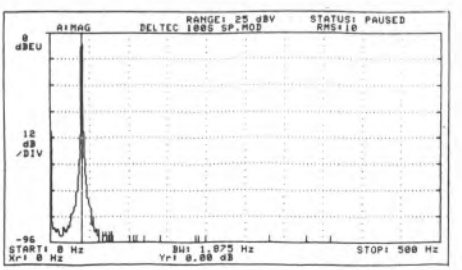
Test Results

Power output			Integrated amplifier
Rated power into 8ohms, maker's spec			80W(18.5dBW)
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	18.5dBW	18.5dBW	18.4dBW
Both channels, 4ohm load	18.3dBW	18.3dBW	18.2dBW
One channel, 2ohms, pulsed	−dBW	16.7dBW	−dBW
Instantaneous peak current		±19A	
Distortion			
Total harmonic distortion,	20Hz	1kHz	20kHz
at rated power, aux input	−96dB	−96dB	−84dB
Intermodulation, 19/20kHz, rated power, aux input			−94dB
Intermodulation, 19/20kHz, at 0dBW, disc (mm)			−94dB
Noise 'A' wtd.	−87dB(0dBW), −105dB(full output)		
DC output offset		left <90mV, right <70mV	
Output impedance (damping)	0.003ohm	0.003ohm	0.03ohm
Channel balance, disc, at 1kHz			0.02dB
Input cannon	150mV	9.8kohm	0.8nF
Size (width, height, depth)			34×12×46cm
Typical price inc VAT			£1900

First reviewed: The Collection 1987



Disc input. RIAA equalisation accuracy

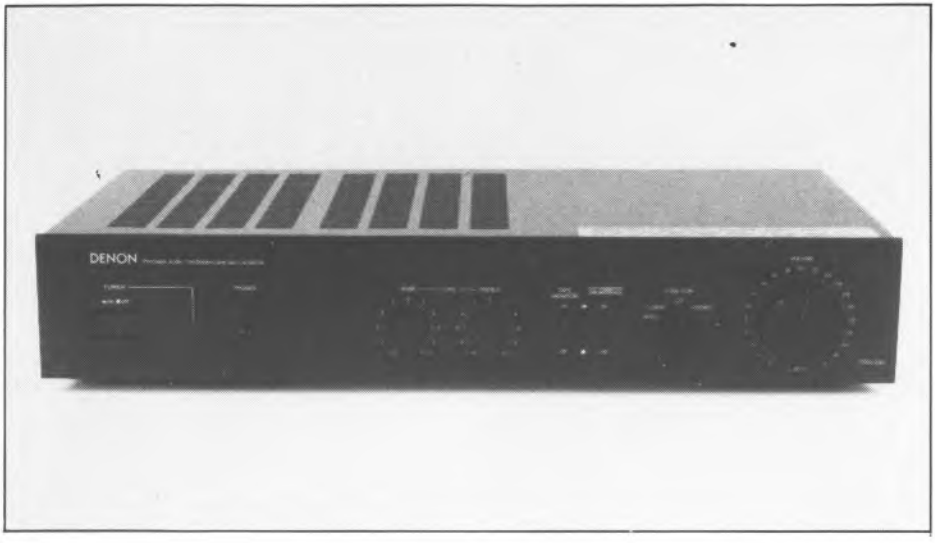


Power supply rejection, 40Hz input

BEST BUY

DENON PMA-250

HAYDEN LABORATORIES, HAYDEN HOUSE, CHILTERN HILL, CHALFONT ST PETER, BUCKS
TEL: (0753) 888447



Building upon the undoubted success of their 'budget' *707* model, Denon have moved a little upmarket to the next convenient price point with the £120 *PMA-250*. Rated at a modest 25W/channel, this offers a little more 'under the skin' engineering in an even simpler 'straight line' design which is clearly intended to accept some of the compromises necessary to achieve good sound quality. For example, there is no switching in the output to the loudspeakers, so headphone listeners will have to unplug the speakers (at the amplifier and with a little care please) if they want to avoid disturbing others.

Tone controls are still fitted, and can only be bypassed when using the CD input, but they remain the only unnecessary frills. The rest of the front panel offers only input switching (MM only disc), tape monitor and 'CD direct' push-buttons, plus the headphone jack, volume control and on/off switch. The rear panel uses phono inputs throughout, with substantial binding posts providing high quality connection for a single pair of loudspeakers. Internally there is evidence of care and expense taken in selecting high quality components for enhanced sound quality, the sort of approach normally only adopted by smaller, more specialist manufacturers.

LAB REPORT

Technically this amplifier has a conventional class A/B direct-coupled complementary bi-polar output, with IC driver stage. It is clearly derived from the *707*, but has an improved power supply and uses more carefully selected high quality components and has a simpler, more direct signal path. Internally it is built to a very high standard, reflecting the external finish in this respect.

The *'250* comfortably beat its admittedly modest power rating, the power delivery being reasonably well maintained into lower impedances, though the ultimate current capability is adequate rather than generous. Distortion was low, and signal-to-noise ratios were satisfactory. Stereo separation and input overload margins

both measured very well.

Though input sensitivities are sensibly chosen, note that the disc input already has 250pF capacitance loading: add another 100pF or so for the leadout wires and the total might be on the high side for ideal matching with the odd cartridge, though most will match fine. The power supply modulation test gave a decent enough result, mains harmonics being below signal harmonics. There is a little room for improvement in volume control tracking, indicative of component tolerancing perhaps. A similar factor may explain the RIAA equalisation: the gentle undulation here will probably play a minor role in determining the overall character of the sound from disc. There is no evidence of bandlimiting on the disc input, so results may vary somewhat with different turntable systems.

Sound Quality

The '250 was rated comfortably above average, good for the price, and towards the top of an increasingly varied and extensive range of 'budget plus' integrated amplifiers from both UK and Far Eastern sources. The sound was distinctively more 'open' than that found with more complex designs, with some attempt at depth portrayal and proper stereo staging, albeit at a sub-audiophile level. Dynamics were quite lively with an attractively 'bouncy' character, while remaining generally tidy and coherent, though the sound lacked a little 'sparkle' and any real sense of 'scale'.

Conclusions

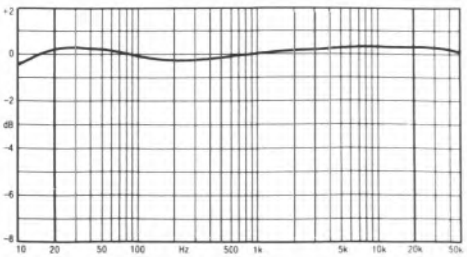
Improving significantly on the sound quality of its '707 predecessor, though to some extent reflecting the steady forward progress of the market as a whole, the '250 turns out to be a well balanced package, sensibly conceived and attractively priced. At the £120 stated typical price, it just manages a Best Buy rating, successfully creating a blend with broad appeal across a wide range of tastes.

Test measurements

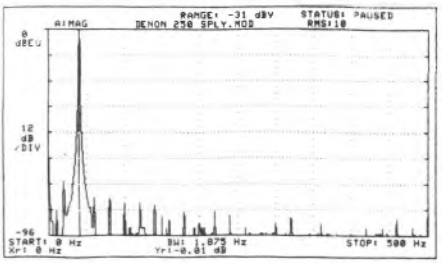
To show how well the amplifier sustains its 8ohm output into real loudspeaker loads, the level into 4ohms and 2ohms is given in dBW (where 0dB= 1W), without adding 3dB or 6dB respectively, as in usual 'power' ratings.

Test Results

Power output			Integrated amplifier
Rated power into 8ohms, maker's spec			25W(=14dBW)
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	16.5dBW	16.6dBW	16.6dBW
Both channels, 4ohm load	13.3dBW	13.8dBW	13.7dBW
One channel, 2ohms, pulsed	–dBW	13.5dBW	–dBW
Instantaneous peak current		+9.5A	–9.5A
Distortion			
Total harmonic distortion,	20Hz	1kHz	20kHz
at rated power, aux input	–83dB	–87dB	–68dB
Intermodulation, 19/20kHz, rated power, aux input			–101dB
Intermodulation, 19/20kHz, at 0dBW, disc (mm)			–75dB
Noise			
Disc (mm) input (IHF, CCIR weighted)			–68dB
Aux/CD input (IHF, CCIR weighted)			–75dB
Residual, unweighted (volume control at min)			–79dB
DC output offset		left –19mV, right –18mV	
Input overload	20Hz	1kHz	20kHz
Disc (mm) input (IHF)	32.5dB	31.9dB	30.8dB
Aux/CD input (IHF)	>20dB	>20dB	>20dB
Stereo separation			
Disc input (mm)	69dB	54dB	61dB
Aux input	73dB	54dB	61dB
Output impedance (damping)	0.24ohm	0.24ohm	0.24ohm
Channel balance, disc, at 1kHz			0.02dB
Volume/balance tracking	0dB	–20dB	–60dB
Aux input	0.06dB	0.39dB	3.94dB
Input data	socket type	sensitivity	loading
Disc (mm) input	Phono	0.56mV	47kohms 250pF
Aux input	Phono	32.3mV	90kohms 40pF
Output, pre-amp (tape)			10.9V max, 100ohms
Disc equalisation error, 30Hz-15kHz			+0.32dB, –0.33dB
Size (width, height, depth)			43.5×8.5×26cm
Typical price inc VAT			£120



Disc input. RIAA equalisation accuracy



Power supply rejection, 40Hz input

conrad-johnson

The fine art of music

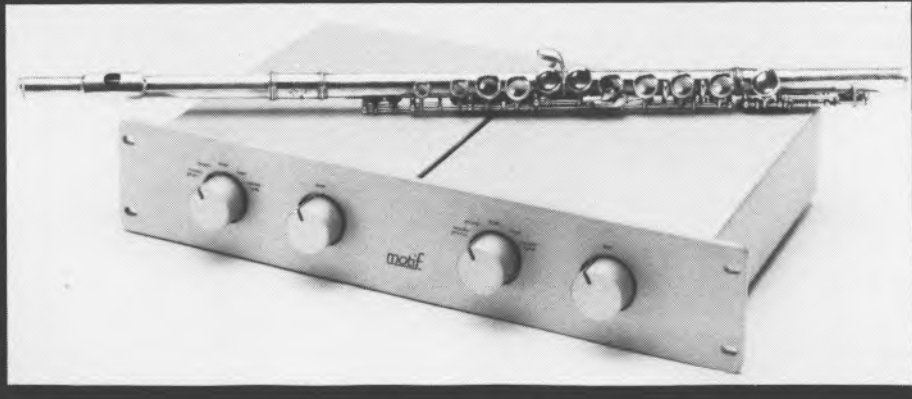
Conrad-johnson are world leaders in the design of audio amplifiers and strive to make audio products that are uncompromisingly musical. CJ amplifiers are reknowned for their superb reproduction and their ability to recreate the emotional experience of a live performance.

Conrad-johnson are usually associated with their outstanding valve amplifiers. They have recently introduced a range of state-of-the-art solid-state FET amplifiers called MOTIF which have received unanimous acclaim:

". . . a major achievement . . . successfully taking on the finest competition in its price range."
Hi-Fi News & Record Review.

". . . will redefine the way we think about solid-state preamplifiers, and more significantly, help us push forward into a new audio frontier . . ."
The Absolute Sound:

Conrad-johnson do not simply strive to make some of the best sounding and most expensive amplifiers in the world, they are also committed to producing "affordable excellence". The PV7 was designed to be a musically accurate valve preamplifier at an affordable price. It is a dramatic demonstration of the excellent results attainable with simple circuits. At its price the PV7 has no peer in terms of the sheer musical enjoyment it delivers.



ASC

Automation Sciences Company,
20, Little Gaddesden,
Berkhamsted, Herts. HP4 1PA
Tel: (044 284) 2786

RECOMMENDED

EXPOSURE V11/V111

EXPOSURE ELECTRONICS, THE WORKS, 59 NORTH STREET, PORTSLADE, SUSSEX BN4 1DH.
TEL: (0273) 423877

The *VII* and *VIII* type numbers are evidence enough that this manufacturer has been established for many years, though they have tended to keep a low profile and this is the first occasion they have appeared in *Hi-Fi Choice*. Both units of this pre-/power amplifier combination cost around £300, and are compact, neat and finished in matt black. A 'wrap-over' case construction breaks the rectangular monotony, and bold gold legends provide a further welcome distinctive touch.

The pre-amp is significantly narrower than the power unit, and unusually light in weight, as it has no power supply of its own — a modus operandum which allows a range of different higher quality power supplies to be used with the same basic circuitry. The cheapest version tested here takes its power from the transformer in the power amplifier (properly regulated of course), but an upgrade path to improved performance is available by adding a substantial outboard pre-amp power supply such as the *VI*, either at initial purchase or a later stage.

The pre-amp is a simple 'straight line' design — Exposure were one of the first to abandon tone controls — with two large and two smaller knobs. The former provide input selection and 'master gain', while the latter are separate volume controls for each channel, allowing balance adjustment. Power supply LEDs show when the unit is active, while the rear panel consists of phono sockets for inputs and outputs, a toggle switch to select between moving magnet and moving-coil disc sources, and a special 270° 5-pin DIN socket for connecting to the power amplifier or other power supply. The power amplifier has a matching socket for the power supply, phono inputs, plus 4mm sockets for loudspeaker connection.

LAB REPORT

The pre-amp has a very neat double mono build, with nicely laid out single channel PCBs with direct signal paths and generally good quality components. It uses all discrete bi-polar circuitry with separate regulated power supplies for stages and channels, the moving-coil input using a traditional, multiple parallel transistor array. The power amplifier has 10,000 μF supply reservoirs and a shared sizeable toroid with good regulation characteristics, including a regulated pre-amp supply. It uses discrete bi-polar output devices with good layout and high quality build.

The output comfortably met the modest specification with good bandwidth measured with one channel into 8ohms, the 2.5dB drop into 4ohms being partly due to the shared supply. The peak current of 10A is on the low side, but practical load tolerance is good. The power

supply modulation spectrogram could have been cleaner, with the 100Hz component at −72dB.

Distortion levels were nothing special, with the m-c disc input intermodulation standing out a little. Noise was fine, and both stereo separation and input overload margins were excellent. Channel balance and volume tracking both show good quality control, and input sensitivites are generous enough to match any ancillaries. Note, however, the moving magnet disc input capacitance is rather high for some cartridge types: a prior trial is advised here. The RIAA m-c equalisation curve shows a smooth trend with sensible bandlimiting, but a characteristic which will give a slightly 'bright' balance.

Sound Quality

The Exposures rated good overall, with a notably 'punchy' and dynamic character which drew somewhat different reactions from individual listeners. Though the two components will almost certainly be used together, there was a distinct preference for the power over the pre-amplifier when auditioned separately, creating a good impression of 'speed' and power. Treble was well controlled, but slightly coarse and 'grainy' in character — a trifle 'fierce' and with a mild loss of air and transparency. Focus and vocal projection were good, but depth and stereo precision were considered about average.

Conclusions

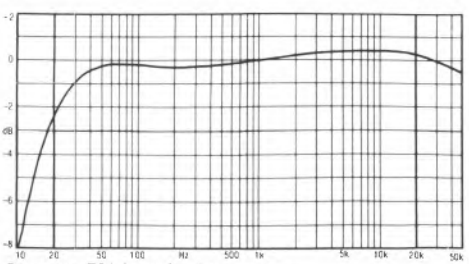
The *VIII* power amplifier is a convincing all round performer with decent lab performance, fine build and a sound quality that deserves recommendation. The pre-amp was a little more controversial, but offered fine construction and a decent moving-coil stage, plus various power supply options for future upgrading. Personal audition in a system context is recommended.

Test measurements

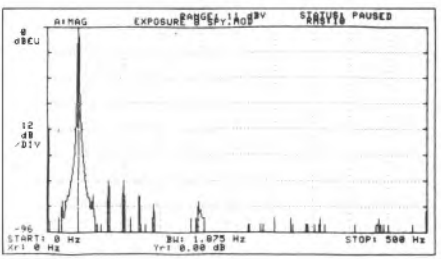
To show how well the amplifier sustains its 8ohm output into real loudspeaker loads, the level into 4ohms and 2ohms is given in dBW (where 0dB=1W), without adding 3dB or 6dB respectively, as in usual 'power' ratings.

Test Results

Power output			Integrated amplifier
Rated power into 8ohms, maker's spec			50W(=17dBW)
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	17.8dBW	18.0dBW	17.7dBW
Both channels, 4ohm load	14.9dBW	15.5dBW	15.2dBW
One channel, 2ohms, pulsed	−dBW	14.1dBW	−dBW
Instantaneous peak current		+10.0A	−10.0A
Distortion			
Total harmonic distortion,	20Hz	1kHz	20kHz
at rated power, aux input	−87.0dB	−68.0dB	−63.0dB
Intermodulation, 19/20kHz, rated power, aux input			−67.0dB
Intermodulation, 19/20kHz, at 0dBW, disc (mm)			−71.0dB
Intermodulation, 19/20kHz, at 0dBW, disc (mc)			−56.0dB
Noise			
Disc (mm) input (IHF, CCIR weighted)			−71.0dB
Disc (mc) input (IHF, CCIR weighted)			65.0dB
Aux/CD input (IHF, CCIR weighted)			−79.0dB
Residual, unweighted (volume control at min)			−86.0dB
DC output offset		left −11mV, right +8mV	
DC offset, pre-amp		left 0mV, right 0mV	
Input overload	20Hz	1kHz	20kHz
Disc (mm) input (IHF)	40.3dB	38.2dB	37.4dB
Disc (mc) input (IHF)*	37.0dB	34.1dB	39.9dB
Aux/CD input (IHF)	>20dB	>20dB	>20dB
Stereo separation			
Disc input (mm)	79.0dB	80.0dB	60.0dB
Aux input	80.0dB	81.0dB	60.0dB
Output impedance (damping)	0.27ohm	0.34ohm	0.28ohm
Channel balance, disc, at 1kHz			0.08dB
Volume/balance tracking	0dB	−20dB	−60dB
Aux input	0.02dB	0.04dB	0.16dB
Input data	socket type	sensitivity	loading
Disc (mm) input	Phono	1.05mV	46kohms 500pF
Disc (mc) input*	Phono	0.064mV	400kohms 100pF
Aux input	Phono	34.0mV	7.0kohms 265pF
Power amp	Phono	1,500mV	18.0kohms 520pF
Output, pre-amp (tape)			12.8V max, 5ohms
Disc equalisation error, 30Hz-15kHz			+0.36dB, −0.85dB
Size (width, height, depth)		(25×7.5×27) + (34.5×9×27)cm	
Typical price inc VAT			£316, £309



Disc input. RIAA equalisation accuracy



Power supply rejection, 40Hz input

HARMAN KARDON 655

HARMAN (AUDIO) UK LTD, MILL STREET, SLOUGH, BERKS SL2 DD.
TEL: (0753) 76911

Available in either black or 'champagne' finish, the '655 is a large full-featured £350 integrated amplifier of exceptional finish and presentation. Formally rated at 60W, it has substantial reserve current capability, and special phase compensation circuitry is also used. Developed from a range which was originally conceived by Matti Otala in conjunction with HK's US engineers, it is in fact manufactured in Japan.

The tone control flexibility is enhanced by alternative turnover frequencies and the provision of a bypass switch. The '655 can accept either moving-coil or moving magnet cartridges, and the latter's responses may be 'fine-tuned' by four different input capacitance values selected from the front panel. A complex collection of rotary switches select input, output to tape, tape monitoring, and speaker selection, while additional pushbuttons operate MM/MC, mono/stereo, high and low filters, 'loudness' contour, and pre-/power separation. Finish and build quality is to the highest standards.

LAB REPORT

The elaborate construction includes an encapsulated moving-coil head amp. Separate channels of discrete circuitry have individual power regulation for RIAA and moving-coil stages. The large transformer has dual secondaries, with good recovery time for this power supply. The overall layout is tidy but over-complicated with four separate boards and complex interconnect harnesses. Good quality components are used, with evidence of careful design and assembly.

The '655 delivered ample power into all loads, with fine bandwidth and quite exceptional peak current capabilities. The power supply modulation spectrogram is reasonably clean, with some harmonic distortion visible but very low

mains harmonics.

The distortion results were generally good nonetheless, though the intermodulation figure for the moving-coil input was significantly out of step. Noise figures are all low, and overload margins impressively large. Inputs sensitivities suggest fine compatibility, including the variable capacitance loading for the disc input. The RIAA equalisation curve shows some gentle changes in direction, but is basically quite flat overall. DC offsets are a little larger than average, and the low level volume/balance tracking and disc channel balance could both have been closer toleranced.

Sound Quality

Rating solidly above average, the '655 goes some way towards justifying its above average price, though it is also true that it is not a subjective class leader. The firm, lively bass was well liked, showing good control and 'speed', with plenty of 'welly' and power. However, high frequencies attracted some criticism for a degree of harshness and brightness, leading to a well-focused but slightly untidy sound overall. Stereo imagery had quite good resolution and managed to portray a fair amount of depth and space. Good on details, the '655 didn't quite manage to pull everything together to create a properly integrated whole.

Conclusions

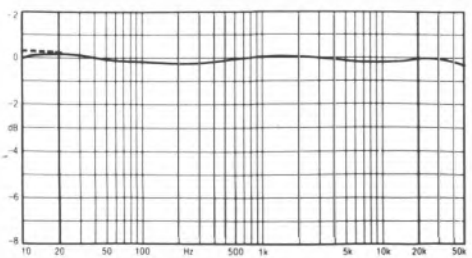
In many ways a fine amplifier of exceptional finish, good power delivery and high quality engineering, the '655 ultimately seems to be a victim of inherent constructional complexity, as this appears to be the most likely constraint upon the sound quality. It certainly performed respectably enough to merit consideration, but is a little on the expensive side for formal recommendation.

Test measurements

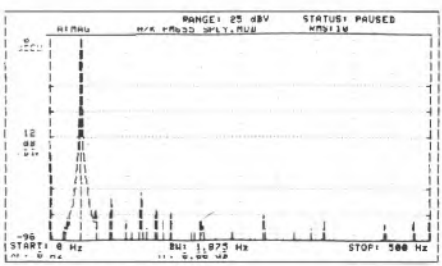
To show how well the amplifier sustains its 8ohm output into real loudspeaker loads, the level into 4ohms and 2ohms is given in dBW (where 0dB=1W), without adding 3dB or 6dB respectively, as in usual 'power' ratings.

Test Results

Power output			Integrated amplifier
Rated power into 8ohms, maker's spec			60W(=18dBW)
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	19.1dBW	19.6dBW	19.3dBW
Both channels, 4ohm load	17.1dBW	18.1dBW	17.9dBW
One channel, 2ohms, pulsed	–dBW	18.0dBW	–dBW
Instantaneous peak current		+40.0A	–40.0A
Distortion			
Total harmonic distortion,	20Hz	1kHz	20kHz
at rated power, aux input	–74.0dB	–81.0dB	–72.0dB
Intermodulation, 19/20kHz, rated power, aux input			–85.0dB
Intermodulation, 19/20kHz, at 0dBW, disc (mm)			–87.0dB
Intermodulation, 19/20kHz, at 0dBW, disc (mc)			–54.0dB
Noise			
Disc (mm) input (IHF, CCIR weighted)			–73.0dB
Disc (mc) input (IHF, CCIR weighted)			–74.0dB
Aux/CD input (IHF, CCIR weighted)			–71.0dB
Residual, unweighted (volume control at min)			–79.0dB
DC output offset		left +42mV, right +42mV	
Input overload	20Hz	1kHz	20kHz
Disc (mm) input (IHF)	33.7dB	33.2dB	31.2dB
Disc (mc) input (IHF)*	29.6dB	49.3dB	48.0dB
Aux/CD input (IHF)	>20dB	>20dB	>20dB
Stereo separation			
Disc input (mc)	60.0dB	59.0dB	39.0dB
Aux input	75.0dB	69.0dB	42.0dB
Output impedance (damping)	0.11ohm	0.11ohm	0.12ohm
Channel balance, disc, at 1kHz			0.52dB
Volume/balance tracking	0dB	–20dB	–60dB
Aux input	0.06dB	0.23dB	1.4dB
Input data	socket type	sensitivity	loading
Disc (mm) input	Phono	0.3mV	45kohms 160pF (var)
Disc (mc) input*	Phono	0.019mV	57kohms n/a pF
Aux input	Phono	17.3mV	n/a kohms n/a pF
Power amp	Phono	107.0mV	22kohms 575pF
Output, pre-amp (tape)			14.4V max, 650ohms
Disc equalisation error, 30Hz-15kHz			+0.14dB –0.33dB
Size (width, height, depth)			44×12.5×40cm
Typical price inc VAT			£350



Disc input, RIAA equalisation accuracy



Power supply rejection, 40Hz input

JVC AX-22

JVC (UK) LTD, 12 PRIESTLEY WAY, ELDON WALL TRADING ESTATE, STAPLES CORNER, LONDON, NW2 7AF. TEL: 01-450 3280

Complete with a flashing light 'power' meter, the *AX-22* is the larger of a pair of compact integrated budget JVC amplifiers. Rated at a generous 55W considering its £120 price tag, the facilities are quite comprehensive, with bass and treble controls operated by sliders beneath the meters, balance by a slider beneath the volume control.

Input and tape monitoring is selected from a row of four main pushbuttons, and three smaller buttons choose between two pairs of loudspeakers (connected in series only, so of little interest to those concerned with sound quality) and 'loudness' compensation, while the on/off switch and headphone jack complete the front panel complement. The rear panel has phono sockets only, alongside the spring-loaded speaker terminals. The disc input covers moving magnet type cartridges only, and there is no provision for tone defeat.

LAB REPORT

Essentially a single-PCB design with a few controls on subsidiary boards, this amplifier has a large transformer but smallish reservoir capacitors and no real evidence of serious audiophile intent in the choice of components. It uses a stereo thick film hybrid output module, and dual IC disc input, with a generally tidy layout which is quite complicated nonetheless.

Comfortably meeting, indeed slightly exceeding its rated power into 8ohms, the '22 showed a little constriction into lower impedances, with some distortion rise at low frequencies, indicating that it is more suited to higher impedance loudspeakers. Harmonic distortion measurements were significantly worse than usual — this doesn't prove anything in itself, but is usually an indication of some sort of stress in a circuit configuration of this kind.

Input overload margins and stereo separation were reasonable enough in themselves, but again somewhat below par compared with others. Another limitation may be seen in the power supply modulation spectrum, which shows significant breakthrough of harmonics suggesting inadequate decoupling and/or reservoir capacity.

The RIAA disc equalisation curve was fine, closely bandlimited at high frequencies.

Sound Quality

Returning a determinedly below average rating, the *AX22* did not raise much enthusiasm amongst the panel. The sound had a basically attractive 'bounce', but lacked much of the subtlety expected in the specialist sector these days. Poor focus and detail led to indifferent stereo imagery and coarsened tone colours. An exaggeration of disc surface noise, plus a serious lack of 'scale' and 'authority' results in a sound that is aptly enough described as 'cheap and cheerful'.

Conclusions

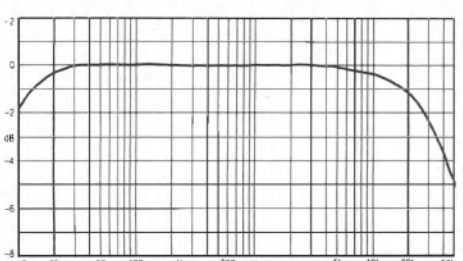
This is an honest enough amplifier in many ways, but it is serving a market that buys on features, appearance and specification rather than sound quality. The 8ohm power rating is higher than many immediate competitors, but current delivery is no greater, and some weakness showed up in the power supply measurement and on basic harmonic distortions. What would probably have passed muster a year or three ago is now sounding increasingly dated compared with many more sound quality oriented alternatives.

Test measurements

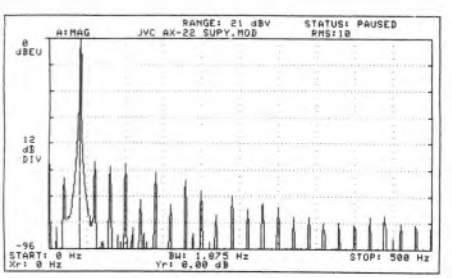
To show how well the amplifier sustains its 8ohm output into real loudspeaker loads, the level into 4ohms and 2ohms is given in dBW (where 0dB=1W), without adding 3dB or 6dB respectively, as in usual 'power' ratings.

Test Results

	Integrated amplifier		
Power output			
Rated power into 8ohms, maker's spec	55W (=17dBW)		
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	17.6dBW	18.5dBW	18.2dBW
Both channels, 4ohm load	13.6dBW	14.9dBW	14.7dBW
One channel, 2ohms, pulsed	–dBW	13.7dBW	–dBW
Instantaneous peak current		+12A,	–12A
Distortion			
Total harmonic distortion,	20Hz	1kHz	20kHz
at rated power, aux input	–42dB	–60dB	–47dB
Intermodulation, 19/20kHz, rated power, aux input			–73dB
Intermodulation, 19/20kHz, at 0dBW, disc (mm)			–66dB
Noise			
Disc (mm) input (IHF, CCIR weighted)			–63dB
Aux/CD input (IHF, CCIR weighted)			–65dB
Residual, unweighted (volume control at min)			–81dB
DC output offset		left –7mV, right –6mV	
Input overload	20Hz	1kHz	20kHz
Disc (mm) input (IHF)	29.6dB	28.8dB	28.2dB
Aux/CD input (IHF)	>20dB	>20dB	>20dB
Stereo separation			
Disc input (mm)	57dB	47dB	24dB
Aux input	55dB	48dB	25dB
Output impedance (damping)	0.19ohm	0.2ohm	0.22ohm
Channel balance, disc, at 1kHz			0.5dB
Volume/balance tracking			
Aux input	0dB, 0.1dB; –20dB, 0.2dB; –60dB, 0.52dB		
Input data	socket type	sensitivity	loading
Disc (mm) input	Phono	0.34mV	48kohms 130pF
Aux input	Phono	21.9mV	6.5kohms 80pF
Output, pre-amp (tape)		8.4V max,	470ohms
Disc equalisation error, 30Hz-15kHz		+0.16dB,	–0.7dB
Size (width, height, depth)		43.5×9×21.5cm	
Typical price inc VAT			£119



Disc input, RIAA equalisation accuracy



Power supply rejection, 40Hz input

RECOMMENDED

KENWOOD KA-550

·TRIO KENWOOD UK LTD, 17 BRISTOL ROAD, METROPOLITAN CENTRE, GREENFORD,
·———MIDDX UB6 8UP. TEL: 01-575 6030———·

Curiously, only Japan and the UK used the Trio brand name on this company's hi-fi equipment. Throughout the rest of the world they were known as Kenwood, a brand identity that was until recently considered unacceptable by a certain UK manufacturer of small kitchen appliances. Japan came into line last Summer — with a postitive influence on sales to boot — and the UK is now following. From Spring '87 all Trios will now be Kenwoods.

The *KA-550* is a 40W integrated model, retailing for around £130. Very smartly finished and sensibly laid out, it makes a few compromises in the interests of convenience, notably the separately switched accommodation for two sets of loudspeakers. But Kenwood have clearly made an effort to keep signal paths short for the sake of sound quality, and unlike many of its immediate rivals in this increasingly competitive sector of the marketplace, the '550 sports a moving magnet/moving-coil cartridge matching option.

Aside from the prominent power switch and volume control, the top section of the fascia provides 'CD Direct' and 'line straight' switching. The lower section has a set of large pushbuttons for input and tape monitoring selection, small pushbuttons select loudspeakers, subsonic filter, −30dB attenuation, and mm/m-c cartridge. The rear panel uses phono sockets throughout, and generous binding posts for loudspeaker connection.

LAB REPORT

Differential FETs improve the performance of the disc input IC op amps to the point where the mm/m-c option is feasible. Both the 'direct' switch routes shorten internal signal paths, and some care has been taken over the circuit layout. The power amps are fully integrated hybrid ICs using conventional complementary config-

uration, fed from a decent size power supply with separate regulation to earlier stages.

Power delivery clearly exceeded the specification when one channel was driven into 8ohms, and still held up reasonably well into lower impedances, reflecting the generous, if somewhat asymmetric current capability. The power supply modulation spectrogram shows generally good isolation and behaviour.

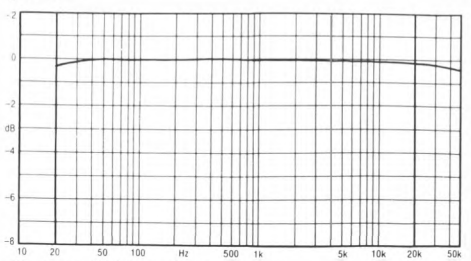
The various distortion and noise measurements were all good, input overload margins were ample, and stereo separation was very respectable too. The various input parameters all appear to be sensibly chosen. The RIAA disc equalisation was commendably flat and sensibly bandlimited particularly *via* moving-coil (the mm trace shows much less low frequency curtailment).

Sound Quality

Rating comfortably above average, the '550 proved to be a gutsy performer, with decent bass 'speed' and 'attack', albeit lacking a little in 'weight' and accompanied by a little 'untidiness' in the treble. Stereo imagery was well portrayed, with fairly good focus and only mild depth curtailment. Furthermore, the moving-coil cartridge input was no also-ran of indifferent performance as has been the case with some cheaper integrated amplifiers over the years: it is genuinely as capable as the other inputs, which is to Kenwood's credit.

Conclusions

Deserving firm recommendation on the basis of its decent sound quality at an affordable price, the '550 has the additional bonuses of fine finish and build quality and a capable moving-coil input, the latter something of a rarity amongst its immediate competition and a definite plus point.



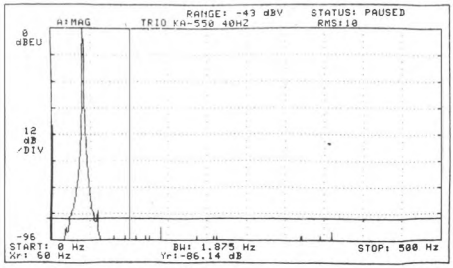
Disc input. RIAA equalisation accuracy

Test measurements

To show how well the amplifier sustains its 8ohm output into real loudspeaker loads, the level into 4ohms and 2ohms is given in dBW (where 0dB=1W), without adding 3dB or 6dB respectively, as in usual 'power' ratings.

Test Results

Power output			Integrated amplifier
Rated power into 8ohms, maker's spec			40W(=16dBW)
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	17.8dBW	18dBW	17.8dBW
Both channels, 4ohm load	15dBW	15.5dBW	15dBW
One channel, 2ohms, pulsed	–dBW	16dBW	–dBW
Instantaneous peak current		+13A	–17A
Distortion			
Total harmonic distortion,	20Hz	1kHz	20kHz
at rated power, aux/CD input	–74dB	–85dB	–74dB
Intermodulation, 19/20kHz, rated power, aux input			–92dB
Intermodulation, 19/20kHz, at 0dBW, disc (mm)			–80dB
Intermodulation, 19/20kHz, at 0dBW, disc (mc)			–60dB
Noise			
Disc (mm) input (IHF, CCIR weighted)			–73dB
Disc (mc) input (IHF, CCIR weighted)			–67dB
Aux/CD input (IHF, CCIR weighted)			–74dB
Residual, unweighted (volume control at min)			–91dB
DC output offset			left <5mV, right <5mV
Input overload	20Hz	1kHz	20kHz
Disc (mm) input (IHF)	34dB	33dB	32dB
Disc (mc) input (IHF)*	33dB	32dB	28dB
Aux/CD input (IHF)	>20dB	>20dB	>20dB
Stereo separation			
Disc input (mm)	67dB	71dB	48dB
Aux/CD input	80dB	70dB	50dB
Output impedance (damping)	0.15ohm	0.15ohm	0.25ohm
Channel balance, disc, at 1kHz			0.21dB
Volume/balance tracking	0dB	–20dB	–60dB
Aux/CD input	0.03dB	0.1dB	0.2dB
Input data	socket type	sensitivity	loading
Disc (mm) input	Phono	0.4mV	47kohms 180pF
Disc (mc) input*	Phono	0.04mV	100ohms n/a pF
Aux/CD input	Phono	26mV	57kohms 450pF
Output, pre-amp (tape)			13.4V max, 220ohms
Disc equalisation error, 30Hz-15kHz			+0dB, –0.4dB
Size (width, height, depth)			42×10.5×33cm
Typical price inc VAT			£130



Power supply rejection, 40Hz input

RECOMMENDED

KRELL KMA-100 II

ABSOLUTE SOUNDS LTD, 318 WORPLE ROAD, LONDON SW20.
TEL: 01-947 5047

Krell were the first US high end amplifier brand for many years to make any significant impact on the UK market, when the *KSA-50* first started to appear about four years ago. It was expensive by UK standards, but Krell's power amp trademark is 'class A' operation (or at any rate class A over most of the available dynamic range), which guarantees high bulk, heat and cost per Watt, while at the same time offering stable operating device temperatures. In effect class A working is equivalent to regulating the power supplies of a class A/B configuration.

However, US audiophiles are a power hungry breed, and 50Watts a side does lack a certain machismo appeal (even though Krell are extremely generous with the current reserves). So the home market prefers monoblocks with even more current capability, or the higher power models in mono and stereo formats — which are now spreading to the UK. There is a also a wide range of *PAM* pre-amp partners which have evolved along similar lines. This review concentrates on the *KMA 100* monoblocks — at £2,500 each, several steps up the ladder from the *KSA-50* featured elsewhere — and also involved comparative auditioning with the significantly cheaper stereo *KSA-100*.

In fact the difficult decision for someone contemplating £5,000+ for a pair of *KMAs* is whether to go instead for a FAIR of *KSAs* (for a grand or two more) and bi-amp the loudspeakers, passively or actively. It is a dilemma that the word-processing pundit (and the importer for that matter) is unable to resolve — the only course is to try out the alternatives. (First, find someone who has both a pair of *KSAs* and a pair of *KMAs* in stock...)

Though all Krells look alike on the surface, each uses different circuitry specific to its task, the monoblocks possessing relatively more current capability and being 'more class A' than the stereo models. External finish is to the highest standards, anodised to a soft silver grey with gilt brightwork. Construction is non-magnetic, using mainly aluminium, and with extensive use of military grade componentry, massive high-current power supplies and very high slew rate bi-polar output transistors. The *KMA-100s* have permanent fan cooling, which is audible but not intrusive (given clean mains), sounding a little like the airconditioning of a modern hotel room.

Lab Report

Rated at 100W/8ohms, this is effectively the class A rating, and the *KMA-100*s can virtually double this delivery in practice. They are capable of delivering a massive +45/−46A into any load, 1ohm *Scintillas* included — indeed big Apogees and Krells seem more or less made for each other. The bandwidth is sensibly rolled off above audibility to a −3dB point at 70kHz. All the measured performance parameters for distortion, noise etc, were excellent.

Sound Quality

Our main listening sessions had earlier updated Mk1 *KMA-100*s, plus a current *KSA-100 II* for interest's sake, and correlation was later made with a brand new production pair of *KMA*s. Both generations of monoblock were clearly superior to the stereo model, particularly in terms of 'grip', 'solidity', focus and control, though the *KSA* still delivered 'reference' standards of sound quality for its price.

The earlier *KMA*s suffered a little from fan noise, but gave outstanding sound quality, transparent and big in scale with tremendous relaxed power. Stereo staging was wide, deep and precise, with solid focusing and great stability. Criticisms were minor. One listener wondered whether the sound was just a little too relaxing and controlled, while a slight 'bright' emphasis was also considered a mild departure from neutrality. This was found to have been resolved on the later samples, with treble sounding significantly sweeter, while the fan noise was also effectively cured.

Conclusions

The *KMA-100* is a genuine reference standard power amplifier, arguably the best that *Choice* has assessed, capable of justifying an extravagant pricetag in an appropriate system and in comparison with its *KSA* stereo sibling. Its *forte* is the combination of tremendous headroom and control that define its unique character, plus an ability to drive any sort of load up to genuine high levels. Similarly the *KSA 100 II* may also be recommended as an outstanding performer.

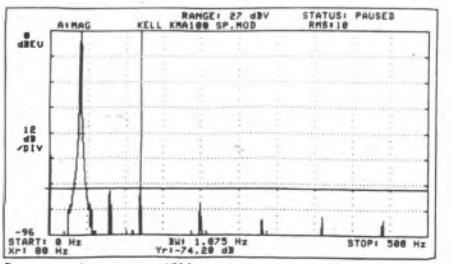
Test measurements

To show how well the amplifier sustains its 8ohm output into real loudspeaker loads, the level into 4ohms and 2ohms is given in dBW (where 0dB=1W), without adding 3dB or 6dB respectively, as in usual 'power' ratings.

Test Results

			Integrated amplifier
Power output			
Rated power into 8ohms, maker's spec			100W(=20dBW)
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	23dBW	23dBW	22.8dBW
Both channels, 4ohm load	22.5dBW	22.5dBW	22.2dBW
One channel, 2ohms, pulsed	–dBW	22.3dBW	–dBW
Instantaneous peak current			+45/−46A
Distortion			
Total harmonic distortion,	20Hz	1kHz	20kHz
at rated power, aux input	−75dB	−77dB	−66dB
Intermodulation, 19/20kHz, rated power, aux input			−86dB
Intermodulation, 19/20kHz, at 0dBW			−105dB
Noise			
'A' wtd			−78dB(0dBW), −98dB(rated power)
DC output offset			0
Output impedance (damping)			0.04 ohms
Input	phonos	120mV	47kohm 0.7nF
Size (width, height, depth)			48×48×23cm
Typical price inc VAT			£5,750 per pair

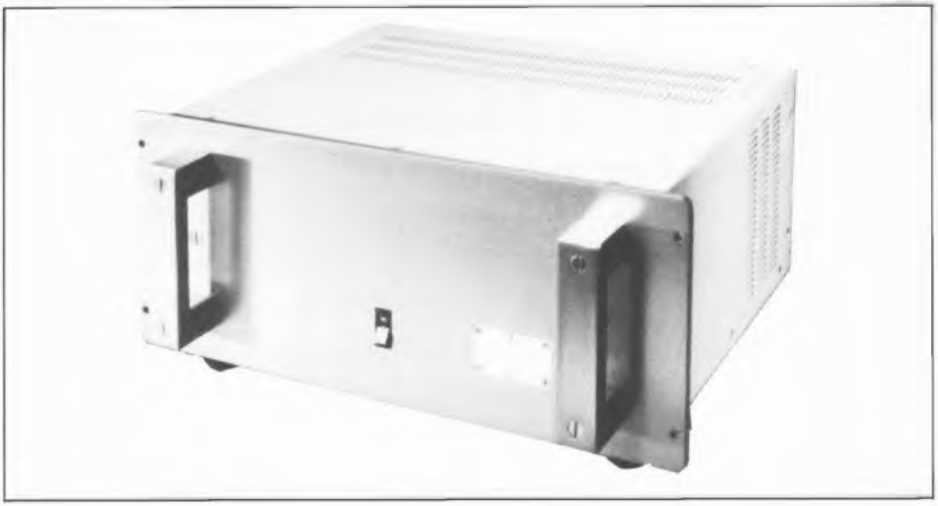
First reviewed: The Collection 1987



Power supply rejection, 40Hz input

KRELL PAM5/KSA50 Mk 2

ABSOLUTE SOUNDS LTD, 318 WORPLE ROAD, LONDON SW20.
TEL: 01-947 5047



Built and finished to the highest standards, the Krell *KSA-50* power amplifier is an expensive American heavyweight, though modestly rated at 50W (17dBW) per channel. Alternatives at 100W and 200W are also available.

The *KSA-50* is constructed as a double-mono design, with massive power supplies to each channel. The amplifier runs in pure Class A into 8ohm loads up to its rated power, and has rapid warm up (minutes rather than the usual hour or so for other Class A designs.) The fan is relatively quiet, producing no more noise than the large toroidal transformers fitted.

The *FAM-5* uses a single external power supply and offers good moving-coil input facilities.

SOUND QUALITY

Re-auditioned for 1986, the Krell *KSA-50* has held its own. It remains a powerful, musical-sounding model, giving good stereo depth and ambience, fine clarity and excellent stereo focus. Tidy and controlled, dynamics were very good, and its high rating position was maintained. The *FAM-5* is a welcome newcomer, in our view now quite to *KSA-50* standard, and a very worthy partner overall.

Essentially neutral, *FAM-5* gave good definition throughout the frequency range with a good measure of 'excitement' and involvement in its sound. The special CD input was rather better than the auxiliary for this signal source, and comparably good results were obtained on analogue moving-coil.

Compared with the finest references, the Krells betrayed a mild 'dryness' and a hint of dimensional restriction but the results remained very good.

LAB REPORT

Rated at only 17dBW, the *KSA-50* typically produced on continuous ratings a 19.9dBW output level, and such was the extraordinary power bandwidth that no significant fall occurred from 20Hz to 20kHz, relative to 1kHz. Likewise the loss into 4 and 2ohms was small. Peak output was approaching 100W, reading 19.9dBW, with 18.2dBW still provided into 2ohms, the Krell proving to have one of the 'stiffest' output and

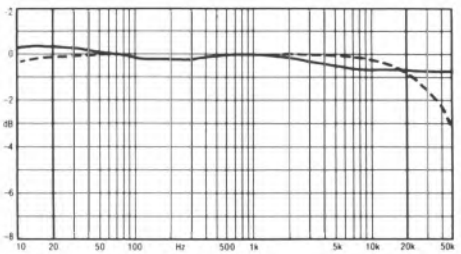
power sections measured. Peak power into 2ohms exceeded 250W. Peak current output was ±32A, which was sufficient for the worst loads.

Both pre-, and power amplifier were exemplary on other parameters. Noise level and separation were fine, and all distortions negligible at all levels below clipping. Substantially accurate, the RIAA equalisation is slightly tailored for a specific sound.

Conclusions

In addition to the *KSA-50*, the *'100* and *'200* units were auditioned recently, and showed small but progressive improvements as well as greater power. Superbly built, Krell products remain a good investment in listening pleasure.

Both the *KSA-50* and the *FAM-5* are well worth considering, despite their high prices.



Disc input: RIAA equalisation accuracy

Test Results

	Pre- and power amplifier		
Rated power into 8ohms, maker's spec	50W(=17dBW)		
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	19.9dBW	19.9dBW	19.9dBW
Both channels, 4ohm load	19.7dBW	19.7dBW	19.65dBW
One channel, 2ohms, pulsed	–dBW	18.2dBW	–dBW
Instantaneous peak current		+32A	–32A
Total harmonic distortion,	20Hz	1kHz	20kHz
at rated power, aux input	–86.0dB	–89.6dB	–72.5dB
NOISE			
Disc (mm) input (IHF, CCIR weighted)			–
Disc (mc) input (IHF, CCIR weighted)			–60.0dB*
Aux/CD input (IHF, CCIR weighted)			–88.0dB
Input overload	20Hz	1kHz	20kHz
Disc (mm) input (IHF)	–dB	–dB	–dB
Disc (mc) input (IHF)	20.8dB	20.5dB	21.5dB
Aux/CD input (IHF)	>20dB	>20dB	>20dB
Input data	socket type	sensitivity	loading
Disc (mm) input	–	–mV	–kohms –pF
Disc (mc) input	Phono	0.076mV	100ohms –pF
Aux input	Phono	136mV	9.4kohms 80pF
Power amp	–	–mV	–kohms –pF
Output, pre-amp (tape)		8.25V max,	1kohms
Disc equalisation error, 30Hz-15kHz		+0.30dB,	–0.65dB
Size (width, height, depth)	48 × 5 × 29cm,	48 × 21 × 43cm	
Typical price inc VAT	£1589, £2300		

*Improved since our test

First reviewed: PAM5, 1986; KSA50, 1983 (reassessed 1985, 1986).
Rating: Recommended.

LINN LK1/LK2

LINN PRODUCTS LTD, 257 DRAKEMIRE DRIVE, CASTLEMILK, GLASGOW G45 9SZ.
TEL: (041) 6340371

In their first amplifier design, Linn have aimed to produce a quality product, one which would be well engineered for production and which would not only match their own top-quality components but would also fit in a number of other hi-fi systems. Furthermore, they intend it to be 'user friendly', with simple operation and an optional remote control.

Rated at a load-tolerant 60W (18dBW) per channel, the power amplifier has fully regulated power supplies. The pre-amplifier incorporates electronic selector switching, balance and volume control, the last not a gain-controlled amplifier but a better-sounding ladder attenuator whose steps are selected electronically — thus there are no moving parts. Moving-coil and moving-magnet cartridge disc inputs are provided plus two tape inputs and auxiliary (CD!). The disc inputs are the usual phonos, with a five pin 'XLR' Cannon for tape in/out and three-pin for tuner, aux. and, separately, the main outputs for left and right channels. Linn can supply the necessary inter-connect cables.

SOUND QUALITY

Re-auditioned for 1987, the Linn rated 'good' overall, proving to be self-effacing and pleasantly 'musical', with a nicely balanced mid-treble, free from the usual hardness or glare.

Its good quality held throughout the frequency range and it also sounded quite transparent, revealing a fair measure of ambience and depth. A little 'dark' textured and somewhat restrained, some of the drama and excitement in the test programme appeared to be diluted.

Overall, it lacked subjective extension at the frequency extremes, sounding mildly 'enclosed'. We found that the sound was however commendably consistent throughout on all the inputs.

LAB REPORT

Re-measured for 1987, the *LK1/2* showed minor changes only. Almost exactly as specified, the power delivery was solid down to 2ohms, with ample 14A peak current. Distortions were low except for the intermodulation results via the disc inputs; the new overload figures will

improve upon the tabulated results by around 10dB. The dc offset for the power amp was a little high at nearly a tenth of a volt. Channel separations were fine throughout, while channel balance was generally good, but deteriorated seriously at the −60dB setting. The auxiliary and power amplifier input impedances were on the low side — purchasers should check whether it is suitable for a given pre-amp and signal sources.

The overload margin on the m-c disc input is now healthier than before, but the mm figure and intermodulation on both disc inputs are still poor. The RIAA equalisation is very flat, mid-band, but rather tightly bandlimited at frequency extremes.

Conclusions

The power amplifier is durable, tolerant and also set a respectable standard on both lab test and audition. The pre-amplifier was marginally less successful, but the two succeed in working well together. In view of the facilities offered, the good build quality and overall competence, the combination is worth considering.

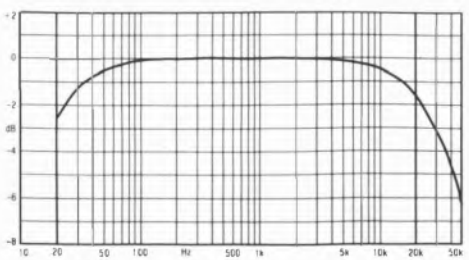
Test measurements

To show how well the amplifier sustains its 8ohm output into real loudspeaker loads, the level into 4ohms and 2ohms is given in dBW (where 0dB=1W), without adding 3dB or 6dB respectively, as in usual 'power' ratings.

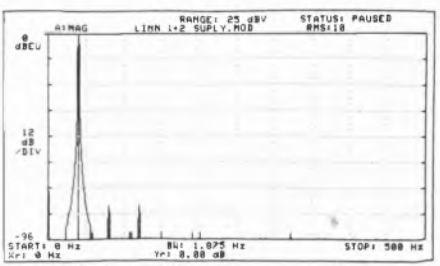
Test Results

	Pre and power amplifier		
Power output			
Rated power into 8ohms, maker's spec	60W(=18dBW)		
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	18.7dBW	18.5dBW	18.5dBW
Both channels, 4ohm load	18.0dBW	18.0dBW	17.9dBW
One channel, 2ohms, pulsed	−dBW	16.7dBW	−dBW
Instantaneous peak current		+14A	−14A
Distortion			
Total harmonic distortion,	20Hz	1kHz	20kHz
at rated power, aux input	−61dB	−78dB	−66dB
Intermodulation, 19/20kHz, rated power, aux input	−83dB		
Intermodulation, 19/20kHz, at 0dBW, disc (mm)	−28dB		
Intermodulation, 19/20kHz, at 0dBW, disc (mc)	−42dB		
Noise			
Disc (mm) input (IHF, CCIR weighted)	−71dB		
Disc (mc) input (IHF, CCIR weighted)	−61dB		
Aux input (IHF, CCIR weighted)	−71dB		
Residual, unweighted (volume control at min)	−79dB		
DC output offset	left −1mV, right −1mV		
DC offset, pre-amp	left 0mV, right 0mV		
Input overload	20Hz	1kHz	20kHz
Disc (mm) input (IHF)	25.8dB	22.6dB	11.5dB
Disc (mc) input (IHF)*	21.1dB	33.4dB	35.1dB
Aux/CD input (IHF)	>20dB	>20dB	>20dB
Stereo separation			
Disc input (mc)	74dB	80dB	59dB
Aux input	80dB	76dB	54dB
Output impedance (damping)	0.01ohm	0.01ohm	0.02ohm
Channel balance, disc, at 1kHz	0.38dB		
Volume/balance tracking	0dB	−20dB	−60dB
Aux input	0.07dB	0.10dB	15.07dB
Input data	socket type	sensitivity	loading
Disc (mm) input	Phono	0.48mV	78kohms 500pF
Disc (mc) input*	Phono	0.035mV	200ohms n/a nF
Aux input	XLR	52.0mV	10kohms 230pF
Power amp	XLR	120mV	5.8kohms 1,000pF
Output, pre-amp (tape)	5.1V max, 69ohms		
Disc equalisation error, 30Hz-15kHz	+0dB, −1.10dB		
Size (width, height, depth)	Pre 26×8×32; Power 32×8×32cm		
Typical price inc VAT	£425/£373		

Reauditioned



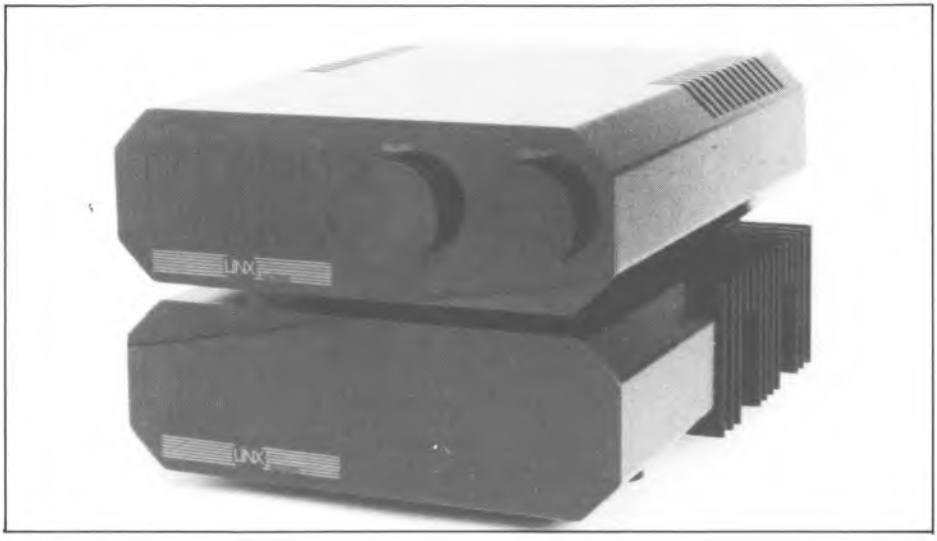
Disc input. RIAA equalisation accuracy



Power supply rejection, 40Hz input

LINX STRATOS

HTS GROUP, CHURCH ROAD, LANE END, HIGH WYCOMBE, BUCKS HP4 3HH.
TEL: (0494) 881685



Linx, a New Zealand manufacturer, have presented the *Stratos* design as a set of three separate components, though the distributors are not at present intending to make the units available separately. Following the original review, there have been modifications to the disc input of the pre-amp, plus a significant price cut, prompting an extensive reassessment for 1987. The power amplifier is itself divided, comprising a pair of mono units. The interior design of the pre-amp has also been arranged to preserve a double mono aspect as far as possible. It uses a touch panel for source switching and a large, good-quality volume control. The circuitry is discrete, with fine components in evidence. Both moving-coil and moving-magnet cartridges are catered for, but with a 'straight line' approach — no balance or tone controls are provided.

The power amplifiers are direct-coupled complementary, using parallel pairs of MOSFETs. Rated at a substantial 120W (21dBW), the amplifier uses a sizeable power supply with high-current 10,000μF reservoir capacitors and a large screened power transformer. Mechanical hum levels were low.

SOUND QUALITY

Rating good overall on audition, the *Stratos* is slightly improved. Stereo is well portrayed, with a good standard of control, clarity and focus, plus a fair grip on dynamics. Subjectively, it sounded 'open' with a wide frequency range, but tonally there was a hint of hardness and thinness in the upper mid, which occasionally gave a compressive effect. The whole effect was of firm control with a pleasant 'easy' sound.

LAB REPORT

Confirming the high sound levels, the peak programme power reached 200W with very little loss even into 2ohms (22.8dBW here equivalent to 800W true!). The continuous ratings were lower but still good, with fine load tolerance shown by the ±33A peak current available.

The changes to the disc input circuitry are immediately apparent, though not necessarily entirely positive nonetheless. The RIAA

equalisation is now commendably flat, but both the high frequency intermodulation and overload margins have become worse — and they were none too good in the first place. On the plus side, stereo separation is significantly improved. Channel balance and volume tracking were both fine, input parameters sensibly selected for broad compatibility, and the power supply modulation spectrogram was very clean.

Conclusions

The Linx faces strong competition in the UK market. The sound quality was very good, but not exceptional in its price category. Load tolerance was good, coupled with a massive peak power delivery, and undoubtedly the power amplifiers are the stronger half of the package. Nonetheless the pre-amp, while not quite '100%', still sounded well. Overall a full recommendation is inappropriate; but this is certainly a substantial product worthy of serious consideration.

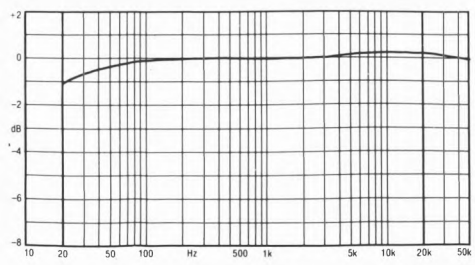
Test measurements

To show how well the amplifier sustains its 8ohm output into real loudspeaker loads, the level into 4ohms and 2ohms is given in dBW (where 0dB=1W), without adding 3dB or 6dB respectively, as in usual 'power' ratings.

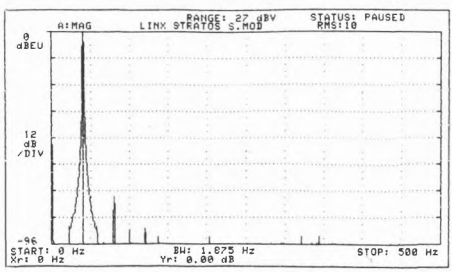
Test Results

Power output	Integrated amplifier		
Rated power into 8ohms, maker's spec	120W(=21dBW)		
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	21.1dBW	21.3dBW	21dBW
Both channels, 4ohm load	19.4dBW	19.5dBW	19.3dBW
One channel, 2ohms, pulsed	–dBW	22.8dBW	–dBW
Instantaneous peak current		+33A	–34A
Distortion			
Total harmonic distortion,	20Hz	1kHz	20kHz
at rated power, aux/CD input	–71.9dB	–71.2dB	–70.7dB
Intermodulation, 19/20kHz, rated power, aux input	–59dB		
Intermodulation, 19/20kHz, at 0dBW, disc (mm)	–17dB		
Intermodulation, 19/20kHz, at 0dBW, disc (mc)	–10dB		
Noise			
Disc (mm) input (IHF, CCIR weighted)	–67.7dB		
Disc (mc) input (IHF, CCIR weighted)	–67dB		
Aux/CD input (IHF, CCIR weighted)	–68.2dB		
Residual, unweighted (volume control at min)	–76.3dB		
DC offset, pre-amp	left 3mV, right 4mV		
Input overload	20Hz	1kHz	20kHz
Disc (mm) input (IHF)	31.6dB	24.0dB	7.7dB
Disc (mc) input (IHF)*	27.4dB	23.1dB	6.9dB
Aux/CD input (IHF)	>20dB	>20dB	>20dB
Stereo separation			
Disc input (mc)	73dB	70dB	45dB
Aux/CD input	98dB	71dB	46dB
Output impedance (damping)	0.02ohm	0.02ohm	0.06ohm
Channel balance, disc, at 1kHz	0.07dB		
Volume/balance tracking	0dB	–20dB	–60dB
Aux/CD input	0dB	0.5dB	0.7dB
Input data	socket type	sensitivity	loading
Disc (mm) input	Phono	0.18mV	47kohms 250pF
Disc (mc) input*	Phono	0.015mV	4.7ohms 1.2nF
Aux/CD input	Phono	10.2mV	89kohms 85pF
Power amp	Phono	125mV	42kohms 1.6nF
Output, pre-amp (tape)	4.84V max, 880ohms		
Disc equalisation error, 30Hz-15kHz	+0.16dB, –0.8dB		
Size (width, height, depth)	3×(24×9×31)cm		
Typical price inc VAT	£999		

Reauditioned



Disc input, RIAA equalisation accuracy

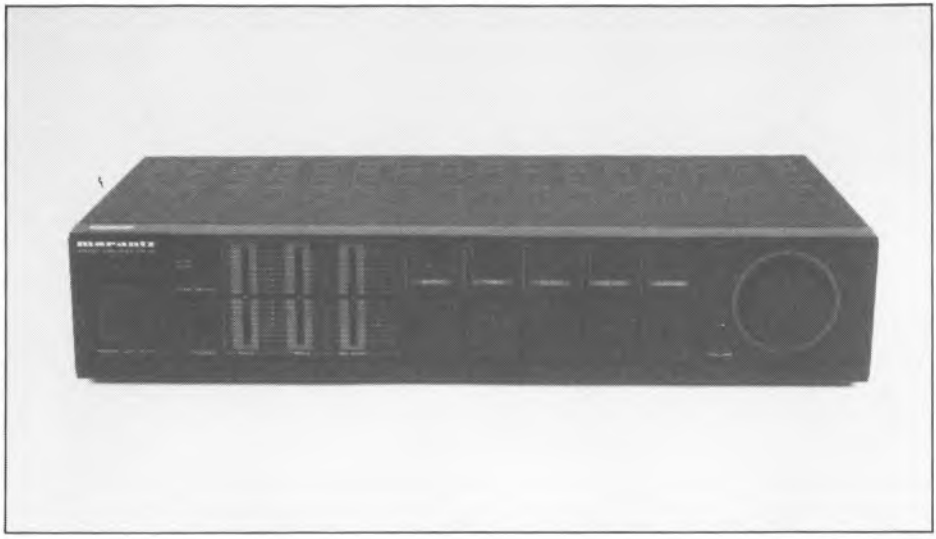


Power supply rejection, 40Hz input

RECOMMENDED

MARANTZ PM26

MARANTZ AUDIO (UK) LTD, 15-16 SAXON WAY INDUSTRIAL ESTATE, MOOR LANE, HARMONDSWORTH, MIDDX UB7 0LW. TEL: 01-897 6633



Though now owned by Philips, Marantz have managed to retain the individual identity of their products, and their amplifiers in particular. Models intended for the competitive UK market receive close sound quality scrutiny at the European end of the operation, and are frequently 'tweaked' in this direction before acceptance.

Simply styled with an attractive touch of individuality, preserving square and rectangular motifs throughout the front panel, the *PM26* is a compact integrated model, fairly modestly priced at £130. It is rated at only 30W, though generously so as it turns out, and is smartly finished and intelligently laid out. The main on/off switch and volume controls are clearly distinguished, while tone and balance is provided on a set of sliders. Input, tape monitor and 'loudness selections are made on a row of pushbuttons. A separate button provides tone defeat, and a front panel headphone socket complements the single set of substantial loudspeaker binding posts on the rear. Rear panel source and tape connections are phono throughout, accommodating only moving magnet cartridges.

LAB REPORT

The *PM26* uses conventional direct coupled complementary bi-polar output devices, with modular IC driver circuits. There is some evidence of careful component selection for sound quality and the single board construction shows neat, simple layout. A single power supply with generous transformer is shared between channels. Overall construction and build is to 'quality budget' standards, though internal mains wiring was unshrouded.

Power delivery measured comfortably above spec driving one channel into 8ohms. Though not serious, the drop into 4ohms/both channels was larger than most, while the substantial peak pulsed rating and +12/−14A current delivery suggest that this is a fairly 'loosely' controlled supply. The rather average supply modulation spectrogram is further supporting evidence of this observation.

Distortion and noise measurements were perfectly satisfactory, with good input overload margins. Stereo separation measured rather poorer than average at high frequencies, and the volume/balance tracking deterioration at low levels is some evidence of component economies. The input sensitivities should be fine, but the highish input capacitance on the moving magnet disc input will not ideally suit all cartridges. Add the effect of cabling and 500+pF will produce audible balance changes at high frequencies that will probably be larger than the range of RIAA equalisation curves found throughout our test programme. The '26's RIAA showed sensible bandlimiting plus a slight excess in the 'warmth' region of the spectrum.

Sound Quality

Rating a little above average, Marantz have clearly made a serious effort with the sound quality of this model, and this was recognised by the panel, albeit without great enthusiasm. A fair degree of 'bounce' and 'liveliness' was noted, but alongside some loss of resolution, 'thickening' of textures and flattening of perspectives. The bass could have been firmer and better defined, and further criticism was levelled at the 'grip' and control, and a somewhat 'small' sound. When driven hard, there seemed comparatively little reserve of power.

Conclusions

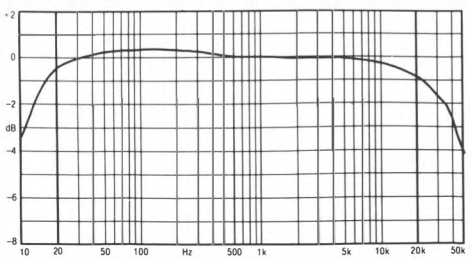
This is a well built and attractively presented model which, on balance, just manages recommendation, though sonically it fell somewhat short of the best examples of its type. Technically competent, there is some evidence of economy in the power supply side, and prospective purchasers should check that the highish cartridge loading is appropriate to their system. Overall, it provides decent performance at a quite modest price.

Test measurements

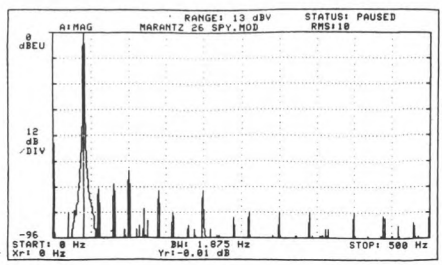
To show how well the amplifier sustains its 8ohm output into real loudspeaker loads, the level into 4ohms and 2ohms is given in dBW (where 0dB=1W), without adding 3dB or 6dB respectively, as in usual 'power' ratings.

Test Results

Power output			Integrated amplifier
Rated power into 8ohms, maker's spec			30W(=15dBW)
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	17.1dBW	17.4dBW	17.2dBW
Both channels, 4ohm load	13.7dBW	14.7dBW	14.5dBW
One channel, 2ohms, pulsed	–dBW	22.2dBW	–dBW
Instantaneous peak current		+12A	–14.0A
Distortion			
Total harmonic distortion,	20Hz	1kHz	20kHz
at rated power, aux input	–78dB	–83dB	–76dB
Intermodulation, 19/20kHz, rated power, aux input			–63dB
Intermodulation, 19/20kHz, at 0dBW, disc (mm)			–58dB
Noise			
Disc (mm) input (IHF, CCIR weighted)			–71dB
Aux/CD input (IHF, CCIR weighted)			–74dB
Residual, unweighted (volume control at min)			–71dB
DC output offset			left –2mV, right +3mV
Input overload	20Hz	1kHz	20kHz
Disc (mm) input (IHF)	32dB	32dB	31.3dB
CD input (IHF)	>20dB	>20dB	>20dB
Stereo separation			
Disc input (mm)	61dB	66dB	36dB
Aux input	65dB	64dB	38dB
Output impedance (damping)	0.15ohm	0.15ohm	0.16ohm
Channel balance, disc, at 1kHz			0.41dB
Volume/balance tracking	0dB	–20dB	–60dB
Aux input	0.03dB	0.56dB	5.66dB
Input data	socket	type	sensitivity / loading
Disc (mm) input	Phono	0.56mV	47kohms 430pF
Aux input	Phono	31.5mV	50kohms 210pF
Output, pre-amp (tape)			10.7V max, 1kohm
Disc equalisation error, 30Hz-15kHz			+0.33dB
Size (width, height, depth)			41.5×8.5×24cm
Typical price inc VAT			£130



Disc input. RIAA equalisation accuracy



Power supply rejection, 40Hz input

RECOMMENDED

MARANTZ PM45

MARANTZ AUDIO (UK) LTD, 15-16 SAXON WAY INDUSTRIAL ESTATE, MOOR LANE, HARMONDSWORTH, MIDDX UB7 0LW. TEL: 01-897 6633

This large and imposing integrated amplifier has a high quality black finish and looks rather more expensive than its £180 and 40W/channel rating might suggest. Furthermore, it represents a valiant effort to apply the simplification techniques which promote sound quality in the context of a fully featured package, having undergone painstaking 'tweaking' in a European context prior to introduction.

The four rotary knobs provide some visual symmetry, the pair on the left adjusting 'tone', those on the right selecting input and adjusting volume. A variety of subsidiary controls include a small balance control, switches for tone defeat, 'CD/phono direct', selection of second loudspeakers only (the main ones being permanently connected), tape monitor/copy, plus 'loudness'. Phono sockets provide interconnection, with switching for matching moving-coil or moving magnet cartridges. Substantial binding posts are used for the loudspeakers.

LAB REPORT

The output has a conventional complementary bi-polar configuration, fed from an IC driver stage. The protection circuitry is unusual in using a relay system instead of progressive current limitation; this is probably a preferable solution than current limiting, if still representing some compromise. ICs are used in the tone controls and disc input stages, with noise and linearity improved in both by a differential FET stage. The single power supply feeds both channels but separate regulation is supplied to earlier stages. Construction quality is good, with selection of components and layout showing clear attempts to maximise sound quality.

The 40W power rating is extremely conservative, and was nearly doubled in practice under lab measurement. Power bandwidth is very well maintained, but the simple, shared supply is

shown by the significant drop into 4ohms. Peak current capability is a generous ±17A, and the power supply modulation spectrogram shows a very clean result, devoid of mains harmonics.

Distortions were quite low, though the moving-coil disc input was rather poorer than the others on intermodulation. Noise was satisfactorily low, input overload margins ample, and separation pretty good. Input sensitivities offer good general compatibility, but 0.5+db error in channel balance was found at several volume settings. The moving-coil RIAA disc input shows a sensibly curtailed low frequency bandwidth and generally even midband, but high frequencies seem to be left wide open, which is mildly worrying.

Sound Quality

Rating solidly above average, this is in fact an unusually good result for a full feature design such as the '45. Space, 'air' and focus were all quite good, with a decent attempt at depth portrayal. The balance was considered generally neutral through the midband, but with a touch of 'boom 'n tizz' coloration and 'untidiness' with resolution fading towards the frequency extremes. Generally pleasant and polite with above average clarity, there was some 'softening', particularly in the bass, restricting drama and dynamic impact somewhat.

Conclusions

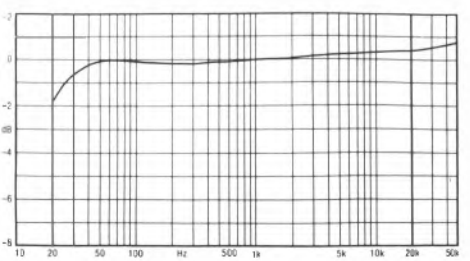
This well balanced, fully competitive package has a sound quality which approaches some of the current 'straight line' integrated amplifiers, while offering a decent quality moving-coil disc input and some power advantage. Formal recommendation is clearly appropriate.

Test measurements

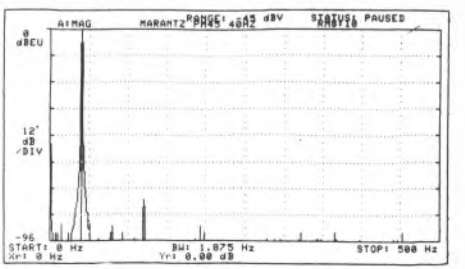
To show how well the amplifier sustains its 8ohm output into real loudspeaker loads, the level into 4ohms and 2ohms is given in dBW (where 0dB=1W), without adding 3dB or 6dB respectively, as in usual 'power' ratings.

Test Results

Power output			Integrated amplifier
Rated power into 8ohms, maker's spec			40W(=16dBW)
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	18.8dBW	18.8dBW	18.7dBW
Both channels, 4ohm load	16.0dBW	16.4dBW	16.4dBW
One channel, 2ohms, pulsed	–dBW	17.0dBW	–dBW
Instantaneous peak current		+17.0A	–17.0A
Distortion			
Total harmonic distortion,	20Hz	1kHz	20kHz
at rated power, aux input	–74.0dB	–84.0dB	–81.0dB
Intermodulation, 19/20kHz, rated power, aux input			–92.0dB
Intermodulation, 19/20kHz, at 0dBW, disc (mm)			–80.0dB
Intermodulation, 19/20kHz, at 0dBW, disc (mc)			–61.0dB
Noise			
Disc (mm) input (IHF, CCIR weighted)			–76.0dB
Disc (mc) input (IHF, CCIR weighted)			–68.0dB
Aux/CD input (IHF, CCIR weighted)			–79.0dB
Residual, unweighted (volume control at min)			–90.0dB
DC output offset		left <10mV, right <10mV	
Input overload	20Hz	1kHz	20kHz
Disc (mm) input (IHF)	29.3dB	29.8dB	28.5dB
Disc (mc) input (IHF)*	32.0dB	31.0dB	30.0dB
Aux/CD input (IHF)	>20dB	>20dB	>20dB
Stereo separation			
Disc input (mm)	72.0dB	84.0dB	59.0dB
Aux/CD input	82.0dB	78.0dB	53.0dB
Output impedance (damping)	0.07ohm	0.07ohm	0.15ohm
Channel balance, disc, at 1kHz			0.53dB
Volume/balance tracking	0dB	–20dB	–60dB
Aux/CD input	0.01dB	0.75dB	0.42dB
Input data	socket type	sensitivity	loading
Disc (mm) input	Phono	0.4mV	44kohms 200pF
Disc (mc) input*	Phono	0.043mV	100kohms 1nF
Aux/CD input	Phono	26.0mV	22.0kohms 85pF
Output, pre-amp (tape)			9.5V max, 220ohms
Disc equalisation error, 30Hz-15kHz			+0dB, –0.8dB
Size (width, height, depth)			41.5×13.5×37cm
Typical price inc VAT			£180



Disc input RIAA equalisation accuracy

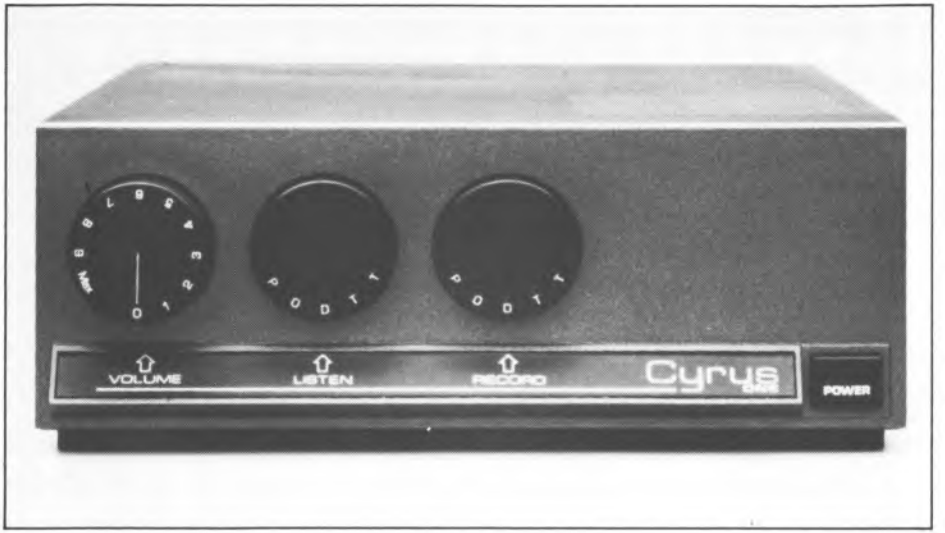


Power supply rejection, 40Hz input

BEST BUY

MISSION CYRUS ONE

CYRUS ELECTRONICS LTD, STONEHILL, HUNTINGDON, CAMBS PE18 6ED.
TEL: (0480) 57477



Something of a modern classic among amplifiers now, the 1987 *Cyrus One* features revised layout and grounding, further component selection, and higher current output transistors. Rated output is a modest 30W (14.5dBW) while the amplifier is also distinguished by the inclusion of a variable gain disc input that is quiet enough to carry out a reasonable job with medium output moving coil cartridges.

Largely constructed from plastic casings this design is particularly compact. Input facilities are comprehensive (all phono sockets) and it also has a versatile 'record out' selector which can delete the recorder from the signal path when not in use.

LAB REPORT

Inside, the direct coupled complementary output amplifiers are fed from a single dual-rail power supply energised by a good quality toriodal transformer. Fast 15A output transistors are used with a 70 MHz FT. No line amplifier is present; instead the power amp is run at a higher than usual gain while the line inputs are fed directly to the medium impedance volume control.

The disc amplifier is based on a 5334 integrated circuit, with evident use of high quality metal film resistors and selected audio grade coupling capacitors.

The specified rating was comfortably exceeded, with a peak power of 17dBW into 8ohms and a full power bandwidth 'cruising' power of almost 16dBW (40W). Fully driven into 4ohms, the power supply sagged with the level down to 13dBW overall. The 12.5dBW output into 2ohms was reasonably healthy coupled with a decent +11, −10A peak current.

All the distortion results were generally good. DC offsets were negligible, while input overload margins were fine. Channel separation was strangely and deliberately just average at around 45dB, though this did not appear to spoil the sound!

Channel balance was very good with a uniform RIAA equalisation showing just a touch of bass and treble cut. A subsonic filter was included. Note that the disc input impe-

dance remained constant regardless of the mc or mm operation. The auxiliary setting was well matched to CD sources. Ripple rejection was just average at −84dB judging by the 40Hz 4ohm power spectrogram.

Sound Quality

Almost from the outset, the high sound standard set by the *One* was well appreciated. Here was a musical, transparent amplifier of adequate size which conveyed a decent measure of depth, space and ambience in the stereo sound stage. Focusing was good, and its overall character was relatively neutral, remaining so throughout its usable and surprisingly wide dynamic range. Moderate clipping overload seemed hardly to affect the sound.

Very little deterioration was noted *via* disc. The clean, confident and slightly lightweight character remained; such a performance in fact came close to rivalling some of the costly recommended separates.

Conclusions

Reauditioned for 1987, the *Cyrus One* continues to show detail improvements. Once warm (5-10 minutes) the amplifier establishes a reference standard for its category. Dynamic and musical, it won't compromise even an expensive audio system and is therefore a strong Best Buy, with the caution that it will not withstand the abuse of short-circuiting the loudspeaker leads.

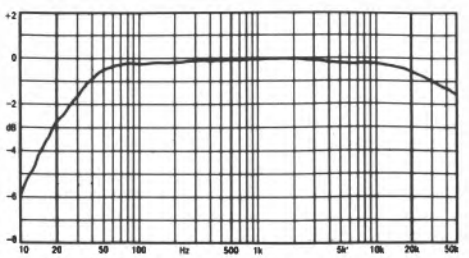
Test measurements

To show how well the amplifier sustains its 8ohm output into real loudspeaker loads, the level into 4ohms and 2ohms is given in dBW (where 0dB=1W), without adding 3dB or 6dB respectively, as in usual 'power' ratings.

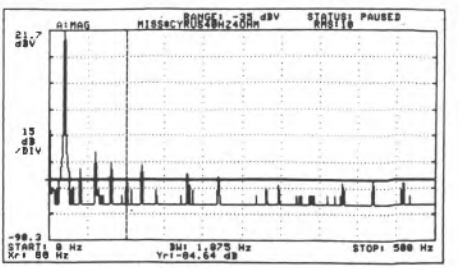
Test Results

Power output			Integrated amplifier
Rated power into 8ohms, maker's spec			30W(=14.5dBW)
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	15.9dBW	16.5dBW	16.3dBW
Both channels, 4ohm load	13.0dBW	13.7dBW	13.4dBW
One channel, 2ohms, pulsed	–dBW	12.5dBW	–dBW
Instantaneous peak current		+11A	−10A
Distortion			
Total harmonic distortion,	20Hz	1kHz	20kHz
at rated power, aux input	−90dB	−92dB	−72dB
Intermodulation, 19/20kHz, rated power, aux input			−90dB
Intermodulation, 19/20kHz, at 0dBW, disc (mm)			−90dB
Intermodulation, 19/20kHz, at 0dBW, disc (mc)			−90dB
Noise			
Disc (mm) input (IHF, CCIR weighted)			−72dB
Disc (mc) input (IHF, CCIR weighted)			−58dB
Aux/CD input (IHF, CCIR weighted)			−77dB
Residual, unweighted (volume control at min)			−75dB
DC output offset			left 6mV, right 7mV
Input overload	20Hz	1kHz	20kHz
Disc (mm) input (IHF)	31dB	28dB	28dB
Disc (mc) input (IHF)	30dB	28dB	28dB
Aux/CD input (IHF)	>20dB	>20dB	>20dB
Stereo separation			
Disc input (mm)	−47dB	−47dB	−48dB
Aux input	−42dB	−43dB	−42dB
Output impedance (damping)	0.05ohm	0.05ohm	0.06ohm
Channel balance, disc, at 1kHz			0.2dB
Volume/balance tracking	0dB	−20dB	−60dB
Aux input	0.05dB	1dB	3dB
Input data	socket type	sensitivity	loading
Disc (mm) input	Phono	0.4mV	47kohms 280pF
Disc (mc) input*	Phono	0.04mV	47kohms 280pF
Aux input	Phono	64mV	−kohms −pF
Disc equalisation error, 30Hz-15kHz			+0dB, −1.6dB
Size (width, height, depth)			21×9×34cm
Typical price inc VAT			£150

First reviewed: 1985.



Disc input. RIAA equalisation accuracy



Power supply rejection, 40Hz input

BEST BUY

MISSION CYRUS TWO AND PSX

CYRUS ELECTRONICS LTD, STONEHILL, HUNTINGDON, CAMBS PE18 6ED.
TEL: (0480) 57477

Mission's *Cyrus One* and *Two* look very similar but important internal differences distinguish them, as well as the matter of some £150 sterling! For the *Two*, the output level has been increased to 50W (17dBW) and output current has also been doubled. Higher quality components are used while the disc stage has also been extensively upgraded to produce an 11dB improvement in noise level *via* mc with optimised input loading. Two large selector switches dominate the front panel, one for the sources and the other for record 'out'. No balance, tone or any other controls are present, save for volume.

The internal construction follows the *One*, using a single printed circuit board, plus a large Holden and Fisher toroidal mains transformer. The direct coupled output uses fast complementary output transistors in classic class A/B mode while the single power supply is shared between the channels. Input connections are phono, the speakers connected *via* large 4mm socket/binding posts which are located rather too close together. Mains input is *via* an IEC socket and matching cable, while a headphone outlet is located on the back panel. (This is not as inconvenient as it sounds, since the rear panel is an accessible horizontal ledge.)

LAB REPORT

Producing close on 18dBW on peaks, the *Two* happily drove the 8ohm load to 17.6dBW over the test power bandwidth. A significant 3dB loss in level was noted into 4ohms, both channels driven, suggesting the transformer could be larger (a special booster pack is now available — the optional *PSX*). The pulsed rating on 2ohms showed a little more than 2dB loss, confirming the worthwhile peak current rating of +19.5, −19A Load tolerance was good.

Both types of measured distortion were very low, particularly the high frequency intermodulation. Input noise levels were fine, including moving coil, while the DC offset at the speaker terminals was held to a satisfactory level. Input overload levels were ample, and the overall output impedance was held to a negligible value. As with the *One*, channel separation was held at a constant but satisfactory average of 45dB.

Volume tracking was fine except at low settings and a better potentiometer would be an advantage here. All input loadings and sensitivities were to a sensible standard, while

disc equalisation was accurate with a subsonic rolloff plus a touch of HF rolloff. The significance of the 40Hz power spectrum is not yet well established, but here the *Cyrus Two* was unexceptional.

Sound Quality

One word sums up this remarkable amplifier: impressive! Good as the *Cyrus One* undoubtedly is, the *Two* is in another class altogether. The sound stage was spacious and deep, showing fine ambience, focus and breadth. It was transparent and produced much fine detail, remaining neutral and highly confident over the whole frequency range. It could also be driven hard without audible distress.

Maximum sound levels of 103dBA and 101.5dBA into an adverse load were obtained and it also clipped well. The fine quality held up well *via* disc. The tonal character was slightly bright with a touch of mid 'thinness', but lacked the usual hardness or brittleness often encountered with moderately priced gear. It could also do fair justice to some substantially good cartridges such as the van den Hul *MC10*, costing as much as the amplifier!

Conclusions

Reassessed for 1987 the *Cyrus Two* performance continues to improve and remains quite exceptional in sound quality terms. Adding the *PSX* (a larger, separate power supply for the power amp section) we have a pre- and power-amp combination of slightly greater power delivery but not necessarily better sound, since the *Cyrus Two* alone is already edging towards true audiophile territory and commands a Best Buy rating.

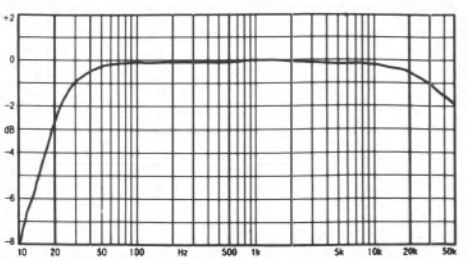
Test measurements

To show how well the amplifier sustains its 8ohm output into real loudspeaker loads, the level into 4ohms and 2ohms is given in dBW (where 0dB=1W), without adding 3dB or 6dB respectively, as in usual 'power' ratings.

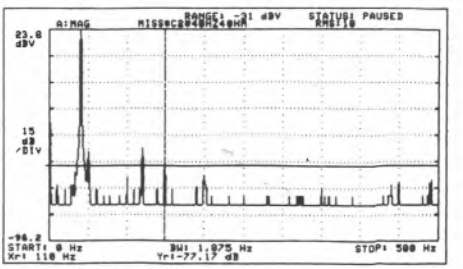
Test Results

Power output			Integrated amplifier
Rated power into 8ohms, maker's spec			50W(=17dBW)
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	18.3dBW	18.5dBW	18.4dBW
Both channels, 4ohm load	15.2dBW	15.8dBW	16.0dBW
One channel, 2ohms, pulsed	–dBW	17.0dBW	–dBW
Instantaneous peak current		+19.5	–19
Distortion			
Total harmonic distortion,	20Hz	1kHz	20kHz
at rated power, aux input	–59dB	–68dB	–70dB
Intermodulation, 19/20kHz, rated power, aux input			>–88dB
Intermodulation, 19/20kHz, at 0dBW, disc (mm)			>–84dB
Intermodulation, 19/20kHz, at 0dBW, disc (mc)			>–84dB
Noise			
Disc (mm) input (IHF, CCIR weighted)			–76.0dB
Disc (mc) input (IHF, CCIR weighted)			–69.0dB
Aux/CD input (IHF, CCIR weighted)			–80.0dB
Residual, unweighted (volume control at min)			–73.0dB
DC output offset			left –26mV, right 13mV
DC offset, pre-amp			left n/a mV, right n/a mV
Input overload	20Hz	1kHz	20kHz
Disc (mm) input (IHF)	38.0dB	36.0dB	36.0dB
Disc (mc) input (IHF)	26.0dB	23.0dB	23.0dB
Aux/CD input (IHF)	>20dB	>20dB	>20dB
Stereo separation			
Disc input (mm)	47.0dB	47.0dB	46.0dB
Aux input	43.5dB	43.0dB	42.0dB
Output impedance (damping)	0.15ohm	0.15ohm	0.15ohm
Channel balance, disc, at 1kHz			1.8dB
Volume/balance tracking	0dB	–20dB	–60dB
Aux input	0.06dB	0.1dB	5.0dB
Input data	socket type	sensitivity	loading
Disc (mm) input	Phono	0.33mV	47kohms 260pF
Disc (mc) input	Phono	0.023mV	470ohms 7pF
Aux input	Phono	60.0mV	14.0kohms 300pF
Power amp	—	—mV	—kohms —pF
Output, pre-amp (tape)			75.0V max, 700ohms
Disc equalisation error, 30Hz-15kHz			+0dB, –1.0dB
Size (width, height, depth)			21×9×34cm
Typical price inc VAT			£300 (£500 with PSX)

First reviewed: 1985. Rating: Best Buy.



Disc input. RIAA equalisation accuracy

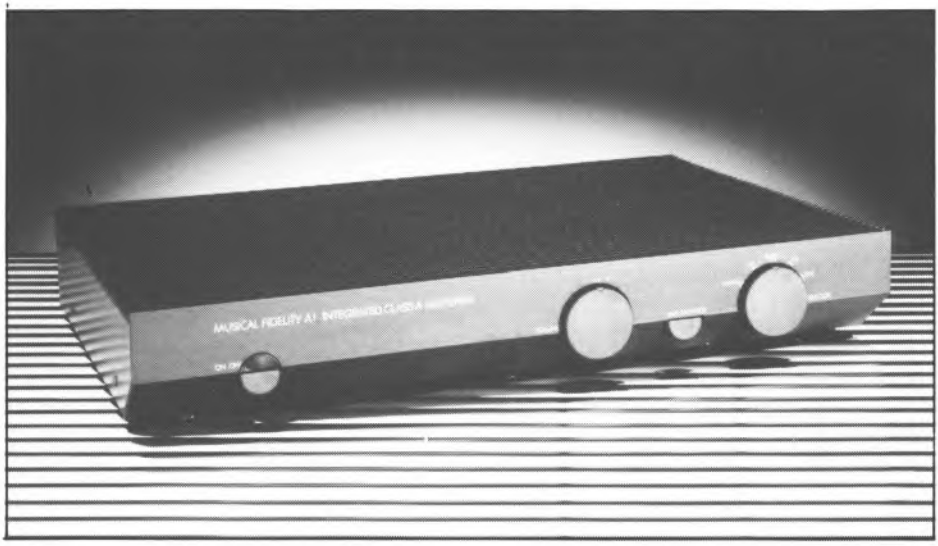


Power supply rejection, 40Hz input

RECOMMENDED

MUSICAL FIDELITY A1

MUSICAL FIDELITY, UNIT 16, OLYMPIC TRADING ESTATE, FULTON ROAD, WEMBLEY HA9 0ND.
—TEL: 01-900 2999—



Re-assessed for 1987, the rated 20W per channel, Musical Fidelity *A1* is one of the smallest amplifiers in *Choice* yet its price exceeds £200. In return, however, it sets out to offer a high standard of sound quality, based primarily on the full class A output stage. Enough standing current flows continuously through the output stage to always meet the rated load demand and to help dissipate the large amounts af heat generated, the whole top surface is a finely finned satin black radiating surface.

A 'straight line' design, the *A1*'s only controls are for volume and input selection. All inputs are *via* RCA phono sockets; speaker outputs are 4mm sockets. Tape, auxiliary/tuner, CD and disc inputs are provided, and the latter may be switched for moving magnet or moving-coil sensitivities, and the relevant loadings.

With the input stage executed in integrated circuits, the bi-polar output stage is direct-coupled complementary. The power supply is shared between channels and energised by a sizeable toroidal transformer.

After prolonged use this amplifier runs rather hot — too hot in fact to touch comfortably, and under no circumstances should it be covered: LP's melt readily on it! I suggested a thermal trip to safeguard against overheating, and this is now a production feature.

LAB REPORT

The rated output was met into 8ohms, but the level fell significantly into 4ohms, effectively to under half power here. Peak current was a modest ±3.8A, which was just sufficient for 4–8ohm speakers under peak programme conditions. At rated power, distortion levels were a satisfactory −50dB or 0.3%. It was fine on intermodulation except *via* moving-coil, this result due to premature overload. Noise levels were fine while the output offset was satisfactorily low. Input overloads were fine in practice while the stereo separations were particularly good.

Channel balance was accurate and the Input sensitivities were judged sensibly. The output impedance was higher than average at a typical

0.4ohms, and this could marginally affect the tonal balance of some loudspeakers.

It performed well with respect to the 40Hz modulation tests, showing a very clean output at a modest power level. The RIAA equalisation has been improved over the original review sample, and now shows a sensible, slightly bandlimited characteristic, still a touch depressed in the treble but generally even and properly extended on both mm and m-c disc inputs.

Sound Quality

Still rating good overall, the improvements in the bass extension on the disc input were noted. The *A1* is exceptionally 'sweet' in character — almost 'syrupy' in the words of one panelist — producing a well defined three-dimensional stereo image with good detail and perspective. Polite yet informative, the sound was a little 'slow' and 'thick', lacking a little transparency and 'air' but with a good impression of ambience. String tone was considered particularly attractive for an amplifier of this price level.

Conclusions

Comfortably maintaining its fine ranking in terms of overall sound quality versus price, and showing some improvement to the disc input, the *A1* remains a distinctive-sounding amplifier which is a trifle idiosyncratic, particularly in terms of its excessive heat output, but clearly continues to merit firm recommendation.

Test measurements

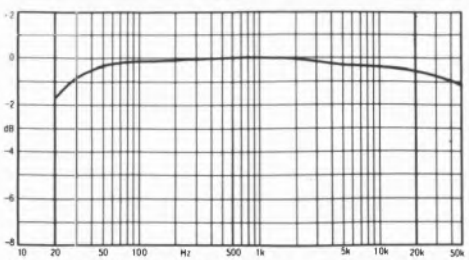
To show how well the amplifier sustains its 8ohm output into real loudspeaker loads, the level into 4ohms and 2ohms is given in dBW (where 0dB=1W), without adding 3dB or 6dB respectively, as in usual 'power' ratings.

Test Results

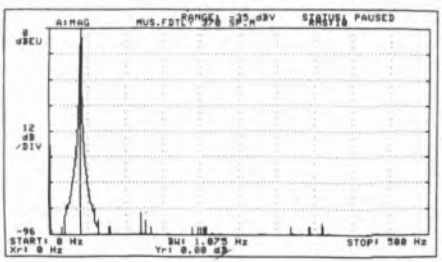
Power output			Integrated amplifier
Rated power into 8ohms, maker's spec			20W(=13.5dBW)
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	13.8dBW	13.7dBW	13.5dBW
Both channels, 4ohm load	8.7dBW	8.9dBW	8.8dBW
One channel, 2ohms, pulsed	–dBW	8.3dBW	–dBW
Instantaneous peak current		+4.0A	–3.6A
Distortion			
Total harmonic distortion,	20Hz	1kHz	20kHz
at rated power, aux input	–50.0dB	–52.0dB	–50.0dB
Intermodulation, 19/20kHz, rated power, aux input			–62.4dB
Intermodulation, 19/20kHz, at 0dBW, disc (mm)			–71.9dB
Intermodulation, 19/20kHz, at 0dBW, disc (mc)			–26.0dB
Noise			
Disc (mm) input (IHF, CCIR weighted)			–70.0dB
Disc (mc) input (IHF, CCIR weighted)			–67.0dB
Aux/CD input (IHF, CCIR weighted)			–82.7dB
Residual, unweighted (volume control at min)			–76.2dB
DC output offset			left 26mV, right 4mV
DC offset, pre-amp			left n/a mV, right n/a mV
Input overload	20Hz	1kHz	20kHz
Disc (mm) input (IHF)	21.6dB	29.9dB	29.8dB
Disc (mc) input (IHF)*	25.3dB	28.6dB	23.0dB
Aux/CD input (IHF)	>20dB	>20dB	>20dB
Stereo separation			
Disc input (mc)	66.9dB*	92.8dB	65.8dB
Aux input	66.6dB*	93.3dB	68.4dB
Output impedance (damping)	0.37ohm	0.41ohm	0.44ohm
Channel balance, disc, at 1kHz			0.15dB
Volume/balance tracking	0dB	–20dB	–60dB
Aux input	0.15dB	0.12dB	1.64dB
Input data	socket type	sensitivity	loading
Disc (mm) input		0.43mV	47kohms 120pF
Disc (mc) input		0.04mV	120kohms 0.20nF
Aux input		23mV	46kohms 50pF
Output, pre-amp (tape)			7.5V max, –ohms
Disc equalisation error, 30Hz-15kHz			+0dB, –2.75dB
Size (width, height, depth)			41×6.5×26cm
Typical price inc VAT			£209

*inc noise

Reauditioned



Disc input. RIAA equalisation accuracy

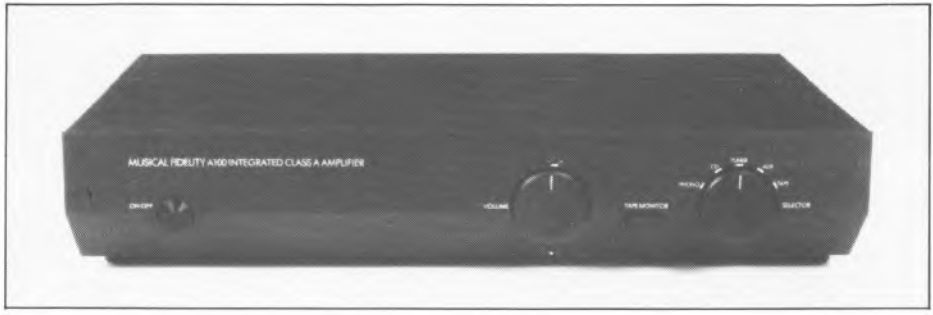


Power supply rejection, 40Hz input

RECOMMENDED

MUSICAL FIDELITY A100

MUSICAL FIDELITY LTD, UNIT 16, OLYMPIC TRADING ESTATE, FULTON ROAD, WEMBLEY HA9 0ND.
TEL: 01-900 2999



The *A100* is an ultra-simple integrated amplifier that operates in class A over a substantial part of its dynamic range. Clearly based closely on the successful *A1*, it is only when the units are actually placed next to each other that the physical differences become apparent. Front-to-back shelf depth has been held the same, but the others have been expanded while keeping the same overall proportions — the *'100* being higher and wider, not to mention heavier, with slightly more than twice the power output (50W instead of 20W), and nearly double the price (£400 instead of £209).

Highlighted by bright blue legends, the intelligently sculptured case is fabricated in ribbed black alloy to help dissipate the substantial waste heat of class A operation: on our sample the fit of these sections could have been better. A permanent internal fan further assists cooling, and this is slightly audible in quiet environments. Nothwithstanding these precautions, the high case temperature remains a matter of some concern: the thermal trip played an effective if infuriating role by interrupting our listening tests, though it refused to repeat the trick later on; rumour has it that eggs will cook slowly on the top surface!

Taking minimal facilities to its logical conclusion, *A100* even eliminates the (normally rather useful) balance control in the interests of simplifying the signal path. We are left with two large knobs for volume and input selection, plus pushbuttons for power on/off and tape monitoring, all of which are a little 'clunky' in operation. Phono sockets are used on the rear, internal switching selecting MC or MM cartridge sensitivities, while 4mm sockets provide for loudspeaker connection.

LAB REPORT

This is very much an extension of the *A1* design, but with a larger heatsink area and internal (gently audible) cooling fan. With a multi-transistor complementary low-noise MC disc input (IC) and high quality shunt/series regulation particularly in pre-amp section, the power amplifier uses complementary bi-polar output transistors operating largely in class A. The power supply has a toroidal transformer with substantial reservoir capacity.

The power characteristics look much more like a valve than a transistor amplifier. Meeting specification without problem into 8ohms, single channel, there was a substantial 5dBW loss into 4ohms. Peak current delivery is restricted, so this design is clearly not ideally suited to awkward or lowish impedance loudspeaker loads, and is somewhat restricted in loudness capability. The power supply modulation spectrogram looks a little alarming, but in fact most of the lines refer to a generally high level of simple harmonic distortion rather than mains-related spuriae.

The various distortion measurements all gave

poor results, though the harmonic products dropped significantly at lower drive levels. Signal-to-noise ratios and input overload margins were both quite acceptable, and stereo separation was very good. Input sensitivities should be fine, though volume/balance tracking went a little awry at low levels. The RIAA equalisation showed tight low frequency band-limiting particularly on moving-coil, and a mild ultrasonic rise on moving coil.

Sound Quality

Rating a very encouraging good on sound quality overall, even here there was some controversy among the listening panel. The *'100*'s main virtues of sweet midrange and treble seemed particularly well suited to classical music while the modest bass 'drive' was felt to be something of a handicap on rock material. Violin tone was particuarly liked. Stereo imagery received high praise for a transparency, space, depth and precision that is exceptional amongst integrated amplifiers, but the impressive sense of scale generated gave a slightly 'heavy' overall character that was not to all tastes.

Conclusions

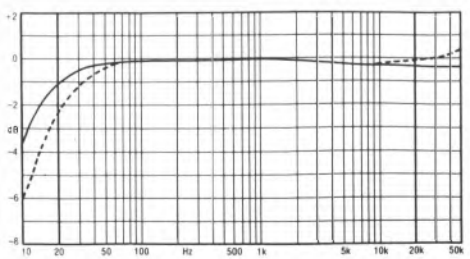
The fine results on listening demand recommendation, but this is something of an idiosyncratic product nonetheless, polarising opinions according to the relative importance to a listener of bass 'drive' versus treble 'sweetness'. It is fair to assume that the thermal cut-out problem was an isolated incident, but the fact that the case does get very hot in use should be borne in mind, by those with young children for example. The technical weaknesses do leave some room for improvement and suggest partnership with a 'kind' loudspeaker of highish impedance, but the fine transparency for the price demands recognition.

Test measurements

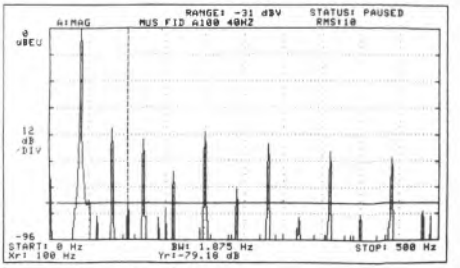
To show how well the amplifier sustains its 8ohm output into real loudspeaker loads, the level into 4ohms and 2ohms is given in dBW (where 0dB=1W), without adding 3dB or 6dB respectively, as in usual 'power' ratings.

Test Results

Power output			Integrated amplifier
Rated power into 8ohms, maker's spec			50W(=17dBW)
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	17.8dBW	17.7dBW	17.1dBW
Both channels, 4ohm load	13.4dBW	12.6dBW	12.0dBW
One channel, 2ohms, pulsed	–dBW	12.0dBW	–dBW
Instantaneous peak current		+6A	–6A
Distortion			
Total harmonic distortion,	20Hz	1kHz	20kHz
at rated power, aux/CD input	–36dB	–35dB	–34dB
Intermodulation, 19/20kHz, rated power, aux input			–46dB
Intermodulation, 19/20kHz, at 0dBW, disc (mm)			–46dB
Intermodulation, 19/20kHz, at 0dBW, disc (mc)			–40dB
Noise			
Disc (mm) input (IHF, CCIR weighted)			–76dB
Disc (mc) input (IHF, CCIR weighted)			–68dB
Aux/CD input (IHF, CCIR weighted)			–70dB
Residual, unweighted (volume control at min)			–80dB
DC output offset			left <20mV, right <20mV
Input overload	20Hz	1kHz	20kHz
Disc (mm) input (IHF)	31dB	29.5dB	29.5dB
Disc (mc) input (IHF)*	34dB	27.5dB	28.5dB
Aux/CD input (IHF)	>20dB	>20dB	>20dB
Stereo separation			
Disc input (mm)	68dB	75dB	67dB
Aux/CD input	70dB	93dB	76dB
Output impedance (damping)	0.4ohm	0.37ohm	0.42ohm
Channel balance, disc, at 1kHz			0.04dB
Volume/balance tracking	0dB	–20dB	–60dB
Aux/CD input	0.3dB	0.1dB	5dB
Input data	socket type	sensitivity	loading
Disc (mm) input	Phono	0.32mV	47kohms n/a pF
Disc (mc) input*	Phono	0.027mV	47kohms n/a nF
Aux/CD input	Phono	18mV	47kohms 20pF
Output, pre-amp (tape)			3.31V max, 980ohms
Disc equalisation error, 30Hz-15kHz			+0dB, –1dB
Size (width, height, depth)			44×9×25cm
Typical price inc VAT			£400



Disc input. RIAA equalisation accuracy



Power supply rejection, 40Hz input

RECOMMENDED

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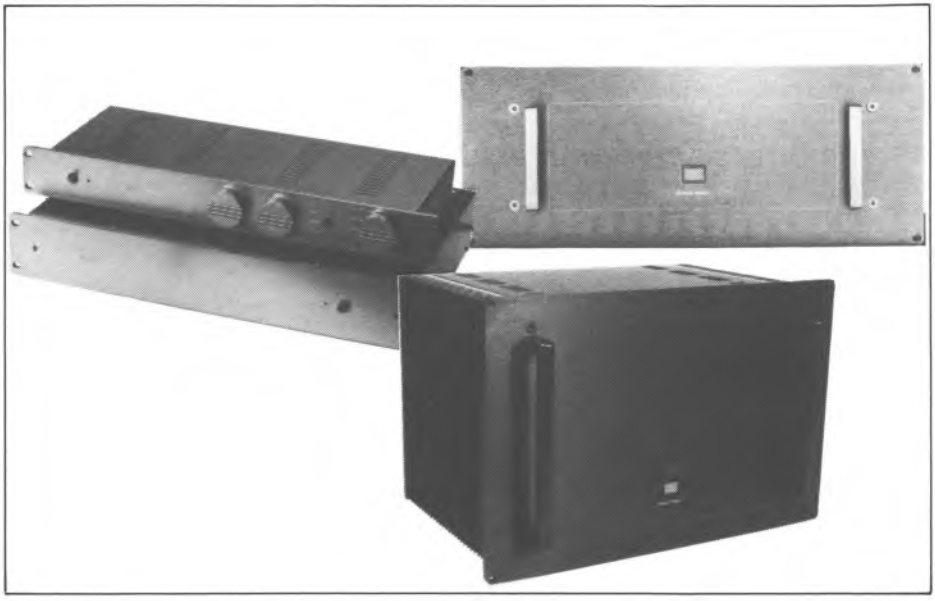


The fastest growing amplifier specialist for many a year, Musical Fidelity have hitherto had the somewhat irritating habit of updating their models at a similarly rapid rate, to the point where the reviewer at least finds it difficult to keep up. The overall format has now stabilised with two pre-amplifiers, the £300 *The Preamp 2a* (pronounced pre-amp), and the £1,000 *MVT*; and three power amplifiers, the *P170*, *P270* and *A370*, at £500, £1,000 and £2,000.

Our knowledge of *The Preamp 2a* is limited, being based upon the *Mk1* model at least two upgrades ago, but this simple 'straight line' model was warmly recommended in its day and presumably continues to maintain a competitive position. The basic data on the *MVT* and *P170* goes back to early 1986, but we have subsequently re-auditioned the *MVT* once (we understand that a *Mk II* upgrade is imminent), and the *P170* twice, along with minor circuit improvements. The *P270* was originally reviewed at the beginning of 1987 for *The Collection II*, with the *A370* making its debut in this issue, compiled into this composite review for brevity's sake.

Where *The Preamp 2a* is a compact unit, the *MVT* is more conventional in appearance, with a heavy full-width anodised front panel complete with rack-mount 'ears'. Both units are tersely simple in facilities, accomodating moving-coil and moving magnet cartridges but otherwise restricted to input selection, tape monitoring and volume — *MVT* possessing the additional luxury of a balance control!

The power amplifiers all follow the *MVT* style, sharing a common width with dark grey heavy anodised front plates equipped (theoretically at least) for racking, and with an excellent standard of external finish. All are basically double-mono in internal construction, with IC op-amp inputs and multiple complementary FET outputs. But besides offering 2dBW steps in output

power as one goes up the range, each successive model operates in class A over a greater part of its dynamic range.

Consequently the *P170* is largely class B and is housed in a slimline case, with a rating of 85W (19dBW). The 21dBW *P270* occupies three times the vertical height and half as much depth again in order to provide the power supply and cooling necessary for working in class A over 20-30% of its dynamic range. The *A370*, its prefix indicating a much closer approach to full class A operation, is nearly twice the height — looking almost cuboid and far from elegant.

Class A operation above all means the substantial production of waste heat all the time that the amplifier is on. A nice by-product is of course that everything warms up quickly after switch on, but when you've got a black cube sitting in the room with a case temperature of around 60°C, it's generating as much as a small radiator. Nice in the winter, when you can just turn the heating down, but not so convenient for summer listeners — in this respect the big MF power amps are better suited to outdoor types or those with air-conditioning.

Attention to constuctional detail is reflected in single strand LC internal wiring and custom polypropylene capacitors. The '370 reservoirs total 100,000uF per channel, using selected Japanese audio premium electrolytics, and other special components are used elsewhere.

Lab Report

The *MVT* pre-amp measured well in every respect, with accurate RIAA, low distortion and ample overload margins. The *P170* comfortably beat its rated power into 8ohms, but showed some restriction towards frequency extremes and into lower impedances. However, peak current delivery and high frequency intermodulation were both exceptional.

Likewise the *270* comfortably exceeded its rating on test; generally well maintained into lower impedances, the ultimate current delivery of +25/−27A peak to peak is not exceptional — this is not really a bargain-price Scintilla driver. There was an odd 1dB peaking in the frequency response at 20Hz, while the output impedance is high enough to cause slight response differences with low impedance loudspeakers.

The '370 delivered a comfortable 200+W per

Test Results

MVT/P170 Pre- and power amplifier

Rated power into 8ohms, maker's spec		85W(=19dBW)	
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	20.3dBW	21.0dBW	17.4dBW
Both channels, 4ohm load	17.7dBW	18.9dBW	16.6dBW
One channel, 2ohms, pulsed	−dBW	14.7dBW	−dBW
Instantaneous peak current		+8.0A	−9.5A
Total harmonic distortion,	20Hz	1kHz	20kHz
at rated power, aux input	−88.0dB	−94.0dB	−82.9dB
Noise			
Disc (mm) input (IHF, CCIR weighted)			−77.0dB
Disc (mc) input (IHF, CCIR weighted)			−72.5dB
Aux/CD input (IHF, CCIR weighted)			−93.0dB
Input overload	20Hz	1kHz	20kHz
Disc (mm) input (IHF)	32.0dB	31.9dB	31.2dB
Disc (mc) input (IHF)	27.0dB	25.7dB	25.7dB
Aux/CD input (IHF)	>20dB	>20dB	>20dB
Input data	socket type	sensitivity	loading
Disc (mm) input	Phono	1.78mV	46kohms 60pF
Disc (mc) input	Phono	0.09mV	94kohms 25pF
Aux input	Phono	89mV	45kohms −pF
Power amp	Phono/XLR	n/a	n/a n/a
Outputs, pre-amp		7.8V max, 100ohms	
Disc equalisation error, 30Hz-15kHz		+0dB, −0.34dB	
Size (width, height, depth)	48 × 6 × 20.5cm, 48 × 6 × 23cm		
Typical price inc VAT		£990, £460	

First reviewed: 1986. Rating: Recommended.

Test Results

P270 Integrated amplifier

Power output			
Rated power into 8ohms, maker's spec		135W(=21dBW)	
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	23.7dBW	23.7dBW	23.5dBW
Both channels, 4ohm load	22.6dBW	22.6dBW	22.3dBW
One channel, 2ohms, pulsed	−dBW	23.6dBW	−dBW
Instantaneous peak current		+25, −27A	
Distortion			
Total harmonic distortion,	20Hz	1kHz	20kHz
at rated power, aux input	−78dB	−87dB	−72dB
Intermodulation, 19/20kHz, rated power, aux input		−98dB	
Intermodulation, 19/20kHz, at 0dBW, disc (mm)		−97dB	
Noise 'A' wtd		−84dB(0dBW), −105dB(full output)	
DC output offset		left 0mV, right 0mV	
Output impedance (damping)	0.13ohm	0.13ohm	0.13ohm
Channel balance, disc, at 1kHz		0.06dB	
Input	phonos	93mV	84kohm 4.4nF
Size (width, height, depth)		48×18×31cm	
Typical price inc VAT		£1,000	

First reviewed: The Collection 1987

Test Results

A370 Integrated amplifier

Power output			
Rated power into 8ohms, maker's spec		185W(=22.5dBW)	
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	23.9dBW	24.0dBW	23.5dBW
Both channels, 4ohm load	23.0dBW	23.1dBW	22.6dBW
One channel, 2ohms, pulsed	−dBW	24.5dBW	−dBW
Instantaneous peak current		+59, −58A	
Distortion			
Total harmonic distortion,	20Hz	1kHz	20kHz
at rated power, aux input	−90dB	−93dB	−82dB
Intermodulation, 19/20kHz, rated power, aux input		−95dB	
DC output offset		left −33mV, right −20mV	
Aux/CD input	120dB	118dB	98dB
Output impedance (damping)	0.12ohm	0.12ohm	0.13ohm
Channel balance, disc, at 1kHz		0.04dB	
Power amp	1,500mV	100kohms	200pf
Size (width, height, depth)		48×33×31cm	
Typical price inc VAT		£2,000	

Continued from previous page

channel, with good bandwidth and load tolerance, backed by a substantial peak current output of +59/−58A. The power supply modulation spectrogram was particularly clean, and other measurements all meet high standards. A small +0.5dB response rise at 10Hz was noted.

Sound Quality

Latest samples confirm that the *MVT* remains competitive. It was particularly liked for the vocal range though the extreme bass and treble attracted less enthusiasm, with some congestion and untidiness, and the overall sound had its own distinct character.

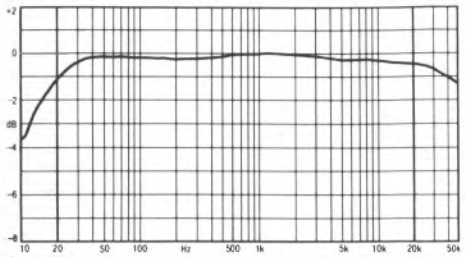
The *'170* was last auditioned simultaneously with its bigger brethren, and continues to rate 'good plus'. Slightly 'larger than life', it produced fine stereo images with good dynamics, but was a little 'untidy' and lacked some subtlety in the comparison.

The *'270*'s fundamental character was a little rich, with some criticism of bass uneveness and 'speed', but an appreciation of good staging with scale, detail and clarity. The treble was a trifle bright, lacking some fine detail but still quite sweet.

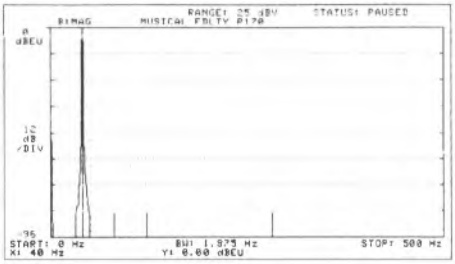
The *A370* is arguably the finest sounding power amplifier manufactured in the UK, bearing comparison with significantly more expensive American alternatives. Effortless weight and scale, accompanied by fine neutrality and control creates unusually solid and convincing images, giving a rare 'very good' overall rating.

Conclusions

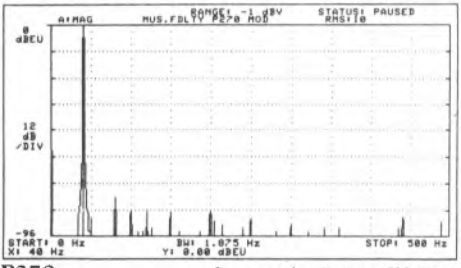
Lacking recent experience of *The Preamp 2a*, we advise you to check for yourself here, but there is no doubt that the *MVT* delivers a fully recommendable sound quality in an attractive and competitive package. Much the same can be said of the power amplifiers, each representing a step up from its predecessor with the *A370* capable of sonically rivalling far more expensive imported exotica. Each has its own character, so audition is certainly worthwhile, but each may be comfortably recommended providing the 'hot box' aspect of the larger models is born in mind.



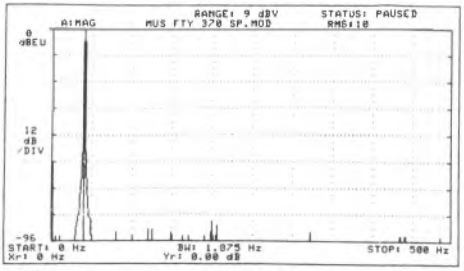
MVT *Disc input. RIAA equalisation accuracy*



P170 *Power supply rejection, 40Hz input*



P270 *Power supply rejection, 40Hz input*



A370 *Power supply rejection, 40Hz input*

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TT2 RECOMMENDED 1983, 1984, 1985 – **HI-FI CHOICE**. "IN TERMS OF PERFORMANCE THE TT2 CAN BE WELCOMED TO THE SELECT BAND OF HIGH QUALITY UNITS" **GRAMAPHONE 1984**. " EXCELLENT WELL MADE. ABOVE AVERAGE PERFORMANCE" **HI-FI ANSWERS 1983**. "THE TT2 IS A SUPERIOR PRODUCT" **HI-FI NEWS 1984**.
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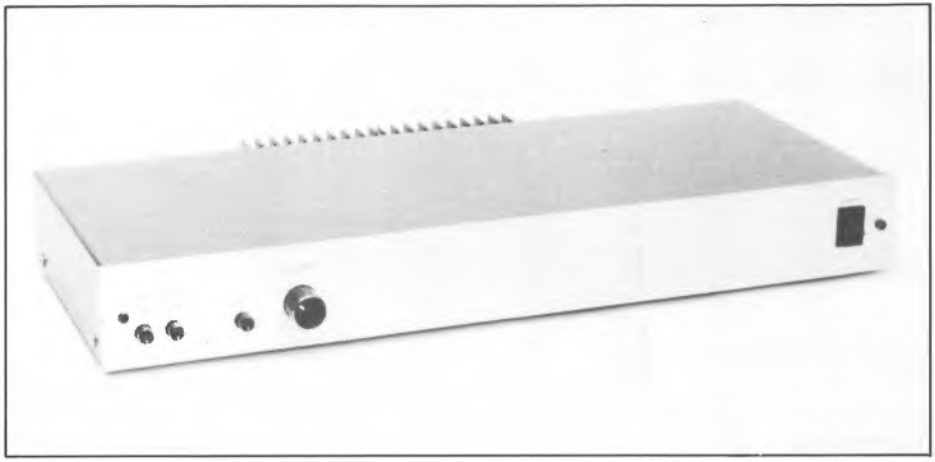


The *TMA3* is an example of an amplifier built to very high standards but in low production volumes. The company concerned is small but dedicated, and have designed this no-frills, low-line integrated amplifier to give a normal-use output of 40W per channel.

Appearance is distinctive, with a cobalt blue case complemented by a satin silver alloy front panel; black finish is now available at a slightly higher price. The controls are reduced to a bare minimum, namely power, volume and just two selector buttons whose various combinations produce tape, tuner, CD and LP disc. All inputs are DIN sockets except for LP disc.

Internal construction is a model of its kind with neat cabling, clear layout, and fully shrouded mains wiring and contacts. Both moving coil and moving magnet cartridges are catered for by plug-in boards, and various loading requirements may be readily met.

A combination of integrated circuit and discrete transistor technology is employed, each where considered appropriate. *Via* mc the input is a virtual earth or shunt feedback current input, considered by many to be the ideal loading, and an input buffer is placed before the RIAA equaliser stage. The moving-magnet offers the normal cartridge loading.

The CD input bypasses the line buffer and is fed directly to the power amplifier *via* the volume control. The impedance here is a satisfactory 12kohms while the normal auxiliary input is higher at 17kohms.

Remarkably simple, the power amplifier is based on a classic Hitachi circuit, with only five transistors. The output is direct coupled complementary with Hitachi 2SK226/2SJ82 MOSFET output devices coupled to the speakers *via* a 2.5amp quick blow fuse.

LAB REPORT

Rated output was comfortably exceeded, with the peak programme output near to 17dBW (50W) per channel with an excellent power bandwidth shown at 16.7dBW. The output held well into 4ohms, while the 2ohm pulsed level was only 2dB below the 8ohm result. The ±12A peak current was sufficient for the rating, and good overall load tolerance was shown.

Harmonic distortion had deteriorated by 20kHz, measuring only −50dB at full power with considerable crossover effects. The high

frequency intermodulation results were fine, however, so distortion was not considered a real cause for concern. Input noise levels were fine while input overload levels were satisfactory. Note that the mc figures relate to EMF at the input, whereas in practice the shunt design implies much better figures using a real cartridge. Channel separation was above average, while volume tracking was excellent. Above 200Hz, the RIAA equalisation was most uniform, but the subsonic filter rolloff incorporated rolls off a little early in the audible bass register, and may account for the 'light' character *via* LP disc.

Sound Quality

Scoring above average, a rating re-affirmed in 1987, the *TMA3* sounded a trifle 'lean', even bright, in tonal balance terms, but this did not impart noticeable 'brittleness'. Tidy and well integrated in character, it provided moderate depth to the stereo images, and above average focus. The bass was found to lack some definition, and did not throw full 'weight'.

The quality held up well *via* disc (mm), but *via* mc some additional loss of definition and clarity was observed. It behaved well at full power into the normal load, providing 102.5dBA, with 101dBA into the adverse load.

Conclusions

This excellently constructed, compact integrated amplifier offers well matched inputs, no frills, and a dependable performance with good load tolerance. It should offer a long life, and with the above average sound quality, definitely merits consideration, recent price increases blunting its competitiveness somewhat.

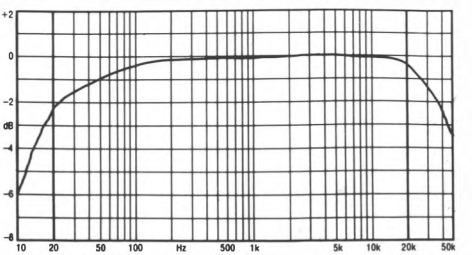
Test measurements

To show how well the amplifier sustains its 8ohm output into real loudspeaker loads, the level into 4ohms and 2ohms is given in dBW (where 0dB=1W), without adding 3dB or 6dB respectively, as in usual 'power' ratings.

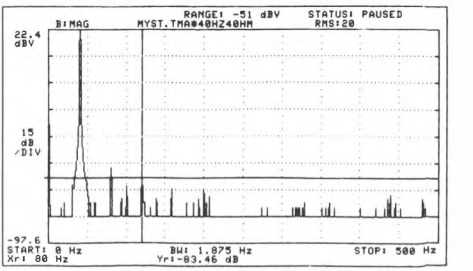
Test Results

Power output			Integrated amplifier
Rated power into 8ohms, maker's spec			35W(=15dBW)
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	16.7dBW	16.7dBW	16.7dBW
Both channels, 4ohm load	14.2dBW	14.3dBW	14.3dBW
One channel, 2ohms, pulsed	−dBW	14.6dBW	−dBW
Instantaneous peak current		+12.0A	−12.0A
Distortion			
Total harmonic distortion,	20Hz	1kHz	20kHz
at rated power, aux input	−80.0dB	−68.0dB	−50.0dB
Intermodulation, 19/20kHz, rated power, aux input			−75.0dB
Intermodulation, 19/20kHz, at 0dBW, disc (mm)			−77.0dB
Intermodulation, 19/20kHz, at 0dBW, disc (mc)			−74.0dB
Noise			
Disc (mm) input (IHF, CCIR weighted)			−66.0dB
Disc (mc) input (IHF, CCIR weighted)			−66.0dB
Aux/CD input (IHF, CCIR weighted)			−72.0dB
Residual, unweighted (volume control at min)			−78.0dB
DC output offset			left 13mV, right 6mV
DC offset, pre-amp			left nilmV, right nilmV
Input overload	20Hz	1kHz	20kHz
Disc (mm) input (IHF)	20.0dB	20.0dB	20.0dB
Disc (mc) input (IHF)*	10.0dB	6.0dB	6.0dB
Aux/CD input (IHF)	>20dB	>20dB	>20dB
Stereo separation			
Disc input (mm)	−70.0dB	70.0dB	64.0dB
Aux input	77.0dB	71.0dB	55.0dB
Output impedance (damping)	0.095ohm	0.096ohm	0.11ohm
Channel balance, disc, at 1kHz			0.4dB
Volume/balance tracking	0dB	−20dB	−60dB
Aux input	0.3dB	0.2dB	0.1dB
Input data	socket type	sensitivity	loading
Disc (mm) input	Phono	63mV✓	47kohms 200pF
Disc (mc) input*	Phono	see text	see text
Aux input	DIN	40.0mV	−50.0kohms 110pF
Power amp	n/a	n/a mV	n/a kohms n/a pF
Output, pre-amp (tape)			00.0V max, 000ohms
Disc equalisation error, 30Hz-15kHz			+0.08dB, −0.55dB
Size (width, height, depth)			43×21.5×6cm
Typical price inc VAT			£288

First reviewed 1985. Reassessed 1987



Disc input. RIAA equalisation accuracy



Power supply rejection, 40Hz input

BEST BUY

NAD 3020e

NAD SALES, COUSTEAU HOUSE, GREYCAINE ROAD, WATFORD, HERTS WD2 4SB.
TEL: (0923) 26499

Though interim versions have risen steadily in price over the years, this new *e* suffixed *3020* brings the price back down to £109 — near its original launch level of some six years ago. The original *3020* swept all before it for a year or two until other manufacturers woke up to the fact that there was money in sound quality. The overall concept has been retained, so this is essentially the same simple, integrated amplifier which seeks to present better sound quality through the careful omission of some, but not all of the 'frills'.

It is neatly presented with a logical control layout and 'camouflage' dark brown finish to high enough standards. The single large volume control is backed by rotaries for tone and balance, with no tone defeat switching, while the seven pushbuttons, in three groups, provide power on/off, input selection including tape monitoring, plus mono/stereo and −20dB muting (the telephone answering switch). The rear panel connections are phonos, the disc input accommodating moving magnet cartridges only. Speaker terminals are (still) cheap spring-loaded types, while small switches select optimum power matching to 4ohm (normal) or 8ohm loudspeaker load, and optional 'soft clipping' circuitry the use of which is recommended to provide a sweeter sound when driving at continuous high levels.

LAB REPORT

This is the classic NAD *3020* design but with some 'streamlining' to keep costs down. Using a conventional direct coupled complementary bi-polar output configuration, component layout benefits from a single board construction, but with rather untidy wiring looping around. The circuitry is all discrete and some care has clearly been taken over bandwidth noise suppression and stage matching, but there was clearly insufficient budget available for special audiophile components. The power supply is standard enough, internal mains connections were unshrouded, and there was also some evidence of Taiwanese production economies.

Rated at only 20W, the measured power de-

livery was really quite generous for such a modestly priced model. It was respectably maintained into lower impedance, and current capability was again very respectable at this price level. The quality of the power supply itself is confirmed in the excellent power supply modulation spectrogram results, where mains and distortion effects are notable for their near absence.

Distortions were all low and signal-to-noise ratios very good, as were overload margins and stereo separation results. Volume tracking calibration and input sensitivities were also fine, while the RIAA equalisation curve shows sensible bandlimiting plus slight bass cut/treble boost, sufficient perhaps to 'lighten' the subjective balance of the amplifier a trifle.

Sound Quality

Rated securely above average, NAD have manged to keep the essential sonic character of the *3020* despite their production economies in this version, and it is further to their credit that this basic design has remained competitive for such a long time. The balance remains a little on the 'light and bright' side of neutral to be sure, but the result is attractively airy and quite transparent, if a trifle 'softened'. Though falling well short of the best, the stereo image presentation and the overall integration were praised, and the sound was reasonably lively, but listeners also noted some lack of 'weight', 'speed' and incisiveness.

Conclusions

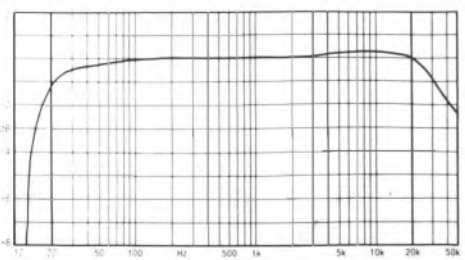
NAD continue to brew a fine budget amplifier, and have also managed to keep the price sharp against the immediate competition, despite working from a design basis that is now several years old. At the typical £110 the *3020e* is clearly Best Buy material, with a clean laboratory bill of health and generally high standards of construction. It has its own distinctive subjective character, a little light in balance and 'weight', so may not suit all tastes equally, but is undoubtedly superior to run of the mill budget amplifiers.

Test measurements

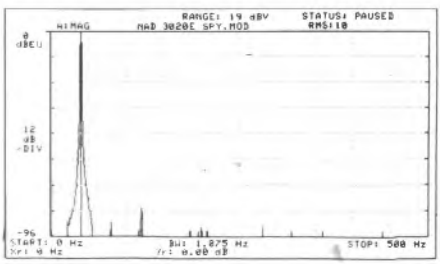
To show how well the amplifier sustains its 8ohm output into real loudspeaker loads, the level into 4ohms and 2ohms is given in dBW (where 0dB=1W), without adding 3dB or 6dB respectively, as in usual 'power' ratings.

Test Results

Power output			Integrated amplifier
Rated power into 8ohms, maker's spec			20W(=13dBW)
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	15.2dBW	15.7dBW	15.3dBW
Both channels, 4ohm load	11.5dBW	13.3dBW	12.7dBW
One channel, 2ohms, pulsed	–dBW	13.8dBW	–dBW
Instantaneous peak current		+12A	–11.0A
Distortion			
Total harmonic distortion,	20Hz	1kHz	20kHz
at rated power, aux input	–90dB	–96dB	–73dB
Intermodulation, 19/20kHz, rated power, aux input			–85dB
Intermodulation, 19/20kHz, at 0dBW, disc (mm)			–72dB
Noise			
Disc (mm) input (IHF, CCIR weighted)			–75.0dB
Aux/CD input (IHF, CCIR weighted)			–81dB
Residual, unweighted (volume control at min)			–89dB
DC output offset		left +1mV, right +2mV	
Input overload	20Hz	1kHz	20kHz
Disc (mm) input (IHF)	34.8dB	33.7dB	32dB
Aux/CD input (IHF)	>20dB	>20dB	>20dB
Stereo separation			
Disc input (mm)	74dB	76dB	62dB
Aux input	75dB	75dB	61dB
Output impedance (damping)	0.18ohm	0.18ohm	0.2ohm
Channel balance, disc, at 1kHz			0.13dB
Volume/balance tracking	0dB	–20dB	–60dB
Aux input	0.05dB	0.03dB	0.37dB
Input data	socket type	sensitivity	loading
Disc (mm) input	Phono	0.51mV	47kohms 70pF
Aux input	Phono	340mV	48kohms 80pF
Output, pre-amp (tape)			15.1V max, 1.6ohms
Disc equalisation error, 30Hz-15kHz			+0.26dB, –0.45dB
Size (width, height, depth)			42×9×28cm
Typical price inc VAT			£110



Disc input. RIAA equalisation accuracy



Power supply rejection, 40Hz input

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RECOMMENDED

NAIM NAIT

NAIM AUDIO LTD, SOUTHAMPTON ROAD, SALISBURY SP1 2LN.
TEL: (0722) 332266

The *NAIT*, Naim's inexpensive integrated amplifier, offers an 'unspecified' low output power, with a 'straightline' circut design format. Tape tuner, and disc mm inputs are provided, the first two in DIN and the disc in phono. Controls comprise push-button selectors, balance and volume. The unit is built in traditional Naim extruded alloy case with black textured finish and satin polished front edge. The effect is simple and clean, this aspect also reflected by the interior, which from an engineering viewpoint is most elegant.

A single printed circut board is well laid out, using good quality components. A toroidal transformer supplies the modest reservoir capacitors, chosen to give a quick recovery as well as high peak current capacity. The output stage is fully complementary direct-coupled, while the electronic protection integrates voltage and current against time, and allows the use of complex loads. In fact the circuitry is largely borrowed from Naim's more costly amplifier line.

LAB REPORT

Hearsay suggests a 15W programme rating (12dBW), though Naim offer no specifications whatever. Measurement indicated 13dBW over the audio bandwidth, with a fair tolerance of 4ohm loading on continuous duty. The peak current delivery was fine for the size of amplifier, with the 8ohm peak output level measuring 13.5dBW and still holding up well at 11.3dBW for the 'extreme' 2ohm load.

Harmonic distortion was just satisfactory at 20kHz, but improved at lower frequencies. *Via* aux the full-power intermodulation was fine, but *via* disc at a lower output it was less impressive. The input signal level was closer to the disc overload point in this test. Signal-to-noise ratios were fine, though the disc input sensitivity was lower than average. Disc input overloads were satisfactory and stereo separation about average, with output impedance negligible and channel balance good, except at the lowest volume settings.

While the auxiliary frequency response was essentially flat, the disc input showed a mildly rising characteristic, with fair agreement to the IEC rolloff in the bass. Mild lift around 7kHz and a subjective treble rolloff of −1.5dB at 20kHz were also apparent. Such a response may help to 'flatter' inexpensive mm cartridges.

Sound Quality

The *NAIT* was found to produce a clear crisp sound with a surprisingly good exposition of the depth and atmosphere present on many recordings. It played louder than expected, louder in fact than the peak programme ratings suggested, due to its good subjective behaviour into mild clipping. For the normal loudspeaker load it provided 97.5dBA, with 95.5dBA into the adverse load.

Via disc the tonal balance was trifle thin, but vocal detail was impressive with decent focus and depth rendition. The bass was not perfect, yet it seemed articulate and gave a good impression nonetheless. The treble was not too precise, but did not raise objections from the panelists.

On auxiliary input, the sound quality was better still, with the detail and mid transparency of this design remaining its strongest point. Overall the effect was that of a lively, involving and musical sound, one which bore comparison with some of the best.

Conclusions

Despite its mild RIAA response aberration, which in a sense is inextricably bound up with any judgement of sound quality, and also bearing in mind the modest output, the *NAIT* must nevertheless be viewed favourably. Possessing an excellent build quality and good load tolerance, it also delivered a sound which stood up to its immediate competition. With little hesitation, the NAIT deserves recommendation.

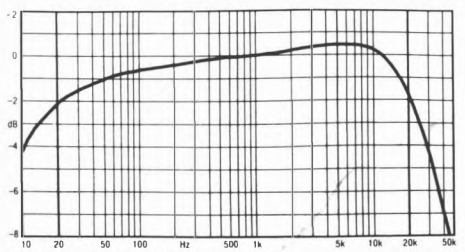
Test measurements

To show how well the amplifier sustains its 8ohm output into real loudspeaker loads, the level into 4ohms and 2ohms is given in dBW (where 0dB=1W), without adding 3dB or 6dB respectively, as in usual 'power' ratings.

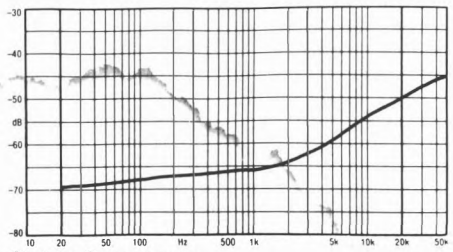
Test Results

Power output			Integrated amplifier
Rated power into 8ohms, maker's spec			15W(=12.5dBW)
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	13.0dBW	13.3dBW	13.1dBW
Both channels, 4ohm load	10.0dBW	11.6dBW	11.4dBW
One channel, 2ohms, pulsed	9.4dBW	11.3dBW	10.9dBW
Instantaneous peak current		+9A	−9A
Distortion			
Total harmonic distortion,	20Hz	1kHz	20kHz
at rated power, aux input	−68dB	−72dB	−51dB
Intermodulation, 19/20kHz, rated power, aux input			−70dB
Intermodulation, 19/20kHz, at 0dBW, disc (mm)			−52dB
Noise			
Disc (mm) input (IHF, CCIR weighted)			−78dB
Aux/CD input (IHF, CCIR weighted)			−80dB
Residual, unweighted (volume control at min)			−75dB
DC output offset			2mV
Input overload	20Hz	1kHz	20kHz
Disc (mm) input (IHF)	25dB	25.5dB	24dB
Aux/CD input (IHF)	>20dB	>20dB	>20dB
Stereo separation			
Disc input (mm)	−69dB	−66dB	−50dB
Aux input	−68dB	−66dB	−42dB
Output impedance (damping)	0.03ohm	0.04ohm	0.04ohm
Channel balance, disc, at 1kHz			0.3dB
Volume/balance tracking	0dB	−20dB	−60dB
Aux input	0dB	0.3dB	8.1dB
Input data	socket type	sensitivity	loading
Disc (mm) input	Phono	0.52mV	46kohms 140pF
Aux input	DIN	21.1mV	61kohms 220pF
Disc equalisation error, 30Hz-15kHz			+0.5dB, −1.5dB
Size (width, height, depth)			28×22×7.5cm
Typical price inc VAT			£242

First reviewed 1983



Disc input. RIAA equalisation accuracy



Disc input: Stereo separation

RECOMMENDED

NAIM AUDIO SEPARATES

NAIM AUDIO LTD, SOUTHAMPTON ROAD, SALISBURY SP1 2LN.
TEL: (0722) 332266

The various building blocks in the Naim range consist of two pre-amps (broadly similar in performance but with different facilities), two pre-amp power supplies, an active filter unit, plus three power amplifiers. Between them they can be combined in enough ways to fill the colour-coded wallchart looking a little like a railway marshalling yard schematic which Naim have produced.

The simplest configuration combines the *NAC42-5* or *NAC32-5* pre-amp with *NAP110* or *NAP140* power amplifiers (the *'140* is a recent upgrade on the *'110*, but both remain available); in this instance the pre-amp draws power from the power amplifier. The next stage involves adding a separate power supply for the pre-amp, either the smaller SNAPS or the heavyweight *HI-CAP*. Thus far each unit is contained within attractively discreet black alloy 'half width' boxes.

Except in special circumstances, the power amplifier improvements are considered best left until the pre-amp is fully extended. The next step up the ladder is the famous *NAP250* - possibly the longest standing amplifier still in current production. This is a full-width model rated at 70W/channel with four regulated power supplies, two of which utilise the same transistors as the output. The final passive step is the *NAP135* monoblock, of similar power rating and size as the *'250* but with improved supplies and a built-in cooling fan. This only comes into operation when the amplifier is working very hard, so it is effectively inaudible.

The passive ladder brings a maximum amplification price of around £2,700, but a price premium of around £750 can bring a neat transfer to the active ladder, by adding an active crossover unit and its accompanying *HI-CAP*. Currently Naim's active systems are oriented towards their own and Linn's loudspeakers, though there is no specific electronic equalisation within the filters so suitably wired alternative speakers are certainly theoretically possible. There are alternative crossovers for two-way and three-way loudspeakers, for which one can use two or three *NAP250s*, or four or six *NAP135s*. The full 'six pack' carries a total amplification price of around £7,000, which is well up into 'high end' territory if still a little paltry compared with some US offerings.

The pre-amps are simple affairs with minimal facilities — volume, balance and input selection, plus mute and tape monitoring. Inside, a series of sub-boards are plugged onto a main

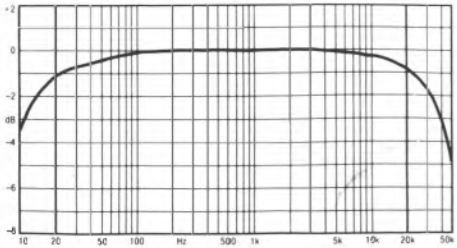
motherboard, allowing substitution for different cartridge matching or upgrading. Both mm and m-c disc boards contain appropriate equalisation and amplification in a single stage.

Fed up with the limitations of phono sockets, Naim have had the temerity to fit *BNCs* for their disc inputs — which is fundamentally an advantage, though inconvenient for dealers and reviewers! Again eschewing phonos (and causing further inconvenience), *XLR* and DIN socketry in various configurations is used throughout the remaining Naim interconnects, appropriate leads with good quality locking plugs being provided. The power amplifiers are entirely plain, their substantial alloy casings providing the heatsinking (fan supplemented on *'135*). The rear loudspeaker terminals are simply recessed banana sockets — wire wrapping and spade terminals are regarded as suffering from gradual material compression, whereas a sprung banana plug preserves contact pressure and self-wipes on insertion.

Lab Report

The basic design configuration is bi-polar quasi-complementary, using selected high speed devices. Lack of output filtering requires the inductance provided by about 3m of Naim cable, so some caution should be taken with unknown exotic types. For similar reasons, there is a tendency to pick up RF breakthrough and mains-borne interference. Both these effects are unpredictable, depending upon the particular site, and seem to affect a fairly small percentage.

Naim amplifiers have always delivered a thoroughly sound if unspectacular lab performance. The *'250* for example, rated at 70W/8ohms, delivers a fine power bandwidth into 8 and 4ohms, still holding up respectably into 2ohms with current delivery of +/−16A.



Disc input. RIAA equalisation accuracy

The disc frequency response shows a precisely tailored characteristic, very flat through most of the range but rolled off fairly early at the extremes, −1dB points being at 20Hz and 20kHz, with acceleration beyond.

Sound Quality

While there is little to complain about in terms of musical communication — the Naims are very involving, lively and informative, delivering a high 'boogie factor' with realistic dynamic shading — the sonics have a distinct character that is not to every taste. There is little of the 'air', 'space' and transparency that is usually associated with an 'audiophile' sound, while imaging sounds rather 'shut in' and constrained in depth.

Conclusions

The Naims continue to merit recommendation, subject to personal taste and appropriate system matching, for they do seem to perform best in a known and controlled context. There is impressive subjective commonality and coherence as one moves up the range, each step clearly audible, while excellent build quality and a good record on avoiding obsolescence are further plus points.

Test Results

NAC 32/250	Pre- and power amplifier		
Rated power into 8ohms, maker's spec	70W(=18dBW)		
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	19.0dBW	19.0dBW	19.0dBW
Both channels, 4ohm load	18.3dBW	18.3dBW	18.3dBW
One channel, 2ohms, pulsed	16.3dBW	16.5dBW	16.9dBW
Instantaneous peak current		+16A	−16A
Total harmonic distortion,	20Hz	1kHz	20kHz
at rated power, aux input	−80dB	−80dB	−63dB
Noise			
Disc (mm) input (IHF, CCIR weighted)			−79dB
Disc (mc) input (IHF, CCIR weighted)			−72dB
Aux/CD input (IHF, CCIR weighted)			−80dB
Input overload	20Hz	1kHz	20kHz
Disc (mm) input (IHF)	30dB	32dB	32dB
Disc (mc) input (IHF)	25dB	25dB	25dB
Aux/CD input (IHF)	>20dB	>20dB	>20dB
Input data	socket type	sensitivity	loading
Disc (mm) input	Phono	0.20mV	46kohms 100pF
Disc (mc) input	Phono	0.01mV	1kohm
Aux input	DIN	10.3mV	20kohms 220pF
Power amp	XLR	105.4mV	18kohms 190pF
Output, pre-amp (tape)	7.7V max, 4.9ohms		
Disc equalisation error, 30Hz-15kHz	+0dB, −0.7dB		
Size (width, height, depth)	32 × 20.5 × 8.5cm, 32 × 43.5 × 8.5cm		
Typical price inc VAT	£425, £960 (Hi-Cap power supply, £385 extra)		

First reviewed: NAC32/250, 1983; NAP135, 1985. For full lab report on NAP135, see issue 39.

RECOMMENDED

NUANCE/PLENITUDE

PRESENCE AUDIO, EASTLAND HOUSE, PLUMMERS PLAIN, HORSHAM, WEST SUSSEX RH13 6NY.
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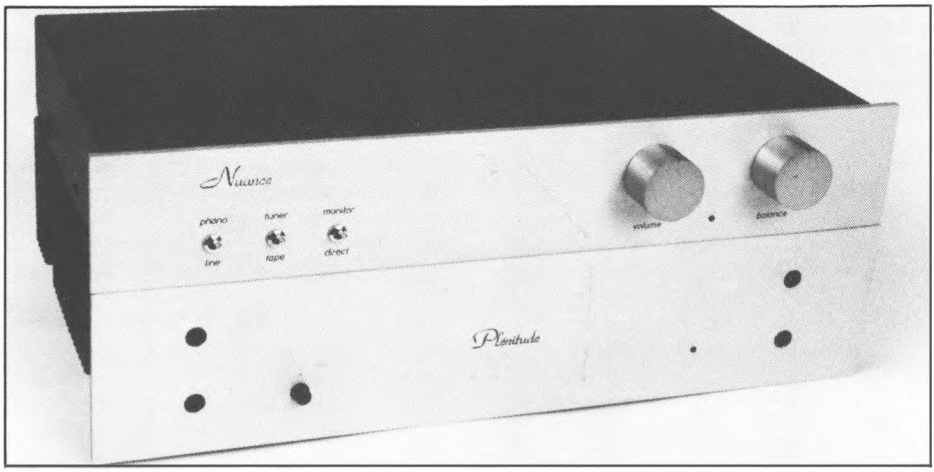


The Nuance/Plenitude pre-/power amplifier combination is the result of that strangest of events, Anglo/French cooperation. The manufacturing is done in France, as was the original format layout, but there has also been considerable additional input from Malcolm Hawksford, particularly on the preamp. This redoubtable academic leads a research group down at Essex University, and has some unusual — not to say somewhat abstruse — ideas of hi-fi and circuit design, including a concept of 'fuzzy distortion' related to small errors in feedback control. The French contribution has also extended to the careful comparative subjective assessment of the components used within the signal paths for optimum end results.

Manufactured by Famco of Paris, these transistor amplifiers are invariably known by their romantic French pet names, are distributed in the UK by Presence Audio, and are available in shiny 'champagne' and now black. The preamp reviewed here is the moving coil model; a cheaper moving magnet Nuance will be available shortly. Finish is first class, giving a solid feel and expectations of a long life.

Nuance is a very simple design, with just two knobs and three switches, covering volume and balance plus input selection. Additional internal adjustments are available for switching in a rumble filter if desired, and for changing the line stage gain in order to accommodate different cartridge and power amplifier sensitivities comfortably. The power supply is outboard, similarly finished in its own compact case. The high quality componentry includes extensive LC wire, Roederstein Resistas, and a Noble volume control.

Plenitude is no more complicated, the designers believing in keeping things as simple as possible. Rated at 80W/ch, this is a conventional complementary bi-polar design with a single power supply, carrying doubled output terminals to assist in bi-wiring. Now fuse protected, signal path components have been carefully selected and Hawksford has again had a hand in the circuit development.

LAB REPORT

Nuance behaved well in the lab, giving no real concern on the various tests. The frequency responses showed sensible bandlimiting at the frequency extremes, though the low frequency rolloff began at a high enough frequency to

affect accuracy marginally; the rumble filter is sensibly shaped with a gradual rolloff and no peaking. There was some increase in IM distortion at high frequencies on disc input, but overload margins were fine.

Plenitude's 18dBW (80W) power rating was comfortably exceeded under most conditions, though distortion rose a little at high frequencies when heavy current was demanded. Midband power was very well maintained into low impedances, reflecting the generous ±25A peak current, and also indicating a 'firm' power supply. Distortion results were rather ordinary, but should be adequate nonetheless, and there was no cause for concern on other measured parameters. A slight mechanical hum could be heard.

Sound Quality

Nuance was quite well received, sounding basically polite and comfortable, albeit lacking the resolution of some alternatives. There was some treble 'sheen' with surface noise mildly exaggerated, a mild 'softening' of dynamics and focus, plus a little loss of low frequency scale and weight. The overall staging was nicely controlled and tidy, showing slight veiling and a mildly 'muted' effect.

Having recently benefited from an upgrade, Plenitude rated slightly above its sister, while showing much of the same 'nice' character. There were no serious adverse comments, and the sound showed good transparency, depth, space and focus. There was some loss of scale and the treble was a trifle lacking in grace, but the sound was well under control and quite 'tight'.

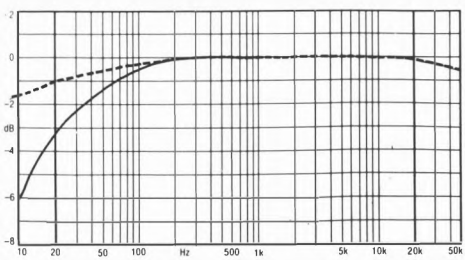
Conclusions

This is a nicely balanced combination that shows fine build quality and close attention to detail. Lab performance and sound quality were both on the ball, the latter having a distinctly 'soft' and attractive character, not unlike some valve models. The price is sufficiently competitive to suggest cautious recommendation subject to personal audition.

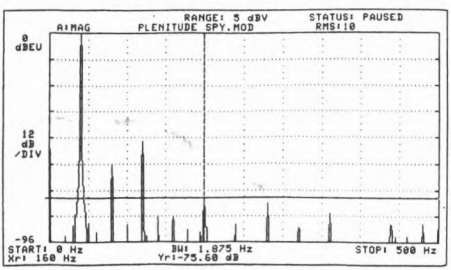
Test Results

Power output			
Rated power into 8ohms, maker's spec			80W (18dBW)
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	20.6dBW	20.4dBW	19dBW
Both channels, 4ohm load	18.9dBW	18.8dBW	15dBW
One channel, 2ohms, pulsed		19.7dBW	
Instantaneous peak current			±25A
Distortion			
Total harmonic distortion, at rated power, aux input	20Hz −80dB	1kHz −80dB	20kHz −78dB
Intermodulation, 19/20kHz, rated power, aux input			−83dB
Intermodulation, 19/20kHz, at 0dBW, disc (mc)			−48dB
Noise			
Disc (mc) input (IHF, CCIR weighted)			−63dB
Aux/CD input (IHF, CCIR weighted)			−77dB
Residual, unweighted (volume control at min)			−89dB
DC output offset			−3mV, −1mV
DC offset, pre-amp			0mV
Input overload	20Hz	1kHz	20kHz
Disc (mc) input (IHF)*	30.1mV	29.7dB	29.3dB
Aux/CD input (IHF)	>20dB	>20dB	>20dB
Stereo separation			
Disc input (mc)	66dB	70dB	50dB
Aux input	86dB	74dB	48dB
Output impedance (damping)	0.07ohm	0.1ohm	0.11ohm
Channel balance, disc, at 1kHz			0.01dB
Volume/balance tracking	0dB(0dB)	0.16dB(−20dB)	0.16dB(−60dB)
Input data	socket type	sensitivity	loading
Disc (mc) input*	phono	38.5µV	14ohms
Aux input	phono	66mV	35kohms	140nF
Power amp	phono	104mV	30kohms	2nF
Output, pre-amp (tape)			15.9V, 470ohms
Disc equalisation error, 30Hz-15kHz			+0.04dB, −0.55dB
Size (width, height, depth)			(41×22.5×6.6)+(11×17.5×6.6)+(41×28×8.8)cm
Typical price inc VAT			£695+£695

First reviewed: The Collection 1987



Disc input. RIAA equalisation accuracy



Power supply rejection, 40Hz input

PIONEER A-44

PIONEER HIGH FIDELITY GB LTD, FIELD WAY, GREENFORD, MIDDX UB6 8UZ.
TEL: 01-575 5757

This large full-facility integrated amplifier is rated at a conservative 55W/ch, with the sheer physical weight at least one indication of substantial power and good load tolerance. It is a medium price model, clear of the morass of budget and near budget models yet by no means extravagant at £180 all in, with fine and imposing standards of finish and presentation.

Some thirteen pushbuttons provide comprehensive switching, though not without some aesthetic 'bittiness' and a tendency towards over-complexity. Besides the large volume control with its attendant slider for balance, two smaller knobs provide bass and treble tone controls, while a third, similar rotary acts as a record-out selector. Inputs are selected by pushbuttons, with supplementary buttons providing MM/MC cartridge option, and speaker selection. Though there is no provision for tone-defeat on all inputs, a prominent 'CD Direct' button provides convenient 'straight through' bypass from the CD input terminals if desired. The rear panel has spring-loaded terminals for two pairs of speakers, while the remaining connections are phono throughout.

LAB REPORT

Inside, the single main power supply has a large regular power transformer but modest reservoirs. The output uses complementary bipolar high current devices operating conventionally in class A/B. The power transistors are mounted on heatsink units so that the whole sub-assembly can be unplugged for easy service. The circuitry is a mixture of IC and discrete, using IC driver stages, and is built on three main boards with long ribbon interconnects. A fairly tidy conventional layout is manufactured to normal commercial quality.

Power delivery comfortably exceeded specification, was generally well maintained into lower impedances, and showed a substantial current delivery margin over cheaper models, confirming where some of the extra money has gone. The power modulation spectrogram is pretty decent, though not as clean as many.

Most of the other measurements gave exemplary results, with low noise and distortion, ample overload margins, and reasonable volume/balance tracking. Stereo separation might have been better at high frequencies, and the moving-coil input showed a near 1dB bass boost 20-50Hz, with influence above 100Hz which could well produce a subjective reaction in listeners. The moving magnet disc input is marginally on the high side for optimum matching with some cartridges, the combination of amplifier and lead-in wiring probably presenting some 350pF to the cartridge in toto.

Sound Quality

Rating only poor on the listening tests, it is hard to pick any strengths in a sound which drew unanimous criticism with impressive consistency for lack of 'life' and 'speed', plus a general 'murkiness' alongside a 'hard' balance and flat stereo presentation. The severest criticisms were aimed at the moving-coil input, presumably reflecting the measured RIAA aberration to a degree, but even 'CD Direct' only helped improve matters slightly.

Conclusions

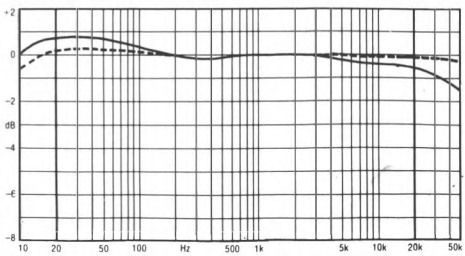
Once again we have come hard up against an amplifier which to all intents and purposes produced a thoroughly decent measured performance, offering a substantial power delivery for the price, yet which proved a complete disappointment on the listening tests. It is a phenomenon that we have encountered before with Pioneer and others, and the only rational explanation is that such matters as component layout and signal path simplicity are of overriding importance in a hi-fi amplifier, and that the addition of multiple facilities can only be accomplished at great expense and/or by sacrificing significant sound quality.

Test measurements

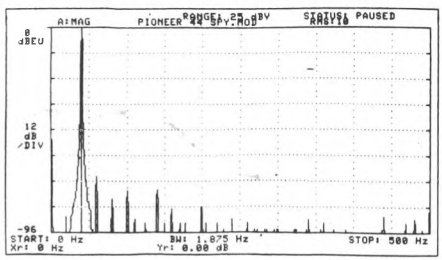
To show how well the amplifier sustains its 8ohm output into real loudspeaker loads, the level into 4ohms and 2ohms is given in dBW (where 0dB=1W), without adding 3dB or 6dB respectively, as in usual 'power' ratings.

Test Results

Power output			Integrated amplifier
Rated power into 8ohms, maker's spec			55W(=17.5dBW)
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	18.9dBW	19.1dBW	19.1dBW
Both channels, 4ohm load	16.3dBW	17.2dBW	17dBW
One channel, 2ohms, pulsed	–dBW	16.8dBW	–dBW
Instantaneous peak current		+17A	–17A
Distortion			
Total harmonic distortion,	20Hz	1kHz	20kHz
at rated power, aux input	–80dB	–82dB	–60dB
Intermodulation, 19/20kHz, rated power, aux input			–89dB
Intermodulation, 19/20kHz, at 0dBW, disc (mm)			–79dB
Intermodulation, 19/20kHz, at 0dBW, disc (mc)			–69dB
Noise			
Disc (mm) input (IHF, CCIR weighted)			–71dB
Disc (mc) input (IHF, CCIR weighted)			–66dB
Aux/CD input (IHF, CCIR weighted)			–73dB
Residual, unweighted (volume control at min)			–86dB
DC output offset		left +16mV, right –5mV	
Input overload	20Hz	1kHz	20kHz
Disc (mm) input (IHF)	32.4dB	31.5dB	29.2dB
Disc (mc) input (IHF)*	30.4dB	46dB	44.4dB
Aux/CD input (IHF)	>20dB	>20dB	>20dB
Stereo separation			
Disc input (mc)	62dB	62dB	33dB
CD Direct input	63dB	59dB	34dB
Output impedance (damping)	0.12ohm	0.12ohm	0.14ohm
Channel balance, disc, at 1kHz (mc)			0.39dB
Volume/balance tracking	0dB	–20dB	–60dB
CD Direct input	0.03dB	0.23dB	0.4dB
Input data	socket type	sensitivity	loading
Disc (mm) input	Phono	0.33mV	55kohms 240pF
Disc (mc) input*	Phono	0.028mV	100ohms
Aux input	Phono	19.7mV	69kohms 130pF
Output, pre-amp (tape)		10.9V max, 2.65kohms	
Disc equalisation error, 30Hz-15kHz (mc)		0.76dB, –0.42dB	
Size (width, height, depth)		42×12×33cm	
Typical price inc VAT		£180	



Disc input. RIAA equalisation accuracy



Power supply rejection, 40Hz input

RECOMMENDED

PS AUDIO PS4.5

ABSOLUTE SOUNDS LTD, 318 WORPLE ROAD, LONDON SW20.
TEL: 01-947 5047

PS Audio first appeared in *Hi-Fi Choice* a number of years ago with a curiously shaped and rather primitively finished pre-/power combination that sounded rather nice. At the time, the initials stood for co-proprietors Paul and Stan. In the interim the then UK distributor ceased operating, and PS themselves went quiet for a time in the States. Now the company is back, this time with only one of its original principals, and the UK distribution of this quite reasonably priced (by high end standards) pre-amp is being undertaken by Absolute Sounds.

Gone is the idiosyncratic styling of those earlier models, replaced by a sleek, full-width, jet black unit of smart finish if rather conventional appearance. A see-through fine mesh lid adds a touch of 'high tech', while lettering is a discreet gold, leaving the potentiometers uncalibrated. A quite small power supply transformer is sited along the mains lead, at a distance from the pre-amp proper, though there was still a gentle mechanical hum. This may be a function of our 50Hz mains, different from the US, or a sample idiosyncracy — either way it is soluble.

Facilities are minimal and sound quality oriented — simply volume and balance (using Noble pots), straightwire/high gain and mm/mc switched options, plus input and output selection switching. The 'straightwire' option here permits bypass of the line stage for greater transparency when the sensitivities of inputs are sufficient to permit its use.

LAB REPORT

The disc response was generally smooth and even, showing a gentle downtilt through the treble amounting to less than 1dB at 20kHz. Harmonic distortion was fine, and 14dB better than the published figure at low frequencies in the 'straightwire' position. The same general

improvement was noted on a number of other parameters — which at least confirms things are working in the right direction!

However intermodulation via the m-c cartridge input was somewhat unsatisfactory, and this is reflected in the high frequency overload measurement which is a little too marginal for comfort. In other respects the measured performance was fine, and it can be seen from the bracketed figures included in the accompanying data that the 'straightwire' sensitivities should be quite sufficient for many sources (though this won't help any HF m-c overload problems).

Sound Quality

Used in the 'straightwire' mode with highish output m-c cartridges, the PS turned in a cracking performance for its price, providing a level of integration, transparency, scale and dynamism normally associated with significantly more expensive devices. And even with the line stage in operation, the sound was still very good indeed, just knocked back a couple of pegs on the ratings.

The sound was powerful, quick and lively, with good space and depth (though wider than deep). However, a point of criticism was that the treble was slightly 'squeaky' or 'edgy', giving a little exaggeration to vinyl surface noise.

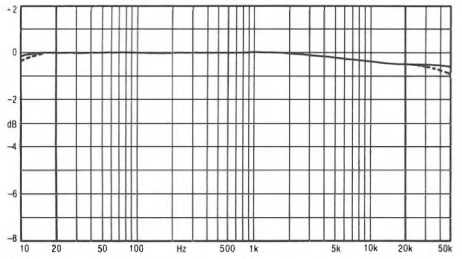
Conclusions

Sonically the best in its class under our listening conditions, assisted by the intelligent 'straightwire' option, this is a strongly recommended preamplifier which represents fine value for money. There remains a touch of doubt over the high frequency overload on the m-c input, which suggests that prospective purchasers should try it out with the intended front end to ensure that results are to taste.

Test Results

Distortion			
Total harmonic distortion	20Hz	1kHz	20kHz
at rated output, CD input	−77dB	−82dB	−81dB
Intermodulation, 19/20kHz, rated power, aux input			−79dB
Intermodulation, 19/20kHz, at 0dBW, disc (mm)			−72dB
Intermodulation, 19/20kHz, at 0dBW, disc (mc)			−20dB
Noise			
Disc (mm) input (IHF, CCIR weighted)			−66dB
Disc (mc) input (IHF, CCIR weighted)			−63dB
Aux/CD input (IHF, CCIR weighted)			−78dB
Residual, unweighted (volume control at min)			−84dB
DC offset, pre-amp			0mV
Input overload	20Hz	1kHz	20kHz
Disc (mm) input (IHF)	30.8dB	30.3dB	25.1dB
Disc (mc) input (IHF)*	26dB	25.4dB	13dB
Aux/CD input (IHF)	>20dB	>20dB	>20dB
Stereo separation			
Disc input (mc)	54dB	65dB	45dB
Aux input	83dB	70dB	48dB
Channel balance, disc, at 1kHz			0.18dB
Volume/balance tracking	0.02dB(0dB)	0.2dB(−20dB)	0.9dB(−60dB)
Aux input			
Input data	socket type	sensitivity	loading
Disc (mm) input	phono	1.1(5.2)mV	43kohms 340pF
Disc (mc) input*	phono	0.06(0.3)mV	50kohms 0.34nF
Aux input	phono	149(725)mV	6.8kohms 40pF
Output, pre-amp (tape)			18.5V, 21K(14)ohms
Disc equalisation error, 30Hz-15kHz			+0dB, −0.32dB
Size (width, height, depth)			48×5.5×26+(12.5×9×16 ps)cm
Typical price in VAT			£695

First reviewed: The Collection 1987

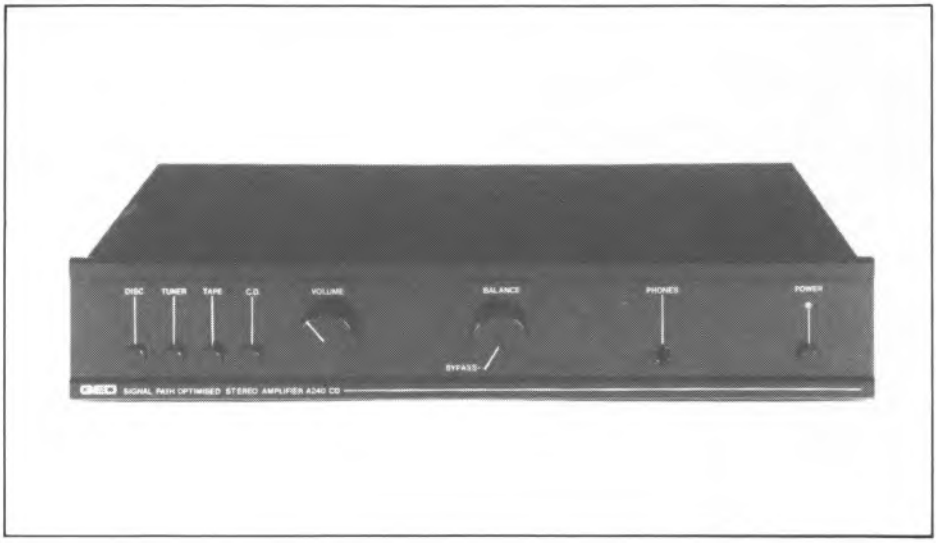


Disc input. RIAA equalisation accuracy

BEST BUY

QED A230/240CD/240SA

QED Audio Products Ltd, Unit 12, Ashford Industrial Estate, Shield Road, Ashford, Middlesex TW15 1AU. Tel: Ashford 46236



This neat and simple integrated amplifier is available in three versions, offering a hierarchy of quality at different price points, with the capability of upgrading between the two 240 variants. All share the same case, but the 'entry level' £120 230 has a smaller (50VA) power supply transformer, giving less dynamic range than 100VA 240s. The latter share the same basic amplification circuitry apart from the disc input: the £150 '*CD* has a simple MM input based on integrated circuitry, the £200 'SA has additional boards with discrete components and integral switching between mm and m-c cartridge types.

Choice has auditioned all the various versions at different stages in their development, for 1987 concentrating upon the top 240SA version, but with reference to earlier findings. The measurements are based on an earlier review of the 240CD, though we have included the data and RIAA equalisation for the 'SA m-c disc input.

Our review sample was in black livery with gold legends. Offering a marginally higher rated power output at 40W, the *240* is only 1dB louder than the *230*, so in reality its other features are of greater significance than the power increase. The 'CD direct' facility allows the Compact Disc user to bypass the pre-amplifier for optimum sound quality.

Lab Report

Essentially, the design is based on a single board construction, the interior revealing good build quality with fine quality components. The output uses a bipolar complementary arrangement, direct-coupled to the load: integrated circuits are used for the earlier stages including the RIAA equalisation, except of course in the *SA* version.

Conservatively rated, this amplifier raised 18dBW under peak programme conditions. The continuous output was near 17dBW, falling to 14.5dBW into 4ohms, and the output held up well into 2ohms, reflecting the good peak current rating of ±12.75A. Quite a good result was obtained on the 40Hz power intermodula-

tion test.

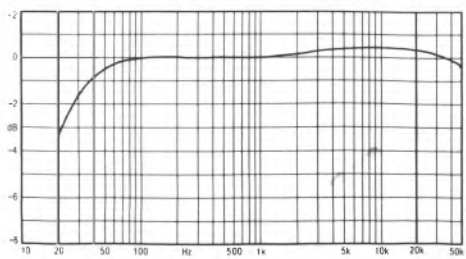
Distortion levels were fine. With really good results for intermodulation at high frequencies. Noise levels were fine while the DC offset at the power amplifier was respectably low. The modest input overload margins reflected the omission of a line amplifier but in practice they were considered sufficient. Really good for its class, the stereo separation results were commendable, with channel balance generally good but deteriorating at low signal levels — for example, an 8dB imbalance at a −60dB setting. The input characteristics were fine with the additional *SA* circuitry, the RIAA equalisation on the mm input is now flat, but still shows a slight treble shelf on m-c, though less pronounced than that of the *'CD*'s IC mm input, and without the latter's mildly worrying ultrasonic rise.

Sound Quality

The 1987 auditioning confirmed the *240*'s good overall rating, somewhat ahead of the *230*. The sound was well integrated, with tight and engagingly 'bouncy' bass reproduction. A little forward in presentation and slightly 'brittle' on the disc input, there was also some 'richness' in the lower mid region. Stereo imagery was good, the open sound lacking only a little in resolution of space and depth, and with a good sense of 'scale'.

Conclusions

All three QED models deserve their Best Buy rating at their respective price points, offering a sensible range of alternatives from the civilised *230* through the more dynamic *240* models, the *'SA* version of which has a quite respectable moving-coil disc input. Lab performance was generally sound, and subjectively these amplifiers remain highly competitive.



Disc input. RIAA equalisation accuracy

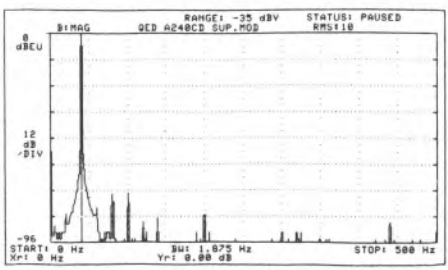
Test measurements

To show how well the amplifier sustains its 8ohm output into real loudspeaker loads, the level into 4ohms and 2ohms is given in dBW (where 0dB=1W), without adding 3dB or 6dB respectively, as in usual 'power' ratings.

Test Results

Power output			A240CD
Rated power into 8ohms, maker's spec			40W(=16dBW)
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	16.9dBW	17.3dBW	15.9dBW
Both channels, 4ohm load	13.4dBW	14.8dBW	14.5dBW
One channel, 2ohms, pulsed	−dBW	15.5dBW	−dBW
Instantaneous peak current		+13A	−12.5A
Distortion			
Total harmonic distortion,	20Hz	1kHz	20kHz
at rated power, aux input	−71.6dB	−76.9dB	−63.1dB
Intermodulation, 19/20kHz, rated power, aux input			−79.6dB
Intermodulation, 19/20kHz, at 0dBW, disc (mm)			−50.0dB
Intermodulation, 19/20kHz, at 0dBW, disc (mc)			−30dB
Noise			
Disc (mm) input (IHF, CCIR weighted)			−72.0dB
Disc (mc) input (IHF, CCIR weighted)			−68dB
Aux/CD input (IHF, CCIR weighted)			−69.5dB
Residual, unweighted (volume control at min)			−77.5dB
DC output offset			left 10mV, right 12mV
DC offset, pre-amp			left n/a mV, right n/a mV
Input overload	20Hz	1kHz	20kHz
Disc (mm) input (IHF)	19.1dB	17.5dB	15.2dB
Disc (mc) input (IHF)*	Phono	0.021mV	62ohms 10pF
Aux/CD input (IHF)	>20dB	>20dB	>20dB
Stereo separation			
Disc input (mm)	89.0dB	88.5dB	66.6dB
Aux input	75.0dB	69.3dB	43.6dB
Output impedance (damping)	0.09ohm	0.09ohm	0.10ohm
Channel balance, disc, at 1kHz			0.73dB
Volume/balance tracking	0dB	−20dB	−60dB
Aux input	0.04dB	0.68dB	8.05dB
Input data	socket type	sensitivity	loading
Disc (mm) input	Phono	0.49mV	47kohms 150pF
Disc (mc) input*	Phono	0.021mV	620ohms 10nF
Aux input	Phono	60mV	14kohms 15pF
Power amp	n/a	n/a mV	n/a kohms n/a pF
Output, pre-amp (tape)			10.8 max, 8.9ohms
Disc equalisation error, 30Hz-15kHz			+0.02dB, −0.85dB
Size (width, height, depth)			36×6×25cm
Typical price inc VAT			£149

Reauditioned

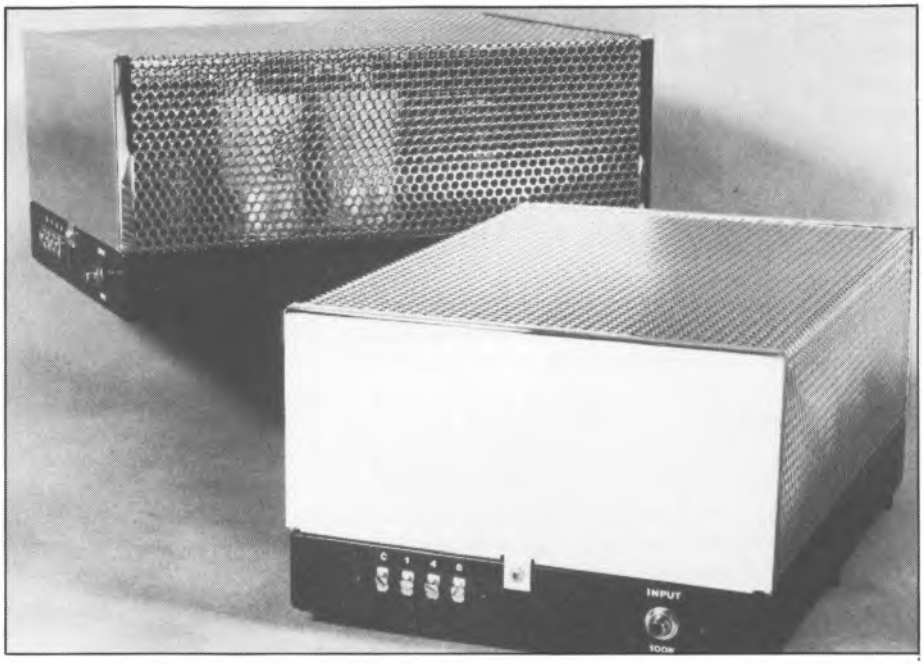


Power supply rejection, 40Hz input

RECOMMENDED

QUICKSILVER POWER AMPLIFIER

VITAL SYSTEMS, 38A THE MEADOW WAY, HARROW WEALD, MIDDLESEX HA3 7BW.
TEL: 01-863 8988



These utterly traditional US built mono valve power amplifiers even use valve rectifiers and no regulation. Fixed bias have 8417 output valves at 63mA, each give a comfortable enriched Class 'A' rating. Large (for a valve amp that is) 320μF reservoir capacitors are used in a CLC smoothing circuit incorporating a choke, the latter section feeding the low level stages. The simple signal paths are coupled with quality polypropylene capacitors, the input is direct coupled, while the output is transformer coupled, push-pull ultra-linear. At the (feedback coupled) secondary, tappings for 8, 4 and 1ohm operation are provided, the last for direct connection to ribbon drivers. The single pole mains switch is unshrouded — I would like to see an improvement here!

SOUND QUALITY

Well, good amplifiers do exist after all, even if they appear to have been designed back in 1955! The *Quicksilver* scored 'excellent' on the listening tests, mainly by virtue of top class transparency. With that quality properly established, the rest fell neatly into place. It proved to be powerful, producing quite substantial sound levels. Bass was highly rated for 'speed' and articulation, but with a hint of richness and overhang. Slightly mellow, the treble remained airy and open with clear, articulate detail. The mid was considered neutral while the stereo focus, width and depth were all extremely good. Finally, it was also dynamic, lively and full of interest as well as possessing a low 'fatigue factor'.

LAB REPORT

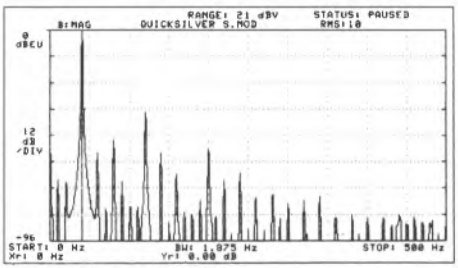
On programmed peaks it reached 102dBA, based on a peak level of 18.5dBW (around 75W). A good power bandwidth was shown at rated power, indicative of a high-quality output transformer. Another surprise was the remarkable load tolerance, with a peak current of 13.5A. On the 4ohm tap it would even handle 2ohm loads!

Low feedback is a feature of this design and

resulted in rather high distortion of 1% mid-band, and nearer 3% at the frequency extremes. Better intermodulation results were observed, while distortion improved greatly at lower powers. Noise levels were fine, though some transformer hum was present on our samples. The output impedance was a rather high 1ohm, which will be sufficient to change the sound of many speakers to some small degree.

Conclusions

This amazing amplifier demonstrated just how poor the lab results can be while at the same time delivering a top class sonic performance. High load tolerance was a surprising asset, and the sound quality was heading towards the £2,500 level. Offering its own unique strengths, transparency was its trump card, and it may be warmly recommended, but check the transformer hum and overall system compatibility carefully.



Power supply rejection, 40Hz input

Test Results

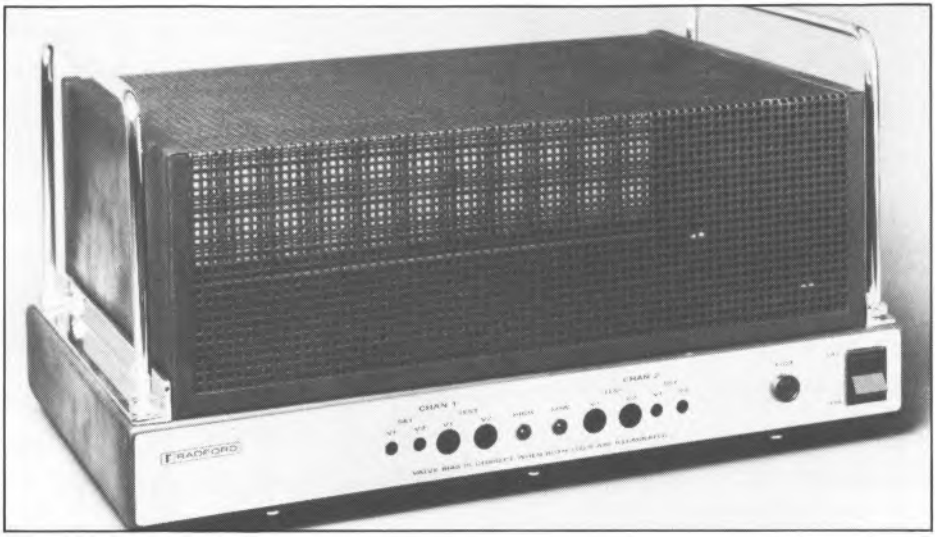
Rated power into 8ohms, maker's spec	60W(=17.5dBW)		
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	17.5dBW	17.6dBW	16.9dBW
One channel, 4ohm load	15.6dBW	15.3dBW	14.4dBW
One channel, 2ohms, pulsed	-dBW	15.0dBW	-dBW
Instantaneous peak current		+14.0A	-13.0A
Total harmonic distortion,	20Hz	1kHz	20kHz
at rated power, aux input	-30.0dB	-41.5dB	-34.6dB
NOISE			
Aux/CD input (IHF, CCIR weighted)	-91.0dB		
Residual, unweighted (volume control at min)	-79.0dB		
Output Impedance (damping)	1.0ohm	1.0ohm	1.1ohm
Input data	socket type	sensitivity	loading
Power amp	Phono	120mV	100kohms -pF
Size (width, height, depth)	23.5 × 15 × 36cm		
Typical price inc VAT	£1775 (pair)		

First reviewed 1986. Rating: Recommended.

RECOMMENDED

RADFORD STA25 RENAISSANCE

WOODSIDE ELECTRONICS, KIMBERLEY ROAD, CLEVEDON, AVON BS21 6QJ.
TEL: (0272) 877611



From the golden age of valve amplifiers, before the transistor types swept the market in the late 'sixties, a handful of British power amplifiers stand out as classics. For many the greatest of all were the Radfords. Enthusiasts rate the rare '15s the best sounding (especially the monoblocks), while the '60 and '100 offered plenty of power. But the real classic has to be the *STA25*, which seemed to provide just the right combination of quality and power, in a package that remains purposefully elegant by any standards today.

Good examples continue to hold their value on the secondhand market, and there has already been an 'anniversary' commercial revival of the original design in replica form a few years ago. Now some of the design team have got back together to create the *Renaissance*. This is manufactured under license by Woodside Electronics, carrying the blessing and identity of Arthur Radford. Staying close to the spirit of the original, it is in fact a full update using the latest components and twenty years of accumulated experience.

The appearance differs somewhat from the original — aesthetically for the poorer, as the valves are now hidden beneath the cover and no longer make a shining, glowing tribute, such is the evolution of safety standards. Still, at least they've kept the chrome handrails. The chassis itself is wider, with the major component layout more reminiscent of the 60/100 models if memory serves right, and the number of changes are quite extensive throughout. Finish is excellent, and the various greys and silvers give an attractive appearance.

LED indicators are now provided to keep valve biases correctly set, though these are now fed from regulated supplies. The radiometal-core transformers look much as before, but the output taps are now fixed at 5ohms to match most current loudspeakers, and there has been a vast increase in reservoir capacity. The main *EL34* output valve has been replaced by a US type 6550: this is really closer to a *KT88*, and is a type widely used by Audio Research and others. The input is now a cascode instead of pentode configuration, while star earthing is adopted. Much hardwiring is used in the construction, with high quality components such as poly-

propylene coupling capacitors.

Lab Report

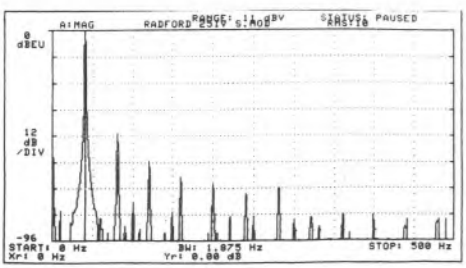
Despite the many changes, this new *STA25* reveals its vintage roots in a range of performance measurements that are generally undistinguished. Power output is still only modest, typically 40W midband but showing some distortion increase when pressed at the bandwidth extremes (particularly the bass); however, ±7.5A current capability is quite generous for this type of amplifier. The bandwidth is reasonably well constrained, −3dB points being at 3Hz and 48.5kHz. Though distortion measurements were fairly mediocre, this is no particular cause for concern, and factors like power supply modulation and distortion residuals were well under control while stereo separation is superb.

Sound Quality

The limited measured performance bore little if any relation to a handsome sound quality which could approach the sweetness and dynamics of expensive references in the vital midband. Initial listening was conducted on a prototype, but a full production sample was re-auditioned before finalising the review. This final sample further enhanced transparency and subjective bass power over the earlier *Renaissance* — and gives a big improvement in every respect over the original *STA25*'s capabilities. The sound does lack a little effort and 'slam' at low frequencies, and the treble adds a touch of 'lispiness', but the *STA25* generates a generous and precise soundstage with genuine audiophile standards of imagery and dynamics.

Conclusions

Nostalgia and sentiment may play a part in recommending this fine valve amplifier, but the latest enhancements have uprated the sound quality to a degree where it is fully competitive, albeit at a highish price. Its strength is subtlety rather than 'slam', but for those who appreciate the value of a delightful midrange it represents a fine proposition.



Disc input. RIAA equalisation accuracy

Test measurements

To show how well the amplifier sustains its 8ohm output into real loudspeaker loads, the level into 4ohms and 2ohms is given in dBW (where 0dB=1W), without adding 3dB or 6dB respectively, as in usual 'power' ratings.

Test Results

Power output			Integrated amplifier
Rated power into 8ohms, maker's spec			25W(=14dBW)
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	9.3dBW	15.7dBW	15.1dBW
Both channels, 4ohm load	5.6dBW	12.9dBW	7dBW
One channel, 2ohms, pulsed	–dBW	11.6dBW	–dBW
Instantaneous peak current			±7.5A
Distortion			
Total harmonic distortion,	20Hz	1kHz	20kHz
at rated power	–36dB(10W)	–59dB	–41dB
Intermodulation, 19/20kHz, rated power			–43dB
Intermodulation, 19/20kHz, at 0dBW			–54dB
Noise 'A wtd	–79dB(0dBW),	–94dB(full output)	
DC output offset			0mV
Stereo separation	95dB	109dB	108dB
Output impedance (damping)	0.69ohm	0.6ohm	1.15ohm
Channel balance			0.16dB
Input phono	105mV	100kohms	
Size (width, height, depth)			42×23×25cm
Typical price inc VAT			£977

First reviewed: The Collection 1987

BEST BUY

ROTEL RA-820BX II

ROTEL HI-FI, 25 HEATHFIELD, STACEY BUSHES, MILTON KEYNES MK12 6HR.
TEL: (0908) 317707

Proliferating suffixes indicate this model's steady evolution over the years, the popular and successful *'820BX* now achieving MkII status. However, it has changed only slightly, and only under the skin, to keep abreast of steadily improving standards of sound quality. It now has a larger mains transformer in order to improve the transient performance of the reservoirs and the subjective bass 'speed', plus extra quality components in selected places. For the 1987 edition we have re-auditioned the current model, but the measurements and general description have been left as before.

A slim but full width integrated amplifier, it comes in satin black, with a fairly low nominal power rating of 25W (14dBW). However, a good load tolerance is claimed, and this was confirmed on test. Another 'no frills' design, both tone controls and filters have been omitted; likewise fuses and protection circuits have been removed from the signal path. Inputs include tape, tuner, CD/aux and disc (mm only). Rear panel sockets are phono, gold plated for disc, while reasonably solid connectors are provided for speaker connection, these large enough to take a decent size of wire.

Inside, construction is very tidy, essentially a single board, with the mains wiring properly terminated and shrouded. Two 8200μF capacitors provide a sizeable reservoir, while the direct-coupled complementary output stage uses paralleled pairs of transistors to increase the current capacity as well as the overload margin. A 0.22ohm resistor is placed in series with the output — a backstop against extreme overload such as a short circuit. ICs are used in the preamplifier stages together with selected audio components.

LAB REPORT

The specified rating was comfortably exceeded with a fine power bandwidth of 15.7dBW at 8ohms. The reduction into 4ohms was moderate, while the 2ohm pulsed output exceeded rated level at 14.5dBW. This was equivalent to 100W into 2ohms while peak current was a very generous ±15A. Distortion levels were moder-

ate, especially with respect to the high frequency intermodulation. Input noise levels were good, with excellent input overload margins. The DC offsets at the speaker terminals were poorer than average but should not give trouble in practice.

Channel separation was satisfactory *via* the disc input but should be much better *via* auxiliary particularly at 20kHz. Volume tracking and channel balance were both pretty good, while output impedance to the speakers was constant as well as moderate. Input sensitivity and loading characteristics were sensible, (0.7mV disc, 45mV tuner). Over a 50Hz to 10kHz range the RIAA equalisation was very accurate, with some rolloff outside these limits due to mild subsonic and ultrasonic filtering. Mains ripple was not particularly well rejected as the 40Hz power spectrum showed. Here the 100Hz line component was only 60dB down — one wonders how the *'BX* would sound if this were improved.

Sound Quality

The *BX II* showed a worthwhile improvement over the earlier *BX*, particularly in terms of bass 'slam' and 'speed'. Maintaining, and indeed slightly improving on the *'BX's* established virtues of good transparency and focus and generous stereo staging, the *II* offers 'weight' and an enhanced sense of 'scale' in an essentially neutral character, erring slightly towards the 'clinical'. Considered a touch 'bright' and 'coarse' at high frequencies, overall praise comfortably outweighed minor criticism of an amplifier which has easily maintained its higly competitive performance.

Conclusions

This latest Rotel again stormed through the listening tests, the latest modifications reflected in particularly fine bass performance. Load tolerant, it also offered a respectable output plus a clear sound with excellent stereo. A Best Buy rating is the only logical conclusion!

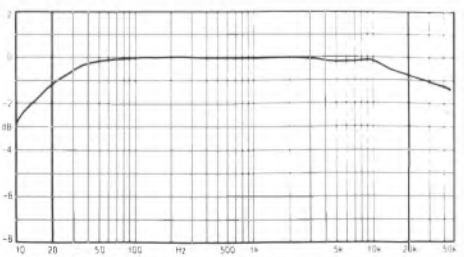
Test measurements

To show how well the amplifier sustains its 8ohm output into real loudspeaker loads, the level into 4ohms and 2ohms is given in dBW (where 0dB=1W), without adding 3dB or 6dB respectively, as in usual 'power' ratings.

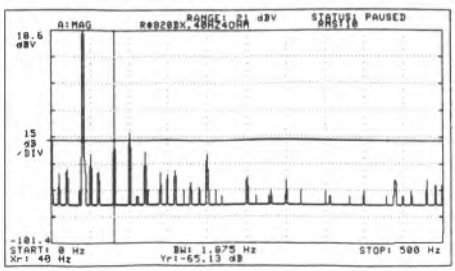
Test Results

Power output			Integrated amplifier
Rated power into 8ohms, maker's spec			25W(=14dBW)
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	15.9dBW	16dBW	15.7dBW
Both channels, 4ohm load	13.0dBW	13.7dBW	13.5dBW
One channel, 2ohms, pulsed	–dBW	14.5dBW	–dBW
Instantaneous peak current		+15A	–15A
Distortion			
Total harmonic distortion,	20Hz	1kHz	20kHz
at rated power, aux input	–66dB	–74dB	–55dB
Intermodulation, 19/20kHz, rated power, aux input			–65dB
Intermodulation, 19/20kHz, at 0dBW, disc (mm)			–73dB
Intermodulation, 19/20kHz, at 0dBW, disc (mc)			n/a dB
Noise			
Disc (mm) input (IHF, CCIR weighted)			–74dB
Disc (mc) input (IHF, CCIR weighted)			n/a dB
Aux/CD input (IHF, CCIR weighted)			–82dB
Residual, unweighted (volume control at min)			–n/a dB
DC output offset			left 36mV, right 19mV
DC offset, pre-amp			left n/a mV, right n/a mV
Input overload	20Hz	1kHz	20kHz
Disc (mm) input (IHF)	36dB	34dB	34dB
Disc (mc) input (IHF)*	n/a dB	n/a dB	n/a dB
Aux/CD input (IHF)	>20dB	>20dB	>20dB
Stereo separation			
Disc input (mm)	63dB	64dB	41dB
Aux input	62dB	48dB	24dB
Output impedance (damping)	0.24ohm	0.24ohm	0.25ohm
Channel balance, disc, at 1kHz			0.05dB
Volume/balance tracking	0dB	–20dB	–60dB
Aux input	0.1dB	0.8dB	0.1dB
Input data	socket type	sensitivity	loading
Disc (mm) input	Phono	–mV	50kohms 220pF
Disc (mc) input*	Phono	n/a mV	n/a ohms n/a pF
Aux input	Phono	–mV	50kohms 180pF
Output, pre-amp			>1V max, 3.8kohms
Disc equalisation error, 30Hz-15kHz			+0dB, –0.6dB
Size (width, height, depth)			43×6×25cm
Typical price inc VAT			£150

Reconditioned



Disc input. RIAA equalisation accuracy



Power supply rejection, 40Hz input

RECOMMENDED

SANSUI AU-G30X

SANSUI (UK) LTD, UNIT 10A, LYON INDUSTRIAL ESTATE, ROCKWARE AVENUE, GREENFORD, MIDDLESEX. TEL: 01-575 1133

Outwardly, this Sansui model is virtually identical to the *AU-G33X* tested in the 1985 *Amplifiers and Tuners* edition, but in fact the *AU-G30X* is the result of considerable development work by Sansui's engineers in Japan during the intervening period.

While the earlier version demonstrated a good technical performance when tested in the laboratory, it did not fare well in the listening tests. But this model has been totally redesigned, with redundant sections stripped away and the remaining components and circuit layout optimised for improved sound. Sansui have (to borrow Rotel's terminology) done a *'BX'* upgrade, refining the design by listening for audible improvements rather than aiming to improve measured performance.

With a rated power output of 45W (16.5dBW) per channel, the *'30X* is a fully equipped design, reasonably priced considering the specification and features on offer. It incorporates the usual control facilities such as speaker switching, bass and treble tone controls and filters, but bypass settings are provided for optimum sonic performance.

A higher-performance moving-magnet disc input stage has been included this time, while the old and compromised moving-coil option of the *'33X* has now been omitted. Based on a classic Sansui design, the power amplifier is a direct-coupled complementary configuration with a well located central power supply. Internal heatsinks are used with through-flow ventilation.

LAB REPORT

As so often happens, there was little to show in the lab measurements that could account for the new sound. The audible change is the result of revised circuits, components and layouts and not necessarily an alteration in specification. Power output reached 19dBW peak (90W), while short term delivery into 2ohms was a very satisfactory 17.5dBW, with a good peak current reserve approaching 19A. High frequency distortion was slightly poorer than before — this being the only clue to reduced negative feedback.

Input characteristics were fine, while the frequency responses were both wide and uniform. Channel balancing was very good, though a loss of channel separation was also

evident at high frequencies. The output resistance was constant at a moderate 0.25ohms. The DC offsets were a little higher than average and could be reduced.

Good sound levels of 103dBA were achieved in the test system, while the 40Hz power spectrum showed a very clean result.

Sound Quality

Reversing our previous opinion, this time the amplifier scored a 'good plus' on the listening tests, which was a fine result for a model at this price level. On disc, the sound was robust, with firm stereo images, stably focused and exhibiting good depth and ambience. Offering decent clarity, good detail was also evident, while the sound improved further when using Compact Disc as the source. It produced fine bass, extended and powerful with good definition. Mid glare and treble 'grain' were held to low levels, and did not impair the good stereo performance. Good sound levels were possible without strain and it also proved load tolerant.

Conclusions

Sansui now have a middle-rank amplifier offering a competitive sound quality. A load-tolerant model, it also has a decent power output as well as versatile facilities, if and when required. The basic stereo performance was much better than before, with sufficient sound quality improvement for a firm recommendation.

Note: The author privately assessed an early model supplied by the manufacturer, prior to this review.

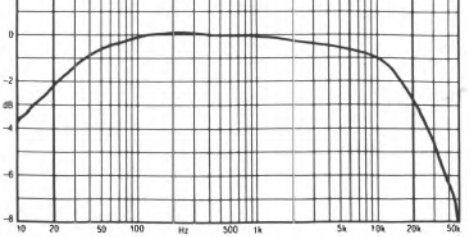
Test measurements

To show how well the amplifier sustains its 8ohm output into real loudspeaker loads, the level into 4ohms and 2ohms is given in dBW (where 0dB=1W), without adding 3dB or 6dB respectively, as in usual 'power' ratings.

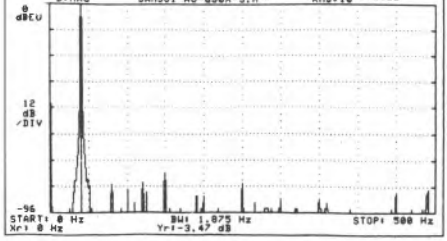
Test Results

Power output			Integrated amplifier
Rated power into 8ohms, maker's spec			45W(=16.5dBW)
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	18.2dBW	18.3dBW	18.1dBW
Both channels, 4ohm load	15.9dBW	16.0dBW	16.5dBW
One channel, 2ohms, pulsed	–dBW	17.5dBW	–dBW
Instantaneous peak current		+18.5A	–20.0A
Distortion			
Total harmonic distortion,	20Hz	1kHz	20kHz
at rated power, aux input	–77.4dB	–78.8dB	–68.8dB
Intermodulation, 19/20kHz, rated power, aux input			–90.0dB
Intermodulation, 19/20kHz, at 0dBW, disc (mm)			–87.4dB
Intermodulation, 19/20kHz, at 0dBW, disc (mc)			n/a dB
Noise			
Disc (mm) input (IHF, CCIR weighted)			–68.2dB
Disc (mc) input (IHF, CCIR weighted)			n/a dB
Aux/CD input (IHF, CCIR weighted)			–73.0dB
Residual, unweighted (volume control at min)			–87.0dB
DC output offset			left 47mV, right 36mV
DC offset, pre-amp			left n/a mV, right n/a mV
Input overload	20Hz	1kHz	20kHz
Disc (mm) input (IHF)	32.9B	32.0dB	32.6dB
Disc (mc) input (IHF)*	n/a dB	n/a dB	n/a dB
Aux/CD input (IHF)	>20dB	>20dB	>20dB
Stereo separation			
Disc input (mm)	68.4dB	53.5dB	30.6dB
Aux input	77.9dB	53.0dB	30.3dB
Output impedance (damping)	0.26ohm	0.26ohm	0.25ohm
Channel balance, disc, at 1kHz			0.01dB
Volume/balance tracking	0dB	–20dB	–60dB
Aux input	0.01dB	0.08dB	1.04dB
Input data	socket type	sensitivity	loading
Disc (mm) input	Phono	1.75mV	47kohms 100pF
Disc (mc) input*	n/a	n/a mV	n/a kohms n/a pF
Aux input	Phono	27.0mV	55.0kohms 230pF
Power amp	n/a	n/a mV	n/a kohms n/a pF
Output, pre-amp (tape)			13.4V max, 100ohms
Disc equalisation error, 30Hz-15kHz			+0.1dB, –1.9dB
Size (width, height, depth)			43×11×33cm
Typical price inc VAT			£190

First reviewed 1986



Disc input: RIAA equalisation accuracy



Power supply rejection, 40Hz

RECOMMENDED

SANSUI AU-G11X

SANSUI (UK) LTD, UNIT 10A, LYON INDUSTRIAL ESTATE, ROCKWARE AVENUE, GREENFORD, MIDDLESEX. TEL: 01-575 1133

This compact budget integrated amplifier, claimed to be designed primarily for sound quality, is attractively finished with gold lettering on a well-ordered fascia, incorporating many of the usual facilities without producing operational confusion. It is priced a little over budget level at £130, and is rated at 25W/channel (14dBW). The disc input is moving magnet only, the tone controls are supplemented by a defeat switch, and further switches select loudness, mono/stereo and tape monitoring.

The headphone socket is accompanied by its own small volume control, and is in fact driven by its own little amplifier, independent of the loudspeaker connection and main signal path. The rear panel socketry is phono throughout, with a single pair of loudspeaker output binding posts, capable of taking quite heavy gauge cable. The overall external finish is to the expected high standards, and the unit feels reassuringly heavy considering its modest price and pretensions.

LAB REPORT

Using a medium sized transformer, the shared 5,800uF power supply incorporates extensive regulation and decoupling for different stages. The separate headphone amplifier avoids switching in the speaker path and gives optimum headphone drive. There is evidence that care has been taken in signal path component selection, with polystyrene capacitors etc, and direct wiring paths. The conventional bi-polar output uses generous high current transistors.

Power output is fairly generous, comfortably above the admittedly modest 25W specification and quite load tolerant besides. Distortions were very low, and noise levels and overload margins were generally satisfactory. The DC offset was a little larger than average, and high frequency stereo separation is only just satisfactory. Inputs should be fine for compatibility with other components. The disc input RIAA curve shows good component tolerancing and an even midband, with sensible bandlimiting at the extremes (amounting to a possibly audible -1dB at 15kHz). Power supply modulation seemed very

well under control.

Sound Quality

Rating a little above average, the *'11X* certainly delivered a cleaner clearer sound than what one might call the 'Far Eastern norm', but on balance it also fell a little short of the achievements of other audiophile-oriented integrated models at around the same price.

A degree of disc surface noise exaggeration was noted, and the most obvious characteristic was that the sound remained tightly controlled, at the expense perhaps of a little 'weight' and 'attack'. Focus was pretty good, but there was some loss of depth, with mild congestion, and a slightly 'dulled', 'thickened' effect. Coloration was generally low, but with some 'steeliness' noted when using CD as a source.

Conclusions

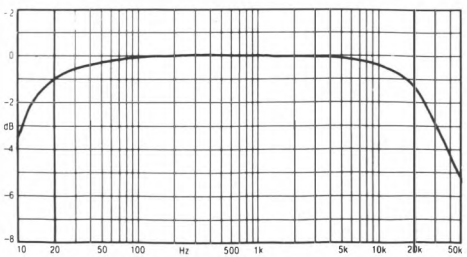
Producing a thoroughly respectable sound for a relatively modest price, the *'G11X* also delivered a decent lab performance. Build quality and finish are both excellent with generous component quality and quite simple layout of signals paths. Taking commercial considerations into account, Sansui have chosen a sensible compromise between facilities and sound quality here, and a recommendation is appropriate.

Test measurements

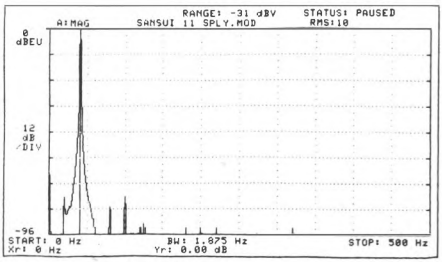
To show how well the amplifier sustains its 8ohm output into real loudspeaker loads, the level into 4ohms and 2ohms is given in dBW (where 0dB=1W), without adding 3dB or 6dB respectively, as in usual 'power' ratings.

Test Results

Power output			Integrated amplifier
Rated power into 8ohms, maker's spec			25W(=14dBW)
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	16.0dBW	15.9dBW	15.8dBW
Both channels, 4ohm load	13.3dBW	13.6dBW	13.5dBW
One channel, 2ohms, pulsed	–dBW	13.6dBW	–dBW
Instantaneous peak current		+11A	–11A
Distortion			
Total harmonic distortion,	20Hz	1kHz	20kHz
at rated power, aux input	–82dB	–92dB	–70dB
Intermodulation, 19/20kHz, rated power, aux input			–80dB
Intermodulation, 19/20kHz, at 0dBW, disc (mm)			–73dB
Noise			
Disc (mm) input (IHF, CCIR weighted)			–70dB
Aux/CD input (IHF, CCIR weighted)			–73dB
Residual, unweighted (volume control at min)			–92dB
DC output offset			left 38mV, right 28mV
Input overload	20Hz	1kHz	20kHz
Disc (mm) input (IHF)	30.7dB	29.8dB	29.5dB
CD input (IHF)	>20dB	>20dB	>20dB
Stereo separation			
Disc input (mm)	61dB	52dB	29dB
CD input	61dB	51dB	28dB
Output impedance (damping)	0.26ohm	0.27ohm	0.25ohm
Channel balance, disc, at 1kHz			0.06dB
Volume/balance tracking			
Aux input	0dB, 0.08dB; –20dB, 0.02dB; –60dB, 1.6dB		
Input data	socket type	sensitivity	loading
Disc (mm) input	Phono	0.44mV	48kohms 100pF
CD input	Phono	30mV	63kohms 215pF
Output, pre-amp (tape)			10.1V max, 1kohms
Disc equalisation error, 30Hz-15kHz			±0.06dB, –0.60dB
Size (width, height, depth)			43×7.5×28cm
Typical price inc VAT			£130



Disc input. RIAA equalisation accuracy



Power supply rejection, 40Hz input

SONY TAF 500ES

SONY UK LTD, SONY HOUSE, SOUTH STREET, STAINES, MIDDLESEX TW18 4PF.
TEL: STAINES 61688

Big, black and surprisingly heavy, the *500ES* is one of Sony's 1987 attempts to get towards the specialist separates marketplace with de-luxe, build and mid-priced integrated amplifiers. These *ES* models reportedly involve additional UK design involvement on the subjective side of things, though most efforts were directed towards the more expensive *700ES* — the £350 *500* being basically derivative. The appearance is almost old-fashioned, with a large fascia and two rows of control knobs. Standards of finish and such intangibles as the 'expensive feel' of the control knobs is exceptional at any price.

The *500ES* provides very comprehensive switching and control facilities, with at least one eye directed towards the anticipated future growth of integrated audio/visual systems, but inevitably, of course, at the cost of some operational complexity. The end result is a little intimidating, but does show some evidence of care in ergonomic layout and in the selection of facilities. It provides bypass routes for certain circuit complexities such as tone controls, and claims careful design of such circuitry. The large volume control is supplemented by smaller rotaries for balance, bass and treble, and rotary switches for input and output selection, and a wide variety of subsidiary functions are available on smaller knobs and buttons. The rear panel uses phono sockets throughout, incorporates pre-/power splitter sockets for adding an external processor of some sort, and has two sets of substantial loudspeaker binding post terminals.

LAB REPORT

Vibration suppression receives a high priority in this solid, heavy design, with the massive 'Gibraltar' chassis and anti-resonant heatsinking. The generous 'STD' power supply is here shared between the two channels, but with separate feed for the driver stages. The output is conventional complementary bi-polar and uses selected components in key positions, but the overall internal construction is complex, with many PCBs and extensive wiring.

Rated at 75W/18dbW, the *500ES* comfortably beat this on test, managing a full-bandwidth 20+dBW with a single channel drive. Plenty of output is available into lower impedances as well, again with wide bandwidth and a generous +/−22A peak current capability. The high quality of the power supply side is seen in the excellent results on the supply modulation spectrogram.

Distortions are generally low, but the intermodulation result for the moving-coil disc input is clearly out of step with the others. However, there is no sign of this weakness being reflected

in the generous input overload margins. Inputs and outputs are sensibly chosen for compatibility, but our sample from early production showed two further weaknesses. Though the moving magnet response was flat, the moving-coil disc input showed a strange inaccuracy in the form of a bass 'bump' hinging on 500Hz and amounting to nearly 2dB at 50Hz. And the volume control was poorly aligned, giving 1-2+dB channel imbalances at progressively lower settings.

Sound Quality

The *500ES* was disappointing on audition, with a below average rating despite a well above average price. It was also found to be rather susceptible to RF interference, which CD players as well as other devices can generate. Using vinyl the bass in particular attracted consistent criticism, possibly in part related to the measured 50Hz peak. Results were rather more respectable with CD, but still sounded over-constrained, lacking 'fire' and 'attack'. Although there were elements of transparency with improved imagery and focus, again bass was somewhat 'softened' and 'heavy', and the soundfield failed to integrate convincingly across the spectrum.

Conclusions

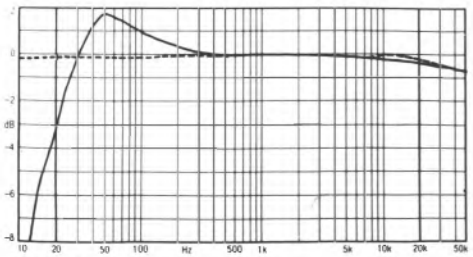
The fine presentation and finish with decent measured performance and the ability to cater for complex A/V integration ensures that these new Sonys will find a place in the marketplace. But despite various promising ingredients, the *500ES* was let down by a sound quality that did not knit together too convincingly, falling significantly behind its big brother in this respect. Sony are aware of our findings and are already taking action to improve this aspect of the performance.

Test measurements

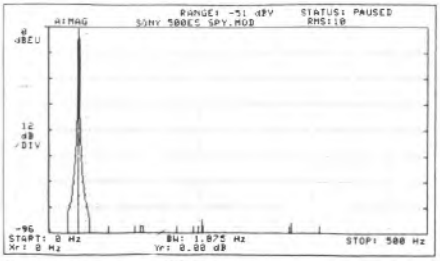
To show how well the amplifier sustains its 8ohm output into real loudspeaker loads, the level into 4ohms and 2ohms is given in dBW (where 0dB=1W), without adding 3dB or 6dB respectively, as in usual 'power' ratings.

Test Results

Power output			Integrated amplifier
Rated power into 8ohms, maker's spec			75W(=18dBW)
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	20.2dBW	20.5dBW	20.2dBW
Both channels, 4ohm load	17.7dBW	18.4dBW	17.9dBW
One channel, 2ohms, pulsed	–dBW	18.5dBW	–dBW
Instantaneous peak current		+22.0A	–22.0A
Distortion			
Total harmonic distortion	20Hz	1kHz	20kHz
at rated power, aux input	–91.0dB	–96.0dB	–87.0dB
Intermodulation, 19/20kHz, rated power, aux input			–96.0dB
Intermodulation, 19/20kHz, at 0dBW, disc (mm)			–75.0dB
Intermodulation, 19/20kHz, at 0dBW, disc (mc)			–48.0dB
Noise			
Disc (mm) input (IHF, CCIR weighted)			–72.0dB
Disc (mc) input (IHF, CCIR weighted)			–73.0dB
Aux/CD input (IHF, CCIR weighted)			–75.0dB
Residual, unweighted (volume control at min)			–86.0dB
DC output offset			left +7mV, right –1mV
Input overload	20Hz	1kHz	20kHz
Disc (mm) input (IHF)	30.9dB	30.4dB	29.3dB
Disc (mc) input (IHF)*	47.3dB	43.6dB	43.0dB
Aux/CD input (IHF)	>20dB	>20dB	>20dB
Stereo separation			
Disc input (mc)	63.0dB	78.0dB	51.0dB
CD direct input	95.0dB	75.0dB	49.0dB
Output impedance (damping)	0.12ohms	0.14ohms	0.18ohms
Channel balance, disc, at 1kHz (mc)			1.67dB
Volume/balance tracking	0dB	–20dB	–60dB
CD input	0.07dB	1.42dB	2.23dB
Input data	socket type	sensitivity	loading
Disc (mm) input	Phono	0.27mV	44kohms 160pF
Disc (mc) input*	Phono	0.018mV	100ohms n/a pF
CD direct input	Phono	16.5mV	50kohms 210pF
Output, pre-amp (tape)			9.8V max, 2 kohms
Disc equalisation error, 30Hz-15kHz (mc)			+1.68dB, –0.33dB
Size (width, height, depth)			43×15×37cm
Typical price inc VAT			£349



Disc input, RIAA equalisation accuracy



Power supply rejection, 40Hz input

SONY TAF700ES

SONY UK LTD, SONY HOUSE, SOUTH STREET, STAINES, MIDDLESEX TW18 4PF.
TEL: STAINES 61688

Making something of a welcome contrast to the 'straight line' purist devices which seem to be taking an increasingly large slice of the specialist market, this large, heavy and beautifully presented £500 Sony 'ES' integrated amplifier incorporates a wide range of facilities and features, sufficient to cater for the most complex audio or audio/video system, with a generous power rating of 100W. However, there is evidence that these have been selected with some sensitivity, and the general layout is ergonomically intelligent, even though the large collection of rotary knobs and switches may prove a little intimidating for the untrained.

The large volume control is supplemented by smaller rotaries for balance, bass and treble, the latter with attendant pushbuttons for switching turnover frequencies and 'defeat'. Three large rotary switches select loudspeakers (3), tape recorder and other inputs, while smaller rotaries cover mono/stereo, record output, and cartridge loading — this last providing a single moving magnet setting alongside 3/40ohm moving-coil alternatives. Further pushbuttons select subsonic filtering, −20dB muting (for answering the phone!), plus 'source direct', to bypass the line amplifiers. The rear panel uses phono sockets throughout, incorporates pre-/power splitter sockets for adding an external processor of some sort, and has two sets of substantial loudspeaker binding post terminals.

LAB REPORT

A massive resin-reinforced 'Gibraltar' chassis plus a central heatsink with anti-resonance frame and fins shows a general obsession with mechanical rigidity and vibration suppression. Parallel pairs of bipolar complementary class A/B outputs are fed from power supplies with separate reservoirs for each channel; the voltage driver supplies are similarly separate. Construction is rather complex, with PCBs scattered around the frame, but there is also some provision for direct signal paths, and some special component selection.

The power rating is generous, and this was generously exceeded on measurement, with good bandwidth extension. Interestingly, the actual peak current capability was somewhat less than that measured for the smaller 500ES model, but this may reflect the separate power supplies adopted for the 700. The power supply

modulation spectrogram gave an excellent result.

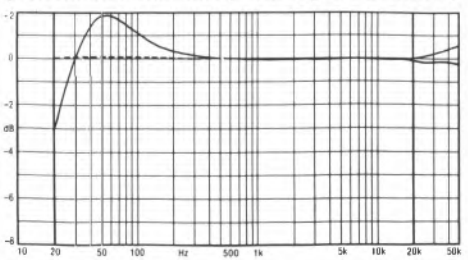
Distortions were fine throughout, with no apparent weakspots. Noise was a little below average on the disc inputs, but input overload margins were generous and stereo separation was fine. Input sensitivities are fine, but note that the moving-coil input impedance is higher than most, and the capacitance loading for the moving magnet is a little too high to provide optimum matching with a few cartridge types (most will be OK). The volume and balance control tracking both showed room for improvement, and the disc input frequency response showed the same +2dB 50Hz 'bump' as the other tested *ES* model.

Sound Quality

Auditioning significantly better than its smaller '*500* brother, the '*700ES* still only managed an average rating overall, appealing more to some listeners than others and doing significantly better on CD rather than vinyl sources. A little 'heavy' and 'slow' in the bass (due partly no doubt to the frequency response on the disc input), the sound was quite well controlled with a fair measure of focus and clarity and a good impression of scale and weight, but with a slight treble 'glare' nonetheless, and mildly 'softened' transients. Stereo staging was not entirely convincing, lacking some transparency, precision and 'air', but the sound had a welcome 'drive' and 'energy' which was well liked.

Conclusions

Turning out to be a better proposition than the cheaper '*500*, the *700ES* is still rather too expensive for the level of sound quality on offer to merit recommendation. That said, it does offer comprehensive facilities and an exceptional quality of build and finish, plus a subjective performance that many will regard as entirely adequate. It would be nice to see a few of the details like the m-c response aberration cleared up, but the *700ES* could be worth considering for those needing this level of operational complexity.



Disc input. RIAA equalisation accuracy

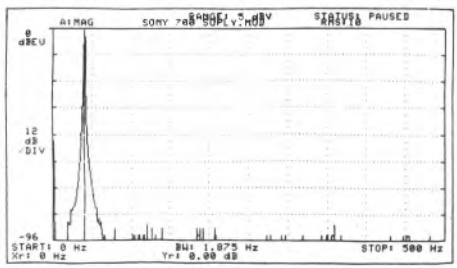
Test measurements

To show how well the amplifier sustains its 8ohm output into real loudspeaker loads, the level into 4ohms and 2ohms is given in dBW (where 0dB=1W), without adding 3dB or 6dB respectively, as in usual 'power' ratings.

Test Results

Power output		Integrated amplifier	
Rated power into 8ohms, maker's spec		100W(=20dBW)	
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	22.1dBW	22.0dBW	21.7dBW
Both channels, 4ohm load	19.6dBW	20.1dBW	19.6dBW
One channel, 2ohms, pulsed	–dBW	19.3dBW	–dBW
Instantaneous peak current		+17A	–17A
Distortion			
Total harmonic distortion,	20Hz	1kHz	20kHz
at rated power, CD input	–87dB	–91dB	–85dB
Intermodulation, 19/20kHz, rated power, aux input			–98dB
Intermodulation, 19/20kHz, at 0dBW, disc (mm)			–76dB
Intermodulation, 19/20kHz, at 0dBW, disc (mc)			–79dB
Noise			
Disc (mm) input (IHF, CCIR weighted)			–60dB
Disc (mc) input (IHF, CCIR weighted)			–67dB
CD input (IHF, CCIR weighted)			–74dB
Residual, unweighted (volume control at min)			–88dB
DC output offset		left +17mV, right +10mV	
Input overload	20Hz	1kHz	20kHz
Disc (mm) input (IHF)	31.7dB	30.9dB	30.4dB
Disc (mc) input (IHF)*	31.6dB	31.2dB	31.2dB
CD input (IHF)	>20dB	>20dB	>20dB
Stereo separation			
Disc input (mm)	77dB	67dB	44dB
CD input	105dB	74dB	46dB
Output impedance (damping)	0.06ohm	0.06ohm	0.10ohm
Channel balance, disc, at 1kHz			0.23dB
Volume/balance tracking	0dB	–20dB	–60dB
CD input	0.02dB	0.29dB	1.22dB

Input data	socket type	sensitivity	loading	
Disc (mm) input	Phono	0.27mV	47kohms	345pF
Disc (mc) input*	Phono	0.018mV	960ohms	560nF
CD input	Phono	16.0mV	54kohms	145pF
Output, pre-amp (tape)	Phono	10.1V max,	1.2kohms	
Disc equalisation error, 30Hz-15kHz	mc	+1.90dB,	–0.10dB	
Size (width, height, depth)		43×16×43cm		
Typical price inc VAT		£500		



Power supply rejection, 40Hz input

RECOMMENDED

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This superbly built studio-class amplifier has a fine pedigree, in part derived from the Tresham company which is now part of Tannoy. The 840 does not have phono socket inputs; instead XLR and ¼in jack inputs are provided, while speaker connection uses 30A binding posts. A massive creation of considerable weight, it has one of the largest toroidal mains transformers we have ever seen. The specification discusses ratings down to 2ohms continuous per channel, and the transformer is commensurately rated for this arduous duty. The basic spec is 250W per channel, or 900W mono bridged.

SOUND QUALITY

Mechanical hum was moderate, while very high, unstrained sound levels were possible. This was one of the biggest amps tested and 111dBA was attained into 8 ohms, with 110dBA into 4ohms — a powerhouse indeed!

Few doubts were expressed on sound quality and on the listening test scores, the amplifier established a 'good plus' overall rating. Focus was fine, but with a slight constriction of stereo depth and image width. The treble register was musical with good definition, while the bass was effortlessly powerful and extended, yet with very good articulation and speed. Tonally, the mid was judged to be slightly 'clinical', but this did not detract much from the rating. Compared with the best examples, it could sound slightly veiled and lacking in 'air'. Conversely it handled dynamics well, giving an impression of power and ease.

LAB REPORT

Considering its high output level, the peak output current was somewhat lower than expected. However, at over 40A this should not give any trouble except with reactive loads below 3ohms, or resistive loads below 2ohms. Peak 8ohm levels exceeded 500W per channel, and this level was

held even into 2ohms. Clearly a conservatively rated model, the 4-8ohm bridged output level will typically lie in the 1,500 to 1,800W range!

Measured distortions were negligible, noise levels fine and DC offset at the output was virtually zero. Channel separation was very good and output impedance very low. Channel balance was held to a typical 0.02dB. It represented a very easy pre-amplifier load requiring 67mV for the IHF 1watt output; by our measurements full clipping would require around 2V.

Conclusions

This very powerful, professional amplifier has passed the critical listening test associated with more delicate exotics intended for 'audiophile' hi-fi use. Lab performance was very good, while the load tolerance was fine, and the power output exceptional. The very good sonic rating places it amongst the best for this power rating. Given its high standard of engineering, it represents good value and is recommended.

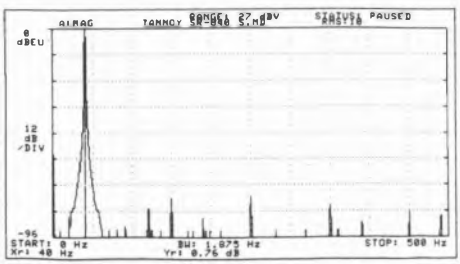
Test measurements

To show how well the amplifier sustains its 8ohm output into real loudspeaker loads, the level into 4ohms and 2ohms is given in dBW (where 0dB=1W), without adding 3dB or 6dB respectively, as in usual 'power' ratings.

Test Results

		Power amplifier	
Rated power into 8ohms, maker's spec		250W(=24dBW)	
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	25.0dBW	25.2dBW	24.8dBW
Both channels, 4ohm load	23.8dBW	24.1dBW	23.7dBW
One channel, 2ohms, pulsed	–dBW	26.4dBW	–dBW
Instantaneous peak current		+45A	–40A
Total harmonic distortion,	20Hz	1kHz	20kHz
at rated power, aux input	–80.9dB	–80.6dB	–68.3dB
NOISE			
Aux/CD input (IHF, CCIR weighted)		–83.0dB	
Resididual, unweighted (volume control at min)		–82.0dB	
DC output offset		left 1mV, right 1mV	
Output impedance (damping)	0.05ohm	0.05ohm	0.11ohm
Input data	socket type	sensitivity	loading
Power amp	XLR	67mV	32kohms	1.6nF
Size (width, height, depth)		48 × 13 × 46cm	
Typical price inc VAT		£1200	

First reviewed: 1986. Rating: Recommended.



Power supply rejection, 40Hz input

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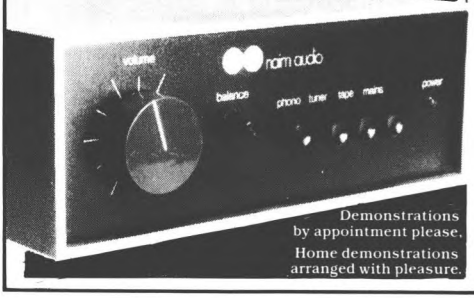

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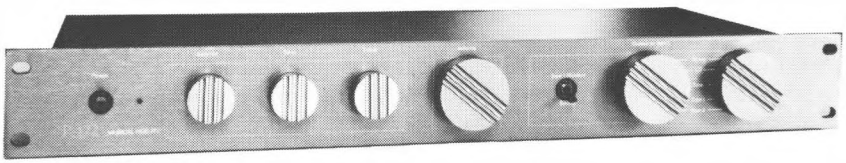

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TECHNICS SU-500

PANASONIC UK LTD, 300-318 BATH ROAD, SLOUGH, BERKS SL1 6JB.
TEL: 0753 34522

A typical Japanese budget integrated amplifier in concept, rated at 40-50W and priced at £100, the *SU-500* has an attractive two-tone black/brown finish that highlights the controls, and is beautifully finished externally. The large volume control is visually complemented by three smaller rotaries for bass, treble and balance. The row of pushbuttons for three inputs plus tape monitoring also includes one dummy plus the 'loudness' switch, while speaker selection, on/off and a headphone jack are sited elsewhere.

The speaker terminals are a twist-grip type, and a rear panel pushbutton provides series (ugh!) or parallel connections depending on the rated loudspeaker impedance if two pairs are to be used. Phono interconnection sockets are used throughout, the amplifier accommodating moving magnet cartridge inputs only.

LAB REPORT

There is no evidence of components chosen specifically for sound quality, though the basic simplicity of this low cost design helps keep signal paths straightforward enough. Technics have a long tradition of innovation in amplifiers, and in this example use proprietary thick film hybrid IC output stages, fixed to an internal heatpipe, with a dual IC disc input as well.

The power output is generous enough, comfortably exceeding specifications. The overall pattern shows a somewhat greater than usual drop when measured with both channels driving into 4ohms, yet generous pulse and peak current capabilities, which tends to indicate a fairly 'loosely' controlled power supply. The power supply modulation spectrogram was pretty decent, however, albeit with a few distortion components in evidence.

In other respects the measurements were pretty good: distortion and noise were both quite low, input overload margins and sensitivities were all fine, and volume/balance tracking and stereo separation pretty respectable considering the price constraints. The sensibly bandlimited

disc RIAA equalisation was quite accurate, though perhaps with enough of a bass/treble shelf to make a contribution to the overall subjective character.

Sound Quality

The panelists were none too kind in their comments, but nevertheless rated this amplifier below average, which is no disgrace at this sort of price point. There was a sort of grudging acceptance that the '500 did most things quite competently while clearly failing to raise any great enthusiasm or excitement amongst the panelists. The balance sounded quite neutral, and there was a bit of 'bounce', but also some treble 'tizz', described as "very hi-fi" in one comment, and the sound started to get untidy when loud. Detail and stereo resolution were both limited, and depth practically non-existent.

Conclusions

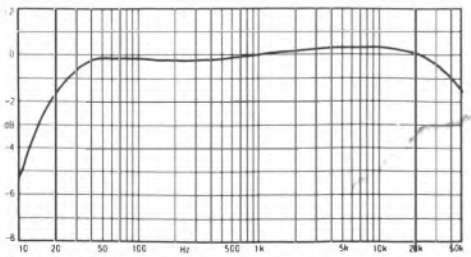
Technics have something of a knack in creating very competitively priced models which just border on what we would regard as minimum standards for hi-fi, as distinct from music centres, and the '500 hits this particular spot as precisely as their low cost turntables tested in late 1986. The SU²500 is worth considering at £100, but our enthusiasm is muted in the knowledge that significant sonic improvement may be had for a little more expenditure. Still it does a workmanlike job, and provides a blend of performance and facilities which will admirably suit many owners of modest systems.

Test measurements

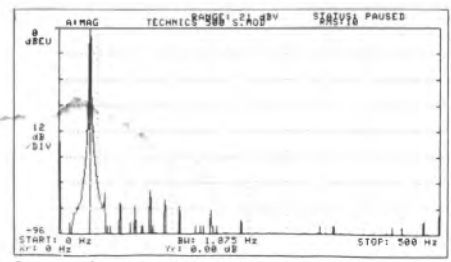
To show how well the amplifier sustains its 8ohm output into real loudspeaker loads, the level into 4ohms and 2ohms is given in dBW (where 0dB=1W), without adding 3dB or 6dB respectively, as in usual 'power' ratings.

Test Results

Power output			Integrated amplifier
Rated power into 8ohms, maker's spec			40W(=16dBW)
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	17.8dBW	18.4dBW	18dBW
Both channels, 4ohm load	13.5dBW	15.3dBW	14.6dBW
One channel, 2ohms, pulsed	–dBW	22.7dBW	–dBW
Instantaneous peak current		+14A	–12A
Distortion			
Total harmonic distortion	20Hz	1kHz	20kHz
at rated power, aux input	–77dB	–80dB	–74dB
Intermodulation, 19/20kHz, rated power, aux input			–76dB
Intermodulation, 19/20kHz, at 0dBW, disc (mm)			–74dB
Noise			
Disc (mm) input (IHF, CCIR weighted)			–69dB
Aux/CD input (IHF, CCIR weighted)			–72dB
Residual, unweighted (volume control at min)			–80dB
DC output offset		left –4mV, right –4mV	
Input overload	20Hz	1kHz	20kHz
Disc (mm) input (IHF)	32.5dB	30.9dB	29.8dB
Aux/CD input (IHF)	>20dB	>20dB	>20dB
Stereo separation			
Disc input (mm)	65dB	61dB	38dB
Aux input	70dB	61dB	36dB
Output impedance (damping)	0.14ohm	0.13ohm	0.16ohm
Channel balance, disc, at 1kHz			0.25dB
Volume/balance tracking	0dB	–20dB	–60dB
Aux input	0.07dB	0.33dB	0.09dB
Input data	socket type	sensitivity	loading
Disc (mm) input	Phono	0.36mV	44kohms 110pF
Aux input	Phono	20.5mV	27kohms 110pF
Output, pre-amp (tape)			9.9V max, 590ohms
Disc equalisation error, 30Hz-15kHz			+0.37dB, –0.60dB
Size (width, height, depth)			43×8.5×25cm
Typical price inc VAT			£100



Disc input. RIAA equalisation accuracy



Power supply rejection, 40Hz input

TECHNICS SU-V60

PANASONIC UK LTD, 300-318 BATH ROAD, SLOUGH, BERKS SL1 6JB.
TEL: (0753) 34522

This large £200 integrated amplifier from Technics' upmarket 'V' range is crammed with facilities, inevitably resulting in a complex front panel, and is rated at a substantial 90W. Legends proclaim all manner of technical features over and above the information necessary for operation, notably that this is a 'VC-4' amplifier system with 'class AA' circuitry. However, the volume control and pushbutton input selectors are easy enough to find, and an over-riding 'CD direct' button is also provided, somewhat akin to a tape monitoring switch in operation.

The remaining rotary controls comprise tone (accompanied by a small 'defeat' switch), balance, and record output selector, the latter backed by an illuminated display alongside that which monitors the selected listening input. Further pushbuttons operate power on/off, loudspeakers main and/or remote, subsonic filter, 'loudness', and select the disc input sensitivity to match moving magnet or moving-coil cartridges.

The rear panel uses phono interconnects throughout, with the facility for two tape recorders plus an external processor (eg graphic equaliser). Substantial terminals for two pairs of speakers are Technics' unique 'push 'n' twist' types, with a switch for parallel or series (ugh!) connection according to the impedances of the speakers being used.

LAB REPORT

The 'V60 uses Technics' proprietary 'class AA' thick film hybrid IC output modules. Internal cooling uses a heat pipe system which has thin, rather resonant fins. The power supply has a decent 8,000uF reservoir, but with a smallish transformer. The construction is quite tidy overall, combining discrete and IC circuitry and with no special evidence of the use of audiophile quality components.

This powerful integrated amplifier comfortably exceeded its 90W/8ohms rating on test. The power was quite well maintained into lower impedances too, though the 13.5A current rating is not especially generous in view of the

voltage rail setting. Distortion and noise measurements were generally good, though the moving-coil cartridge input noise is less than the best. Input overload margins are fine, with sensible, compatible sensitivity values. Stereo separation is poorer than most, perhaps reflecting the simple shared power supply arrangement, though it behaved impeccably on the heavy modulation spectrogram. The RIAA disc equalisation curve is nigh impeccable, with little bandlimiting in operation.

Sound Quality

The *V60* was rated average on auditioning, achieving satisfactory results but lagging a little behind the simpler, sound-oriented models that are increasingly contesting the price/power stratum below this model. The sound was considered a little 'bland', 'softened' and 'slow', though politely inoffensive, 'open', 'clean', and generally easy on the ears. However, some general lack of coherence and integrity did tend to allow the attention to wander. Focus and stereo precision were unexceptional, with little 'hear through' impression of depth and transparency, and some 'thickening' of textures.

Conclusions

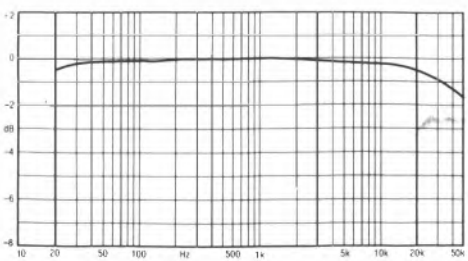
Worthy and respectable enough in many respects, the *V60* nevertheless failed to distinguish itself on audition, sounding a little 'dated' compared with more self-consciously sound quality oriented models. Nevertheless, it did not disgrace itself either, and offers a healthy power output for the price, with exemplary standards of construction and finish plus the plentiful features and facilities that some users will still prefer.

Test measurements

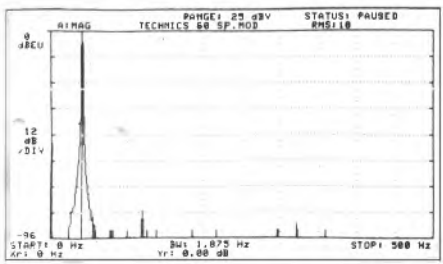
To show how well the amplifier sustains its 8ohm output into real loudspeaker loads, the level into 4ohms and 2ohms is given in dBW (where 0dB=1W), without adding 3dB or 6dB respectively, as in usual 'power' ratings.

Test Results

Power output			Integrated amplifier
Rated power into 8ohms, maker's spec			90W(=19.5dBW)
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	20.4dBW	20.6dBW	20.4dBW
Both channels, 4ohm load	17.2dBW	18.3dBW	17.9dBW
One channel, 2ohms, pulsed	–dBW	17.5dBW	–dBW
Instantaneous peak current		+13.5A	–13.5A
Distortion			
Total harmonic distortion,	20Hz	1kHz	20kHz
at rated power, aux input	–85dB	–92dB	–78dB
Intermodulation, 19/20kHz, rated power, aux input			–88dB
Intermodulation, 19/20kHz, at 0dBW, disc (mm)			–77dB
Intermodulation, 19/20kHz, at 0dBW, disc (mc)			–77dB
Noise			
Disc (mm) input (IHF, CCIR weighted)			–70dB
Disc (mc) input (IHF, CCIR weighted)			–65dB
CD Direct input (IHF, CCIR weighted)			–71dB
Residual, unweighted (volume control at min)			–78dB
DC output offset			left –6mV, right –7mV
Input overload	20Hz	1kHz	20kHz
Disc (mm) input (IHF)	32.1dB	31.4dB	30.0dB
Disc (mc) input (IHF)*	30.0dB	39.4dB	39.0dB
CD Direct (IHF)	>20dB	>20dB	>20dB
Stereo separation			
Disc input (mc)	44dB	50dB	32dB
CD Direct input	79dB	66dB	42dB
Output impedance (damping)	0.21ohm	0.21ohm	0.28ohm
Channel balance, disc, at 1kHz			0.37dB
Volume/balance tracking	0dB	–20dB	–60dB
CD Direct	0.07dB	0.12dB	1.79dB
Input data	socket type	sensitivity	loading
Disc (mm) input	Phono	0.28mV	46kohms 140pF
Disc (mc) input*	Phono	0.021mV	230kohms 530nF
CD Direct input	Phono	16.3mV	35kohms 110pF
Output, pre-amp (tape)			10.9V max, 530ohms
Disc equalisation error, 30Hz-15kHz			+0dB, –0.27dB
Size (width, height, depth)			43×12×34.5cm
Typical price inc VAT			£200



Disc input. RIAA equalisation accuracy

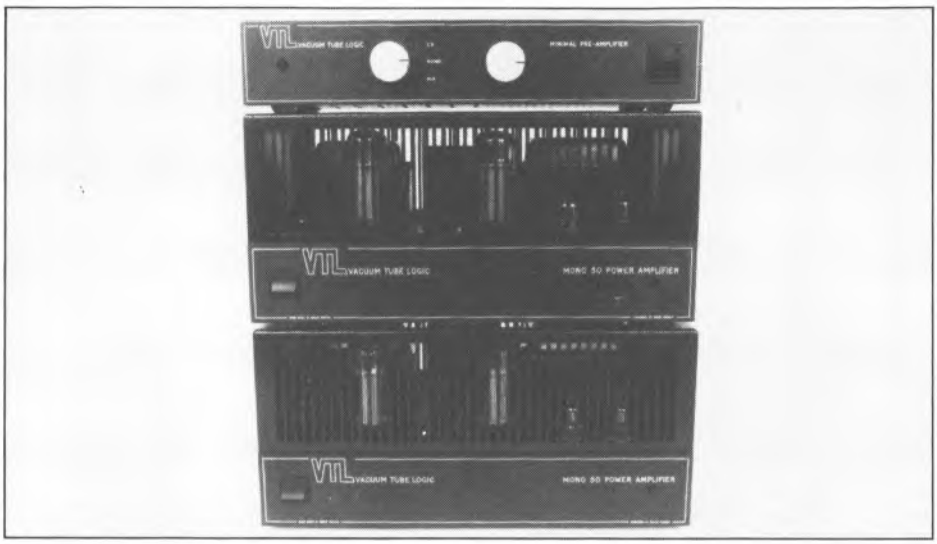


Power supply rejection, 40Hz input

RECOMMENDED

VTL MINIMAL/50W MONOBLOCK

VACUUM TUBE LOGIC, UNIT K, REAR BLOCK, 8-14 NORWOOD ROAD, SOUTHALL, MIDDX UB2 4DL.
TEL: 01-574 4814



Claiming to be the largest valve amplifier manufacturer in Europe, Vacuum Tube Logic's name — a gentle if ambitious parody of the world's largest studio mixer company (SSL) — puts their commitment to valves and transformers firmly on the line, with a big enough range to back that up. They have three pre-amps, some nine power amplifier configurations including an in-car unit(!), and have even shown a prototype CD player with thermionic circuitry. Such a range cannot be fully represented in a single review, but the £300 Minimal pre-amp, combined with a pair of 50W *Monoblock* power amplifiers (£1,150 each), will give a flavour of the VTL approach. Due for imminent launch, a stereo moving-coil all valve pre-amplifier will extend VTL's capabilities still further, but at a probable cost of £500-£700.

The *Minimal* pre-amp lives up to its name, and is notably compact and simple, if lacking some of the deluxe details enjoyed by more expensive models, with just input selector, volume and balance controls. The monoblock power amplifier is also suprisingly and conveniently compact compared with many of this breed, combining simple triode drivers and EL34 output valves with a substantial output transformer and solid state power supply.

LAB REPORT

Good quality components combine with capable 'hand built' construction and neat and simple layout. The pre-amp is based on three double triodes with solid stage high voltage regulators and regulated heaters. The line stage is a unity-gain cathode follower — so check that ancillary tuners, cassette decks etc. have enough output. The power amp uses straightforward 'classic' ultra-linear circuitry, with regulated bias supply.

The power amplifiers had some difficulty meeting specification at high frequencies, and showed some reluctance to perform into low impedances, though the instantaneous peak current figure of +/−8A was reasonable enough for this type of amplifier. The power supply

modulation spectrogram looks rather alarming, but largely reflects high levels of harmonic distortion: mains components are quite well under control.

Harmonic distortion was poor but intermodulation was reasonable. Noise and stereo separation were both a little marginal on the disc input, but overload margins were generous, volume/balance tracking good, and input sensitivities fine, though there is no chance of getting away with a moving-coil cartridge on the disc input. The RIAA curve shows excessive bandlimiting, the −1dB points being at 100Hz and 10kHz, with −3dB at 50Hz and 20kHz.

Sound Quality

Both pre- and power amplifiers rated good on audition, despite their laboratory limitations. The pre-amp's limited bass extension was noticed, but perhaps contributed to a lively yet well controlled, 'punchy' sound. The mid and treble were clear and open, again well controlled, with fine focus but some constriction of depth and space. The power amplifiers sounded a little 'lumpy' and 'over-powerful' at low frequencies, compensating a little for the pre-amp here perhaps, and lacked a little in speed and transparency.

Conclusions

As so often with valve amplifiers we are faced with the weighing up good sound quality against modest measurements and awkward practical considerations. The pre-amp is particularly good value, and the units deserve recommendation on the basis of decent sound quality, but the lack of a moving-coil input (which costs a lot as a separate extra from VTL!) is regrettable. The power amplifiers are less distinctive and quite expensive — in fact for a 25% higher price we regard the 100W monoblocks as a better proposition. The usual care needs to be taken in siting the hot little monoblocks.

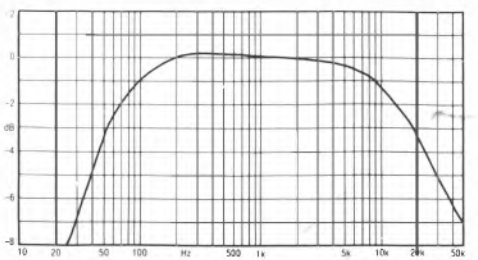
Test measurements

To show how well the amplifier sustains its 8ohm output into real loudspeaker loads, the level into 4ohms and 2ohms is given in dBW (where 0dB=1W), without adding 3dB or 6dB respectively, as in usual 'power' ratings.

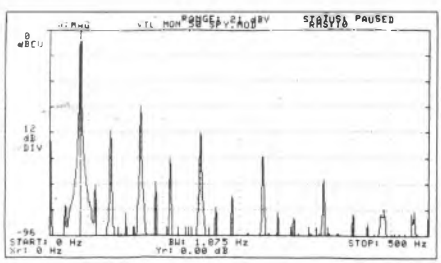
Test Results

Power output		Integrated amplifier	
Rated power into 8ohms, maker's spec		50W(=17dBW)	
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	17.2dBW	17.9dBW	15.7dBW*
One channels, 4ohm load	13.6dBW*	13.7dBW*	11.6dBW*
One channel, 2ohms, pulsed	–dBW	11.5dBW	–dBW
Instantaneous peak current		+8.0A	−8.0A
Distortion			
Total harmonic distortion,	20Hz	1kHz	20kHz
at rated power, aux input	−40.0dB	−43.0dB	−26.0dB
Intermodulation, 19/20kHz, rated power, aux input			−73.0dB
Intermodulation, 19/20kHz, at 0dBW, disc (mm)			−68.0dB
Noise			
Disc (mm) input (IHF, CCIR weighted)			−61.0dB
Aux/CD input (IHF, CCIR weighted)			−86.0dB
Residual, unweighted (volume control at min)			−71.0dB
DC output offset			0mV
DC offset, pre-amp			−2mV
Input overload	20Hz	1kHz	20kHz
Disc (mm) input (IHF)	41.2dB	58.2dB	38.9dB
Aux/CD input (IHF)	>20dB	>20dB	>20dB
Stereo separation			
Disc input (mm)	59.0dB	52.0dB	30.0dB
Aux input	104.0dB	80.0dB	53.0dB
Output impedance (damping)	1.1ohm	1.06ohm	1.05ohm
Channel balance, disc, at 1kHz			0.09dB
Volume/balance tracking	0dB	−20dB	−60dB
Aux input	0.09dB	0.09dB	1.54dB
Input data	socket type	sensitivity	loading
Disc (mm) input	Phono	1.27mV	29kohms 170pF
Aux input	Phono	39.5mV	216.0kohms 60pF
Power amp		730mV	130kohms 50pF
Output, pre-amp (tape)			12.9V max, 410ohms
Disc equalisation error, 30Hz-15kHz			+0.14dB, −6.9dB
Size (width, height, depth)			34×16.5×24cm
Typical price inc VAT			£300 + £500 + £500

*Some harmonic distortion here.



Disc input. RIAA equalisation accuracy

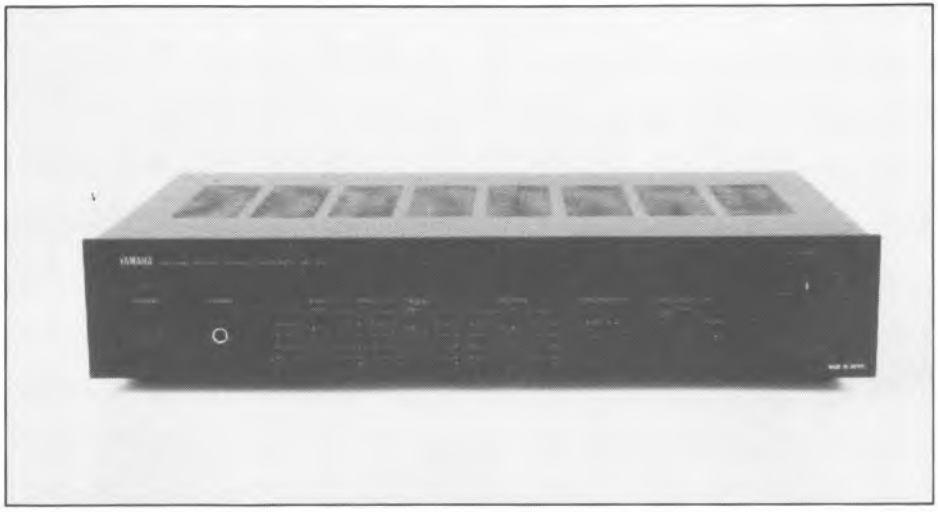


Power supply rejection, 40Hz input

RECOMMENDED

YAMAHA AX-300

YAMAHA ELECTRONICS, 200 RICKMANSWORTH ROAD, WATFORD, HERTS WD1 7JS.
TEL: (0923) 33166



This just-above-budget-price £120 integrated Japanese amplifier is typical of the new breed of simplified designs which are aimed particularly at the UK market. It is a compact model, though taller than most of its competitors, rated at 30-40W, and finished inevitably in black. A functional if stark front panel has five knobs, two pushbuttons and a headphone socket. Supplementing the main volume control are three subsidiary rotaries for tone and balance, plus an input selector, the centre position on the tone controls labelled defeat. Tape monitoring and power switching are provided by the individual pushbuttons. The rear panel has phono socketry throughout, the disc input restricted to moving magnet cartridges, plus a single set of binding posts for loudspeaker connection.

LAB REPORT

Using a very clean single board layout, the '300 uses a high-gain discrete-component direct-coupled bi-polar power amplifier section which also includes the tone control circuitry, and so avoids using a line stage altogether. Output relays provide effective protection, disc input circuitry is dual IC, and although mains connections were unshrouded the unit generally showed very competent Japanese build quality throughout, with clear evidence of sound quality priority.

Power output was respectably above the fairly modest specification, and was also respectably maintained into low impedances, with a generous current capability of 15/16A. Distortion and noise measurements were both very good, overload margins and stereo separation were fine, and calibration reasonable enough for the price. Inputs should show no matching problems provided auxiliaries have normal output levels. The power supply modulation spectrum shows an excellent result at any price, while the RIAA disc equalisation might have been a little closer toleranced, and will provide a touch of 'character'.

SOUND QUALITY

The '300 was rated comfortably above average

and close to a 'good' rating; it is clearly one of the more impressive models at its price level — up with well regarded models costing considerably more. Not the most comfortable of sounds, the liveliness and dynamics provided the strongest impression, with good 'speed' and 'momentum' outweighing criticisms of some loss of transparency and a rather 'bright' overall balance. Not the subtlest or most controlled sounding performer, a natural sense of exuberance more than compensates.

Conclusions

Fine build quality plus sound quality oriented engineering bring Yamaha strongly into the market for 'stripped down' 'budget audiophile' integrated amplifiers with a very impressive contender. Livelier than most if a little less polite than many, the '300 clearly merits confident recommendation.

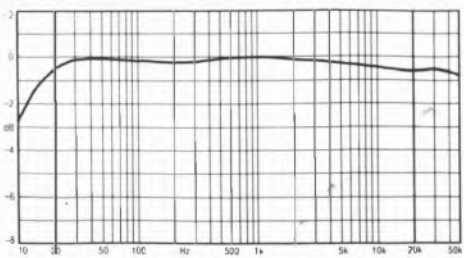
Test measurements

To show how well the amplifier sustains its 8ohm output into real loudspeaker loads, the level into 4ohms and 2ohms is given in dBW (where 0dB= 1W), without adding 3dB or 6dB respectively, as in usual 'power' ratings.

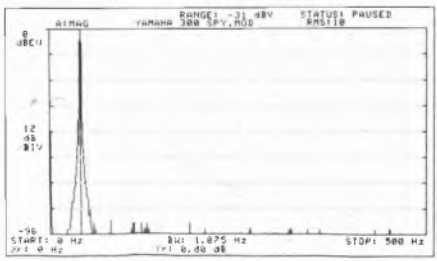
Test Results

Power output			Integrated amplifier
Rated power into 8ohms, maker's spec			30W(15dBW)
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	17.5dBW	17.5dBW	17.4dBW
Both channels, 4ohm load	13.5dBW	14.5dBW	14dBW
One channel, 2ohms, pulsed	–dBW	15.4dBW	–dBW
Instantaneous peak current		+15,	–16A
Distortion			
Total harmonic distortion,	20Hz	1kHz	20kHz
at rated power, aux input	–92dB	–95dB	–88dB
Intermodulation, 19/20kHz, rated power, aux input			–98dB
Intermodulation, 19/20kHz, at 0dBW, disc (mm)			–71dB
Noise			
Disc (mm) input (IHF, CCIR weighted)			–74dB
Aux/CD input (IHF, CCIR weighted)			–77dB
Residual, unweighted (volume control at min)			–86dB
DC output offset		left 17mV, right 17mV	
Input overload	20Hz	1kHz	20kHz
Disc (mm) input (IHF)	32.5dB	32dB	31.8dB
Aux/CD input (IHF)	>20dB	>20dB	>20dB
Stereo separation			
Disc input (mm)	63dB	69dB	43dB
Aux input	83dB	68dB	44dB
Output impedance (damping)	0.09ohms	0.09ohms	0.13ohms
Channel balance, disc, at 1kHz			0.65dB
Volume/balance tracking 0dB, 0.08dB, –20dB, 0.79dB, –60dB, 1.22dB			
Aux input			

Input data	socket type	sensitivity	loading	
Disc (mm) input	Phono	0.49mV	47kohms	70pF
Aux input	Phono	29.5mV	62kohms	95pF
Output, pre-amp (tape)			11.5V max,	560ohms
Disc equalisation error, 30Hz-15kHz			+0dB,	–0.47dB
Size (width, height, depth)			44×9.5×31cm	
Typical price inc VAT			£120	



Disc input. RIAA equalisation accuracy



Power supply rejection, 40Hz input

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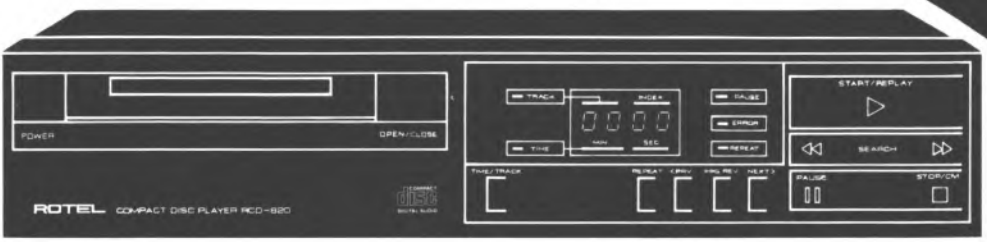

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AMPLIFIER SUMMARY REVIEWS

These brief reviews summarise our findings on models which have been fully tested previously but have been displaced from the main review section by the inevitable pressure on space. Note that despite this briefer coverage, many of the models here are still fully recommended.

Akai AM-A90 (£400)
This upmarket integrated amplifier has a number of advanced features, a plethora of facilities, plus a healthy power output of around 22dBW — comfortably exceeding the rated 130W/ch. Capable of high sound levels, the sound quality was quite respectable, though bettered by a number of less costly models nonetheless.

Audio Research SP8/D70 (£1998, £2190)
This legendary US valve 'high end' pre- and power amplifier combination has been around a number of years, each item now costing about £2000. Though their respective sound qualities are now comfortably exceeded by more expensive alternatives from the same manufacturer, these models have themselves been steadily refined and remain competitive, fully meriting recommendation on sound quality grounds.

The *D70* has a power output of around 18.5dBW, but with some constriction into 'difficult' loads. The *SP8* is expected to be joined by an *SP9* later in 1987, incorporating changes along the lines of those which distinguish the *SP11* from the *SP10*.

Burmester 838/846/850 (£990/£1050/£2650pr)
A slim, high-precision disc input device, the 838 may be used as a pre-amp if no other inputs are required; adding the 846 brings a superior line output stage as well as additional input facilities. The *838*'s strong points include extreme neutrality, dry clean bass and notably sharp stereo focusing. While not quite entering the territory of the best tubed devices, these and the *850* mono power amplifiers are very fine pieces of equipment, and are recommended.

Conrad Johnson PV5/MV50 (£2010, £1795)
More reasonably priced than many US exotics, the valve *PV5/MV50* pre- and power amplifiers are still fine sounding models which substantially justify their asking price on sound quality grounds. The *PV5* has sufficient sensitivity for the healthier output moving-coil cartridges, and although the MV50's loudness and power delivery are both somewhat restricted, the quality is still highly regarded.

Conrad Johnson Premiere III/IV
(£3400, £3600)
This prestige valve amplifier combination is extravagantly priced but capable of genuine audiophile sound quality, with seductive stereo staging of great depth and transparency and fine, subtle detail resolution. Power output is generous for a valve amplifier, with reasonable bandwidth besides, while the pre-amp provides sufficient sensitivity to handle the higher output moving-coil cartridges, though at some cost in noise performance.

Counterpoint SA7/SA12 (£750, £1250)
This valve pre-/power combination from the US includes an unusually high sensitivity/low noise disc input allowing direct working with the higher output moving-coil cartridges. The power amplifier is a valve/MOSFET hybrid providing a good combination of the better characteristics of valve and transistor operation, with substantial wide bandwidth power delivery. Both rate highly on sound quality considering prices which are expensive but not unreasonably so, though the *'12* power amplifier is the stronger performer overall.

DNM pre-amplifier (from £1000)
This pre-amplifier system has been through some major changes since we last received samples for assessement (despite promises). Historically it has proved a competitive performer, though the price appears to have risen somewhat.

Deltec pre-amplifier (£666)
This simple up market pre-amplifier has minimal facilities but caters for mm and m-c cartridges. Lab results were satisfactory, but with limited high frequency overload, while sound quality was good throughout, indicating that a 'worth considering' rating is appropriate at the price.

Denon PMA-707 (£100)
Still rating recommendation, this simple and straightforward 'budget' integrated amplifier delivered a solid lab performance with good power delivery for the price, plus a sound quality

that sets it a little apart from the 'rack system' standards achieved by many immediate competitors.

Hafler DH120 (£360/295)
Available assembled or in kit form (£360/£295), this US transistor power amplifier has a very respectable lab performance and a power output around 18dBW, with quite good load tolerance. Sound quality was substantially good, though no more than might be expected for the price, indicating a 'worth considering' rating.

Harman Kardon HK645 (£225)
From the same series as the '655 given a full review in this edition, the '645 has a lower power output (18dBW/8ohms/one channel, comfortably bettering the 16dBW spec.) and lacks the moving-coil disc input. It delivers a decent standard of sound quality, sufficient to merit consideration, if a little below recommendation by current standards.

Hitachi HA3 (£180)
This mid-priced integrated model has comprehensive enough facilities but with the notable omission of a moving-coil cartridge input. Power output generously exceeded specification, reaching 21+dBW into 8ohms but with some restriction on current delivery into low impedances. Sound quality was disappointingly well below average, however.

Krell PAM5/KSA50II (£1589, £2300)
Despite prices that are extravagant by UK standards, the *PAM5/KSA50II* combination represents the bottom of this US class A specialist's line. Sound quality is qualitatively very fine indeed, though falling a little short of still more expensive exotics in terms of transparency. Power delivery is generous, moving from class A to A/B as extreme demands are made, and lab performance is to the highest standards.

Le Tube (£535)
This somewhat idiosyncratic minimalist French pre-amp system uses valves throughout, with outboard power supplies and an expensive optional moving-coil valve head amp (*Le Pre Pre*, £435). A little lacking in some areas of lab performance, the sound quality was to a good standard, and in no way compromised by the additional head amp except in price terms.

Luxman LV-105 (£532)
This large integrated amplifier has a hybrid valve/transistor power amplifier, employing double triode drivers with MOSFET power devices. The £532 pricetag reflects exceptional finish and build quality, with comprehensive facilities. The power rating of 18.5dBW was comfortably exceeded in our tests at 8ohms loading, but protection circuitry limited power delivery into lower impedances. Sound quality is comfortably above average — sweet, open and essentially musical, if somewhat 'softened' besides.

Magnum A100 (£1995 pair)
The massive mono *A100* power amps can produce around 400W (26dBW) peak per channel into 8ohms, and scored well on audition, with powerful and tuneful bass, though a mild 'thinning' in the midrange was noted, with a touch of treble 'grain'. Recommendation remains appropriate.

Marantz PM64 (£300)
With a rated power of 100W (20dBW), this large amplifier is well equipped with tone controls and input facilities. It showed restricted power delivery into difficult loads, but peak output was undoubtedly high at almost 200W (23dBW). Basically pleasant and inoffensive, the bass showed a boomy effect and lack of real definition. Its smooth nature did suit CD sources, but the overall score was below average on listening tests.

Marantz PM84 (£500)
This large black integrated amplifier has comprehensive facilities and boasts class A operation up to a quarter of its substantial rated 21dBW power. Our tests improved on this figure by a dB or so, but showed some protection limiting into low impedances. Sound quality is comfortably above average — smooth in nature and capable of high levels — while finish and build quality were both excellent.

Mentmore M100 (£1182)
With some changes including different output valves, we partly re-assessed this traditional-style

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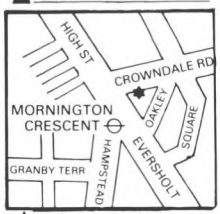

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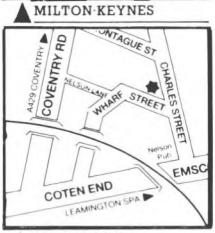

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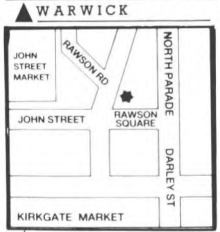

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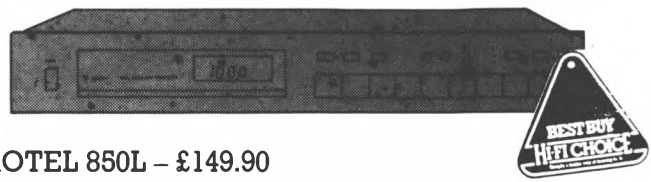

ROTEL 850L – £149.90

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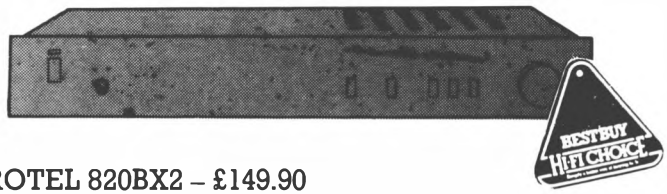
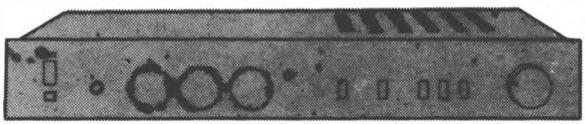


ROTEL 820BX2 – £149.90

The enthusiast's amplifier. Offering an exceptional musical performance for its price. The BX2 is the latest in the line of critically acclaimed 'B' series amplifiers with direct CD input. Further refinement by component selection to this straight line UK design has resulted in improved definition and resolution.



ROTEL 820 – £109.90

The first choice for many on the road to serious sound reproduction, offering dynamic power far in excess of its conservative 25 watt rating. High current capability – no degrading protection circuitry – hard wiring to speakers – speaker switching – large well engineered power supply – tone controls with tone defeat switch and a carefully tailored phono stage, all combine to make this an excellent amplifier.

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VISA BADA

UK valve monoblock power amplfier for 1987. The latest sample showed some improvement in power bandwidth at high frequencies, and a respectable enough lab performance for this type of design. The sound quality still rates good, sufficient to merit consideration rather than outright recommendation at this price level.

NAD 2200 (£339)

This medium priced power amplifier is starkly functional in appearance. Rated at 20dBW (100W), it is designed to deliver undistorted programme peaks of up to 500W per channel — claims which actually turned out to be quite conservative on test. Load tolerance was good, and ample current of +52/−60amps was measured. The sound quality is also good — dry and controlled and capable of very high levels of around 110dB without strain — so the *2200* is clearly worth considering for those who require massive power output at a fairly modest cost.

Perreaux SA3/1850 (£690, £990)

With an extravagant power rating of nearly 25dBW (8ohms, one channel), the lab performance of this expensive and beautifully finished transistorised pre-power combination from New Zealand was nigh impeccable. However, the sound quality was a little disappointing for the price, rating only above average by the latest standards adopted for 1987.

Pioneer A-77XBK

Large, black and imposing, the A-77X is a complex full-featured £400 device with substantial (20+dBW) power output and exemplary lab performance. However, the sound quality proved very disappointing, lacking balance, drama, dynamics and sheer interest-value, with indifferent focus and stereo depth.

QUAD 34/405 (£259/£299)

These established components offer great preamplifier flexibility with sensible and creative facilities. Lab performance was generally satisfactory, though the *405* is not ideal for 'difficult' loudspeaker loads. Sound quality in our estimation is now a little below average. However, the fine build quality — backed up by the finest after-sales service in the business — ensures these components remain worth considering.

Robertson Forty Ten (£987)

A US-designed transistor power amp built in the Far East, the heavily-built *Forty Ten* is rated at 60W per channel. It set a high sonic standard, as transparent and dimensional as the very best semiconductor amplifiers, and a number of valve amps, with lively dynamics and a clean open character; it was good enough to show most of the merit of a pre-amp like the Audio Research *SP8*. Though slightly clinical in tonal balance, it also proved unfatiguing, and most satisfying over long listening sessions.

Rotel RA820 (£110)

With tone controls and all the usual features, this 20W (13.5dBW) amplifier is the basis of the 'stripped' *'BX* version (see full review). It provides a musical-sounding immediacy, conveying depth, space and ambience, though the treble was a little bright; *via* auxiliary, it was even better, with impressive dynamics and clarity. Though not matching the sound of the *'BX*, the standard *'820* is still recommended in its own right.

Rotel RA840BX (£200)

This bigger brother to the *'820BX* offers more power (a rated 40W (16dBW) per channel) and an mc input facility, plus two tape inputs and a mono switch. Auditioned though not fully tested, it offered fine performance, retaining the virtues of the *'20*, and is recommended. A *BXII* type *840* is now available, but has not yet been received for assessment.

Rotel RA870 (£315)

This upmarket integrated amplifier was developed from the *'870* separates, adding lessons learnt with the cheaper *820BX* series. It has minimal facilities but covers mm and m-c cartridges. Power delivery comfortably exceeds the 60W/18dB rating, with ample current reserves. Measured lab performance and sound quality are both good, so continued recommedation remains appropriate.

Rotel RC870/RB870 (£245/£245)

Rotel's pre-amp is built with separate optimised buffer amplifiers for its mc and mm disc inputs,

"This amplifier was the best tested of its power rating." *Hi-Fi Choice*

"This very powerful, professional amplifier has passed the critical listening test associated with more delicate exotics intended for 'audiophile' hifi use. Lab performance was very good, while the load tolerance was fine, and the power output exceptional. Its very good sonic rating probably means that *this amplifier was the best tested of its power rating.* Given its high standard of engineering, it represented good value and is recommended." *Hi-Fi Choice*

"With an explicit presentation, the speed and dynamics of good programme material was reproduced well, with a low fatigue factor. Overdriven, it clipped well showing a peak sound level rather greater than the specification suggested.
In conclusion, while this amplifier can be used for workhorse duties due to its generally durable design and professional build quality, its metier was undoubtedly in monitoring applications where an accurate programme transfer to the speaker system is essential. Large enough for almost all monitoring setups it offered a high standard of sound quality which rated well above the norm. with that special performance in mind, plus the good load tolerance and the programme power of some 400W per channel, eight ohms, or 800W, four ohms, this amplifier gets a firm recommendation." *Sound Engineer & Producer*

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and uses fine quality components. It preserved good stereo depth, resolving rear detail well, and though tonally a touch 'lean', verging on the clinical, it gave a fine sound for the money. Surprisingly for the price, the 60W (18dBW) power amp is constructed as a double mono unit, and provided a likeable sound with good dynamics, though with some bass softness and touch of steel in the treble. Though overshadowed in value terms by the latest integrated '870, these units are recommended.

Sansui C2301/B2301 (£2306, £1880)

These massive units in beautiful lacquer finish are far from discrete visually, but very representative of 'flagship' models from mainstream Japanese manufacturers, with comprehensive features and facilities including a rather garish pair of power meters. Lab performance was very good, and power output quite generous, but although the power amplifier delivered a respectable enough sound quality, the pre-amp proved subjectively somewhat disappointing in relation to its high price.

Tandberg 3008A (£564)

Delivering a consistently good sound quality with impeccable lab performance, the *3008A* pre-amp has comprehensive facilities to satisfy any needs, though in the final analysis the sound was a little 'clinical' in character, lacking full musical integration.

Trio KA-54 (£99)

A simple enough £100 Japanese budget amplifier, the *KA-54* still carries a wide range of facilities and delivers a healthy enough 17+dBW power output. It showed a generally sound lab performance throughout, but was a disappointingly poor performer in the listening tests, with poor dynamics and significant loss of detail — a notable contrast to Trio/Kenwood's more recent and slightly more expensive '*550*.

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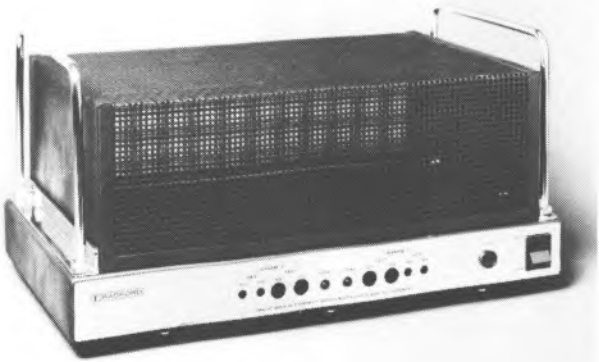

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TUNERS

Not the most glamorous of the hi-fi components, tuners are usually bought on cosmetic grounds, by the 40 per cent or so who choose to partner a previously selected amplifier. Years ago, people bought receivers instead, but these have fallen from favour and fashion. But at least the separates option allows the tuner to be added later as a system upgrade, and may also allow the customer to choose a level of performance to suit his pocket and interest in the radio medium.

The motivation to buy a tuner must surely relate closley to the characteristics of radio programming in whatever country. And in this respect the UK is very wierd indeed — a bizarre combination of Government over-regulation and indecision at the local level alongside a national network widely regarded as the envy of the world. The result is certainly some of the best programming in the world, but biased in such a way that could only exist in a non-commercial operation, and leaving substantial gaps in the balance and depth of popularly-orientated programming. But for those with broad or specifically classical music tastes, the BBC is one of the few services which continue to transmit substantial amounts of live performance, and this is a powerful reason for contemplating a significant investment in a decent tuner. Given a reasonably decent hi-fi system, radio transmissions of pre-recorded material rarely equal the quality obtainable by reproducing that same source directly in the home; broadcast treatment of LP discs is a particular travesty. Yet the live transmission from studio or concert hall, if sensitively miked and mixed, can produce a spine-chilling realism that transcends other sources in certain respects. It is a treat that should not be overlooked.

Basic Requirements

From the hi-fi perspective, FM (VHF) is the only form of radio which is worth considering, and the only source of stereo broadcasts in the UK. But many programmes are only available on AM (Medium and Long wave) transmissions, so an FM-only tuner may need the backup of a common or garden transistor radio to cope with the BBC's infuriating habit of trying to squeeze five channels into three FM networks by switching and swapping frequency allocations. There is clearly a powerful argument for looking closely at the FM/AM combination tuner. But do not look too closely, because the quality of the AM sections fitted to most hi-fi tuners is embarassingly bad. The typical medium priced portable will probably comfortably outclass the hi-fi tuner's AM section, presumably because its portability requires that it worksunder a wider range of reception conditions.

But frankly — and rather sadly — AM is a dead loss for quality reception in Europe these days, simply because the airwaves are grossly overcrowded with powerful transmitters. To get them all in without even worse interference problems, the stations restrict the bandwidth of the signals they transmit, by rolling off most of the treble range well below the natural range of human hearing, an expediency which deals fidelity a fatal blow. Moreover, AM in the UK remains resolutely monophonic, without even that curiously random and intermittent luxury of FM in stereo provided by the BBC.

The Vital Element

Nostalgia aside, we must accept that FM is it, and then see what is needed to get decent results. In pole position, not too surprisingly, comes the quality of the aerial ar antenna. It is a common misconception that you only need rooftop aerial if you're trying to pull in distant signals over difficult terrain. In fact you may need an even better aerial to get good results in the urban jungle than you do amongst the rolling hillsides, because of the need to get well above traffic and other electrical interference and to avoid the multiple reflection effects of nearby large buildings.

To get a decent aerial system needs a budget

of perhaps 25 per cent of the cost of the tuner, and the attentions of a skilled installation engineer. A knowledge of local terrain and transmission conditions is very important in choosing and siting the aerial, and it makes some sense to look for a radio enthusiast rather than someone who spends 90 per cent of his time pointing TV aerials at the local repeater. But programming preferences can also influence the selection of an aerial, so make sure the contractor is properly briefed.

The ideal aerial for tuning to local stations is not the ideal for long distance reception. The final choice will depend upon the range you wish to recieve and the direction of the relevant transmitters. It may be possible to get adequate local signals from a single fixed antenna of two to four elements, though the disposition of transmitters may sometimes require the addition of an aerial rotator. Long distance reception needs a higher gain multi-element antenna, which has a commensurately 'tighter' reception beam, and a rotator will be that much more useful.

It is also worth pointing out that signal has to be many times stronger for the tuner to produce a stereo rather than a mono output. If you want stereo radio, you do need a real aerial, and preferably not something inadequate that needs a booster along the cable in order to make the stereo beacon light up.

The Tuner Itself

Tuners may be very simple or highly complex. The bare necessity is an aerial connection and a couple of sockets for passing the stereo signal on to the amplifier, plus some sort of device for tuning in the stations, but the ingenuity of manufacturers has come up with all manner of additional facilities to enchance the performance or baffle the uninitiated. The opposite extremes are admirably illustrated by comparing two well-respected models which cost the best part of £1,000, one from the UK and the other from the Continent. The former has no apparent frills at all, carrying out functions like muting entirely automatically; the other gives an almost infinite number of options under manual or automatic control, with a front panel to rival the complexity of a personal computer. Both have their loyal adherents, yet the philosophical rift is so great it is hard to see how the purchaser of one would have even considered the other.

Tuners consist of two distinct sections. The 'front end' receives most of the attention, and is the part which is responsible for capturing the wanted signal from the aerial — and more important, is responsible for rejecting all the other signals coming down the aerial, either interference or from stations on other frequencies which are often many times more powerful than the wanted signal. The *Choice* tests analyse the front end RF performance in some considerable detail, but their complexity does not lend itself to simple interpretation in such a brief introduction.

Because specialist tuners have traditonally been designed by specialist radio engineers, most of the attention has been lavished on the receiving 'front end' circuitry. Yet the broadcast system in the UK is such that most locations receive a reasonably strong transmission signal for a limited number of stations. UK hi-fi manufacturers have been busily getting back into the tuner market after years of Japanese domination by emphasising the superior sound of simple, carefully designed audio circuitry — in much the same way as they have creamed off some of the top end of CD player sales. The paradoxical result is that some of the better sounding tuners often have comparatively weak RF performance, but this will only prove a liability under abnormally difficult reception conditions. The sheer complexity of the tuner with exceptional RF capabilities can prove a handicap on basic sound quality. The customer has the option of going in either direction, according to his needs, preferences, and local signal conditions.

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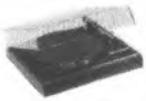

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TECHNICAL INTRODUCTION TUNERS

All the tuners included in the test programme were subjected to laboratory analysis as well as listening tests to determine sound quality under various reception conditions

Tests were carried out on a group of tuners which are the logical partners of a number of the amplifiers covered in this book. All were examined carefully in the laboratory and given thorough subjective tests, even though the reporting is somewhat brief.

Listening Tests

For the auditioning the tuners were tried on a variety of local and regional stations at the author's North London address. Critical tests included the use of a studio quality stereo encoder and low distortion transmitter/generator. The degradation imparted by the tuners was assessed on a before-and-after transmission basis. In addition, the low-signal radio frequency and quieting performances were subjectively assessed, particularly with respect to the odd whistles which are still to be found on some digitally synthesised tuners.

Laboratory Testing

Lab testing included a number of distortion measurements, for example, at 100% modulation depth, 1kHz, with the results for both mono and stereo working. Response to over-modulation was subjectively assessed on programme as well as by a 130% modulated 1kHz tone, with distortion readings here in mono. Distortion was also assessed via a Curtis-designed test whereby one channel is fed 1kHz, and the other 5kHz, with the resulting crosstalk and dynamic intermodulation products analysed.

Muting levels were noted: these are the signal strengths below which the designer considers that noise is excessive and the tuner output is therefore automatically muted.

AM rejection is a measurement allied to capture ratio, seeking to quantify how powerfully the tuner can reject co-channel interference, multipath reflections, ignition and impulse breakthrough, unwanted radio signals from other transmitters or a weaker FM signal very close to the wanted one. Capture ratios of lower than 1.3dB are pretty good; the range generally runs between 0.6 to 3.0dB, the latter being regarded as poor. AM rejection ratios go from 50 to 80dB, the former an adequate result, the latter an excellent one.

Pilot tone rejection is the supression of unwanted stereo tones at 19 and 38kHz. For most people these are inaudible, but they nonetheless can disturb tape recordings. Better than 55dB is considered good.

Ultimate signal-to-noise ratios (CCIR/ARM weighted with a 1kHz reference) for mono and stereo are also given, the latter rather more relevant. Stereo separation is measured from 1-10kHz, with figures of 45dB (35dB, 10kHz) considered pretty good.

Alternate channel selectivity quantifies how well the tuner can receive a weak distant transmission spaced closely on the dial to strong stations. Here 60dB is considered a good practical standard, with 80dB very good.

Graphs were plotted of limiting and quieting *versus* signal strength, the former showing how quickly the output level stabilises and the latter how quickly the noise level improves to a good subjective value.

Finally, the frequency responses were measured from 10kHz to 20kHz. Most had pretty flat responses, so this is unlikely to be a major influence in the auditioning.

Aerial Considerations

FM reception conditions can vary considerably with quite small differences in district, address or local geography and buildings. When purchasing a tuner for use in a difficult area, it is worth having an arrangement with a dealer to return those models that prove unsatisfactory at your location. We cannot stress too strongly the need for a good, preferably roof-mounted aerial for FM if a hi-fi performance is to be achieved from a good tuner — a poor or badly sited aerial with multipath effects can produce a constant 10-15% distortion on peak modulation.

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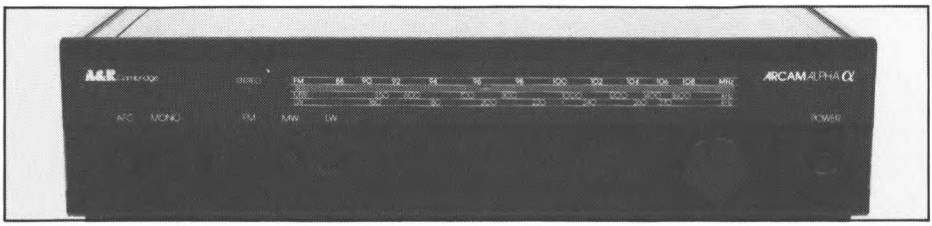


Matching the Arcam *Alpha* and *Delta*, this is an analogue tuner, covering FM and AM bands. The 'scale and pointer' presentation has distinct advantages over a digital readout as does a conventional watchface over the digital equivalent.

Tuning is facilitated by a neat LED indicator in the indicator pointer. This emulates the traffic light by changing from red *via* orange to green when a station is correctly tuned, and the frequency may then be held by selecting AFC (automatic frequency control). Radio specialists could argue that the resolution and accuracy of the pointer/scale is a little imprecise, but this will not worry the user who should in any case 'fine-tune' by ear. The tuning knob itself lacks any real flywheel action, but then one hardly has the right to expect this at a near 'budget' £140. The remaining buttons select FM and long and medium wave AM, plus mono/stereo.

Sound Quality

FM sensitivity seemed fine, with decent stereo from around 500μV aerial input, albeit with a slight whistle, and fine quality stereo from 1mV upwards. The sound quality itself was comfortably in the good class – less than the best but a fine result for the price nonetheless. It was described as inherently pleasant and musically relaxing, if a trifle bland and lacking 'air' and 'drama'.

AM was rather insensitive with noticeable background noise which restricts dynamic range, but had the significant aural advantage of being able to 'fine-tune' the tuning envelope away from the station centre transmission frequency for the best trade off between balance and dynamics: as such results were amongst the most acceptable from a far from inspiring range of alternatives. At least this hi-fi tuner gives an AM performance to match a good transistor radio – and plays it through the main hi-fi system.

Lab Report

Sensitive and with good signal-to-noise ratios, the *Alpha* measured pretty respectably throughout. Stereo separation and harmonic distortion were a little below par, and the pilot tone rejection figure dropped to −31dB with modulation. The frequency response showed a mild high frequency rolloff.

Conclusions

This tuner has successfully established a distinctly 'British' identity, with attractively classic ergonomics. A modest price plus sound quality comfortably better than most are further reasons for a Best Buy recommendation.

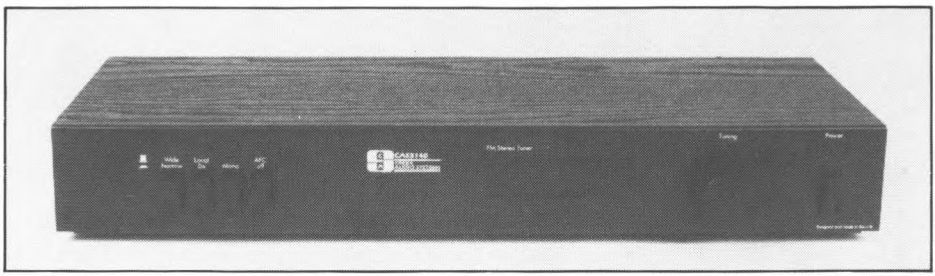
Test Results

Sensitivity for 50dB signal-to-noise Mono/stereo	3μV/30μV
Ultimate signal-to-noise (CCIR/ARM, 1kHz ref)	
Mono/stereo	−68dB/−62dB
Muting threshold	2.5μV
Alternate channel selectivity	63dB
Pilot tone rejection, 19kHz/38kHz	66dB/55dB
AM rejection	−60dB
Capture ratio	1.3dB
Total harmonic distortion at 100% mod, 1kHz	
Mono/stereo	−43dB/−43dB
Stereo separation, 1kHz/5kHz/10kHz	30dB/28dB/24.5dB
Output level, 100% mod	840mV
Dimensions (width, depth, height)	40×9.7×22.5cm
Typical price inc VAT	£140

BEST BUY

CREEK CAS 3140

CREEK AUDIO SYSTEMS, 2 BELLEVUE ROAD, FRIERN BARNET, LONDON N11 3ES.
TEL: 01-368 4425



Matching the *4040* in presentation, the £140 FM-only *3140* has some nice touches in the black wooden sleeve made up into a quality case with rounded front edges. The tuned frequency is displayed on a large green digital frequency readout, alongside a decent sized flywheel-assisted tuning knob.

A row of four pushbuttons provide useful functions, some rarely found on such a low cost model, including 'narrow/wide' and 'local/DX' to optimise reception for short or long range reception, plus mono/stereo and AFC on/off. The fact that the stereo beacon glows green over a switch labelled mono is a touch idiosyncratic, but a useful centre-tune indicator is also fitted.

SOUND QUALITY

Sensitivity was very good, with very low noise stereo available from a modest 500μV aerial input, and with added flexibility through the narrow/wide feature. The sound quality was very well received, rating very good and showing many of the favourable characteristics of state of the art models at far higher prices. There was little to criticise apart from a slight 'thickening' of textures and slight rolloff detectable at high frequencies, but much praise was awarded for the clear, firm sound with good bass 'weight' and fine focus.

LAB REPORT

Giving fine results for sensitivity, signal-to-noise, pilot tone and AM rejection, selectivity and capture ratio, the RF side of this fine tuner is beyond reproach. On the audio side the response was flat enough, with a gentle low frequency rolloff, but distortion was only average and stereo separation rather below par. The DX/local selector had only a marginal effect. The output level is lower than most, so a check on amplifier compatibility will be worthwhile.

CONCLUSIONS

The Creek *3140* emerges as a true front rank performer with excellent ergonomics and audiophile sound quality, all at a near budget price — clearly a strong Best Buy amongst separate tuners, albeit with the minor handicap of covering FM only.

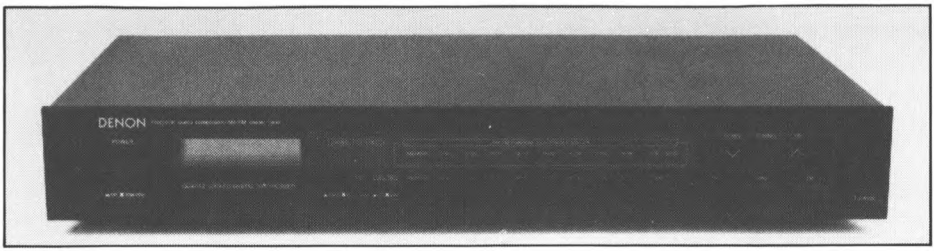
TEST RESULTS

	Tuner
Sensitivity for 50dB signal-to-noise Mono/stereo	3μV/35μV
Ultimate signal-to-noise (CCIR/ARM, 1kHz ref)	
Mono/stereo	74dB/–65dB
Muting threshold	4μV
Alternate channel selectivity	100dB
Pilot tone rejection, 19kHz/38kHz	66dB/100dB
AM rejection	66.5dB
Capture ratio	1.3dB
Total harmonic distortion at 100% mod, 1kHz	
Mono/stereo	–52dB/–52dB
Stereo separation, 1kHz/5kHz/10kHz	24dB/26dB/27dB
Output level, 100% mod	233mV
Dimensions (width, depth, height)	42×17.5×6.2cm
Typical price inc VAT	£150

RECOMMENDED

DENON TU-450L

HAYDEN LABORATORIES, HAYDEN HOUSE, CHILTERN HILL, CHALFONT ST PETER, BUCKS SL9 9UG.
TEL: (0753) 888447



Making a natural partner for the *PMA250* amplifier, the *'450L* is a simple £130 tuner which is quite typical of low cost, lightweight Japanese offerings. It uses digital synthesiser circuitry.

Covering FM plus medium and long wave AM bands, with a row of 8 presets providing memory for up to 16 stations, there is no signal strength indicator as such, merely a single beacon marked signal alongside that which shows that a stereo broadcast is being received. Additional push-buttons select mono/auto stereo, multiplex filtering (to assist recording stereo broadcasts), memory setting, plus waveband. The electronic tuning is manual only, with no search/scan facilities. The rear panel has the usual phono outputs with ferrite AM aerial and terminals for connection of 75ohm, 300ohm and AM antennae.

SOUND QUALITY

The FM receiving capabilities of this simple tuner were very good. Background noise was generally free of nasties at low aerial inputs, stereo was useably quiet by 500μV and solid by 1mV. The sound quality was reasonably good too, firmly rated above average overall, though there was mild criticism of a slightly 'dead', 'boxy' character, and slight 'untidiness' and loss of resolution at high frequencies.

AM again showed superior receiving (RF) characteristics, being more sensitive than most and with quite quiet backgrounds, generally free from spuriae, though the fixed 9kHz digital tuning steps prevents adjusting fine tune to taste. Sonically pretty disastrous, this was undoubtedly partly due to a very tightly curtailed bandwidth at high frequencies — which did at least help it sound tidy enough.

LAB REPORT

The *'450L* returned from the laboratory with a clean bill of health, with good sensitivity, a flat frequency response, and respectable enough results on all other parameters save for rather weak pilot tone rejection. Even the muting threshold was set at a fairly sensible level.

CONCLUSIONS

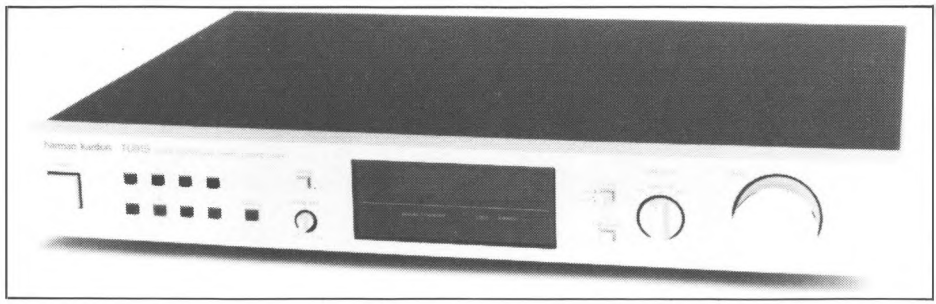
The *450L* is a well balanced, competitively priced tuner with above average FM sound quality and first class RF performance. Though poor AM sound quality might be a mild deterrent, the balance of FM performance fully merits recommendation.

TEST RESULTS

Sensitivity for 50dB signal-to-noise Mono/stereo	7μV/43μV
Ultimate signal-to-noise (CCIR/ARM, 1kHz ref)	
Mono/stereo	−72dB/−62dB
Muting threshold	15μV
Alternate channel selectivity	72dB
Pilot tone rejection, 19kHz/38kHz	−36dB/−68dB
AM rejection	67dB
Capture ratio	1.7dB
Total harmonic distortion at 100% mod, 1kHz	
Mono/stereo	−56dB/−55dB
Stereo separation, 1kHz/5kHz/10kHz	46dB/40dB/32dB
Output level, 100% mod	782mV
Channel balance, stereo	0.02dB
Dimensions (width, depth, height)	43×7×24cm
Typical price inc VAT	£130

HARMAN KARDON TU915

HARMAN (AUDIO) UK LTD MILL STREET, SLOUGH, BERKS SL2 5DD.
TEL: (0753) 76911



This upmarket design is tastefully finished in pale gold (champagne) or black. Cleanly styled, the front panel sports several facilities, including eight preset buttons, valid for all three wavebands — long and medium-wave AM and VHF/FM. The muting level is continuously variable, while 'high blend' is available to reduce the noise on weak stereo transmissions. Stereo/mono mode selection is independent of interstation noise muting.

Inside, the unit is quite sophisticated and the flywheel tuning is revealed as an optical shaft encoder, feeding the all-digital synthesiser circuitry. Manual and auto-seek tuning circuitry is present, with special care taken to maximise audio quality.

SOUND QUALITY

This tuner gave a good performance on FM but liked a healthy signal if minor but audible whistles were to be fully suppressed. Bass was quite solid and extended, while the mid was open and clear with realistic stereo depth, width and focus. In absolute terms it was a touch 'forward' with a degree of treble 'slurring'. On AM it was thought wretched, sounding 'tinny and scratchy' — a really unpleasant sound.

LAB REPORT

The presence of audible whistles prejudiced the 50dB sensitivity in stereo, which was unexceptional at 80μV. Likewise, the ultimate signal-to-noise ratio in stereo was just average at 60dB. Pilot tone rejection was fine and alternate channel selectivity was very good. AM rejection was also very good, while capture ratio was just average. The total harmonic distortion held to 0.25% at full modulation is stereo, and channel separation was also good, nearing 50dB mid-band. On frequency response, the bass was very well extended while the treble rolled off a little, to −1.3dB by 10kHz for example.

CONCLUSIONS

With a promisingly good FM sound quality, this tuner was marred by a digitally-related breakthrough into the audio at modest aerial signal levels. The AM sound quality was a huge contrast and rated as 'poor', which was disappointing for a model in this price class. Nonetheless, it rates as worth considering.

TEST RESULTS

Sensitivity for 50dB signal-to-noise	
Mono/stereo	7.5μV/80μV
Ultimate signal-to-noise (CCIR/ARM, 1kHz ref)	
Mono/stereo	−74dB/−59dB
Muting threshold, R.F. level	18μV–
Alternate channel selectivity	−78dB
Pilot tone rejection, 19kHz/38kHz	−41dB/−100dB
AM rejection	−66dB
Capture ratio	2.8dB
Total harmonic distortion	
At 100% mod, 1kHz	
Mono/stereo	−54dB/−51dB
Stereo separation, 1kHz/5kHz/10kHz	−46dB/−47dB/−44dB
Output level, 100% mod	855mV
Channel balance stereo	0.20dB
Dimensions (width, height, depth)	44×7×36cm
Typical price inc VAT	Champagne or Black £325

First reviewed: 1983

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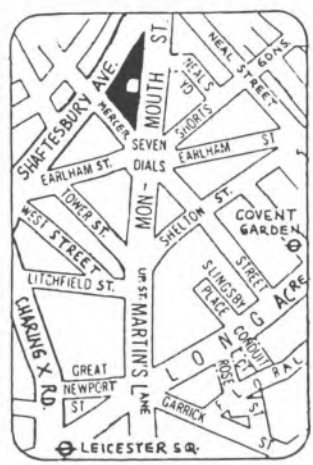

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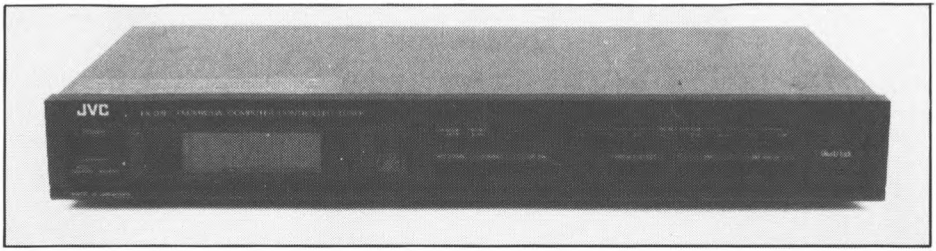
London WC2

BADA

JVC FX-33L

JVC (UK) LTD, JVC HOUSE, 12 PRIESTLEY WAY, ELDONWALL TRADING ESTATE, STAPLES CORNER,
LONDON NW2 7AF. TEL: 01-450 3282



A natural cosmetic partner to the *AX-22* integrated amplifier, the £100 *TX-33L* carries a 'made in Singapore' label which presumably gives a competitive advantage over Japan-sourced products, though the package itself is virtually indistinguishable from many such 'budget', slimline, lightweight models. Covering FM and medium and long wave AM, this quartz digital synthesis tuner has 8 preset buttons covering 16 memorised channels. The electronics tuning system has an orange digital display plus additional computer controlled tuning features labelled 'preset scan' and 'auto memory', besides the basic memory and mono/stereo mute buttons.

Sound Quality

The FM reception performance seemed well below average, with a whistle audible on stereo below 5mV aerial input, and much background 'hash' of a basically unpleasant nature at low signal inputs. Mono quality was acceptable above about 500μV. Furthermore the FM sound quality itself was not well liked, rating significantly below average. Vocals had a 'pinched' quality, some background detail and space seemed suppressed, and high frequency musical detail lacked subtlety, though the bass and overall balance seemed reasonable enough.

The AM sound quality was marginally better than found in some similar competing models, but still offers little to the hi-fi listener. Dynamic range was better than some and the reception was whistle-free, but there was a 'jangly' quality related to the tight bandwidth limiting of the tuning 'window'. Sensitivity was unexceptional, and the 9kHz digital tuning steps prevented 'fine tuning' optimisation off the wanted station central frequency.

Lab Report

Somewhat below average in sensitivity, the *'33L* also showed slight high frequency ripple in the response, and was −3dB at 15kHz. Pilot tone rejection was good, and other measurements indicate respectable enough all round performance.

Conclusions

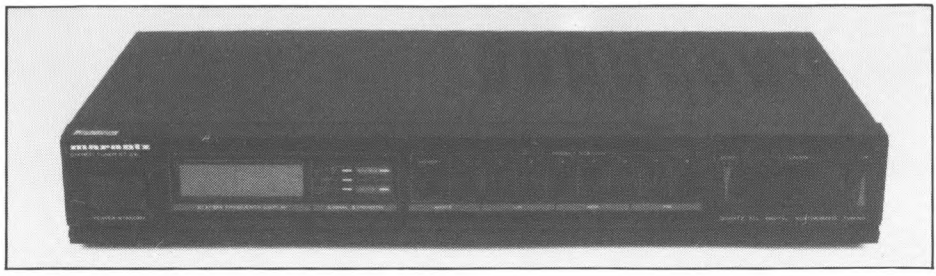
Though generally competent the *FX-33L* suffered more than most from breakthrough of synthesiser 'hash' onto the audio circuitry, limiting the ability to accommodate a wide dynamic range at the aerial, and presumably playing its part in the generally indifferent reactions of the listening panel.

Test Results

Sensitivity for 50dB signal-to-noise Mono/stereo	15μV/200μV
Ultimate signal-to-noise (CCIR/ARM, 1kHz ref)	
Mono/stereo	69dB/60dB
Muting threshold	11μV
Alternate channel selectivity	53dB
Pilot tone rejection, 19kHz/38kHz	65dB/71dB
AM rejection	57dB
Capture ratio	1.6dB
Total harmonic distortion at 100% mod, 1kHz	
Mono/stereo	−63dB/−53dB
Stereo separation, 1kHz/5kHz/10kHz	49dB/40dB/35dB
Output level, 100% mod	1473mV
Channel balance	0.01dB
Dimensions (width, height, depth)	43.5×6×24cm
Typical price inc VAT	£100

MARANTZ T26

MARANTZ AUDIO (UK) LTD, 15-16 SAXON WAY INDUSTRIAL ESTATE, MOOR LANE,
HARMONDSWORTH, MIDDX UB7 0LW. TEL: 01-897 6633



Styled to match the *PM26* with its rectangular motifs and absence of rotary controls, this slim, compact, lightweight tuner has good ergonomics, fine presentation and finish, and sells for a near-budget £130. Covering long and medium wave as well as stereo FM, the unit uses IC-based digital synthesiser electronic tuning and memorises up to eight stations for preset selection. Besides the presets the user has the option of 'manual' or automatic scan tuning, and may also choose between auto stereo and mono modes.

Sound Quality

Though mono noise was well suppressed above 50μV or so aerial input, there was still a certain amount of 'birdie' interference on stereo below 1mV. Furthermore, as the aerial signal increased above 5mV there was a gradual onset of mild low frequency interference developing into more serious nonlinearity at highish levels. Given a suitable input the FM sound quality was rated usefully above average. The sound was a little 'shut in' with some 'grain', a touch of sibilant emphasis, and a slight loss of impact and crispness, but these criticisms were all mild, particularly in the context of a modestly priced machine.

Though the AM section was quite sensitive, reception was also rather noisy, marred by what sounded like synthesiser hash breakthrough. Coloration seemed low, but the sound was clothy and thick, rating poor overall.

Lab Report

The distortion level is very low, separation good, and for once the muting threshold is set to a sensible figure, but sensitivity was well below average despite reasonable RF results elsewhere. The frequency response show a mild treble droop, while the output level is distinctly higher than usual.

Conclusions

Something of a mixed bag, the FM sound quality of the *T26* could have rated recommendation, but for the reservations regarding reception limitations which may be irritating under some circumstances. Meanwhile the AM debacle did nothing to assist matters. Certainly worth considering for Marantz owners, a home trial to check on local reception performance is strongly advised.

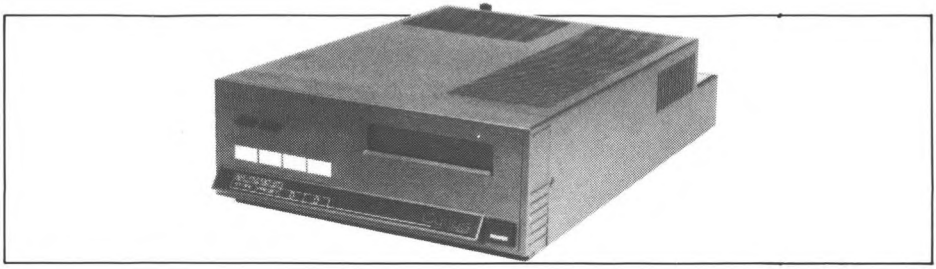
Test Results

Sensitivity for 50dB signal-to-noise Mono/stereo	20μV/120μV
Ultimate signal-to-noise (CCIR/ARM, 1kHz ref)	
Mono/stereo	68dB/60dB
Muting threshold	92μV
Alternate channel selectivity	58dB
Pilot tone rejection, 19kHz/38kHz	30dB/82dB
AM rejection	55dB
Capture ratio	1.75dB
Total harmonic distortion at 100% mod, 1kHz	
Mono/stereo	−65dB/−65dB
Stereo separation, 1kHz/5kHz/10kHz	47dB/48dB/39dB
Output level, 100% mod	1260mV
Channel balance, stereo	0.06dB
Dimensions (width, height, depth)	42×6.5×22.5cm
Typical price inc VAT	£130

RECOMMENDED

MISSION CYRUS

CYRUS ELECTRONICS LTD, STONEHILLL, HUNTINGDON, CAMBS PE18 6ED.
TEL: (0480)57477



This compact design is styled to match the *Cyrus* amplifier series and the sound is claimed to match it too! Elegantly simple, it uses a large digital display with full synthesiser operation, and covers stereo plus medium wave AM bands. Tuning is manual via an auto-seek mode, with eight presets for each band.

LAB REPORT

We tested two tuners as the first provided a poor 4.8dB result for capture ratio. However, the second sample was only slightly better at 4dB, pointing to some weakness in the IF design. AM rejection (IHF) was unexceptional at 51dB and varied strongly with level. Sensitivity was fine but at low RF levels some mild background warbles were audible in stereo mode. The ultimate signal to noise ratio reached almost 60dB, which was rather poorer than the best examples in the issue; in our view, the muting level was set too low. Alternate channel selectivity was pretty good at 71dB while the pilot tone rejection (IHF, no modulation) was fine on paper at −43 and −64dB for 19kHz and 38kHz components. However, under modulation the 38kHz sidebands deteriorated to just −24dB — not a good idea for recording purposes and representing a potential source of IM beats. Stereo distortion was just average at 0.3% while separation was likewise about average, measuring 44dB midband and falling to 35dB at 10kHz. The tuner's healthy 1V output drive the *Cyrus* amplifier satisfactorily.

SOUND QUALITY

Living up to its *Cyrus* namesakes, this tuner provides satisfying audio quality on FM stereo. Tidy and musical, it produced good stereo width and depth, plus pleasing ambience, a sweet treble and good detail. Backgrounds were not entirely silent, and on quiet programmes the hiss level was not up to the best possible standard.

On AM, the sound was rather below average, being 'thick' with a 'hollow' coloration.

CONCLUSIONS

Though 'best buy' material on sound quality grounds, this model's radio frequency performance let it down. For high-quality local station reception it will probably perform well but in more difficult conditions its abilities were questionable; at this stage the design qualifies only for recommendation.

TEST RESULTS

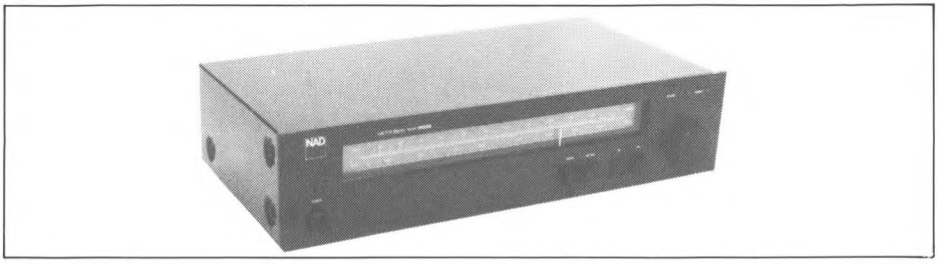
Sensitivity for 50dB signal-to-noise ratio	
Mono/stereo	7.7μV/27μV
Ultimate signal-to-noise (CCIR/ARM/1kHz ref)	
Mono/stereo	−68dB/−59.0dB
Muting threshold, R.F. level	5.5μV
Alternate channel selectivity	−71dB
Pilot tone rejection, 19kHz/38kHz	−43dB/−64dB
AM rejection	−51dB
Capture ratio	4.8dB
Total harmonic distortion	
At 100% mod, 1kHz, mono/stereo	−57dB/−50dB
Stereo separation, 1kHz/5kHz/10kHz	−44dB/−41dB/−35dB
Output level, 100% modulation	998mV
Channel balance, stereo	0.04dB
Dimension (width, height, depth)	21.5 x 8.5 x 39.5cm
Typical price inc VAT	£180

First reviewed 1985. Reassessed 1987.

BEST BUY

NAD 4020B

HI-FI MARKETS LTD, COUSTEAU HOUSE, GREYCAINE ROAD, WATFORD WD2 4SB
TEL: (0923) 26499



Traditionally styled, looking much as tuners did a decade ago, the *4020B* is none the worse for that. A large 'slide rule' tuning scale dominates the front panels, showing clearly that traditional analogue design still evades the almost ubiquitous synthesiser chip. I still like analogue tuners and appreciated the rapid dial response of the flywheel-loaded tuning.

A simple but effective tuning indicator uses two red lamps flanking a green 'OK' light. FM and the medium wave AM band are covered, and muting and mono modes can be separately engaged. On the rear panel, in addition to the movable rod AM aerial, there is also a proper UK coaxial socket for FM. Clip connectors are provided for an additional AM aerial as well as 300 ohm and 75 ohm FM options.

Lab Report

While not up in the super class the sensitivity was sufficient for most applications (but not extreme fringe). Stereo signal-to-noise levelled off at 58dB and did not improve greatly in mono while the muting threshold of 5μV was too low to give sensible service. The pilot tone rejection was fine and total harmonic distortion was satisfactory both as regards mono and stereo. Stereo separation was pretty good right up to 10kHz while the radio frequency parameters were also good, including selectivity, AM suppression (rejection of interference) and capture ratio. The audio frequency response was sensibly flat and the RF input showed a fine overload performance.

Sound Quality

Scoring very well on the listening tests, clean stereo reception was obtained with signal levels over 800μV. Background hiss was just satisfactory, countered by a lively and open sound, plus good stereo image, showing fair depth and space.

The AM sound was quite presentable and in fact above average; but as usual this is not saying much!

Conclusions

While this was neither the quietest or the most sensitive tuner of the group, it nonetheless provided a great sound for the money. Easy to use, it was musical as well as ambient, proving a worthy match for the NAD *3120* as well as any other comparably good amplifier. The value rating suggests a Best Buy.

Test Results

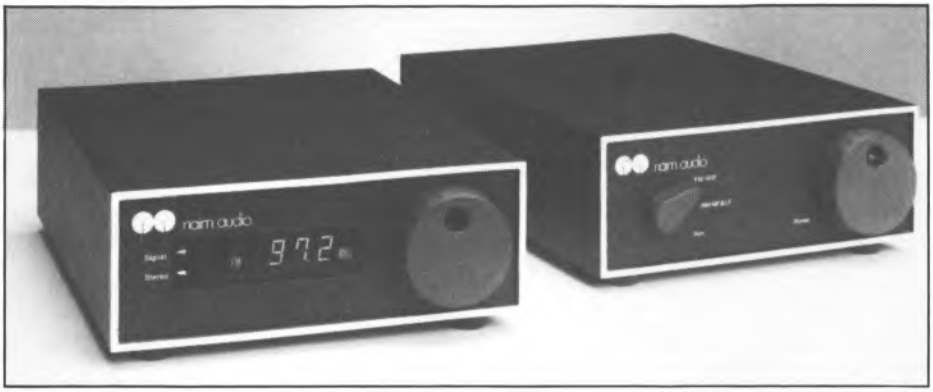
Sensitivity for 50dB signal-to-noise ratio	
Mono/stereo	4μV/80μV
Ultimate signal-to-noise (CCIR/ARM/1kHz ref)	
Mono/stereo	63dB/58dB
Muting threshold, R.F. level	5μV
Alternate channel selectivity	68dB
Pilot tone rejection, 19kHz/38kHz	58dB/–70dB
AM rejection	60dB
Capture ratio	1.4dB
Total harmonic distortion	
At 100% mod, 1kHz, mono/stereo	–51dB/–50dB
Stereo separation, 1kHz/5kHz/10kHz	55dB/52dB/48dB
Output level, 100% modulation	910mV
Channel balance, stereo	0.03dB
Dimension (width, height, depth)	42 x 24 x 10cm
Typical price inc VAT	£139

First reviewed 1985

RECOMMENDED

NAIM NAT 01

NAIM AUDIO LTD, SOUTHAMPTON ROAD, SALISBURY SP1 2LN.
TEL: (0722) 332266



There are now two Naim FM tuners, but this review concentrates on the top model, the £1098 two-box *NAT01*. The second newer *NAT101* model is a pared down version with smaller power supply and mechanical tuning indicator; at two-thirds the cost it is still on the expensive side in terms of the marketplace, but offers a similar design philosophy as the *'01* at a slightly lower performance level. Naim place particular emphasis on the need for the best possible aerial system for the best possible results, in their leaflets and instructions to dealers.

Both the *NAT01* units are contained within Naim's 'half width' modules, one being a substantial power supply and the other containing the actual tuner.

NAT01 follows the usual Naim tradition of simplicity first and foremost, and a minimum of user adjustment. The power supply contains only a switch in preparation for any additional tuning modules, and so may be sited out of the way for the time being. The tuner itself just has a single large knob and a digital frequency display, backed up by two indicator lights, though the tuning itself uses analogue varicaps, unusually with a turning head made by Naim Audio themselves. Though lacking presets, the tuning knob has a fine traditional flywheel action.

Most of the necessary functions like stereo/mono switching are performed automatically. The lower indicator arrow comes on to indicate signal, while the upper is added when the tuner switches to stereo, while the frequency display itself brightens perceptibly when the station is precisely tuned. It was felt that presets would not be necessary because the user should soon learn the handful of main local frequencies like telephone numbers. Speaking from a year's experience, this is only partly true: one only easily remembers the frequencies that are tuned regularly — staying mainly on one station soon brings amnesia. That aside, the extreme simplicity is much appreciated by one who is interested in the content as opposed to the medium of radio.

LAB REPORT

The *NAT01* performed most satisfactorily on the lab tests. The frequency response was flat up to around 10kHz, then beginning an initially gradual rolloff (−2dB at 15kHz), which is a sensible characteristic; curiously, a presumably harmless 3.5dB peak was recorded at a subsonic 7.5Hz.

The various RF measurements indicated a high quality carefully aligned 'front end', entirely effective at capturing wanted and rejecting▶

◀ unwanted aerial input and showing evidence of careful quality control. The automatic muting threshold is set a little higher than most, so this is clearly not a tuner for those who wish to explore the airwaves and pull in weak, distant stations.

Sound Quality

There may be better sounding tuners around somewhere in the world, but we have yet to hear one. The sound is recognisably 'Naim-like', but *NAT01* provides an unsually transparent window onto the broadcasting studio. This can be something of a two-edged sword: one is sometimes discomforted by the generally mediocre quality of much recorded music output, but when a real live broadcast comes along the difference is immediately, spine-tinglingly obvious — even if the music isn't to taste, it is difficult not to stay tuned. And radio drama takes on a dynamic realism quite devoid of the artificiality that most tuners seem to introduce.

Conclusions

Serious hi-fi listeners interested primarily in the content of radio could find *NAT01* (or its cheaper *NAT101*) something of a pleasant surprise, the overall sound remaining remarkably civilised and easy on the ear while still proving responsive to the fundamental quality of the broadcast. Clearly meriting recommendation, the crucial question will then be whether or not radio programming rates an expenditure of £1098.

Test Results

	Tuner
Sensitivity for 50dB signal-to-noise Mono/stereo	7μ70μV
Ultimate signal-to-noise (CCIR/ARM, 1kHz ref)	
Mono/stereo	72dB/66dB
Muting threshold	55μV
Alternate channel selectivity	−66dB
Pilot tone rejection, 19kHz/38kHz	−54/−76dB
AM rejection	−73dB
Capture ratio	2.3dB
Total harmonic distortion	
At 100% mod, 1kHz mono/stereo	−50/−60dB
Stereo separation, 1kHz/5kHz/10kHz	35dB/37dB/35dB
Output level, 100% mod	200mV
Channel balance stereo	−0.02dB
Dimensions (width, depth, height)	(21×36×8.5)×2cms
Typical price inc VAT	£1098

First reviewed: The Collection 1987.

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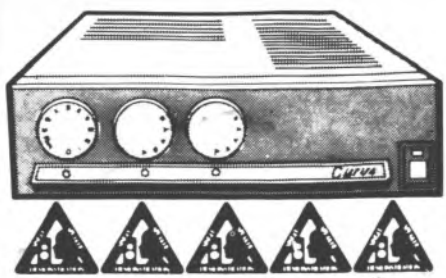

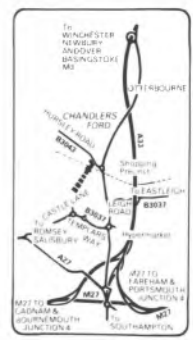

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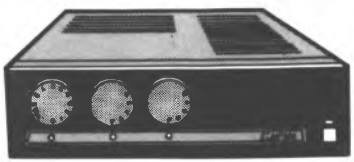

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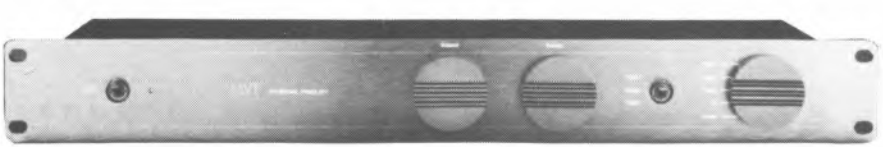

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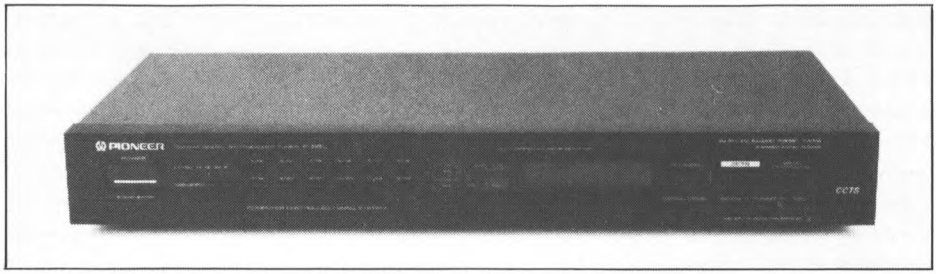
PIONEER F-55L

PIONEER HIGH FIDELITY (GB) LTD, FIELD WAY, GREENFORD, MIDDLESEX. UB6 8UZ.
TEL: 01-575 5757



Logically partnering the '44 (or '33) integrated amplifiers, the *F-55L* is a somewhat upmarket version of the Japanese 'standard' digital synthesiser tuner. A lightweight slimline package making extensive use of microprocessors and integrated circuitry, it has 12 double-action presets to hold a total of 24 FM or AM (medium or long wave) stations in memory. The quartz synthesised tuning has a very sensitive computer controlled (CCTS) plus 3-speed 'accel' tuning. The mono/stereo mode option is provided, and the rear panel has facilities for connecting 75ohm and 300ohm FM aerials plus an external AM aerial, as well as the standard AM loop.

SOUND QUALITY

Having grappled (a little grudgingly) with the CCTS, we found fabulous front end FM sensitivity that lit the stereo beacon around 5μV (!), and was usable from as low as 20μV, with no untoward results with overmodulated signals either. The sound quality itself rated a solid enough average. It was a little on the 'bright' side with some upper range colorations, but showed fine subjective 'speed', albeit with a slight loss of bass resolution. The stereo soundstage was clear, but with some reduction in width and depth.

Though some whistles could be heard, the AM performance was really quite respectable, given the bandwidth limitations imposed by European transmission practise. The 9kHz frequency steps prevent any 'fine tuning' to optimise sound quality.

LAB REPORT

The *55L* delivered a very clean bill of laboratory health, with fine sensitivity, flat rejection and capture ratio, and decent figures for distortion, stereo separation and signal-to-noise ratios. The muting threshold was set too low, selectivity was only average and pilot tone rejection rather weak, but the overall pattern is very positive.

CONCLUSIONS

The exceptional reception (RF) performance is this tuner's main strength — it could be ideal for city flat dwellers unable to erect a proper external aerial, for example. The computer controlled tuning has its own charm, and the sound quality is generally quite respectable, so the '*55L* is recommended.

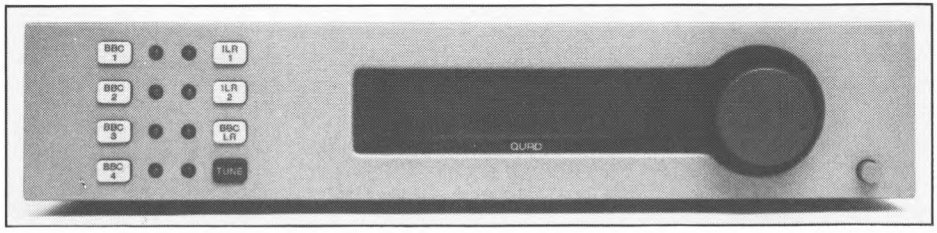
TEST RESULTS

	Tuner
Sensitivity for 50dB signal-to-noise Mono/stereo	3μV/30μV
Ultimate signal-to-noise (CCIR/ARM, 1kHz ref)	
Mono/stereo	70dB/61dB
Muting threshold	2.5μV
Alternate channel selectivity	63.5dB
Pilot tone rejection, 19kHz/38kHz	37dB/63dB
AM rejection	77dB
Capture ratio	2.3dB
Total harmonic distortion at 100% mod, 1kHz	
Mono/stereo	−48dB/−47dB
Stereo separation, 1kHz/5kHz/10kHz	34dB/33.5dB/31dB
Output level, 100% mod	820mV
Channel balance, stereo	0.03
Dimensions (width, height, depth)	42×5.8×22.5cm
Typical price inc VAT	£110

RECOMMENDED

QUAD FM4

QUAD ELECTROACOUSTICS LTD, 30 ST PETERS ROAD, HUNTINGDON, CAMBS, PE18 7DB.
TEL: (0480) 52561



A characteristically distinctive design from this famous British company, this mid-priced Quad tuner has been intelligently designed and works with a minimum of fuss. A large, well-weighted tuning knob gives manual station selection, the tuned frequency shown on the large digital display. A combined signal-strength/centre-tune bar graph is included in the display, and was found to work well. Seven pre-set stations may be automatically programmed, appropriately marked BBC1 through 4; BBC LR (local radio); and ILR1/ILR2 for the local commercial stations.

Rear panel facilities include a three-pin IEC mains input, a shrouded IEC three-pin mains outlet, plus a 75ohm (female) coaxial aerial socket and DIN audio output. Both finish and constructional standards are high.

SOUND QUALITY

Despite digital tuning, the *FM4* had clean backgrounds free from any annoying whistles. By the time input reached 1mV, it showed decently quiet stereo backgrounds, and the sound quality was much favoured. Stereo images were well focused, and pleasing depth was reproduced. Tonally it sounded quite neutral, and the treble was free of grain or harshness. Some mild loss of detail and bass attack was apparent when compared with the original sources, but this is a favourable result when the attainment of some of the other models is taken into account.

LAB REPORTS

The *FM4* was quite sensitive, reaching 50dB stereo quieting (1kHz ref, CCIR/ARM) by 70μV and a 66dB ultimate stereo signal-to-noise ratio by 2mV, which is a satisfactory result, (slightly better than the broadcast chain). This tuner was not at its best separating a weak from a nearby strong station, with a rather below average selectivity of around 50dB. Conversely AM rejection and capture ratio were quite good. Output level was lower than usual at 300mV but good pilot tone rejection was shown. Total harmonic distortion was about average with 0.25% mono and 0.5% stereo (full modulation, left or right channel only). It also responded well to overmodulation, and attained good stereo separation.

CONCLUSIONS

This tuner appeals on the grounds of its fine sound, excellent ease of use, good build and finish, and a more than satisfactory technical performance. Clearly a quality design.

TEST RESULTS

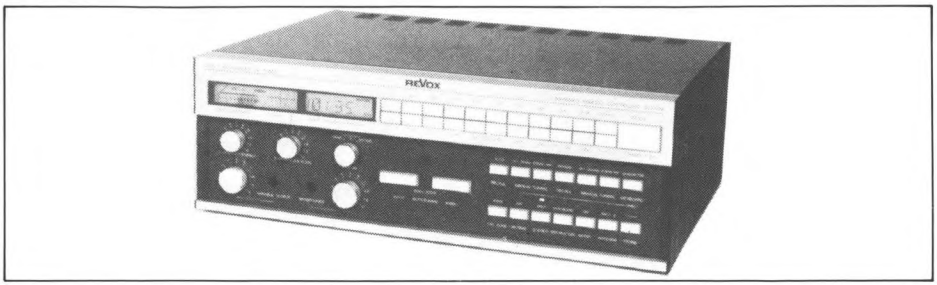
	Tuner
Sensitivity for 50dB signal-to-noise Mono/stereo	7μV/70μV
Ultimate signal-to-noise (CCIR/ARM, 1kHz ref)	
Mono/stereo	70dB/66dB
Muting threshold	
Alternate channel selectivity	−49dB
Pilot tone rejection, 19kHz/38kHz	−63dB
AM rejection	−61dB
Capture ratio	1.8dB
Total harmonic distortion at 100% mod, 1kHz	
Mono/stereo	0.25%/0.35%
Stereo separation, 1kHz/5kHz/10kHz	48dB/38dB/30dB
Output level, 100% mod	300mV
Dimensions (width, depth, height)	32×21×6cm
Typical price inc VAT	£279

First reviewed: 1983. Rating: Recommended.

RECOMMENDED

REVOX B261

F.W.O. BAUCH LTD, 49 THEOBALD STREET, BOREHAMWOOD, HERTS WD2 4RZ.
·———TEL: 01-953 0091———·



This is a remarkable FM tuner, closer to professional than domestic build quality. For FM only, it has a host of facilities ranging from auto aerial rotation to twin volume-adjustable headphone sockets. Digitally synthesised, the tuner has space for 20 preset stations whose names may be entered *via* a keyboard and are then displayed on selection. The signal-strength meter is highly accurate and all facilities worked well including the variable muting and stereo thresholds. Infra-red remote control is possible, and this model is also compatible with the new line of Revox electronics.

SOUND QUALITY

This tuner was superbly engineered, and felt 'right' when setting up for the auditioning. It proved to be sensitive, with good quieting by 50μV and was almost silent at 500μV with no spurious tones or whistles. The sound quality rated as 'good', if slightly subdued and softened when compared to the original source, but very pleasant nonetheless, with a clean treble. The mid tonal balance appeared a little thin, but not seriously so, while stereo focus was good and depth satisfactory.

LAB REPORTS

The IHF mono 50dB quieting figure was an impressive 1.6μV, and our 50dB stereo (1kHz ref CCIR/ARM) figure was achieved at a good 45μV. This is a sensitive tuner suited to a wide range of reception conditions, particularly if the aerial rotation facility is taken into account. Alternate channel selectivity was very good and capture ratio excellent, as was the AM suppression at no less than 77dB. Distortion was low, particularly when overmodulated. Pilot tone suppression was excellent and the ultimate signal-to-noise ratios were also pretty good. Stereo separation rated as very good, reaching 60dB mid band, while audio output was an ample 2.2 volts, variable to suit the matching amplifier. The treble response was very flat from 100Hz to 2kHz but showed a very slight lift around 0.6dB in the last two octaves.

CONCLUSIONS

This comprehensive tuner was a most sophisticated and well executed example of modern broadcast design. For the FM enthusiast with a deep pocket it could be a logical choice, and can be expected to give years of service.

TEST RESULTS

	Tuner
Sensitivity for 50dB signal-to-noise Mono/stereo	4μV/45μV
Ultimate signal-to-noise (CCIR/ARM, 1kHz ref)	
Mono/stereo	76dB/70dB
Muting threshold	variable
Alternate channel selectivity	−82dB
Pilot tone rejection, 19kHz/38kHz	−82dB
AM rejection	−77dB
Capture ratio	0.8dB
Total harmonic distortion at 100% mod, 1kHz	
Mono/stereo	0.04%/0.15%
Stereo separation, 1kHz/5kHz/10kHz	60dB/51dB/39dB
Output level, 100% mod	2.2V
Dimensions (width, depth, height)	45×33×15cm
Typical price inc VAT	£1148

First reviewed: 1983. Rating: Recommended.

BEST BUY

ROTEL RT-850L

ROTEL HI-FI, 25 HEATHFIELD, STACEY BUSHES, MILTON KEYNES MK12 6HR.
TEL: (0908) 317707

Rotel's two tuners, the '830 and '850 have been designed with an accent on sound quality — in a sense they are of the 'BX' generation. The *RT-850* is the more expensive model, and covers FM stereo, medium and long-wave bands; a full digital design, it offers both auto-seek 'power' tuning and manual frequency entry. In power tune mode, the muting threshold is sensibly set to ignore weak, noisy stations.

LAB REPORT

The RF performance was substantially good, with a decent sensitivity coupled with other figures which point to a good performance in fringe reception areas. Background whistles were suppressed well but the rejection of ultrasonic signals was not as effective. Rejection of the exact pilot tone frequency was numerically quite good, but in the presence of normal modulation, spurious sidebands appear at only 23dB down. Ultimate signal to noise ratios were more than satisfactory. Alternate channel selectivity was to a decent standard while both the AM suppression and capture ratio were first rate.

On stereo, worst case, harmonic distortion held to 0.2% in the midband, which was a fine result, while stereo channel separation was also pretty good. Channel balance was excellent, while stereo frequency response proved to be very flat and extended, only 1dB down at 10Hz, and 3dB down at 17.5kHz. At high signal strengths some variation in AM rejection was noted; for example, 50dB at 30mV, and some spurious RF responses were also apparent.

SOUND QUALITY

Justifying the designers' efforts, the '850 scored well in the listening tests, and was one of the best sounding models at the price level. The FM stereo showed a good rendition of depth and ambience, coupled with fine central focus and width; tonally, it was sweeter than usual, with good perspectives, and a clear sparkling treble.

Unfortunately, on AM the sound was barely average even allowing for the inherently poor sound of this waveband. It was however relatively crisp and intelligible, particularly on voice.

CONCLUSIONS

With sound quality regarded as a major parameter in *Hi-Fi Choice* assessments, the *RT-850L* happily scored a Best Buy in its price category. Furthermore, the basic tuner RF performance was also pretty good.

TEST RESULTS

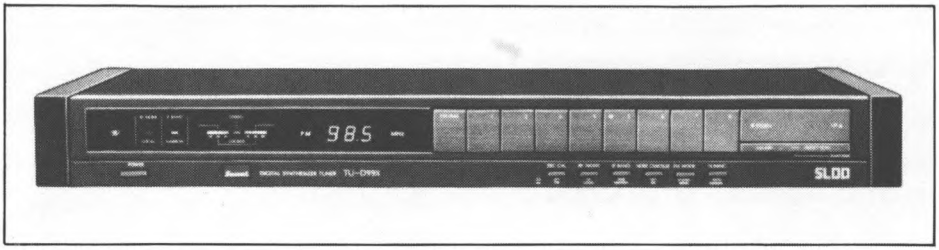
Sensitivity for 50dB signal-to-noise ratio	
Mono/stereo	2μV/17μV
Ultimate signal-to-noise (CCIR/ARM/1kHz ref)	
Mono/stereo	−73dB/−63.0dB
Muting threshold, R.F. level	4.4μV
Alternate channel selectivity	68dB
Pilot tone rejection, 19kHz/38kHz	−40dB/−51dB
AM rejection	−66dB
Capture ratio	1.1dB
Total harmonic distortion	
At 100% mod, 1kHz, mono/stereo	−63dB/−55dB
Stereo separation, 1kHz/5kHz/10kHz	−40dB/−42dB/−34dB
Output level, 100% modulation	575mV
Channel balance, stereo	0.01dB
Dimension (width, height, depth)	43 x 6.5 x 31cm
Typical price inc VAT	£150

First reviewed 1986

RECOMMENDED

SANSUI TU-D99XL

SANSUI (UK) LTD, UNIT 10A, LYON INDUSTRIAL ESTATE, ROCKWARE AVENUE, GREENFORD, MIDDLESEX. TEL: 01-575 1133



This slimline compact model is an upmarket design with a comprehensive specification. A quartz locked synthesiser model, it offers FM coverage as well as AM medium wave, with 8 auto-tuned preset station positions on each band. Details include a record calibration tone at −6dB on peak level, plus a local/normal switch for front end sensitivity and a normal/narrow IF switch to aid separation of closely spaced stations. There is also a noise suppressor for weak stereo stations. At the rear, a Japanese-style coaxial connector is fitted using a special plug which has to be made up.

LAB REPORT

The '99X acquitted itself well in the lab tests. The RF performance was fine with very good sensitivity, a sensible muting threshold and excellent AM suppression as well as capture ratio. Selectivity was satisfactory in 'normal' and very good in 'narrow' IF mode. Signal-to-noise ratios were up with the best, while harmonic distortions held to a fine 0.1%, −60dB, in all conditions. Channel suppression was very good in normal mode and was still more than satisfactory in 'narrow'; for this tuner 'narrow' mode operation was no hardship. Output level was healthy, balance very good with the frequency response respectably flat.

SOUND QUALITY

Scoring very well on the listening tests, the '99 produced just slight background whistles, which had cleared by the 200μV input level, and from 500μV upwards the stereo output was very quiet. It presented a close copy of the original source, although the merest dullling of transients was noted. Otherwise the sound — stereo, depth, and tonal neutrality — all met high standards. High level RF blocking was cleared via the 'local' switch.

The AM sound was thought unpleasant with a notable hardness and ringing sound. Here it rated below average.

CONCLUSIONS

With a front rank sound quality and a very strong RF performance, this is clearly a fine tuner design. Suited, with the 'local' switch, to both fringe and high strength locations, a versatile performance is offered, and if the AM section is not considered important, it could fit the bill nicely. The '99X represents very good value and is recommended.

TEST RESULTS

	Tuner
Sensitivity for 50dB signal-to-noise Mono/stereo	2.5μV/25μV
Ultimate signal-to-noise (CCIR/ARM, 1kHz ref)	
Mono/stereo	76dB/71dB
Muting threshold	40μV
Alternate channel selectivity	40dB/75dB
Pilot tone rejection, 19kHz/38kHz	71dB/>93dB
AM rejection	>68dB
Capture ratio	1.0dB
Total harmonic distortion at 100% mod, 1kHz	
Mono/stereo	−60dB/−63(−60*)dB
Stereo separation, 1kHz/5kHz/10kHz	55/58/52dB(37/40/42*)dB
Output level, 100% mod	825mV
Channel balance	0.15dB
Dimensions (width, depth, height)	43×26×5cm
Typical price inc VAT	£230

Narrow IF bandwidth

First reviewed 1985

BEST BUY

SONY ST-S 700ES

SONY UK LTD, SONY HOUSE, SOUTH STREET, STAINES, MIDDLESEX, TW18 4PF.
TEL: STAINES 61688

This £300 upmarket 'ES' tuner is the top current Sony model available in the UK. Described as 'direct comparator', it is larger than most, solidly built and finely finished. This quartz digital synthesiser design covers FM and medium and long wave AM, with 10 preset switches plus 'manual' and computer controlled electronic tuning.

A feature is the wide/narrow IF option which helps get the best performance from local/distant stations respectively. Pushbuttons and knobs select auto muting/mode plus a variety of tuning and programming functions such as 'scan'. However, the signal strength meter is rather more decorative than functional, using 10 segments to display five levels, with full saturation at a low 100μV.

Sound Quality

FM sensitivity seemed subjectively very good, adequate for good stereo by 200μV and solid above 500μV aerial signal, with noticeably quiet backgrounds compared with the norm. The sound quality too is very good indeed, with excellent stereo focus and width, fine resolution at low and high frequencies, and an even, smooth overall balance, perhaps a touch on the bright side compared with other leading references. Coloration was negligible, but a slight softening of impact was queried by one listener.

The AM reception was competent and the tuning indicator worked well. Backgrounds were again unusually quiet, and the sound quality was pretty decent, particularly in the bass, though the 'corner' of the HF rolloff seemed audible as a slightly 'quacky' coloration.

Lab Report

An outstanding set of performance measurements serve as a worthwhile benchmark against which lesser models may be compared, with signal-to-noise ratios particularly excellent. The normal/narrow tuning 'window' proved effective in operation, with appropriate advantages and disadvantages showing up in the figures.

Conclusions

This is a first class tuner in every respect including FM sound quality, with above average AM reception. Though it is more expensive than average it shows what a basic Japanese IC package can achieve by intelligent engineering and a little relaxation of tight budgetry constraints, and fully merits recommendation.

Test Results

	Tuner
Sensitivity for 50dB signal-to-noise Mono/stereo	2.6/36μV (3/39μV narrow)
Ultimate signal-to-noise (CCIR/ARM, 1kHz ref)	
Mono/stereo	−82dB/−75dB
Muting threshold	4μV
Alternate channel selectivity	71dB (83dB narrow)
Pilot tone rejection, 19kHz/38kHz	−73dB/−93dB
AM rejection	71dB
Capture ratio	1.8dB (2.6dB narrow)
Total harmonic distortion at 100% mod, 1kHz Mono/stereo	70dB/ 65dB
Stereo separation, 1kHz/5kHz/10kHz	54dB/42dB/37dB
Output level, 100% mod	570mV
Channel balance, stereo	−0.02dB
Typical price inc VAT	£300

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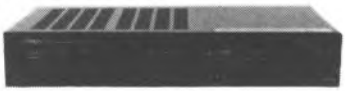

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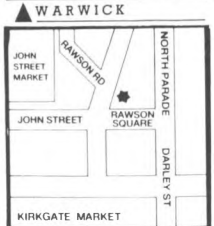

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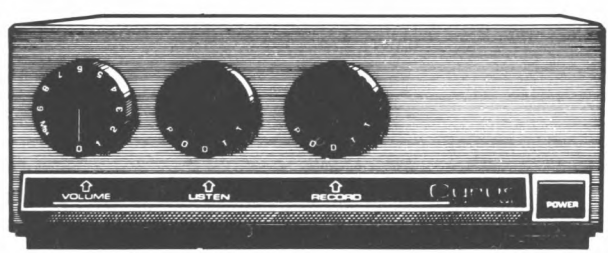

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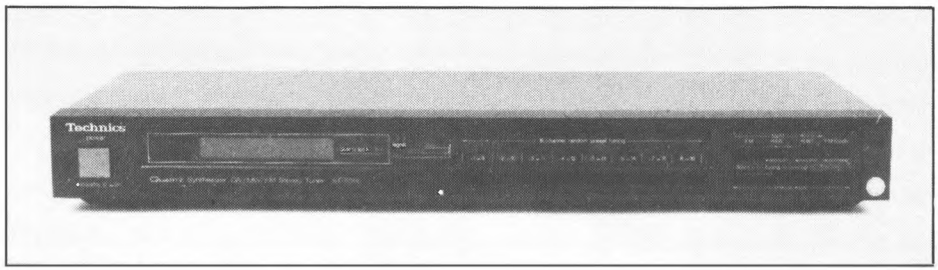
- MILTON KEYNES: Dukes Drive, Bletchley, Milton Keynes. ☎ (0908) 367341
- HI-FI EXPERIENCE at JCV House, Wharf Street, Warwick, CV34 5FQ. ☎ (0926) 493796
- HI-FI EXPERIENCE at Erricks, Rawson Square, Bradford BD1 3JR. ☎ (0274) 309266

VISA BADA

RECOMMENDED

TECHNICS ST-500L

PANASONIC (UK) LTD, 300-318 BATH ROAD, SLOUGH, BERKS.
TEL: (0753) 34522



The natural partner to Technics' 'budget' *SU500* integrated amplifier, this simple £100 tuner is comfortably the cheapest amongst those tested in 1987, yet is also well equipped. The construction is very slim and lightweight, but external finish in Technics' traditional 'camouflage' brown is to the usual high standard, and ergonomics are fine.

Using quartz digital synthesis to cover three wavebands (FM plus medium and long wave AM), 8 presets provide memory for 16 stations — the two groups distinguised by pushing briefly or holding down the requisite button. The main tuning control may be used manually or will scan automatically. The rear panel carries 75ohm coaxial and AM aerial inputs, the usual loop AM aerial, plus a remote control socket for use when integrating in a Technics system.

SOUND QUALITY

The FM reception (RF) capabilities of this tuner are very good, capable of decent quality stereo with aerial signals as low as 300μV, delivering solid results from 1mV, and coping very capably with overmodulation. However, the sound quality itself rated a little below average. The tuner was well behaved enough, generally uncoloured and neutral, but had a tendency to 'thicken' the sound somewhat. A loss of 'air' and 'speed' reduced insight into the music somewhat, while there was further criticism of a lack of 'weight' and 'grip' in the bass region.

The AM sound quality was dire: "sounds like music coming down a long furry tunnel", according to one panelist. Furthermore the 9kHz digital tuning intervals prevented any 'fine tuning' remedies.

LAB REPORT

Fine sensitivity and very good general measured performance gives no clue to the low cost of this model. The slight weaknesses are the limited pilot tone rejection, low stereo signal to noise, mild (−1dB) treble shelf cut in the frequency response, and a really silly muting threshold.

CONCLUSIONS

The combination of a fine RF performance on FM and fair sound quality at something of a bargain price for tuners nudges us towards recommendation, though it must be admitted that we found it difficult to raise any great enthusiasm for what is, ultimately, very much a common denominator performer.

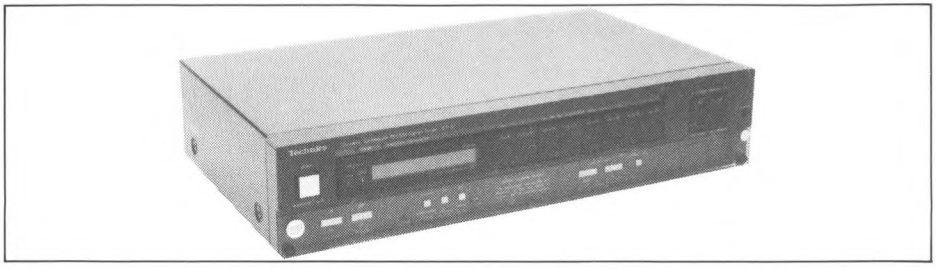
TEST RESULTS

Sensitivity for 50dB signal-to-noise Mono/stereo	3.8μV/110μV
Ultimate signal-to-noise (CCIR/ARM, 1kHz ref)	
Mono/stereo	73dB/50dB
Muting threshold	1.4μV
Alternate channel selectivity	−64dB
Pilot tone rejection, 19kHz/38kHz	33dB/47dB
AM rejection	−53dB
Capture ratio	1dB
Total harmonic distortion at 100% mod, 1kHz	
Mono/stereo	−54dB/−57dB
Stereo separation, 1kHz/5kHz/10kHz	42dB/42dB/39dB
Output level, 100% mod	621mV
Channel balance, stereo	0.33dB
Dimensions (width, depth, height)	43×54×19.5cm
Typical price inc VAT	£100

RECOMMENDED

TECHNICS ST-G7

PANASONIC (UK) LTD, 300-318 BATH ROAD, SLOUGH, BERKS.
TEL: (0753) 34522



Finished in the traditional Technics dark bronze, the upmarket STG7 sports a backlit liquid crystal display like the Revox. It is a synthesiser design, and an array of push-buttons allow pre-selection of up to 16 stations from the FM and medium wave bands.

Automatic or manual switching for two IF bandwidths helps optimise reception, and the display is calibrated to read signal strengths in dB. Fine setting of AM and FM synthesised frequencies is possible, and a recorder calibration output is also provided.

SOUND QUALITY

Highly rated on test, the stereo quality was fine by 400μV signal strength, and the background was clear of whistles once perfectly in tune. Audio quality was considered to be close to the original source, with good dynamics. Good stereo, depth and focus as well as a wide neutral frequency range were also apparent.

However, it sounded quite poor on AM, with a muffled and laboured effect. Heavy coloration was also present and it was considered quite fatiguing to listen to.

LAB REPORTS

Our test methods differ in some respects from those used to specify the G7, and the results are further complicated by a dual bandwidth IF. On 'wide', which gives best sound quality, sensitivity was normal while signal-to-noise ratios were also very good. (CCIR ARM 1kHz.) Alternate channel selectivity was satisfactory in 'wide', and good in 'narrow'. Multiplex tone rejection was excellent — no trace of it could be found! AM rejection was also excellent, together with a fine capture ratio.

Harmonic distortion, while excellent in mono, degraded to 'satisfactory' in stereo, which was a pity. Channel separation was very good in 'wide' but rather worse in the narrow IF mode.

CONCLUSIONS

In the optimum 'wide' mode the audio performance was very good, with the RF parameters a little less so. 'Narrow' will allow reception in difficult conditions but it is a sonic compromise nonetheless. The overall sound quality was much liked, and together with the features and major test results indicates sufficient value for recommendation even at this high price.

TEST RESULTS

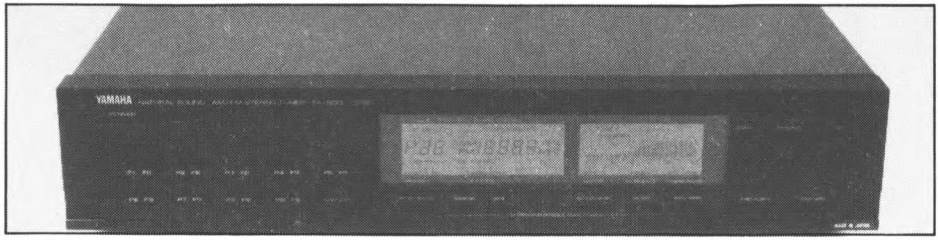
	Tuner
Sensitivity for 50dB signal-to-noise Mono/stereo	5μV/50μV
Ultimate signal-to-noise (CCIR/ARM, 1kHz ref)	
Mono/stereo	77dB/70dB
Muting threshold	8μV
Alternate channel selectivity	47dB/72dB
Pilot tone rejection, 19kHz/38kHz	>90dB/90dB
AM rejection	>70dB
Capture ratio	1.5dB
Total harmonic distortion at 100% mod, 1kHz	
Mono/stereo	−70dB/−55(−34*)dB
Stereo separation, 1kHz/5kHz/10kHz	53(20*)dB/45(16*)dB/36dB
Output level, 100% mod	675mV
Channel balance	0.7dB
Dimensions (width, depth, height)	43×28×10cm
Typical price inc VAT	£400

Narrow IF bandwidth

First reviewed 1985

YAMAHA TX-500

YAMAHA ELECTRONICS LTD, YAMAHA HOUSE, 200 RICKMANSWORTH ROAD, WATFORD,
HERTS WD1 7JS. TEL: (0923) 33166



Not for the fainthearted, this Yamaha tuner is bigger than most, and features the largest and most colourful display we have seen. Under the rather gaudy skin this is a conventional enough collection of ICs, providing digital synthesised phase locked loop tuning at a price of £150. The signal strength meter in particular looked impressive, and was quite linear with some 20 different divisions, but was fully saturated by a lowish 200μV.

Ten preset buttons permit memorisation of up to 20 stations, while the electronic tuning may also be driven manually or scan automatically. Additional pushbuttons provide for mono/auto stereo mode, and 'high blend' which may be used to reduce noise along with high frequency stereo separation when receiving weak signals. The aerial input terminals were unconventional, resembling a group of four old-style sprung amplifier speaker terminals.

Sound Quality

The *TX-500* proved subjectively very sensitive, capable of giving reasonable stereo results from 300-400μV aerial signals and fully into its stride with 1mV, with very low background noise. It was most curious to find that the display frequency of our pre-production sample had a systematic error, reading 8kHz up on the actual tuned frequency.

The sound quality was rated above average. Competent enough to be sure, it failed to raise any real enthusiasm amongst the listeners, who described the sound as a bit 'shut-in' and 'leaden', with rather coarse treble resolution.

AM plumbed the depths with a dreadful noise that sounded as if it were travelling up through a long tube, due to the excessive bandwidth limiting, the digital stepping system giving no option to mistune slightly for improved subjective bandwidth.

Lab Report

With a sensitivity a little below average and some rolloff of the response at high frequencies, the '500 was very quiet and had fine AM rejection figures. It certainly passes muster technically, but was also unexceptional overall.

Conclusions

Though the *TX-500* gives plenty of display for the money and is technically competent particularly on FM reception terms, the AM sound quality was poor while the FM sound quality rated average. Good enough as an FM partner to a Yamaha amplifier, it is not especially distinguished as a separate item.

Test Results

Sensitivity for 50dB signal-to-noise Mono/stereo	11μV/120μV
Ultimate signal-to-noise (CCIR/ARM, 1kHz ref)	
Mono/stereo	72dB/67dB
Muting threshold	17μV
Alternate channel selectivity	−42/−79dB
Pilot tone rejection, 19kHz/38kHz	−50.35dB/−78dB
AM rejection	74dB
Capture ratio	1.8dB
Total harmonic distortion at 100% mod, 1kHz	
Mono/stereo	−52dB/−47dB
Stereo separation, 1kHz/5kHz/10kHz	31dB/31dB/28dB
Output level, 100% mod	490mV
Channel balance, stereo	0.1dB
Dimensions (width, depth, height)	43.5×92×27.5cm
Typical price inc VAT	£150

Bill Hutchinson

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PM-655 60WPC	£355.00	TU-915 Digital with Presets	£325.00
PM-665 100WPC	£555.00		
HK-870WPC/PA	£455.00		
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PM-15140WPC	£ 89.90	ST-151L Digital with Presets	£ 99.90
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PM-24 40WPC	£179.90	ST-26L Digital with Presets	£124.90
PM-54II 60WPC	£229.90	ST-64/16L Digital with Presets	£219.90
PM-64II 100WPC O/A	£299.90		
PM-84II 100WPC Mosfet	£499.90		
PM-94 140WPC Mosfet O/A	£849.90		

PIONEER

AMPLIFIERS		TUNERS	
A-22 30WPC	£ 99.90	TX-570L Analogue FM LW MW	£ 69.90
A-33 40WPC	£139.90	TX-970 Digital with Presets	£ 89.90
A-44 55WPC	£179.90	TX-1070L Digital with Presets	£ 99.90
A-66X 80WPC	£299.90	F-55L Digital with Presets	£109.90
A-77X 100WPC	£399.90	F-77L Digital with Presets	£169.90
SX-1500 46WPC	£169.90	F-99XL Digital Direct Decorder	£249.90
SX-V200L 30WPC Rec	£199.90		

Sansui

AMPLIFIERS		TUNERS	
AUG-11X25WPC	£119.90	T-500L FM MW LW Analogue	£ 74.90
AUG-11X MkII 25WPC	£129.90	T-700L FM LW MW Dig Pre	£ 99.90
AUG-30X 45WPC	£189.90	TUD-33XL FM MW LW Dig Pre	£119.90
AUG-50X 60WPC	£279.90	TUD-55XL Dig Pre	£169.90
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AUG-90X 130WPC	£479.90		
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C2101 Pre Amp for B2101	PRICE		
A-500 40 WPC	£ 74.90		
A-700 65WPC	£ 99.90		

SONY

AMPLIFIERS		TUNERS	
TA-F222ES 100WPC	£199.90	ST-S222ES Quartz Dig Pre	£149.90
TA-F444 ES MkII 120WPC	£299.90	ST-S444ES Quartz Dig Pre	£199.90
TA-X2308 40WPC	£ 99.90	ST-JX2302B Dig Pre	£ 99.90
TA-X3308 60WPC	£119.90		

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SUMMARY REVIEWS — TUNERS

Denon TU-717 (£100)
This 'budget' analogue tuner delivered a fine RF performance for this or any other price for that matter. The FM sound quality was satisfactory enough for the price, though AM was disappointing, but overall recommendation remains appropriate.

Hitachi FT5500 II (£230)
Something of a classic design, the original '5500 was one of the first high preformance digital tuners, and the *Mk II* maintains Hitachi's increasingly rare presence in the separates hi-fi market. Covering FM and MW AM only, the ergonomics require a little patience but the RF performance is very good. Sound quality on FM is also good, though perhaps beginning to show its age compared with more recent introductions. AM sounded basically satisfactory.

Luxman T215L (£156)
Though soon to be discontinued this attractively presented manual analogue tuner covers FM plus medium and long wave AM. The RF performance was very good, but FM sound quality was rather undistinguished, with restricted bass and some treble 'roughness'. AM sounded a little above average.

Marantz ST151L (£105)
This simple digital tuner covers FM plus long and medium wave AM, with 8+8 tuning presets. Attractively presented and finished, it is also priced significantly below the majority of its type. The RF performance was rather weaker than average, but sound quality was well up to par, and reasonably respectable on AM besides, so this 'budget' model remains recommended for those primarily interested in local reception to a decent standard at a modest outlay.

Pioneer 99X (£240)
This comparatively expensive digital synthesis tuner covers FM and medium wave AM with up to 16 preset, plus extensive features for autotuning and optimising local/distance reception. The RF performance is first class, not to mention unusually versatile, and the sound quality was also good on FM and quite respectable on AM, so recommendation is appropriate.

CONCLUSIONS, BEST BUYS & RECOMMENDATIONS

For some years the amplifier market has seen a steady process of polarisation, between the low cost integrated model selling for maybe £100-200, and the more exotic separates costing £1,000 or more. The middle ground has not been entirely barren, but it has certainly not been conspicuously fertile. And the sizeable jump from one level to the next has been a financially painful deterrent to many.

It would be premature to say that this gap has been filled, but there are clear signs that 'middle ground' amplifiers are finding their feet again, ofering customers a more progressive ladder of price against sound quality.

The high performance of both the best low price integrated models and the cream of high priced separates is clearly largely a function of their inherent simplicity. Middle ground models have often sought to justify their existence by adding complexity in features or circuit design to the framework of established bread-and-butter base models. The result has often sounded smoother and better controlled, but also less lively, transparent and informative at the same time.

Though there remain exceptions largely amongst companies active in the broader consumer electronics market where there remains significant demand for extensive features, specialist manufacturers have increasingly accepted that complexity is a negative quality, to be avoided as far as possible. They have also discovered that the cost of adding value 'under the skin' can pay off in sound quality terms and consequently sales at whatever price point.

That said, the most active sector is still the simple integrated amplifier. Sound quality here continues to improve as time passes, with plenty of new contenders raising the standards of competition — and generating effective response from several established favourites.

Such models are currently distinguished from conventional consumer electronics equivalents by a price premium — selling at say £130-150 instead of around £100 — but offering significantly better sound quality at some sacrifice in features and facilities. Though only one or two feature moving-coil cartridge inputs, this is clearly a future trend, but it must be pointed out that such inputs often represent something of a compromise at these prices. In the quest for simplified signal paths, some of these models now omit the amplifier's line stage entirely. This can be an advantage with the highish standard output of a CD player, but can leave the amplifier a little short of the gain needed for other ancillaries. Fortunately this is not a major problem, but there may be some instances where ideal compatibility at line level is not achieved.

BEST BUYS RECOMMENDATIONS

Our extensive measurement programme does reveal weaknesses in performance, but ironically these seem more likely to be found in a good sounding amplifier than in the more mundane subjective performer. Given the 'acceptable' standards of lab performance attained by the majority, sound quality in relation to price has become the prime arbiter when selecting Best Buy and Recommended models.

We take the task of establishing sound quality ratings very seriously, with extensive comparative auditioning under a variety of conditions, plus re-rating of earlier reviews to take account of steadily improving standards. But sound quality is not an absolute. It depends significantly on both the listening conditions, and on the taste and perception of the listeners.

To give each amplifier its best shot requires using the highest quality ancillary components for auditioning, but in the case of cheaper models this will not necessarily represent 'typical use' conditions. An amplifier transparent to the finest quality source may not necessarily handle a compromised source with its accompanying distortions quite so effectively.

Furthermore, during the sessions there were

clear differences between panelists, not so much in what they heard but what they regarded as important and how they valued different aspects of performance. So rather than take our ratings as gospel, we would advise the reader to use them as a guide to shortlisting likely contenders, and then try to get to hear some alternatives, preferably with similar components to those which will be used in the final systems.

We have distinguished our favourites as Best Buy models, but there will be circumstances where a Recommended or Worth Considering model is more appropriate to the overall subjective performance that you want from your particular system.

Best Buys — Amplifiers

Restricting the Best Buys to integrated amplifiers costing below £300, the list starts with the **NAD 3020e** (£109), a newly updated 'economy' version of this classic budget amplifier which is sonically a clear cut above mainstream consumer electronics models. For a few dollars more (£120 to be precise), the **Denon PMA 250** comes in as a fine all-rounder, substantially better than the still available '707, while the first British model in the lists is the **QED 230s** (£119), a little sparse and spartan but sweet and musical to the ears nonetheless.

Moving up the price ladder, the **QED 240CD** appears at around £199, adding a little more verve to the basic '230 package. The **Mission Cyrus One** (£150) is visually and sonically superb, with exceptional transparency for the price, while the **Rotel 820BXII** (£150) stays fully competitive, trading a little 'see-through' subtlety for superior bass drive and 'slam'.

A new entry at £200 is the **Cambridge 'P40**, a fast and lively performer with a (just) usable moving-coil stage. (It has a slightly bigger *P55* brother which is apparently very similar, though we haven't tried it yet.) Move up to £300 and the moving-coil inputs improve significantly, on the fine **Mission Cyrus Two** and **Audiolab 8000A**, representing contrasting sound qualities and philosophies but both offering near audiophile sound quality at an affordable price.

Recommended Amplifiers

The three least expensive Recommended models are all fine performers in their own right, but suffer a little in comparison with their more recently developed peers. The **Denon PMA 707** (£100) was rated a Best Buy last year, but improving standards from Denon themselves and others now leave this fine budget amplifier amongst the Recommended models. Again suffering a little in comparison with its *BXII* stablemate, the **Rotel 820** (£110) is still fine value for money.

Moving to the next price point there are several exciting new contenders from the overseas manufacturers. The **Yamaha AX300** (£120) is a very hopeful sign, representing a substantial improvement over previous low cost amplifiers from this manufacuturer. Likewise the **Sansui AUG11X** (£130) brings this manufacturer back into competitiveness for 1987 in the near-budget market. With a better record than most for tailoring their product to suit the UK palate, the **Marantz PM26** (£130) maintains this tradition in a neatly styled package. And as if to celebrate changing their UK name from Trio, the £130 **Kenwood KA550** shows new impetus from this company, with the added advantage of a decent quality moving-coil cartridge input.

Two fine British amplifiers offer a welcome alternative to this oriental onslaught. Whether A&R's £150 **Arcam Alpha** is a *Plus* or not in name remains a moot point, but the recent improvements are cosmetically attractive and keep this well balanced all-rounder competitive on sound quality. The £150 **Creek 4040** is less neutral and was more controversial soundwise, but continues to deliver good musical integrity and shows significant measured improvements over earlier versions.

At £180 the **Marantz PM45** is a logical step up from the '26, again offering good sound quality but with significantly greater power output plus a decent quality moving-coil cartridge input. The £190 **Sansui AUG30X** rated Best Buy in last year's edition, but steadily improving standards suggest Recommendation is now more appropriate for this powerful and good sounding all-rounder. (We haven't yet received a £200 **Rotel 840BXII**, but previous subjective experience with the *Mk I* and the record of the **820BXII** suggests this model should also be worth a close look.)

Three British models occupying the next

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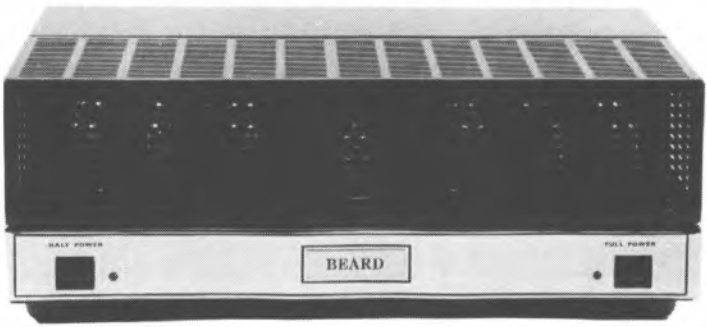

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three price slots offer similarly ultra-simple configurations but strongly contrasting sound characteristics. The £200 **QED 240SA** (£199) adds moving-coil cartridge capability to the fine qualities of the cheaper QED models and gives a neutral, open and lively sound. The £210 **Musical Fidelity A1** may lack power and get hot, but it has a Class A sweetness and transparency that some will find irresistable, and a (mildly compromised) moving-coil input. The £240 **Naim Nait** could not provide a greater contrast soundwise, its musical integrity making up for a sound which some now regard as slightly 'dated'.

Topping £315, and assuming continued availability, the **Rotel RA870** is a powerful, decent sounding model with moving-coil cartridge input, continuing to merit recommendation.

The £400 **Musical Fidelity A100** represents an enlargement of the *A1* concept, similarly idosyncratic but with sound and power improvements to match the price increase.

Worth Considering Integrated Models

The following models are regarded as fine performers in their own right, but were not in our estimation quite as competitively priced as the full recommendations:

Arcam Delta (£330), giving extra power and a good quality moving-coil input in a package with some similarities to the *Alpha*.

Harmon Kardon HK645 (£225) and **655** (£350) have so much in common, including fine finish and sensible facilities, plus comfortably above average sound quality.

Myst TMA3 (£287), a sweet-sounding, simple integrated model with quality moving-coil input and fine construction.

Onkyo Integra A-8057 (£230), a moving-coil equipped powerful performer with fine lab performance and a respectable standard of sound quality.

Sony TA-F700ES (£500), expensive, but sounding decent enough with extensive facilities and fine build.

Recommended Separates

Given our policy of recommending products that achieve a certain high standard irrespective of price, plus a reluctance to award Best Buy ratings within the separate pre-/power sector, the following list becomes a little unwieldly, so for convenience is broadly grouped according to transistor or valve operation, each working through at steadily rising prices, with some manufacturer's ranges covered together. We have also included items which have not been formally reviewed, but of which we have some subjective experience. The valve/transistor split does not imply favouritism for one or the other approach, but acknowledges the 'differentness', both subjectively and practically; note also that the valve items do not include moving-coil cartridge compatibility as a matter of course.

Three British transistor systems provide middle market contrast. The **Audiolab 8000C/P** (£275/£450) gives traditional facilities, good transparency and generous power output. The **Cambridge Audio C75/A75** (£259/279) is exceptional value for money having a simple, quality pre-amp and generous power output at a quite modest price. The **Exposure VII/VIII** (£316/£309), with our preference and formal recommendation primarily for the power amplifier, this combination is unusually presented with fine build and the provision for pre-amp upgrading.

The **Musical Fidelity** separates range is increasingly extensive, and is generally recommended in isolation or combination. **The Preamp 2a** (£300) and **MVT** (£1000) have both been revised since our last auditioning, but presumably continue to set a high standard at their price points. The **P170** (£460), **P270** (£990) and **A370** (£1990) are 'double mono' power amplifiers moving steadily up the power and quality scale with increasing Class A operation with increasing price.

In contrast, the **Naim Audio** separates range should only be used in combination and a carefully matched system. **NAC 32-5** and **'42-5** pre-amps (£425/£262) with **SNAPS** or **HICAP** supplies (£212/£385), plus **NAP140, NAP250** and **NAP135** power amplifiers (£414, £959, £966) have a distinctly 'different' sound quality which is not to all tastes but has many loyal adherents (including The Editor), with logical consistency and upgrading paths within the range.

Amongst imported items, the US manufactured **PS Audio PS4.5** (£695) is a fine pre-amplifier with good 'speed' and transparency. The French **Nuance/Plenitude** combination (£795/£795) is sweeter and softer, with our preference for the power over the pre-amplifier. At higher prices our findings on the **DNM** pre-amplifiers (from £1000)

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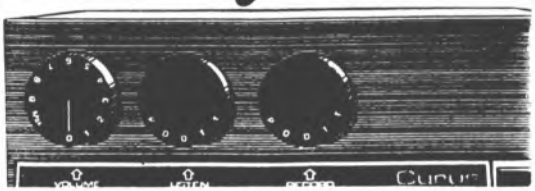

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are rather out of date; despite being a little expensive, recommendation presumably remains appropriate. The **Tannoy SR-840** (£1200) is a hefty MOSFET power amplifier aimed at the professional market, but with a subtle sound quality that belies its massive power output.

At the top end of the transistor price spectrum the **Deltec DPA100** is an expensive but fine power amplifier from Wales. US contenders include the two very good **Conrad Johnson Motif 7** and **Motif 8** pre-amplifiers (£4,400/£2,400). And in a price group all on its own, the **Cello Audio Suite** is a totally flexible and extravagant pre-amplifier system that provided a fine reference point throughout the tests.

Amongst the extensive **Krell** range, our preference is for the larger power amplifiers, particularly the **KMA100II** monoblocks (£5,750/pr), with the **KSA100II** (£3600) also highly rated. The **FAM5 pre-amp (£1589)** and smaller **KSA50II** power amplifier (£2300) remain worth considering.

The valve ladder starts with a variety of UK items. The **Croft Super Micro/Series IVS** (£250/£730) is a typically sweet-sounding combination. The **VTL Minimal** (£300) and **Standard** (£500) are alternative pre-amplifiers, while recommended power amplifiers in the same general price bracket are the **Beard P35** (£695) and **Radford STA25 Renaissance** (£977).

The £995 **Beard 506** is a largely successful attempt to produce a full feature valve pre-amp with built-in m-c transformer, while the £1775/pr US monoblock **Quicksilver** power amplifiers remain recommended. Also from the USA, the **Counterpoint** range continues to provide above average power in a valve 'hybrid' configuration with the **SA12** (£1250) and **SA20** (£2350) power amplifiers, while the **SA7** pre-amp (£747) still merits consideration.

Amongst the real US valve (increasingly 'hybrid') exotics, the extensive Audio Research range continues to set the pace, matched at most price points by alternatives from Conrad Johnson.

Our main **Audio Research** recommendations are for the **SP10** and **SP11** pre-amplifiers (£2850/£5150), plus the **D115 II** (£3331), **M100** (£2850), **D250 II** (£6950) and **M300** (£4998 each) power amplifiers, covering stereo and monoblock ranges, while the **SP8/D70 II** combination (£1998/£2190) remains worth considering.

The **Conrad Johnson Premiere Three** (£3400) pre-amp could combine with **Premiere Four** (£3600) or **Premiere Five** power amplifiers — or the cheaper (£1,795) **MV50** for that matter, while the £2,010 **PV5** pre-amp is also worth considering.

Worth Considering

Besides the handful mentioned above, many other separates remain worth considering. In many cases these are derived from older reviews and assume that the product has not changed significantly, whereas in practice many manufacturers follow a policy of continual improvement, so some may well have merited full recommendation had our experience been more up to date.

Availability has been assumed, but may be limited in some cases.

Transistor combinations include the **Linn LK1/LK2** (£800), **Linx Stratos (£999), Burmester 838/846/850** (£990/£1050/£2650/pr); pre-amps include the **Quad 34** (£259) and **Tandberg 3008A** (£564); power amplifiers the **Quad 405** (£290), **NAD 2200** (£340), **Hafler DH120** (£360/kit £300), **Robertson Forty Ten** (£1000), **Magnum A100** (£2000/pr).

Valve components include **Le Tube** pre-amp (£535) and the **VTL 50 Watt** (£1150/pr), **Mentmore M100** (£1140/pr), and **Beard M70** (£1,595/pr) Monoblock power amplifiers.

Tuners — Best Buys & Recommended

Our recent series of tests show no particular technical trends, analogue/varicap models co-existing alongside — and frequently outperforming — digital synthesis models, though amongst the latter the incidence of 'synthesiser hash' is mercifully now rare.

Choosing a tuner is often made on ergonomic or cosmetic grounds, to partner an amplifier from the same manufacturer for example. But it does make some sense to consider local reception conditions and the quality of the aerial installation. Decent FM sound quality really demands a fine aerial, though a number of our recommended models can make do surprisingly well with the proverbial 'piece of wet string' — flat dwellers please note. But if you do provide a decent aerial signal, there is far less need to go for high sensitivity unless you want to pull in distant (eg European) stations.

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FM quality is given far greater weight in our assessments than AM quality, simply because there is precious little one can do about the latter's limitations, but again consider your requirements in the light of local programme availability — bearing in mind that many transistor radios do a better job on AM bands than most of the digital devices tested here.

Best Buys

These models gave exceptional value for money coupled with a substantially good performance.

Arcam Alpha Tuner (£140)
Good sound quality on FM and (comparatively speaking) AM bands plus fine 'traditional' ergonomics and presentation combine with a good standard of RF performance at a sensible price from this analogue design.

Creek CAS3140 (£150)
FM-only, this analogue varicap tuner gave outstanding RF performance including high sensitivity, plus a very superior sound quality for a highly competitive price.

NAD 4020B (£140)
This traditional analogue design gives good sound quality and decent RF performance, and still represents good value for money.

Rotel RT-850L (£150)
This all-band digital synthesis model gave good FM sound quality yet was poor on AM, but still rates strong recommendation for its overall FM performance at a competitive price.

Sony STS700ES (£300)
With outstanding presentation and lab performance throughout, this digital synthesis design gave a very good FM sound quality and even made a decent attempt on the AM bands.

Recommendations

The following models are recommended on the basis of good value with the accent on improved performance in the case of the more costly models. Sound quality improves with price only up to a certain point but performance as a selective receiver continues to get better as cost increases.

Denon TU-717 (£100)
With good measured performance for the price the *TU-717* also rated as satisfactory on sound quality.

Hitachi FT-5500 II (£230)
In its *Mk II* form, this classic design scored on excellent radio performance, designed to cope with a range of reception conditions, coupled with a basically good audio quality.

Marantz ST151L (£105)
This nicely styled and very well finished digital tuner gave acceptable technical results, and while best suited only to normal reception areas, did give decent sound on all bands.

Mission Cyrus (£180)
Rating highly on sound quality, this tuner was not so impressive on radio performance, making its potential abilities in poorer reception areas less than outstanding.

Naim NAT01 (£1098)
With attractively simple ergonomics, this expensive analogue/varicap model provided reference standard sound quality of FM bands, requiring a reasonably strong aerial signal.

Pioneer F-55L (£110)
This all-band digital synthesis model delivered a fine RF performance with acceptable sound quality, but was poor on AM.

Pioneer FX-99X (£240)
This digital tuner offered exceptional radio performance suiting almost any reception conditions, along with basically good sound quality.

Quad FM4 (£279)
An ergonomic delight, this FM-only model has a very competent all round performance and a pleasing sound, continuing to merit recommendation.

Revox B261 (£890)
A flagship tuner, this versatile model had a wealth of facilities including auto aerial rotation. For the serious FM radio enthusiast the RF performance was excellent.

Sansui TUD99X (£250)
Something of a reference in 1986, the '99X delivers excellent RF performance and good sound quality on the FM band, but was rather mediocre on AM.

Technics ST-500L (£100)
With a thorougly respectable RF and lab performance, the sound quality was considered acceptable enough for recommendation as a basic FM tuner, though AM was poor.

Technics ST-G7 (£400)
Comprehensive facilities and a generally impressive level of technical performance justify a high price so this well-furnished model can again be recommended.

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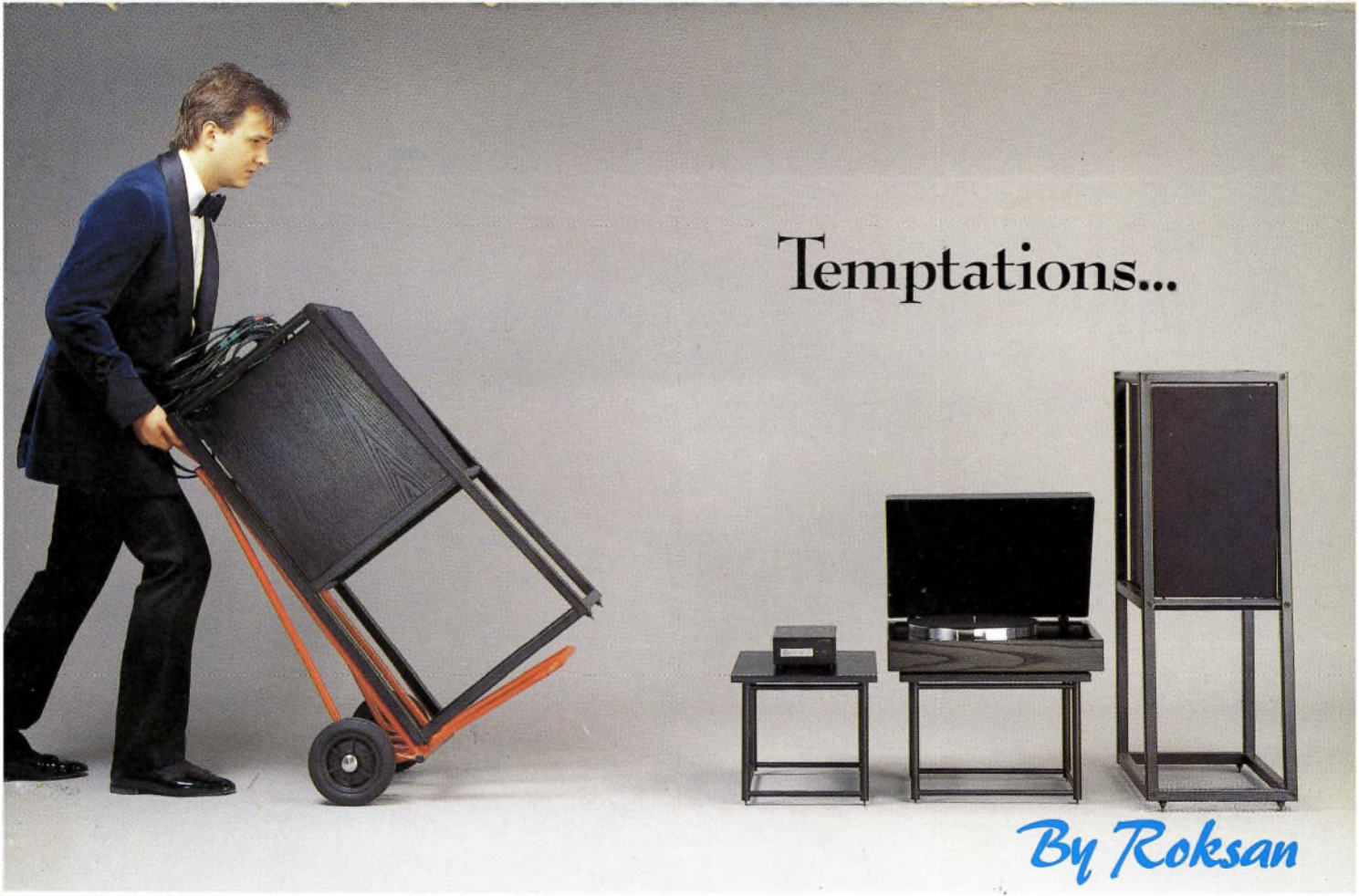

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