Accuphase

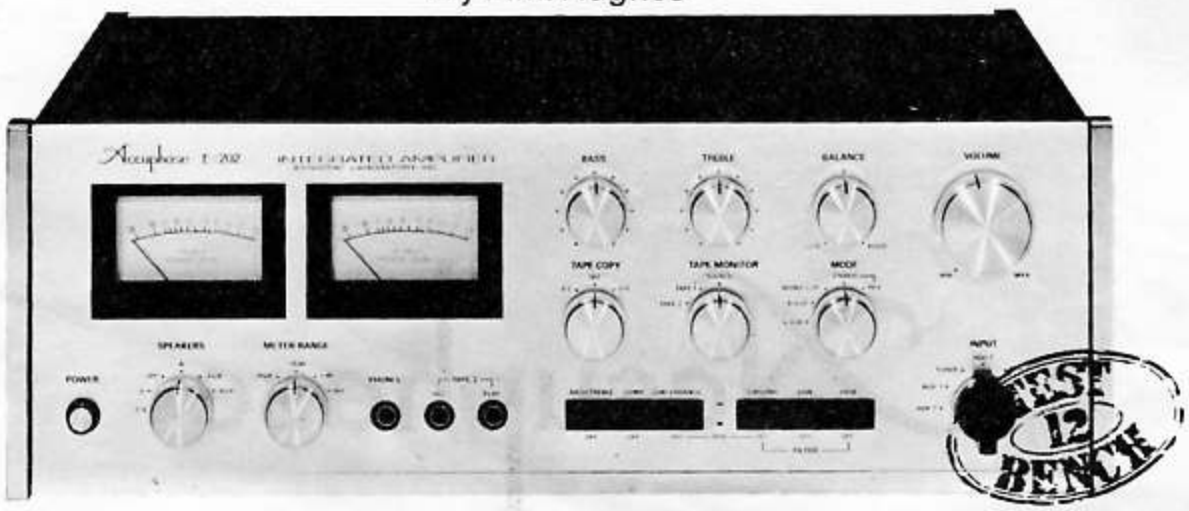
WORLD EQUIPMENT REVIEWS

(MODEL E-202 and T-101)

INDEX

Accuphase E202 amplifier

By F.M. Hughes



Readers may recall a certain hesitation on my part, concerning the asking price, when confronted in the past by a £350 receiver. The unit reviewed here is even more costly — an amplifier which retails at around £400. Whatever argument may be put forward concerning the law of diminishing returns, and outright basic extravagence, the answer is simply that here, as elsewhere, such super-fi products have found a market. In fact, if judged by some admittedly exotic standards, this model is not over expensive.

Accuphase is a relatively new Japanese brand name, the factory having been founded by the same persons who were previously responsible for 'Trio' ('Kenwood' outside the UK). Their aim is to produce technically outstanding products, and if the E202 is representative of their range, then this aim has been attained. As a result of the advanced and complex nature of its design, which became readily apparent with preliminary testing, a rather more detailed investigation than is normal was undertaken.

Basic performance

For an integrated unit containing both pre and power amplifiers, a conservative 2 x 100W into 8 ohms is specified. Commensurate with the elevated price, the distortion and noise figures are low, and the bandwidth wide. Although a fair sized unit — it measures 18in wide, 6in. high and 14in deep — the E202 is surprisingly heavy, weighing some 43lb.

No wooden case was supplied though I am told one will soon be available, the structure being finished in semi-professional matt black paintwork, which is relieved by the satin silver front panel and the trim extrusions. The panel layout is simple and uncluttered, being dominated by the VU type power output meters. Scaled from +3 to -20dB, a range selector switch is provided to increase the sensitivity by 10 and 20dB, hence allowing visible meter deflections to occur at lower power levels. At maximum meter sensitivity a -20dB reading corresponds to an average level of 10mW. However, as VU meters under-read on typical programme peaks, from between 5 and 8 dB, and assuming a 2dB peak reserve capability for the amplifier, it means that in practice the VU meters at full power will not be driven beyond -4dB. The obvious solution would have been for Accuphase to have employed peak reading meters which indicate instantly the maximum power capability of an amplifier.

Filling the remainder of the fascia area are the ten rotary controls, generously dimensioned in solid alloy. Typical of the overall standard of construction, each knob is secured by two socket-head grub screws, a practice common to most professional equipment. All the usual facilities are present — speaker selection, mono/stereo modes, balance, volume, etc. The tone controls are ganged for simultaneous operation of both channels, and are true rotary switches. High and low filters, contour and subsonic rejection, plus low frequency lift — called enhance — are incorporated. The latter is rather unusual, being a simple 1dB of lift over the whole bass register on disc inputs, operative from 1kHz and downwards. In contrast to the usual 1kHz frequency for the tone control centre, the specification quotes more widely-spaced points of 400Hz and 2·5kHz.

Three jack sockets are present on the front panel; two for record/replay of Tape 1 and 2, the third being for stereo headphones.

Four US mains sockets, and the screw terminal bank for three pairs of loudspeakers, are located on the rear panel, the remainder of the space being taken up by an array of phono type sockets. Several subsidiary controls are here provided. Linked with Disc input 1, independent left and right sensitivity potentiometers allow adjustment of level and balance to be made for a given cartridge, so that parity with another input, such as a second cartridge feeding Disc 2, may be obtained. Also allied to Disc 1 is a variable input impedance selector, offering a choice of 30,47 and 100kohms. Disc 2 has the standard 47kohms value. Another switch allows the pre and power amplifiers to be separated for the interposition of further control units, such as may be required for four channel use.

The damping factor is also variable, via a three position rotary control. Normal (>20) medium (5) and soft (1) are available, although I cannot imagine a situation where a DF of 1 would be applicable. Medium might well improve an over-damped infinite baffle loudspeaker system, or may well help the amplifier to drive an electrostatic model.

Performance

As regards internal construction, and assembly, a very high standard of workmanship was evident. The major part of the circuitry was split into a number of printed circuit cards. These plugged into sockets bolted to the chassis. Unlike many other models where the printed circuit board track is itself gold flashed to form a plug contact strip, in the E202 a separate plug-in unit was attached to each board. This latter practice is in fact the more reliable. Massive black finned extruded heatsinks are employed, one for each channel. This lessens the chance of thermal inter-channel coupling, which may upset the thermal compensation of the output stages. The bass and treble controls were found to be true switches connected to an impressive array of Rs and Cs, rather than the more usual click detents which have been added to an ordinary variable potentiometer.

Accessibility is good and hence servicing should prove straightforward.

Circuitry

In agreement with advanced modern practice, the RIAA disc input amplifier is quite complex, employing five transistors. The input has a high intrinsic impedance,

generated by a long tailed pair. The collector load for the input transistor is a constant current source, buffered from the circuit's output transistor by an emitter follower. All the transistors are DC coupled, with AC equalisation feed-back taken from the output to the second of the differential pair, thus isolating the input terminal from the feedback loop. Supersonic frequency rolloff is imparted by a 5pF collector-base capacitor on the first transistor. The subsonic and low frequency enhance modes are provided by the use of a series capacitor for the former, and a slight change in the equalisation components for the latter. The high input impedance allows inputs of 30k, 47k and 100k to be obtained via selected parallel resistors. Plus and minus 40 volt rails supply the disc preamplifier, and elaborate smoothing and zener diode stabilisation is incorporated. These precautions, in conjunction with the overall good circuit design, will result in a high signal-to-noise ratio and overload margin.

The equalised disc output arrives at the source selector switch together with the other signals — auxiliary 1 and 2, tuner, and tape 1 and 2. At this point is placed the passive balance and volume control stage — the 'contour' curve generated via a CR network switched into a tapping on the volume potentiometer track. A common failing with many amplifiers is the increase in rotational volume control noise which comes with use, frequently attaining intolerable levels. This deterioration is often due to the presence of low frequency or DC currents between the slider and track, during switch-on, or in normal operation.

It is most likely that in an effort to completely eradicate this problem, Accuphase have used a FET input of very high impedance, and hence minimal loading, for the succeeding amplifier stage. This is also advantageous in that it simplifies the design of a low distortion feedback type of tone control stage, which is this amplifier's main role. Consisting of a cascaded design of two long tailed pairs, the first is executed in the fets mentioned, and the second in bipolar transistors.

A pair of active low and high roll-off filters follow, leading to the power amplifier. The low cutoff frequency is sensibly chosen at 30Hz, although the high turnover at 5kHz could be nearer 8kHz, with advantage.

Throughout the circuit full use has been made of pnp and npn transistors where most appropriate. Local high frequency feedback is present on most stages to improve the stability, and to discourage the amplification of unwanted supersonic frequency signals.

The power amplifier is a direct-coupled complementary design, with parallel pairs of output transistors arranged as emitter followers. Small individual emitter resistors are present to ensure load sharing among the output devices. An instantaneous recovery peak current limiting circuit is present, at the push-pull driver stage, which prevents the output transistors from being driven into a breakdown region. This form of protection, if considered in the light of the two parallel pairs which deliver an extraordinary power bandwidth, indicates that the output devices are rather better than those commonly employed (in terms of bandwidth and distortion) but of necessity they need greater care at the design stage to protect them against premature failure.

The differential input with local HF feedback is buffered by an emitter follower before driving the main class 'A' pre-drive transistor. Several design features have obviously been incorporated at this stage to reduce transient intermodulation distortion (TID). These are — low impedance drive from the preceding emitter follower; local degenerative feedback via an undecoupled emitter resistor; minimal collector-base capacitance; a high operating power of well over a watt, and finally, a generous excess rail margin over the output stage proper. This latter point is often neglected by designers. The 167V total rail for the predriver ensures that cutoff or saturation is never approached while the ±55V power rails are clipped. Considering its performance,

Power amplifier only

Parameter	Specification	Result	Comment
Power output, 8 ohms, 1% clip, both channels driven at 1kHz. 4 ohms	2 x 100W at 0·1% 2 x 140W at 0·1%	2 x 120W, 1%	generous spec
Programme power	N/S	2 x 135W	ample for the best domestic — may even find professional usage
Power bandwidth ref full power, 100W	-0·2dB at 20Hz to 20kHz	-0dB at 5Hz -3dB at 120kHz	amazingly wide
Intermodulation Distortion	at full power 0·1% max 20Hz to 20kHz	0·1% 60/6K SEE GRAPH	agreed
Total harmonic distortion	0·1% rated power 20Hz to 20kHz 0·05% at ½ power	<0·04% SEE TABLE 0·03%	well exceeded
Damping factor, 8 ohms, at 40Hz	>20 normal 5 medium 1 soft	>50 5 1	good figs. Control may be useful for some loudspeakers
DC output offset	N/S	L 18mV R 4mV	taken at full working temperature
Power Level meter	0dB = 100W 8 ohm	OK	good calibration
Typical channel balance	N/S	0·25dB	excellent
Signal/noise	94dB	101dB	unweighted value
Sensitivity	1V	1V	standard result
Frequency response	+0-0·2dB, 20Hz-20kHz	+0 — 1dB, 3Hz to 70kHz	excellent

Pre and power amplifier

Parameter	Specification	Result	Comment
Distortion		See Table	
Sensitivity Disc 1 Disc 2 Aux, tape etc	 2·5 — 5mV 2·5mV 160mV	 OK OK OK	 accurate calibration good
Signal/noise unwt'd Disc 5mV Disc 2·5mV Aux Disc 2·5mV excluding hum	 68dB N/S 80dB	 70dB 64dB 87dB 74dB	 fine figures which include hum excellent
Disc overload	300mV at 2·5mV sens 600mV at 5mV sens	360mV 720mV	superb
Tape output	160mV	OK	
Final output	1·0V	OK	
Frequency response	N/S	-1dB 7Hz and 41kHz	a little too wide — see text
RIAA Response	±0·5dB, 20-20000Hz	agreed, see graph	very good
Filters		see graph	reasonably steep slopes
Tone controls	±10dB, 10kHz, 100Hz, 400Hz, 2·5kHz turnover points	agreed, see graph	useful ranges
Loudness	'Comp' =9dB at 50Hz at -30dB output	agreed, see graph	quite acceptable
Low enhance	+1 dB on RIAA below 1kHz	agreed, see graph	what ever for?
Subsonic	6dB/oct cutoff at 25Hz on RIAA	agreed, see graph	almost useless
Price	£375 plus VAT (walnut cabinet £25 approx)		
Manufacturer Imported by — —	Kensonic Laboratory Inc, Yokohama, Japan.		

Fig. 1. Power amplifier only. 1kHz, 100W, 8Ω, 0.0035% distortion.
Fig. 2. Power amplifier only. 10kHz, 10W, 8Ω, o.004%. No crossover.
Fig. 3. TID, -20dB on full power. No significant disturbance.
Fig. 4. TID, full power. Very mild disturbance.
Fig. 5. 40Hz squarewave into 8 ohms. Minimum tilt.
Fig. 6. 1kHz squarewave, 8 ohms.
Fig. 7. 10kHz squarewave, 8 ohms.
Fig. 8. 10kHz squarewave, 8Ω@ 2μF Damping factor medium
Fig. 9. 10kHz squarewave, 8Ω@ 2μF-20dB power. DF high
Fig. 10. 10kHz squarewave, 8Ω@ 2μF half power. DF high

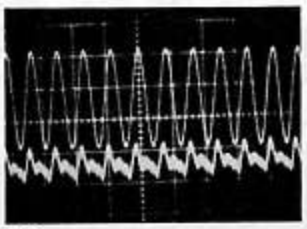


Fig. 1.

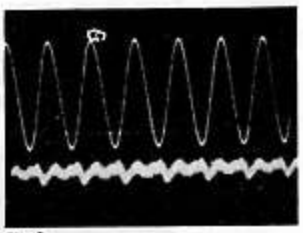


Fig. 2.

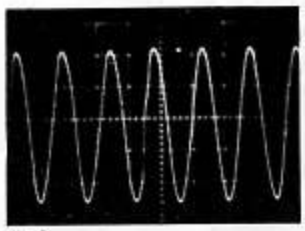


Fig. 3.

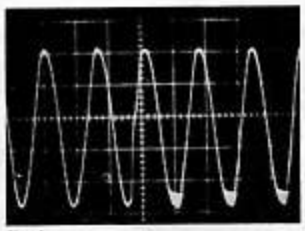


Fig. 4.

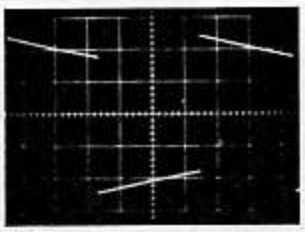
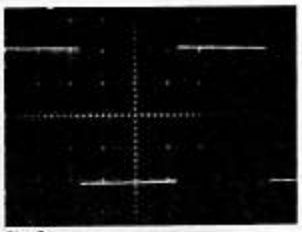


Fig. 5.



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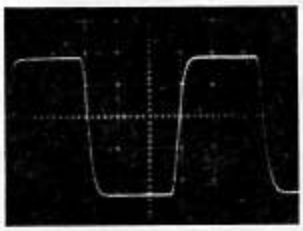


Fig. 7.

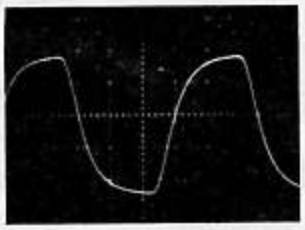


Fig. 8.

Fig. 9.

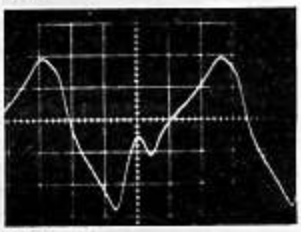


Fig. 10

the circuit is commendably simple, illustrating that intelligent if conservative design coupled with the use of high quality components will provide positive results.

The damping factor control is derived by a true feedback network in the power amplifier.

Turning to the power supply section, two stabilisers supply ±40 lines to the pre-amplifier circuits. A sensing unit monitors the mean DC output voltage and controls a speaker muting relay — the latter disconnecting the output during switch on, fault or overload conditions. An enormous reservoir storage capacity for the power amp is provided by four 10,000μF capacitors, two in parallel for ±20.000μF. A resettable circuit breaker protects the mains supply in the event of gross failure. This covers all parts from the mains input connection, including the massive power transformer.

Whilst lab performance is described in the tables and graphs, certain points are worthy of more specific mention.

Firstly, the both channels driven power delivery is exceptional for a relatively compact and integrated unit. Power bandwidth measurements showed zero fall off at 5Hz — the limit of the test oscillator — and the -3dB high frequency limit at 120kHz is extraordinary. Equally outstanding is the disc input parameters of 350mV overload on a 2·5mV sensitivity, allied with a 74dB (hum excluded) signal-to-noise ratio. This latter figure enabled an all time low for worst case distortion to be recorded, namely 0·021% at 1kHz (taken right through from the disc input to the output). The subsonic filter was next to useless as the graph (RIAA) shows, but fortunately the low filter possessed a turnover at 30Hz, with an effective slope.

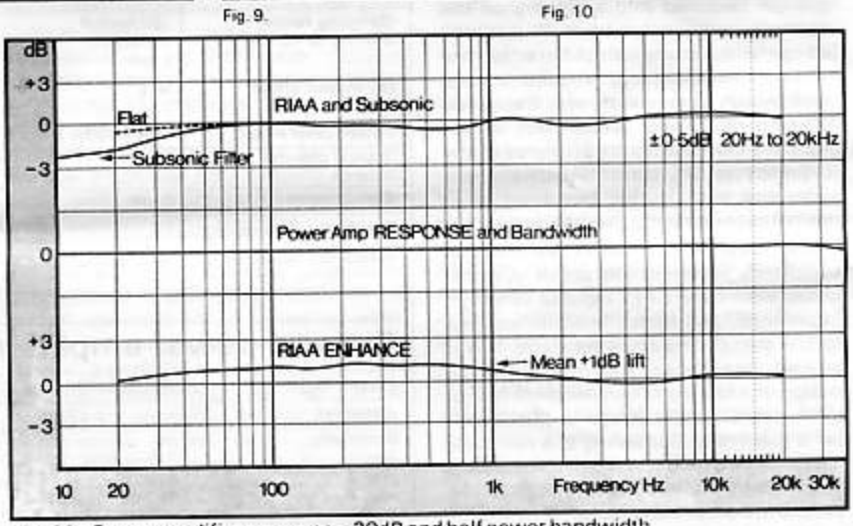


Fig. 11. Power amplifier response, -20dB and half power bandwidth

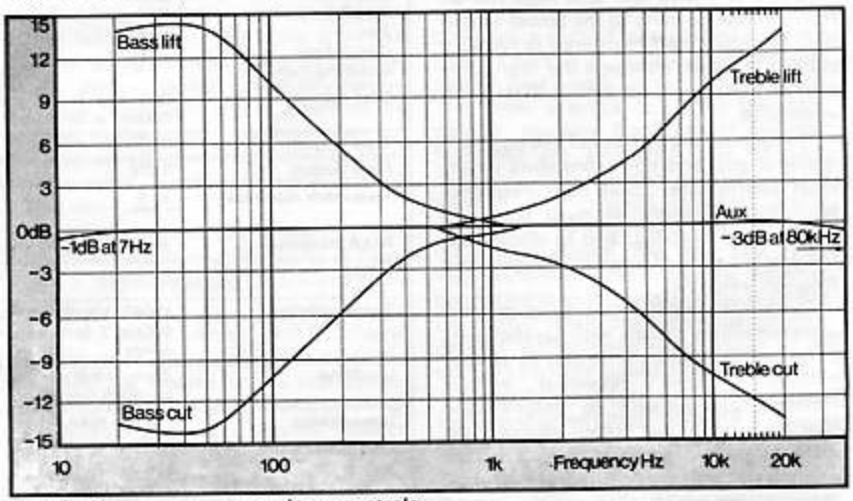


Fig. 12. Preamp response and tone controls

Total Harmonic Distortion (%)

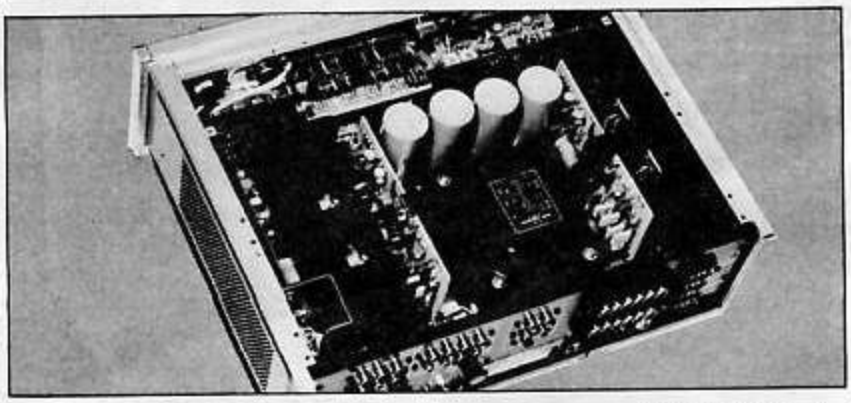
At 100 watts rated output into 8 ohms

	20Hz	1kHz	20kHz	50kHz
Pre and power	0·035	0·016	0·03	—
Power amp only	0·01	0·004 photo	0·015*	
At 10 watts				
Pre and power amp	0·02†	0·01†	0·02†	0·03*

The worst case condition — Disc 2 input to main output
At 10 watts, 1kHz, distortion was 0·021 (including considerable noise.)

†Depending on the power level, the distortion figures include considerable noise power in some cases. Despite this fact, the results nevertheless indicate the very low levels which were obtained. Lower power measurements were useless, as the noise levels exceeded the distortion.

*Note that up to 20kHz crossover effects were negligible. At 50kHz some degradation was becoming apparent.



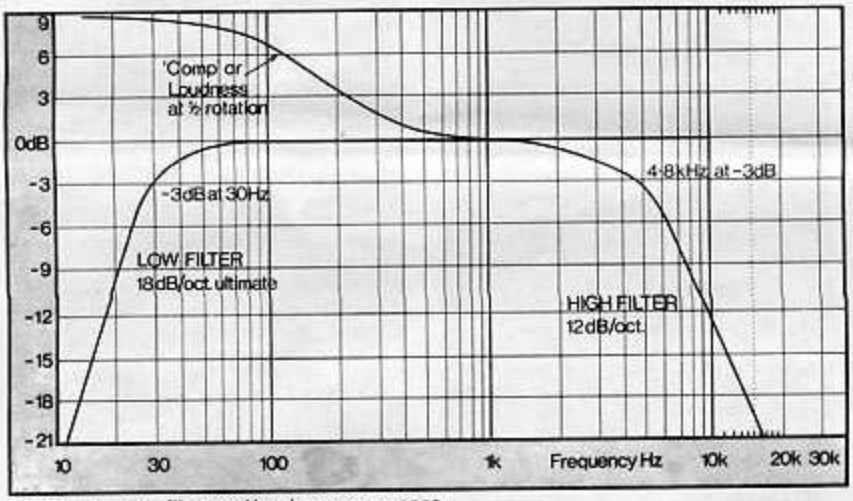


Fig. 13. Preamp filter and loudness responses

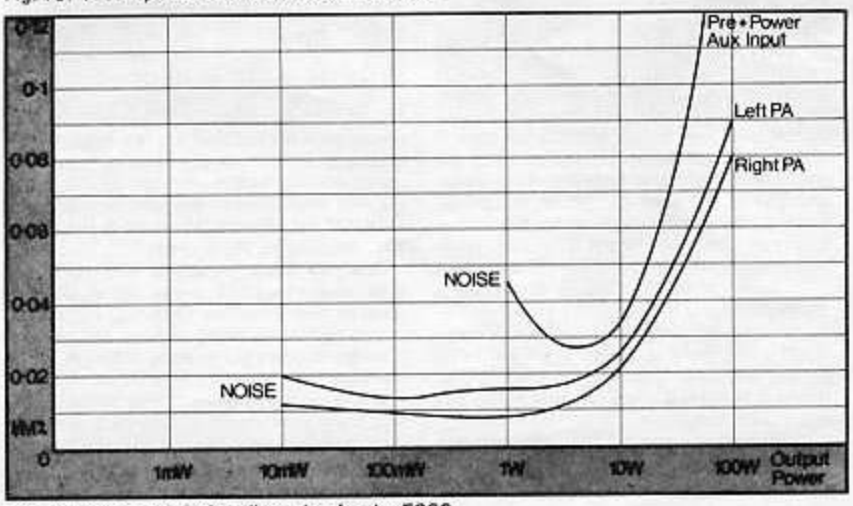


Fig. 14. Intermodulation distortion for the E202

I feel that the pre-amplifier bandwidth could be marginally lower, to maximise the low TID aspect of the design. The measured value of -3dB at 80kHz could possibly be reduced to 40kHz, although the designers might argue that this could slightly impair the phase response.

The very low distortion values recorded were due to a combination of the fine signal-to-noise ratios and the inherently low distortion of the design. The intermodulation measurements and distortion factor photos illustrate that crossover effects are neglible, even at high frequencies.

Transient intermodulation tests using a low frequency fast rise square wave, with a 15kHz 'signature' added, were taken at full power and at 1 watt, in an attempt to find whether the full power 'signature' waveform would show any significant disturbance. The amplifier is actually just into clipping on the full power photo, and yet the transition from full negative to full positive on the transient risetime has only disturbed the signature join (just left of centre trace) at 1 watt. The design can hence be judged as very satisfactory with regards to this important power parameter.

With use, two problems were encountered: the speaker selector switch was not wired to connect the parallel speaker combinations specified on the panel, and the square wave performance into electrostatic load showed power amp protection limiting at half power and above. The excessive power demanded at the treble end of the spectrum by a 2μF capacitor when fed with a fast risetime signal, initiates the over-current electronic protection. In addition, loudspeakers with a low impedance characteristic at the highest frequencies might also cause trouble. However, when the damping factor switch was set to medium, the electrostatic load response was totally devoid of ringing, and listening tests confirmed the suitability of this setting for such loudspeakers.

Judged subjectively the sound quality was exceptional, and is also the subject of comment in a separate article, entitled 'Subjective sound of the amplifier',' published in the January issue. Compared with similar and established models, important gains were noted in many directions — for example, very firm and well damped percussive bass of great power and attack; detailed and accurate mid range, plus unobtrusive and delicate treble showing great differentiation between various high treble sounds. The amplifier could be driven very hard without distress for long periods, and proved unfatiguing over the test period.

Conclusion

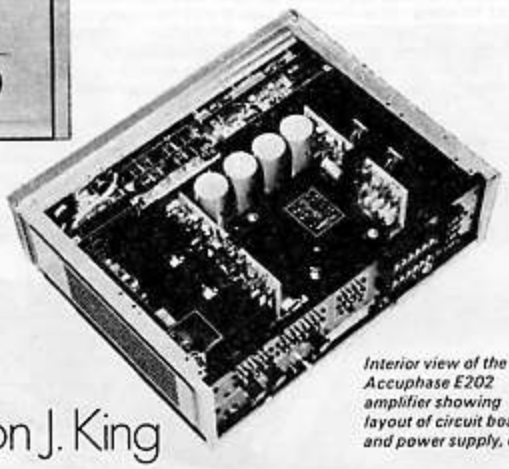
Notwithstanding the high price, my conclusion must be that the E202 is a genuinely super-class amplifier of outstanding quality. Whilst capable of satisfying the most demanding domestic applications, I am sure that many professionals will eye this amplifier with some interest, as it outclasses several more costly and well known models in their bracket.

Reprinted from February 1975 issue of Hi-Fi for PLEASURE Magazine.

AUDIOLAB

ACCUPHASE E202 amplifier

by Gordon J. King



Interior view of the Accuphase E202 amplifier showing layout of circuit boards and power supply, etc.

THE Accuphase E-202 is an integrated hi-fi amplifier having the incredible power capacity of 100+100W into eight-ohm loads over 20Hz-20kHz for a distortion content not greater than 0.1 per cent. This means that the power up to clipping level is in excess of 100+100 watts, and, as shown in the Audiolab results table significantly more than the rated power at all frequencies was obtained to clipping threshold, which corresponds to about 0.5 per cent distortion factor. Large air-cooled dummy loads were required to measure this sort of power.

The amplifier is designed in such a way that the pre-amplifier and power amplifier sections can be operated independently if required. A switch at the rear introduces the discontinuity of the two channels between the two sections, and two pairs of phono type sockets then allow the introduction of signals to the power amplifier and the obtaining of signals from the pre-amplifier. This facility could be useful for introducing a matrix quadraphonic decoder or graphic equalizer. With the switch in the closed position the amplifier operates in the integrated mode, and it was under this condition that it was measured.

The high power is obtained by parallel power transistors in the push-pull output stages, the heat being adequately dissipated by massive heat sinks beneath a perforated metal cover. Protection circuits are incorporated which guard against any damage to the loudspeakers or power transistors in the event of a short circuit or should an abnormally low output load condition occur. A circuit operates to disconnect the loudspeakers from the power stages under fault conditions, the loudspeakers being automatically reconnected when the fault condition is corrected.

There is also a circuit breaker which removes the mains power supply in the event of power supply surges or a power circuit fault condition. This is controlled by a red press-button at the rear, which releases when such a fault occurs.

The power in each channel is monitored by two good-sized decibel meters which work in conjunction with a range switch. In the lowest sensitivity position the meters read 0dB for 100 watts into eight ohms. Two more positions give meter sensitivity increases of 10dB and 20dB, corresponding to ten watts and one watt outputs at 0dB respectively.

Tests proved that the meters and attenuators were accurately calibrated and that they are 'linearly' responsive over at least 20Hz to 20kHz. It should be understood, however, that the meters are calibrated in terms of continuous average sinewave power and that music peaks of at least 10dB over the indicated value could occur due to the inertia of the meter movements, etc.

The amplifier is designed to accommodate three pairs of loudspeakers (A, B and C), and a fascia switch gives the selection of A, B or C, A+B or A+C. The switch also has an 'off' position so that a headphone set can be operated without the loudspeakers, for which a jack socket is included on the fascia.

The fascia is of the 'brushed aluminium' style and is laid out with due attention to the ergonomics. The two meters are located together in the top left-hand corner with the meter and loudspeaker switches underneath. The mains on/off button lies in the bottom left-hand corner, and the headphone jack socket and two similar sockets for tape 2 record and replay are by the side of the switches. The main controls are conveniently arranged on the right-hand side, and below these are two sets of three push-switches which provide tone control switching, loudness compensation, 'low enhance' for pickup (see anon), subsonic filtering, low filtering and high filtering.

The volume control lies in the top right-hand corner, and is larger than the other control knobs, which are for bass, treble, balance, tape copy, tape monitor, mode and source selection.

Switchable sources are auxiliaries one and two, tuner, and discs one and two. These are connected at the rear to phono type sockets. The input impedance of disc one is switchable over 30k, 47k and 100k (small rear slider switch), and the input level of each channel of this input is also adjustable by means of a small control for each channel at the rear. Disc two has a fixed 47k impedance and a fixed input level (see Audiolab section).

There are two tape machine circuits, one and two, and each has its own two pairs of phono sockets for recording and replay at the rear in addition to the recording and replay jack sockets at the front for tape circuit two. One omission is .DIN socket duplication for tape machine based on the DIN standard, which is becoming increasingly important, particularly with cassette decks which invariably have DIN socketry.

The two tape circuits in conjunction with the tape copy switch facilitate dubbing from circuit one to two and circuit two to one. Either circuit can be monitored in the usual way since the tape monitor switch has tape one and tape two positions in addition to the source position. In addition to mono (L+R), stereo and stereo reverse positions, the mode switch also has positions labelled L−L+R and R−L+R which respectively give left channel sound from both loudspeakers and right channel sound from both loudspeakers.

An uncommon feature nowadays (although the latest Goodmans Galactron Mk100 power amplifier has one) is a rear loudspeaker damping control. This has three positions giving normal, medium and soft damping, but the test conducted in this area indicate that most—if not all—loudspeakers 'sound' best with the damping at maximum!

The rear is also equipped with no fewer than four mains (American type) outlets, three of them switched. Each disc socket pair has an adjacent earthing terminal, and a mains voltage adjuster going from 100V to 240V nominal. The equipment is not endowed with mains earthing facilities (there being but a two connector mains socket/plug arrangement and two-core mains cable) so to work safely in the UK some other means would have to be found to earth the amplifier, though

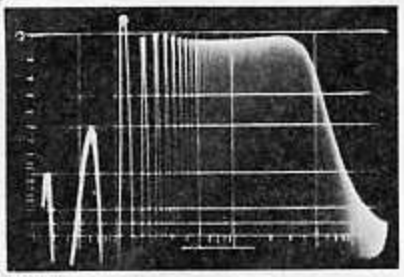


Fig 1

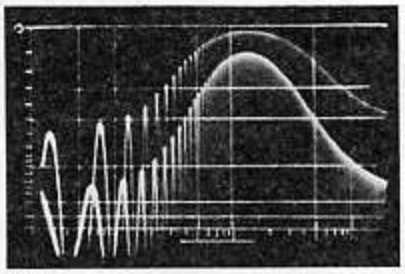


Fig 2A

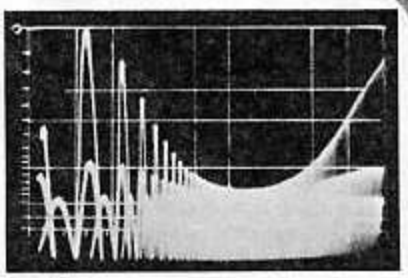


Fig 2B

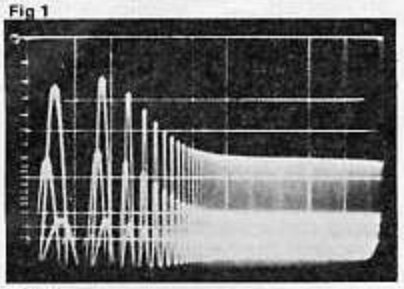


Fig 3

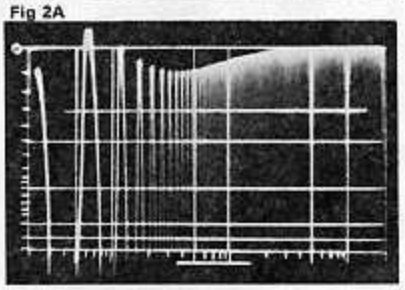


Fig 4A

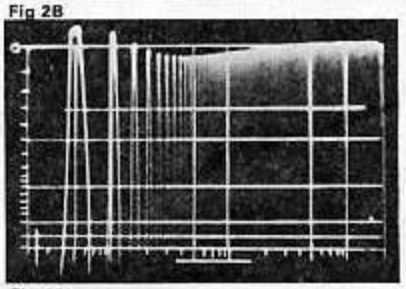


Fig 4B

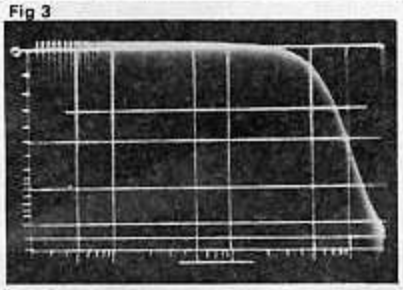


Fig 5

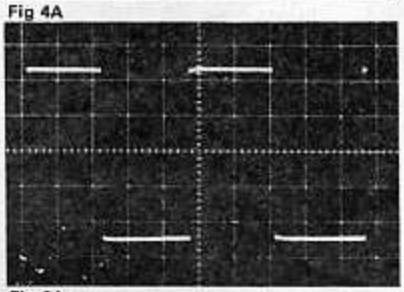


Fig 6A

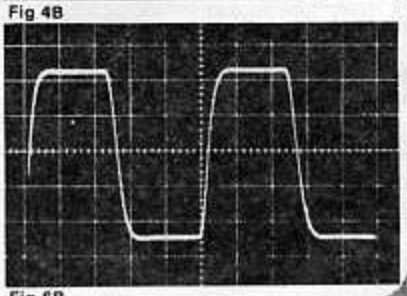


Fig 6B

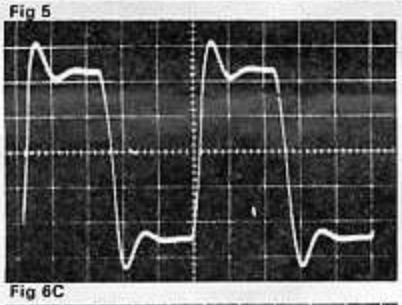


Fig 6C

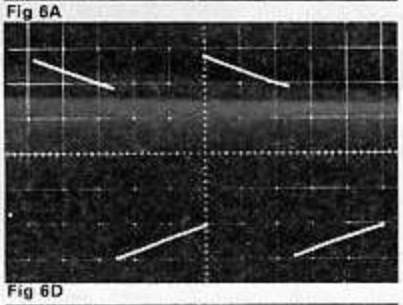


Fig 6D

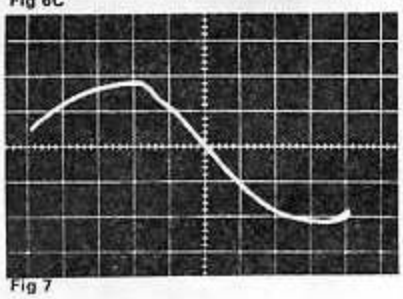


Fig 7

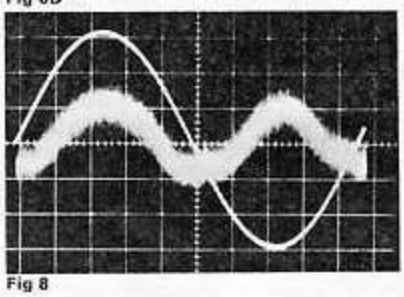


Fig 8

Fig 1. Low and high filters 20Hz—20kHz sweep.

Fig 2. Tone controls. (a) bass and treble cut at −2 points and maximum. (b) bass and treble lift at +2 points and maximum ref. zero. Sweep 20Hz—20kHz.

Fig 3. Loudness at −20, −30 and −40dB. Sweep 20Hz—20kHz.

Fig 4. Departure from RIAA at pickup one. (a) low enhance filter off. (b) low enhance filter on. Sweep 20Hz—20kHz.

Fig 5. High-frequency response, sweep 200Hz—200kHz, showing −3dB point at circa 80kHz (this is mildly affected by volume control setting, as also is rise-time.

Fig 6. Half power squarewaves. (a) 1kHz/eight ohms. (b) 20kHz/eight ohms, which is adjusted relative to graticule to show rise-time. Sweep 10μsec./div hence rise-time circa 4.5μsec., which is mildly affected by setting of volume control. (c) 10kHz/eight ohms in parallel with 2μF, showing overshoot. (d) 40Hz/eight ohms, indicating good low-frequency performance.

Fig 7. Slewing rate measurement. Sweep 1μsec./div.; amplitude 20V/div; power 100 watts into eight ohms; frequency 86.177kHz. Slewing rate thus 21.5V/μsec., which is excellent.

Fig 8. Distortion factor at 50+50 watts eight ohms and 1kHz, corresponding to 0.016 per cent. No crossover distortion. Excellent performance.

there is little doubt that the mains insulation (to the metal case, etc.) is internally very sound.

The amplifier is a massive piece of kit, very well made and presented, but the sample was without a wooden sleeve or cabinet*. The top, sides and rear are metal of black matt finish. Dimensions are 455(W)×162(H)×355(D) mm (17⅞×6×14 inches) and the uncartoned net weight 19.5kg (43lbs).

The amplifier was subjected to very detailed tests and measurements, and in spite of protracted full power and high-frequency operation on the test bench no signs of stress were observed. The temperature rose, of course, but the amplifier would certainly withstand high power music signal reproduction without danger of collapse.

All the measurements are given in the Audiolab section and by the various oscillograms, some of which are sweep-frequency displays, and all these are detailed by the captions.

The slight dip in the departure from RIAA sweep in *Fig 4 (a)* should not cause concern, for the deviation is barely 1dB, and was less on the other channel. *Fig 4 (b)* shows the effect when the low enhance filter is operated. Here a mild boost is applied around 100Hz to the pickup circuits only.

I was surprised, however, to find that the loudness compensation applies boost only to the bass frequencies (sweeps *Fig 3*). To match the hearing curves of equal loudness a little treble boost should also be applied as the level of reproduction is reduced.

Squarewaves were well handled, and *Fig 6(d)* shows only mild tilt at 40Hz, which indicates a well maintained low-frequency performance with minimal phase shift. Signifi-

**An optional Accuphase A3 cabinet (walnut finish only) is available.*

Test Results

Parameter	Manufacturer's specification	Test results
Power:	100W/ch. 8 ohms	20Hz & 1kHz: 120+120W 20kHz: 112+112W. Measured at 8 ohms. Excellent.
Harmonic distortion:	⩾0.1% at rated power; 0.05% at half power 20Hz—20kHz	*20Hz**: 0.022% 100+100W 0.02% 50+50W 0.027% 10+10W *1kHz*: 0.023% 100+100W 0.016% 50+50W 0.02% 10+10W *20kHz*: 0.045% 100+100W 0.035% 50+50W 0.02% 10+10W Measured with both channels driven into 8-ohm loads as dist. factor. Negligible crossover dist. *(see Fig 8)*. Excellent results. Input aux. 1. *includes ripple.
Frequency response:	Main amp: +0dB−0.2dB High level: +0dB−0.5dB Low level: +0dB−1dB (20Hz—20kHz)	<5Hz—77.19kHz −3dB 6Hz—50kHz −1dB Upper-frequency mildly affected by setting of volume control. Measurement made from auxiliary.
Damping factor:	20, 5 and 1 (switchable)	60, 10 and 2.6 Measurement at 2W and 40Hz ref. 8 ohms.
Rise-time:	not stated	4.5μsec. Affected by volume control setting
Slewing rate:	not stated	21.5V/μsec. *(see Fig 7)* Excellent *(see text)*.
Inputs (sensitivity/Z/ hum & noise):	Disc 1: 2.5—5mV/30, 47, 100k/74dB Disc 2: 2.5mV/47k/74dB High level: 160mV/100k/80dB Main: 1V/100k/94dB	2.7—7.5mV/30, 100, 47k/62dB 2.8mV/47k/62dB 170mV/100k/88dB As specification. Disc 1 sensitivity & Z switchable. Measurements ref. 100W unweighted hum & noise.
Residual hum and noise:	not stated	0.4mV/8 ohms Excellent. Corresponds to 2×10^{-8}W at 8 ohms.
Magnetic pickup overload:	300mV	380mV to clipping. At high sensitivity setting. Excellent.
Meters:	0dB for 100W/8 ohms	Agreed (over 20Hz—20kHz). Meter sensitivity adjustable +10 & +20dB.
Filters:	sub f_0 25Hz 6dB/octave low f_0 30Hz 12dB/octave high f_0 5kHz 12dB/octave	*See Fig 1*. Sub. filter as specification.
Price: £375 plus VAT.		(Measurements made at 240V, 50Hz mains input)

Distributor: Belmont AV Limited, Fircroft Way, Edenbridge, Kent, TN8 6HA

cant over-shoot was, however, evoked by driving into capacitive impedance *Fig 6 (c)*. On the other hand a 'text book' squarewave was obtained at 1kHz into eight ohms *Fig 6(a)*. The 20kHz squarewave at *Fig 6(b)* is arranged to show the overall rise-time. The sweep here is 10μsec/division, so the time period between the ten per cent and ninety per cent amplitude points corresponds to about 4.5μsec., which is the rise-time. This puts the −3dB point around 77kHz.

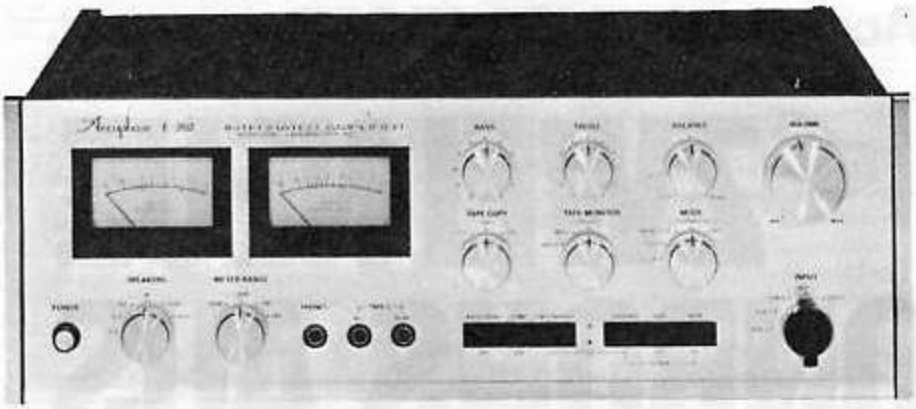
A new oscillogram is one that shows the slewing rate as in *Fig 7*. This corresponds to a 100 watt/eight ohm sinewave of 86.177kHz, which is the maximum frequency that the amplifier is able to deliver its rated power dictated by the onset of bad distortion. The amplitude of this display is 20V/div. and the sweep 1μsec./div. Thus the slewing rate corresponds to the incredibly fast value of 21.5V/μsec.

Notwithstanding the fast slewing rate and the filters, there would appear to be some advantage (to ensure the very least possibility of transient intermodulation distortion, for example) for the designer to roll-off the pre-amplifiers before 77kHz. I can see no advantage in having a rise-time less than, say, 10μsec., which would put the −3dB pre-amplifier point around 35kHz, depending on the response and phase characteristics of the filter used for the roll-off.

Finally, the distortion factor. As shown in the Audiolab section, this was also measured at a very low value and the residual in *Fig 8* shows no signs at all of crossover artifacts.

There we have it, then. A remarkably well designed and presented amplifier of adequate audio yield for the most demanding of requirements and one that I would certainly like to own. There is also a matching tuner, Type T-101.

Reprinted from April 1975 issue of PRACTICAL Hi-Fi and AUDIO Magazine.



ACCUPHASE E202

amplifier

JOHN EARL

An amplifier engineered to generate a true 100+100W (200W in all) of low distortion audio power into 8-ohm loudspeakers over the frequency range 20Hz-20kHz may be regarded by some as far too powerful for their domestic scene.

A relatively simple sound level meter operated at the favourite seat position of, say, the Royal Albert Hall will indicate sound pressure peaks around the 96dBA mark during fff crescendos. The amount of acoustical energy liberated by the playing orchestra to produce a sound pressure level of 96dBA a third of the way down the concert hall is greater than that produced by the average stereo hi-fi system. For instance, by replacing the orchestra with our stereo loudspeaker pair it would need an amplifier of even greater power than that of the E202 to simulate the orchestra peak sound pressure level at the favourite seat, in spite of the Accuphase having the power specification detailed at the start.

In the listening room the sound is contained in a smaller volume, which means, happily, that we can usually get away with less acoustical energy than required in the concert hall, yet still retain the 96dBA peak sound pressure level at our favourite armchair.

Some hi-fi devotees favour peaking at an even greater level, and if 100dBA peaks are the order of the listener, then a 2.5:1 power step up at the amplifier would be required. We really should select our amplifier power in conjunction with our loudspeakers to cater for 96dBA peaks; but fortunately smaller rooms and more efficient (than 0.1%) loudspeakers cut the power demands.

The Accuphase E202, therefore, would suit the larger room and loudspeakers of lesser efficiency; it would also cater for the devotee wishing to run to 100dBA peaks.

Very useful with a powerful amplifier are the two dB meters on the front panel of the E202 which monitor the power in each channel. They can be switched over three sensitivities, so that 0dB reads 100W, 10W or 1W into 8 ohms. Meters like these would have application for small hall reproduction, for example, so that the operator can ensure that a satisfactory margin to peak overload remains even during the most dramatic crescendos.

The amplifier has outputs for three (A, B and C) pairs of loudspeakers and front switching so that pairs A, B, C, A+B or A+C can be operated. An off position on the switch disconnects all loudspeakers for headphone-only listening, for which there is a suitably attenuated jack socket on the front panel. The headphone circuit is also active with the loudspeaker working.

Source inputs and switching are available for radio tuner, two auxiliaries and two magnetic pickups, all connected to rear 'phono' type sockets. One of the pickup inputs has a fixed 47k impedance, while the other can be switched to 30k, 47k or 100k so that the impedance giving the best load to the cartridge can easily be established (rear slider switch). The tape enthusiast is fully catered for with two tape circuits and front switching for inter-dubbing and monitoring from either circuit. Each circuit has its own recording and replay pairs of rear 'phono' type sockets, while one circuit also has its recording and replay pairs brought out to two front jack sockets. DIN sockets are not provided.

An unusual feature is the loudspeaker damping switch at the rear. This has three positions labelled normal, medium and soft.

The fascia is conveniently laid out, with the two meters at the top-left and the main controls at the right. Push-switches operate low, high and subsonic filters, tone control switching, loudness and 'low enhance' on pickup, this latter giving a mild boost to the response around 100Hz to counteract the low-frequency droop of some pickups. The loudness affects only the bass end of the spectrum; but the filters have desirably fast rates of roll-off and turn-over at useful frequencies. The subsonic filter cuts the response of the power amplifier section at very low frequencies, having in mind that this is directly coupled to the loudspeakers. Good protection circuits are fitted; for example, a circuit operates to disconnect the *loudspeakers* from the power stages under fault conditions. There is also a circuit breaker which removes the *mains supply* in the event of surges, overloading, etc. This is controlled by a red button at the rear, which automatically releases should such a fault occur.

Detailed laboratory measurements proved that the amplifier was well up to its specification. To waveform clipping a full 112+112W into 8-ohm loads was obtained over the frequency range 20Hz to 20kHz. At below clipping threshold the distortion factor over the entire dynamic range was well below 0.1%. Indeed, at 10+10W noise predominated and the total harmonic distortion was around the 0.01% mark; even at 100+100W at 1kHz the distortion factor was no greater than 0.023%. The distortion residual was completely clear of crossover artifacts and there was no significant rise in distortion at the 20Hz and 20kHz terminal frequencies.

The high-frequency performance of the power amplifier can be appreciated by the slewing-rate, which was over 21V/μsec, which is extremely good. The small-signal rise-time was 4.5μsec overall which, although rather small, is well catered for by the excellent slewing rate. The noise performance was quite acceptable, with the residual hum and noise being no greater than a mere 0.4mV across 8 ohms, corresponding to about 2×10^{-8}W — an inaudible power!

The low noise coupled with a 300mV magnetic pickup 1kHz overload margin ensures that the full dynamic range potential of the amplifier can be realised. The amplifier handled squarewaves and transient-type signals very well, and in the domestic scene gave an extremely good account of itself. It was not tried in a hall; but there is certainly enough distortion-free power available to make the amplifier a viable proposition for this sort of reproduction, given suitable loud-speakers, of course. A very well designed and engineered amplifier which can be recommended for the larger system. A matching tuner goes under Model T-101.

SPECIFICATION

Power: 100W/ch at 8 ohms. **Harmonic distortion:** less than 0.1% at rated power and less than 0.05% at half power over 20Hz to 20kHz. **Damping factor:** 1, 5 and 20, switchable. **Inputs:** PU 2.5mV and 74dB S/N ratio (two inputs, one 47k and the other switchable 30k, 47k or 100k); high level (two aux and tuner) 160mV, 100k and 80dB S/N ratio; main amplifier 1V, 100k and 94dB S/N ratio. **Magnetic pickup overload:** 300mV. **Tape recorder circuits:** two (both with rear terminations and one with extra front jack terminations — see text; also with inter-dubbing and monitoring switching). **Distributor:** Belmont AV Limited, Fircroft Way, Edenbridge, Kent. **Price:** £468.75.

Reprinted from December 1975 issue of RECORDS and RECORDING Magazine.

ZWEI NEUE HIFI-BONBONS AUS FERNOST

Einmal mehr hat sich der Reigen der auf den europäischen Markt drängenden japanischen Hersteller hochwertiger HiFi-Komponenten vergrößert: Über die Firma Boyd & Haas ist nun auch die „Kensonic Laboratory Inc." hierzulande vertreten. Und sie scheint gleich „hoch einsteigen" zu wollen: Der von ihr angebotene, sich konsequent auf den UKW-Bereich beschränkende Tuner Accuphase T-101 (Preis im Handel zwischen 1500 und 1600 Mark) ist schon fast von professioneller Qualität. Mit seiner soliden, geschliffenen Metallfrontplatte und seinen lediglich zwei Drehknöpfen gibt er sich betont schlicht und technisch. Alles an ihm atmet Qualität – die große Skala mit ihrem hervorragend leichtgängigen und doch sehr präzisen Antrieb, die massiven und griffigen Knöpfe sowie die beiden sehr gut ablesbaren Anzeigeinstrumente.

Wie leider so oft bei japanischen Geräten, schlägt auch beim T-101 das Instrument für die Feldstärkeanzeige bereits bei knapp 1 mV Antennenspannung voll aus. Gleichwohl kann man den Tuner gut an einer Richtantenne betreiben, denn ein weiteres, in die Skala eingearbeitetes kleines Instrument („Multipath") zeigt sofort an, wenn Mehrwegeempfang vorliegt. So läßt sich der gewünschte Sender doch noch optimal anpeilen. Den „ganz Technischen" bietet das Gerät außerdem noch einen rückseitigen Ausgang zum Anschluß eines Oszillografen, mit dem eventueller Mehrwege-(durch Reflexionen gestörter)Empfang noch besser kontrollierbar ist.

Zwei Dreiergruppen von Tasten weist die Frontplatte auf. Die erste Taste schaltet die Stummabstimmung zur Beseitigung des Zwischenstationsrauschens bei der Senderwahl, die zweite verringert das Rauschen beim Stereo-Empfang weit entfernter Stationen. Die dritte Taste erfüllt eine besondere Funktion: Mit ihr läßt sich in besonders kritischen Empfangssituationen die ohnehin schon ganz hervorragende Trennschärfe des Geräts nochmals – auf den fast unglaublichen Wert von 100 dB – verbessern. Die erste Taste der zweiten Gruppe schaltet den Tuner auf Mono; die nächste ist zu drücken, wenn nur stereofon sendende Stationen empfangen werden sollen. Die letzte Taste stellt den Normalfall wieder her. Jede der sechs Tasten hat über sich ein Lämpchen zur Anzeige ihrer jeweiligen Funktion.

Mit dem Drehknopf rechts unten läßt sich der Pegel der vom T-101 gelieferten Ausgangsspannung regeln. Diese wird an einem rückseitigen Cinch-Buchsenpaar abgegriffen. Ein benachbartes Buchsenpaar liefert die Ausgangsspannung fest, also nicht regelbar. An eine weitere Buchse kann ein Vierkanal-Adapter angeschlossen werden, falls es einmal zu entsprechenden UKW-Sendungen kommen sollte. Neben dem Anschluß für eine UKW-Bandkabel-Antennenleitung ist auch eine Koaxial-Antennenbuchse vorhanden. Was man leider vermißt, ist eine Kopfhörer-Anschlußbuchse, wie sie manche Konkurrenzmodelle aufweisen. Obwohl auf 220 V Spannung eingestellt, hat das Gerät einen amerikanischen 115-V-Netzstekker. Dieses – übrigens auch VDE-widrige – Ärgernis sollte der Importeur abstellen.

Sieht man einmal vom Wert für die Gleichwellenselektion – er könnte etwas besser sein – ab, weisen sämtliche Meßwerte den T-101 als zur absoluten Spitzenklasse gehörig aus. Die Daten für die Stereo-Empfindlichkeit, die Trennschärfe und die Pilottondämpfung (daher der exzellent niedrige Klirrgrad auch bei hohen Frequenzen) sind die besten, die wir je ermittelt haben. Sie liegen an der Grenze des mit vertretbarem Aufwand physikalisch überhaupt noch Realisierbaren. Ausgezeichnet sind auch der Frequenzgang und die Kanaltrennung. Kein Wunder also, daß das vom T-101 vermittelte Angebot an sauber und klar zu empfangenden Sende°en sowie das „gestochen scharfe", ungemein ausgewogene und – bei Stereo – sehr schön räumliche Klangbild keinerlei Wunsch offen läßt. Ein wohlgelungener Einstand!

WISSENSWERTES FÜR TECHNISCH INTERESSIERTE

Empfindlichkeit Mono (26 dB S/N, 40 kHz Hub)	1,0 µV
Empfindlichkeit Stereo (46 dB S/N, 40 kHz Hub)	22 µV
Trennschärfe (± 300 kHz)	
Selektivitätsschalter „Normal"	72 dB
„Narrow"	> 100 dB
AM-Unterdrückung	57 dB
Spiegelwellenselektion	80 dB
Gleichwellenselektion	2,0 dB
Zf-Dämpfung	100 dB
Pilotton-Dämpfung	65 dB
Übertragungsbereich	20 Hz – 15 kHz + 0/– 1 dB
Klirrgrad (Stereo, 1 kHz)	< 0,1 %
Fremdspannungsabstand (Stereo, Ue = 1 mV)	70 dB
Kanaltrennung (1 kHz)	48 dB
Ausgänge	
Nf-Spannung fest, Nf-Spannung variabel, Multipath-Signal an Oszilloskop	
Bestückung	
7 IC, 2 FET, 25 Transistoren, 24 Dioden	
Leistungsaufnahme	25 W
Maße (BxHxT)	46x15x36 cm

Von gleicher, fast professioneller Qualität wie der – auch maßgleiche – T-101 ist der Vollverstärker E-202 aus dem gleichen Hause. Für etwa zweieinhalb Tausender erhält der Kunde mit diesem Gerät nicht nur ein kleines Kraftwerk an Ausgangsleistung. Er erhält auch einen Verstärker, dessen Klirr- und Intermodulationsverzerrungen beispielhaft niedrig sind, dessen Frequenzwiedergabekurve wie mit dem Lineal gezogen ist und der außergewöhnlichen Bedienungs- und Anschlußkomfort bietet. Auch am E-202 bestechen die Frontgestaltung und die soliden, griffigen Bedienungsknopfe.

Große, in ihrer Empfindlichkeit dreifach veränderbare Instrumente zeigen die Ausgangsleistung an. Ein Schalter verbindet wahlweise drei Boxengruppen sowie die Paarungen A + B und A + C mit der Endstufe, die durch einen Schalter vom Vorverstärker getrennt werden kann. Aus- und Eingänge sind separat herausgeführt. Die Klangregler sind exakt rastende Drehschalter (fünf Schritte zu je etwa 2 dB Anhebung oder Absenkung). Neben Hinterbandkontrolle erlaubt der E-202 direktes Überspielen von einem Bandgerät auf das andere. Das zweite Gerät ist auch frontseitig anschließbar.

Der eine der beiden Phono-Eingänge ist außer in der Empfindlichkeit noch in der Impedanz veränderbar. Veränderbar ist auch der Dämpfungsfaktor des Verstärkers. Beide Werte konnten etwas besser sein. Außer den Phono- und Tonbandeingängen sind noch einer für Tuner und zwei für weitere hochpegelige Quellen vorhanden. Ein Betriebsartenschalter gestattet die Wahl zwischen fünf verschiedenen Wiedergabearten, darunter Mono, Stereo und Stereo verkehrt. Frontseitig läßt sich über eine Klinkenbuchse ein Kopfhörer anschließen.

Doch damit nicht genug: Die Klangregler sind abschaltbar. Eine Taste „Compensator" bietet eine Baßanhebung bei geringen Lautstärken. Die erganzende Höhenanhebung fehlt aber leider. Eine geringe Anhebung bei etwa 100 Hz ist mit der Taste „Low Enhance" möglich. Zu einem für Plattenwiedergabe empfohlenen „Subsonic Filter", dessen Dämpfungskurve aber zu flach verläuft, gesellt sich noch ein hervorragend ausgelegtes Tiefenfilter. Sehr gut ist auch der Dämpfungsverlauf des Höhenfilters. Gerade deswegen aber sollte der Einsatzpunkt etwas höher liegen als bei etwa 4 kHz.

Die Meßwerte des E-202 sprechen für sich. Die mühelos erreichte Dauerleistung von über 2 x 100 W reicht für einen Saal. Auch die brutalsten Dynamikspitzen kosten den Verstärker nur ein Lächeln. Fülle, Transparenz und Räumlichkeit des Klangs sind hervorragend. Ein Lob auch für die Fremdspannungsabstände. Gerade wegen der Störgeräuschfreiheit hätte aber eine bessere Phono-Empfindlichkeit (2,0 oder gar 1,5 mV) möglich sein sollen. Dies fällt etwas aus dem Rahmen. Die herbe Kritik am Netzstecker (vgl. T-101) gilt leider auch hier.

WISSENSWERTES FÜR TECHNISCH INTERESSIERTE

Sinusleistung	> 2 x 100 W an 4 Ω
Klirrgrad (2 x 100 W, 1kHz)	0,05 %
Intermodulation	0,1 %
Frequenzgang	20 Hz – 20 kHz ± 0 dB
Kanaltrennung (1kHz)	> 50 dB
Fremdspannungsabstand (bezogen auf 2 x 100 W)	
Eingang Endverstärker	90 dB
Eingange Phono magn. 1 + 2	68 dB
hochpegelige Eingange	80 dB
Lautstärkesteller umschaltbar linear/„Compensator"	
Tiefensteller (bei 50 Hz)	± 13 dB
Höhensteller (bei 10 kHz)	± 11 dB
„Disc Subsonic Filter" (– 3 dB bei 30 Hz)	5 dB/Oktave
Tiefenfilter (– 3 dB bei 25 Hz)	16 dB/Oktave
Höhenfilter (– 3 dB bei 5 kHz)	12 dB/Oktave
Empfindlichkeiten	
Eingang Endverstärker	0,9 V/100 kΩ
– Disc 1	2,5–5 mV/30/47/100 kΩ
– Disc 2	2,5 mV/47 kΩ
hochpegelige Eingange	150 mV/100 kΩ
Dämpfungsfaktor	1/5/>20 (variabel)
Ausgänge	
2 x TB-Aufnahme, externer Endverstärker (schaltbar), 3 Boxenpaare (schaltbar), Kopfhörer	
Bestückung	
4 FET, 53 Transistoren, 2 Thermistoren, 44 Dioden	
Leistungsaufnahme	max. 380 W
Maße (BxHxT)	46x15x36 cm

IN WENIGEN SÄTZEN:

Der Tuner T-101 und der Verstärker E-202 von Kensonic sind in die absolute Spitzenklasse einzuordnen. Manche Übertragungsdaten des T-101 liegen an der Grenze des technisch Möglichen. Nützlich ist die Anzeige für Mehrwegeempfang. Eine Kopfhörerbuchse wäre wünschenswert. Abgesehen von der – vergleichsweise – etwas geringen Phono-Empfindlichkeit ist der E-202 ein Musterbeispiel für hohe Leistung bei geringsten Störungen sowie für Bedienungs- und Anschlußkomfort. Die Verarbeitung beider Geräte ist schon fast professionell. Unverständlich ist ihre Ausrüstung mit amerikanischen Netzstekkern. J. St.

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radio tv electronic test

Accuphase E-202 – ein Verstärker der Spitzenklasse

Dr. J. Kraus
W. Kunz Dipl. El. Ing. ETH

Als weiteres Glied der *Accuphase-Reihe von der japanischen Firma *Kensonic*, welche schon den Tuner T-100, den Vorverstärker C-200 und den Leistungsverstärker P-300 hervorbrachte, steht nun mit dem kombinierten Vor-/Endverstärker E-202 ein Gerät für etwas verminderte Platz- und Finanzverhältnisse zur Verfügung, der aber dank seiner hohen Ausgangsleistung und den sehr guten technischen Daten auch renommierte Hi-Fi-Fans zu befriedigen weiss.**

Die Kensonic-Laboratorien wurden von den *Kasuga*-Brüdern gegründet (auf welche auch Trio Electronics mit den Kenwood-Produkten zurückgeht) und fertigen ausschliesslich Geräte, die sich an der Grenze des technisch Möglichen bewegen. So ist es kein Wunder, dass alle unsere Messungen die Herstellerangaben übertrafen. Dies liegt zum Teil darin begründet, dass Kensonic die technischen Daten garantiert. Sie stellen somit Mindest- und nicht nur typische Werte dar. Dass nur eine genau kontrollierte Fabrikation und eng tolerierte Bauteile eine solche Garantie ermöglichen, ist klar. Gleichzeitig erklärt sich dadurch der Preis des E-202 von Fr. 2950.–.

Beschreibung

Das auffälligste Merkmal des E-202 sind die beiden grossen, in Dezibel geeichten Aussteuerungsmeter *(Bild 1)*. Sie sind so eingestellt, dass 0 dB einer Ausgangsleistung von 100 Watt in 8 Ω entspricht. Mit dem Drehschalter «Meter Range» kann die Empfindlichkeit der Anzeige um 10, bzw. 20 dB erhöht werden.
Links daneben befindet sich der Lautsprecherwahlschalter. Es können maximal drei Paare angeschlossen werden. In der Stellung «Off» ist das Signal nur noch an der Kopfhörerbuchse erhältlich. Der Kopfhörer sollte eine Impedanz zwischen 4 und 32 Ω aufweisen.
Als sehr vorteilhaft erweist es sich, dass die Anschlüsse für ein Tonbandgerät zusätzlich an die Frontseite geführt wurden. Überhaupt wurden die Bedürfnisse eines Tonbandamateurs bei der Auslegung des Verstärkers in vorbildlicher Weise berücksichtigt. So lassen sich gleichzeitig 2 Maschinen anschliessen. Mit dem Schalter «Tape Copy» kann ohne Umstöpseln von Bandgerät 1 auf 2, resp. umgekehrt überspielt werden. Gleichzeitig bestimmt der Schalter «Tape Monitor», welches der beiden Signale am Verstärkerausgang erscheinen soll. Es ist sogar möglich, während des Überspielens ein völlig unabhängiges Programm zu hören.
Die Bass- und Höhenkontrollen sind in Stufen von 2 dB geeicht. Die maximalen Anhebungen und Abschwächungen bei 100 Hz bzw. bei 10 kHz betragen ± 10 dB. Für absolut linearen Frequenzgang können beide Regler über die Taste «Bass/Treble» abgeschaltet werden. Mit der Taste «Camp» können bei geringer Lautstärke die tiefen Frequenzen angehoben werden (ca. 9 dB bei 50 Hz). Man vermisst hier allerdings eine gehörrichtige Lautstärkeregelung mit der dazugehörigen Anhebung auch der hohen Frequenzen. Beim Abhören von Schallplatten besteht zusätzlich die Möglichkeit, die RIAA-Kurve bei 100 Hz um 1 dB nach «oben» zu verschieben. Laufgeräusche des Plattenspielers können mit einem steilen 25-Hz-Hochpassfilter eliminiert werden. Schliesslich stehen noch zwei weitere Filter zur Verfügung: ein Hochpass mit 18-dB-Oktave Steilheit unter 30 Hz und ein Tiefpass mit 12-dB-Oktave Steilheit über 5 kHz.
Von den Möglichkeiten, die die Rückseite des E-202 bietet, sei nur der Schalter «Speaker Damping» erwähnt. Damit kann die Lautsprecherdämpfung, die normalerweise über 20 beträgt, auf 5 oder gar 1 erniedrigt werden. Hart klingendes Programmaterial wird auf diese Weise hörbar «aufgeweicht».

Bild 1 Frontansicht des Hi-Fi-Stereoverstärkers *Accuphase* E-202

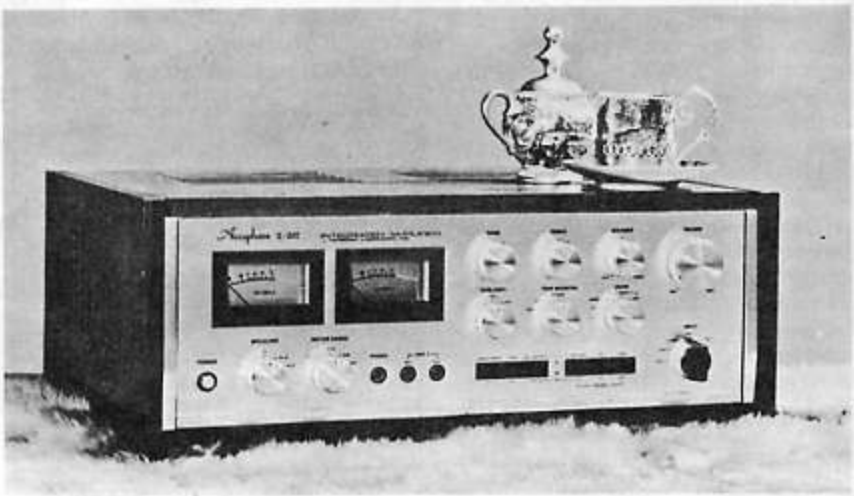
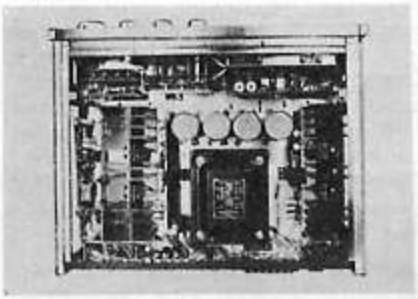


Bild 2 Der Blick ins Innere des Verstärkers zeigt den sauberen Aufbau



Technische Daten laut Hersteller

Ausgangsleistung	140 W_{eff} an 4 Ω 100 W_{eff} an 8 Ω 50 W_{eff} an 16 Ω
Klirrgrad	0,1% bei Nennleistung im Frequenzbereich von 20...20 000 Hz
Frequenzgang	
Aux.	+0, −0,5 dB von 20...20 000 Hz
Phono	+0, −1,0 dB von 20...20 000 Hz
Dämpfungsfaktor	In Stellung normal 20 In Stellung medium 5 In Stellung soft 1 (bei 8 Ω Last, von 20...20 000 Hz)
Eingangsempfindlichkeit	Disc 1 : 2,5...5 mV; 30 kΩ, 47 kΩ, 100 kΩ Disc 2 : 2,5 mV; 47 kΩ Aux 160 mV; 100 kΩ
Fremdspannungsabstand	Aux. 94 dB Phono 74 dB
Compensator	+ 9 dB Anhebung bei 50 Hz bei − 30 dB Ausgangsleistung
Ausgangsleistungs-Anzeigeinstrument	Das Instrument zeigt 0 dB an wenn die Ausgangsleistung 100 W an 8 Ω beträgt
Lastimpedanz	4,8 und 16 Ω
Stromverbrauch	70 W bei Leerlauf 375 W bei Nennleistung an 8 Ω
Halbleiterbestückung	53 Transistoren, 4 FETs, 44 Dioden 2 Thermistoren
Abmessungen (H × B × T)	152 × 455 × 355 mm
Gewicht	19,5 kg

* Generalvertretung für die Schweiz: *Hi-Fi electronics*, Idastrasse 3, 8003 Zürich, Telefon (01) 33 32 66

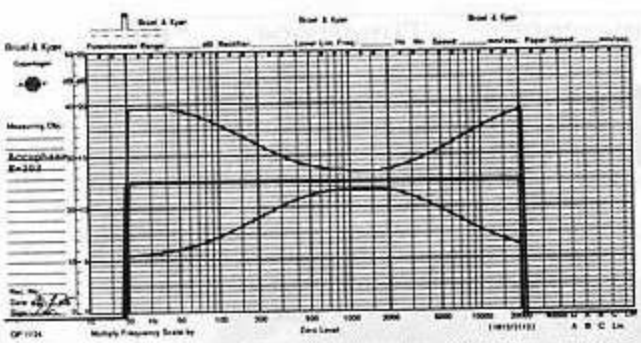


Bild 3 Frequenzgang mit eingeschalteten Klangreglern, gemessen bei 6 dB unter Nennleistung an 8 Ω

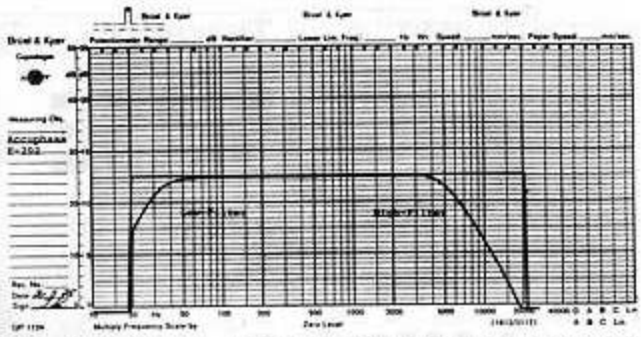
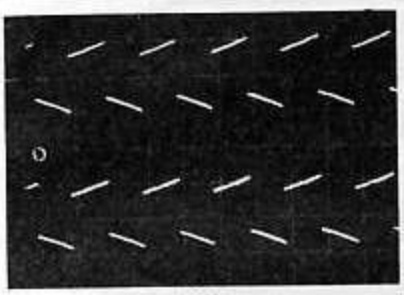
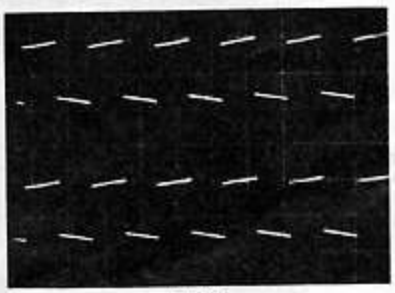


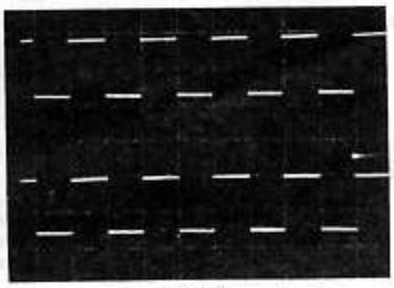
Bild 4 Frequenzgang mit Low- und High-Filter, gemessen bei 6 dB unter Nennleistung an 8 Ω



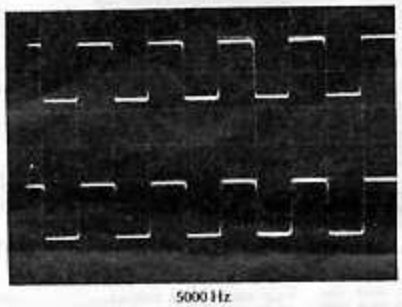
40 Hz



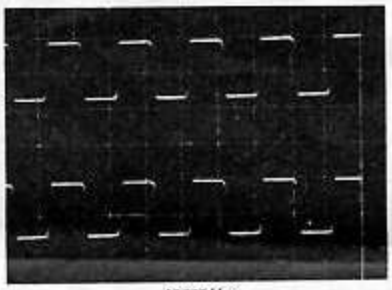
100 Hz



1000 Hz



5000 Hz



10000 Hz

Bild 5 Rechteckverhalten von linkem und rechtem Kanal bei verschiedenen Frequenzen, gemessen bei Nennleistung und den Frequenzen: 40 Hz, 100 Hz, 1000 Hz, 5000 Hz und 10000 Hz

Bild 6 Fremdspannungen, gemessen bei Nennleistung und normgerecht abgeschlossenen Eingängen

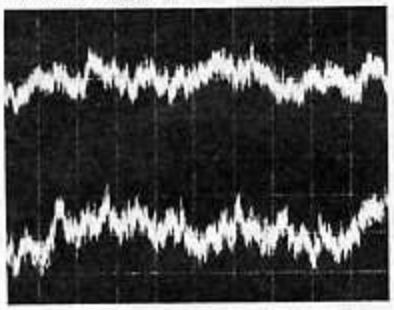


Bild 6a Phonoeingang Vertikal: 50 mV/Div. Horizontal: 5 ms/Div.

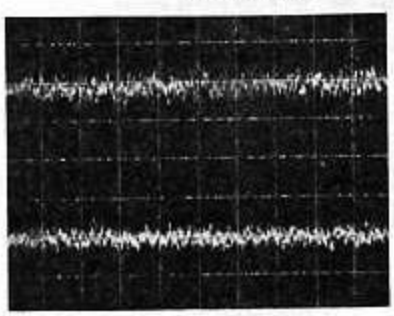


Bild 6b Auxiliary-Eingang Vertikal: 10 mV/Div. Horizontal: 0,5 ms/Div.

Eigene Messungen

Sinus-Dauertonleistung
gemessen bei Nennleistung und 1 kHz, Aussteuerung beider Kanäle

an 4 Ω reell	170 W
an 8 Ω reell	120 W
an 16 Ω reell	60 W

Frequenzgang
Bild 3 zeigt den Frequenzgang im Bereich von 20...20000 Hz gemessen 6 dB unter Nennleistung an 8 Ω reell

Dynamischer Innenwiderstand

Regler in Stellung normal	Ridyn = 0,013 Ω
Regler in Stellung medium	Ridyn = 0,37 Ω
Regler in Stellung soft	Ridyn = 0,51 Ω

Dämpfungsfaktor
gemessen bei Nennleistung und 1 kHz, an 8 Ω

Regler in Stellung normal	D = 45
Regler in Stellung medium	D = 3,7
Regler in Stellung soft	D = 1,5

Fremdspannungsabstand
bezogen auf Nennleistung an 8 Ω reell, Eingänge normgerecht abgeschlossen

Phono (siehe auch *Bild 6a*)	68 dB
Andere Eingänge (siehe auch *Bild 6b*)	52 dB

Rechteckverhalten
Bild 5 zeigt das Rechteckverhalten beider Kanäle bei Nennleistung und den Frequenzen 40 Hz, 100 Hz, 1000 Hz, 5000 Hz und 10000 Hz

Übersprechdämpfung
gemessen bei Nennleistung und 1 kHz an 8 Ω des einen Kanals und normgerechtem Abschluss des anderen Kanals 52 dB

Eingangsempfindlichkeit
gemessen bei 1 kHz für 2 × 100 W an 8 Ω

Phono 30 kΩ Eingangswiderstand	2,5 mV
47 kΩ Eingangswiderstand	3,5 mV
100 kΩ Eingangswiderstand	5 mV
Aux.	150 mV
Tape	150 mV

Filter
Bild 4 zeigt die Wirkung des Low- bzw. High-Filters

Übertragungsbereich
gemessen bei 6 dB unter Nennleistung bezogen auf 1 kHz für −3 dB Abfall der Frequenzgangkurve

an 4 Ω reell	8,5...52 kHz
an 8 Ω reell	8,5...51,5 kHz
an 16 Ω reell	8,5 Hz...54 kHz

Leistungsbandbreite
Eckfrequenzen bei denen bei 3 dB unter Nennleistung der Klirrgrad 1% beträgt

an 8 Ω reell	8,5 Hz...65 kHz

Klirrgrad
gemessen bei Nennleistung

40 Hz	0,016%
1 kHz	0,017%
10 kHz	0,017%
15 kHz	0,017%

gemessen 20 dB unter Nennleistung

40 Hz	0,05 %
1 kHz	0,05 %
10 kHz	0,045%
15 kHz	0,05 %

Ausgangsspannung für Tape
gemessen bei 1 kHz mit Nenneingangspegel 160 mV über Aux Eingang 320 mV

Fortsetzung auf Seite 456

ACCUPHASE LOOKS—(AND SOUNDS) LIKE A WINNER

ACCUPHASE of Japan, a relatively new name on the hi-fi scene, has introduced the E-202 integrated amplifier as the lowest-priced product in its impressive line of super-amps (the C-200, P-300, M60) and the I-101 tuner (also pictured).

The E-202 looks magnificent, all dressed up in a distinctive, business-like manner. Cosmetics include a gold-anodised brushed aluminium escutcheon flanked by two large power indicator meters and a parade of pushbuttons as tone enactors.

Its sheer size (455mm x 152mm x 355mm) and bulk (almost 20kg) lent it an air of austere professionalism. So did the man-sized control knobs and the precision-etched escutcheon markings. Quality of finish is of the highest order with controls that worked with silken smoothness. Accuphase ought to be commended for this meticulous attention.

Very generous is the power output, providing a total of 280 RMS watts into 4 ohms and 200 RMS into 8 ohm loads. This is maintained with both channels operating simultaneously and over the entire audio band of 20Hz to 20,000Hz.

Guarantee

Distortion is vanishingly low, reaching no more than 0.04 per cent (as verified by the manufacturer's distortion curve) over the entire audio band at full power and below. This must surely be one of the best distortion ratings I've yet encountered in an integrated amplifier.

Interesting (and highly promising) is the fact that the E 202 — along with all Accuphase products — is not only guaranteed against defects and failure but also from any deviations from published specifications for three years.

If, within the first three years of ownership should you discover (say, via an "amplifier clinic" at a dealer) the amp is not meeting its specs in any way, Accuphase or its appointed agent will undertake to see that it does. That's about as absolute and unequivocal as any warranty can get.

This amplifier offers extreme flexibility in controls. Two turntables and three tape decks can be connected. Two decks can operate simultaneously while the third is jacked into the front-panel input which will then surpass one of the decks connected from the rear inputs.

The tape monitor function has facilities for either deck and is marked accordingly. A tape copy switch permits tape duplicating from one deck to another while listening to another programme source.

You can hook as many as three loudspeaker systems to the E-202, the speaker selection knob being marked thus: (Speakers) A, B, C, A & B, A & C, and Off. There is also a speaker damping control on the rear panel with normal, medium and soft positions allowing effective conditioning to various loudspeakers.

Complementing the treble and bass controls are these refinements (the push buttons): bass treble circuit switch, loudness compensation, low enhance, subsonic filter, and low and high frequency filters.

The circuit switch cuts the bass/treble functions out of the amplifier circuit when in use. This will ensure an intrinsically flat response without added equaliser distortion.

"Low enhance" applies a one dB boost to the phono equalisation at 100Hz, delicately giving the music "presence". Accuphase recommends the continued use of the subsonic filter which eliminates all subsonic (below 25Hz) turntable vibrations.

I'll quickly summarise what's on the rear panel. Aside from the mentioned speaker damping control, quite intriguing is a switch controlling the separation of the pre- and power-amp sections of the E-202. The unit can then either be used as a full-fledged pre-amp control unit or a 280-watt power amplifier.

I've taken advantage of this facility and have been very successful both ways. And there's the phono level controls for each channel, ground posts for each phono input, and a phono impedance matching adjustment.

Switched convenience outlets number three, plus an unswitched one. All connections, by the way, are of the American mode.

Superb

PERFORMANCE AUDIT: How did this "magnificent brute" sound? In a word, superb. The Accuphase had a neutral, mellow tonal character, faintly reminiscent of a typical McIntosh unit, which could rightfully be the "Rolls-Royce" of amplifiers.

It gave an accurate, unfettered account of everything from the New York Philharmonic to Led Zeppelin. So pure and unbiased was its reproduction that it seemed to "disappear" from the system, leaving you a stem-to-eyeball confrontation with the music.

It's a remarkably powerful unit; users should have no problem playing it with the least efficient of loudspeakers at levels that shake plaster off the ceiling. It is my conviction that the E-202 will serve as a perfect mate to such speaker types as Cerwin-Vega, JBL, Infinity Systems and Micro-Acoustics.

Appropriate signal feeders would be the ADC XLM and the Ortofon SL-15E II. When used in these combinations the Accuphase will reveal and achieve its true colours, which really is no colour at all!

Among my favourite evaluation tests for subtle nuances of transpareney of an amplifier or loudspeaker is to use massed choral works supported by heavy orchestration.

Here Columbia's "Catulli Carmina" was chosen, zestfully performed by the Temple University Choirs and the Philadelphia Orchestra. It was tracked by a Stanton 681EE (you've guessed it) which neither takes nor adds to the sound. I looked for the individual definition of voices, the sensous impact of the percussion and, would happuy say, found them.

Granted, I have heard greater clarity and definition, but this evolved only from the Mark-Levinson / Audio Research echelon of audioware.

An amplifier of less-than-outstanding quality will distort severely at full volume levels. Taking a pair of highly inefficient bookshelf acoustic-suspension systems, I drove the Accuphase to its full 280-watt output (as indicated by the power meters) and to my pleasant surprise found it to be in no way sounding anything less transparent or linear than was at half power (the optimum operative level of most run-of-the-mill transistor units).

Thus one can safely say that the E-202 is as distortionless at full volume as it is at moderate-to-low levels, subjectively confirming its ambitious distortion claims.

Endurance

In my competence test for the electronic circuit breakers, I carried out the usual "short" and "open" circuit procedures, quite determined to outsmart the circuit devices and blow an output transistor or two.

I found, to my dismay, that the endurance of the E-202 proved greater than mine, and suffice it to say that this amplifier is immune to all maltreatment imaginable.

The owner's annual is comprehensive and lucid in its intents, explaining elementary hook-up procedures with the aid of block diagrams and detailing each and every function in an uncomplicated manner.

The Accuphase E-202 proudly takes its place in the Accuphase line. On all counts — appearance, power, versatility, infinitesimal distortion — it's helluva amplifier for $1,350 nett.

Sole agent: Singapore Audio Pte. Ltd.

● **NEXT SUNDAY:** Answers to readers' letters.

ACCUPHASE E-202

Styling	Excellent
Finish	Excellent
Bass response	Very Good
Mid-range response	Very Good
Treble response	Very Good
Transient response	Very Good
Channel separation	Excellent
Distortion absence	Excellent
Noise absence	Excellent
Overall realism of sound	Very Good
Overall assessment Vis-a-vis price	Excellent

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Accuphase

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