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COMPLETE STEREO SYSTEMS

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HI-FI CHOICE No 34
Complete Stereo Systems

CONTENTS
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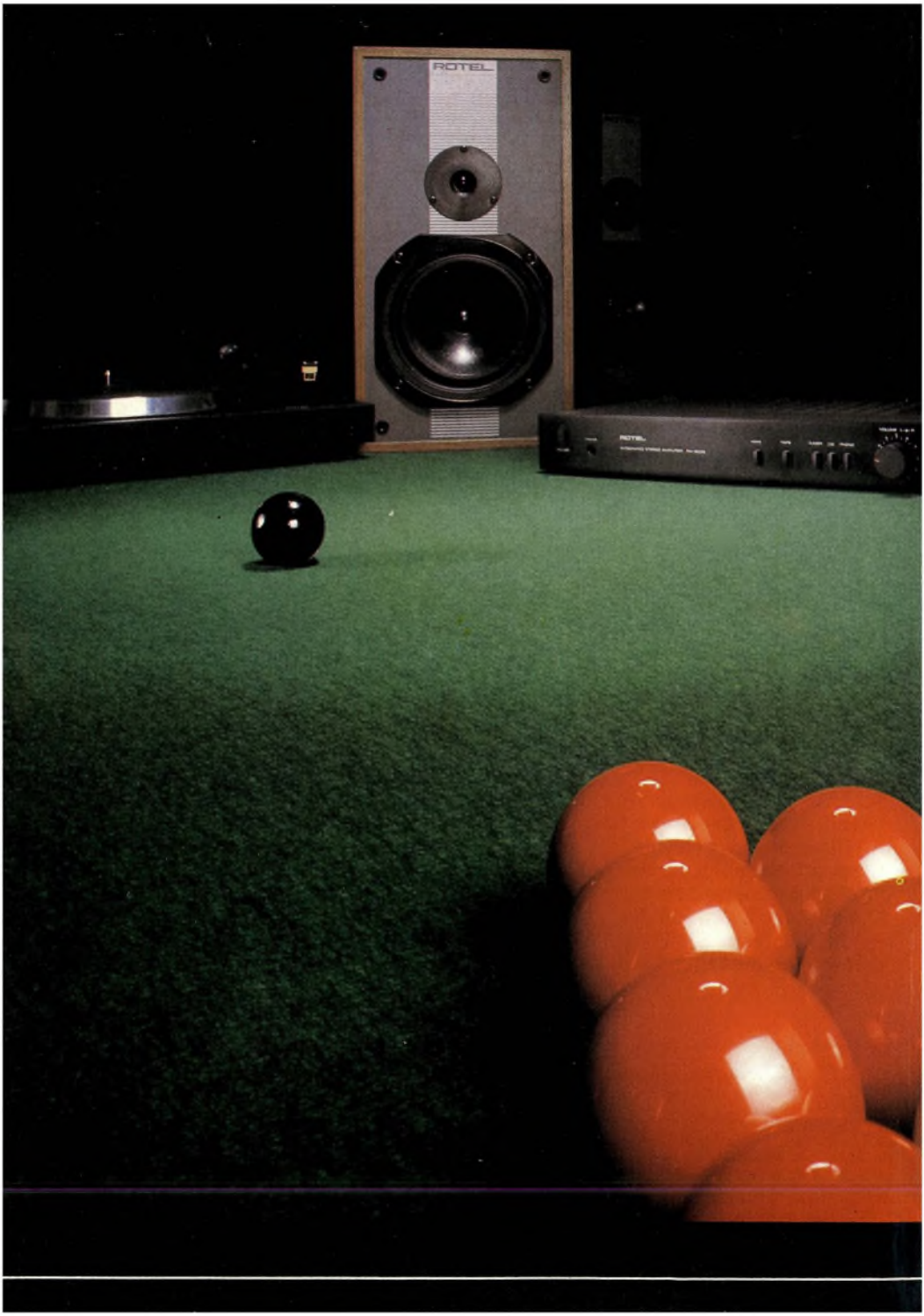
Published by Sportscene Publishers Ltd, 14 Rathbone Place, London W1P 4DE Tel 01-631 1433
Distributed by Seymour Press Ltd, 334 Brixton Road, London SW9
Typesetting by Clerkenwell Graphics, 13-14 Vandy Street, London EC2A 2ED
Printed by H E Warne & Co Ltd, London and St Austell

Specialist retailers:

The complete range of current publications in the Hi-Fi Choice series is always available from the participating retail stockists listed on page 80.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EDITORIAL

The Hi-Fi Choice series offers a complete and consistent guide to hi-fi buyers. This edition is for those who want to choose a complete system from a single manufacturer.

This book aims to tell you all you need to know when you decide to buy a complete hi-fi system. Other editions in the Hi-Fi Choice series are designed to comprehensively test models in any one product category — such as loudspeakers, cassette decks or turntables. But this Complete Systems issue is for the buyer who wants the convenience and other advantages of buying an all-in-one hi-fi 'package', and probably does not want to get involved with the intricacies of separate hi-fi components.

Of course, testing 50-odd systems meant that we in fact tested well over 200 individual hi-fi components — so this edition reviews more hi-fi units than any other publication ever!

'Rack system'. 'console system' and 'component system' are some of the names that manufacturers give to their system packages, but all these terms amount to the same thing. In every case the system consists of a set of matched components which together allow you to play discs, receive radio broadcasts and play cassettes. It will also allow you to record on to cassettes from disc or radio, and in some cases a 'double' cassettes deck section will allow you to copy from one cassette to another without having to wire up another recorder. As well as a cabinet or rack to house the electronics, most systems are supplied complete with speakers.

'Compact' systems will suit those who do not want a floor-standing cabinet, but want to stack the units neatly on an existing shelf or other convenient site. They are sometimes called 'midi' systems, and as that term implies are rather bigger than the true 'mini' or 'micro' hi-fi components — big enough to allow a proper turntable to be included in the stack. This system format seems in many ways to offer the best of both worlds, although it appears that you do still have to pay a bit extra for compactness — mainly because a compact 'LP jacket size' turntable is more expensive to engineer.

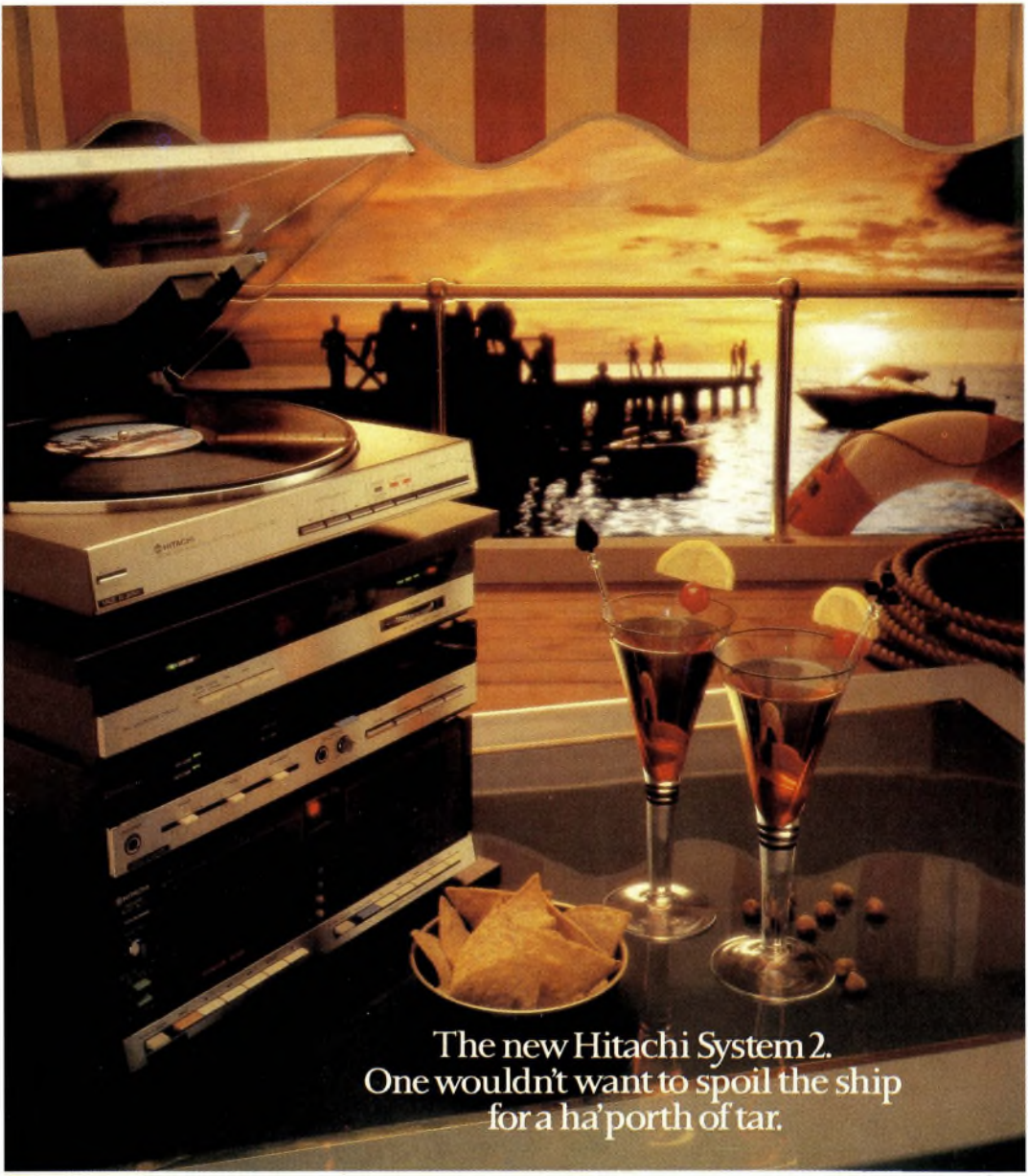
In the test programme we tried to include a comprehensive range of rack systems from all the leading manufacturers, along with compact or midi systems where available. In addition, we included a selection of low-cost audio systems, retailing at around £200 or less. These systems may be styled to look as if they are built up of separate components, but in fact consist of a single main unit and a pair of loudspeakers: functionally, they can be regarded as music centres. While our coverage of this category is far from comprehensive, we give a representative look at what is available.

All systems tested were evaluated under controlled, consistent conditions — and it is of course, this consistency which allows *Choice*, uniquely, to offer fair and valid comparisons between a very large number of competing hi-fi products.

It is inevitable that many readers will want to turn straight to the 'Best Buys and Recommendations' chapter, where we have summarised our findings on those products which appear to us to offer outstanding value for money, give very good overall performance. But be warned that these terse summaries are only summaries, and cannot tell the whole story: to assume that they did would do a grave injustice to many other products which may be of very considerable merit. Readers should certainly consult the reviews in every case before forming an opinion of a particular system, whether we have given it a 'Recommended' flag or not — many systems missed recommendation only because of a particular point which some users may not find relevant — for example, we withheld recommendation from many 'with-speakers-only' systems because of the failings of the speakers. If you are prepared to 'write off' the cost of the speakers, or if you *are* able to buy the system without, then a recommendation is in order. On this subject, note that many 'speakers optional' systems are in our judgement to be recommended only when bought without speakers, as is pointed out in the reviews where appropriate.

As happen with every *Choice* edition, there were some models we regret having to have left out, but we feel that we have covered the current systems scene fairly thoroughly. At the end of the day, our job it to act as a guide to buying, rather than to dictate! Having narrowed the choice to a shortlist, you should ideally try to listen to as many units as possible (take along some of your own records) before buying. A helpful and sympathetic dealer will make all the difference.

Steve Harris



WHEN ONE HAS ACQUIRED all those little luxuries that mean so much, one wouldn't want to spoil it all with a hi-fi that's lacking in one respect or another.

Which is why Hitachi have created System 2. The Hitachi System 2 is a little more expensive than most, but then it does have everything you could ever want from a hi-fi.

The record deck is belt driven to speeds set automatically by sensors, and has a repeat facility. The tone arm uses linear tracking, thus playing records the same way as the masters were cut.

There are two cassette decks to make dubbing simplicity itself, and to make it even quicker, the System 2 can dub at double speed, or use the microphone mixing facility to become your own DJ. The System 2 can also use metal tape and record onto it using a choice of Dolby B or C noise reduction systems.

In fact there's so much to the System 2, that to find out all about it, you will have to spend a good few minutes with it. But be reassured, it'll be time and money well spent.

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CONSUMER INTRODUCTION

Complete stereo systems offer the promise of a genuinely hi-fi standard of sound reproduction, in a convenient and domestically acceptable package. While the shape, size and performance varies widely, the basics are similar. Here we look at the 'building blocks' of hi-fi.

Music is the art-form we take in through our ears. It is easily recorded and reproduced using our century's technology, yet it is easily corruptible in the reproduction. Our memories for sounds are good in many ways yet extremely feeble in others, and in the absence of the 'real thing' we may be quite able to accept a poorly-contrived fake.

By itself this hardly seems important. If we're that easily fooled by the faking process, if we can 'hear through' failings in the reproduction process to the music beneath; why do we need to worry about the quality of the reproduction?

There are two aspects to the answer. First, although we may not find it easy to pick out the specific faults with reproduced sound, the fact remains that poor sound soon becomes tiring and unrewarding to listen to. Secondly, poor sound usually means *incomplete* sound. If musical information is missing, we're simply not hearing all the music, and again the act of listening becomes tiring and unrewarding. It is for these reasons, and these reasons alone, that pursuing audio excellence is a worthwhile exercise. For countless thousands of people, a 'hi-fi' or rack system has become merely an ornamental centrepiece of the house rather than a tool for playing music, because after the initial excitement had passed, there was little joy left in listening to music. This is the effect of poor sound-reproducing equipment. But there are hi-fi systems which *will* give you musical enjoyment and enduring pleasure.

For many people interested in listening to music in the home, a packaged audio system of the type usually referred to as a rack system is the obvious choice. There is no doubt that choosing your own seperates to make a working system has its satisfactions, and under ideal conditions will provide the most worthwhile and musical results. But it is also liable to end up with a rather Meccano-like appearance and wired up with 'a plateful of spaghetti', to use Sony's memorable description.

The integrated rack system avoids these problems, with components of matching appearance, and a piece of furniture to subdue the 'hi-tech' look of bright chrome, control knobs and displays. Choosing a one-make system might appear to guarantee optimum electrical and mechanical matching. Appearances can be deceptive though, and many apparently well-matched systems (in the technical sense) are anything but.

To warrant inclusion in this publication, all systems had to include a record player, a cassette deck, a tuner and an amplifier. The majority were supplied with a rack housing – there were a few exceptions amongst the smaller, shelf-top systems – and many of them came with loudspeakers. Some didn't though, leaving the choice of this component to the buyer, and in other cases the manufacturer provides a range of options. Where the information is available, these options are detailed in the reviews and are also indicated on the *Overall Comparison Chart*.

The two main types of system represented here are first, the 'traditional' free-standing type with full-size components usually 43-44cm wide, and the miniaturised shelf-top systems whose width is held to 33cm or even (in one case) just 21.4cm! There is no inherent advantage in equipment being larger except perhaps that it's easier to hold costs down; there is a cost factor in keeping things small, especially in the case of turntables where relatively complex expedients like parallel tracking arms are normally used to reduce the width requirements.

Turntable

The usual type of rack system turntable is of a simple design which includes auto-return at the end of side, and a magnetic cartridge. Recent design trends have seen S-shaped arm tubes giving way to straight ones, and for simpler types of interchangeable headshell, where they're interchangeable at all. In some ways recent design trends look worrying; there is an increased use of flimsy plastic mouldings in areas of structural importance (eg headshells) whilst the weight and build quality of the turntable chassis has tended to become lighter and stay static, respectively. The change in arm tube form is a matter of style and fashion rather than function.

This project does, however, mark a significant trend towards turntables with so-called parallel tracking arms, where the whole arm slides along a runner parallel to the line the stylus describes as it plays the record. Most

manufacturers claim that as records are cut with such mechanisms in the first place, it makes technical sense to play them back this way, pointing out that parallel tracking mechanisms reduce stylus geometry errors which are inevitable in a pivoted arm. Although this looks like a reasonable proposition it's worth remembering, that the error on a well-designed pivoted arm need result in distortion no higher than about 1% maximum.

It turns out, though, that turntables with parallel tracking arms are frequently (not always) more resistant to feedback and the effects of externally applied shocks to the rack housing or shelf on which the turntable is stood. Parallel tracking arms are also invariably associated with fully automatic operation and in some cases, programmable track-search facilities.

Another noticeable trend is a slight narrowing of what sometimes seems like the chasm that divides the rack system market from the high-fidelity for separate components market. The NAD and Rotel turntables exemplify this minor trend, the former being massively over-engineered by normal rack system standards, and the latter incorporating a fully-sprung platform for the arm and platter which reduces susceptibility to feedback enormously but at the expense of a rather 'wobbly' assembly to handle.

As in previous years, the majority of cartridges are readily interchangeable if required. A significant number of the more recent turntable designs incorporate the new T4P or 'P'-mount cartridge fitting, where the cartridge plugs into the end of the arm using the terminal pins. These cartridges all have a common specification which means no alteration to any of the arm settings is required no matter what cartridge is fitted. With some turntables, the cartridges are not interchangeable at all, and where this is the case, it's indicated within the reviews. The ability to change cartridges provides an easy, if limited route to improving system performance at a later date.

There is a remarkable uniformity in the types of cartridges fitted. Nearly all are standard magnetic designs, bearing the rack maker's name in most cases, but often recognisable as coming from Audio-Technica.

The exceptions are to be found in the half-dozen or so very inexpensive systems included in this project. The majority of these systems cost under £200 complete, and are supplied with BSR turntables (the exceptions being the Tensai Comp 10 and Sanyo) of very basic design, and ceramic cartridges of the type familiar to users of table-top gramophones 15-20 years ago. These cartridges cannot be changed for magnetic ones, which would neither fit in the arms or give enough output to work with the amplifier properly.

Cassette Deck

There have been changes in the cassette decks supplied with rack systems too, especially in peripheral areas like transport control and record level meter designs.

Ignoring the sub-£200 systems for a moment, the archtypal cassette deck looks something like this. It will have a door which opens to accept the cassette, a range of buttons to operate the transport and a number of controls to set the tape type, recording levels (with the aid of record level meters) and switch in the noise reduction system.

On virtually all modern cassette decks, the controls are power assisted, or go further still by being fully power operated from panel switches which in effect 'instruct' built in micro-processor circuitry, whose job it is to collate and route these instructions appropriately. Both types of control can incorporate so-called 'logic' operation, though it's the fully powered transports that usually have this ability. Logic operation acts like a watchdog, if you like, so if you try any sequence of operations that might damage the tape (direct from fast rewind to play for example) the deck will 'pace' these instructions out so that nothing untoward happens. Such decks are often recognisable by the fitting of light-touch controls and are usually very silky and responsive in use. They don't intrinsically offer or deliver better sound quality though.

Better sound quality, though, is the aim of the recent Dolby C noise reduction system, which works very much like the familiar Dolby B but which gives twice the noise reducing effect. Dolby C is fitted to most of the more expensive decks, whilst Dolby B is almost universal as it is needed to replay pre-recorded cassettes which are invariably recorded to the B format. A powerful system called dbx which competes with Dolby C but gives even stronger noise reducing effects (unfortunately with occasionally rather more noticeable side effects) is used alongside Dolby on some Technics equipment, including the Z75 system reviewed here.

There are other changes too, in some cases

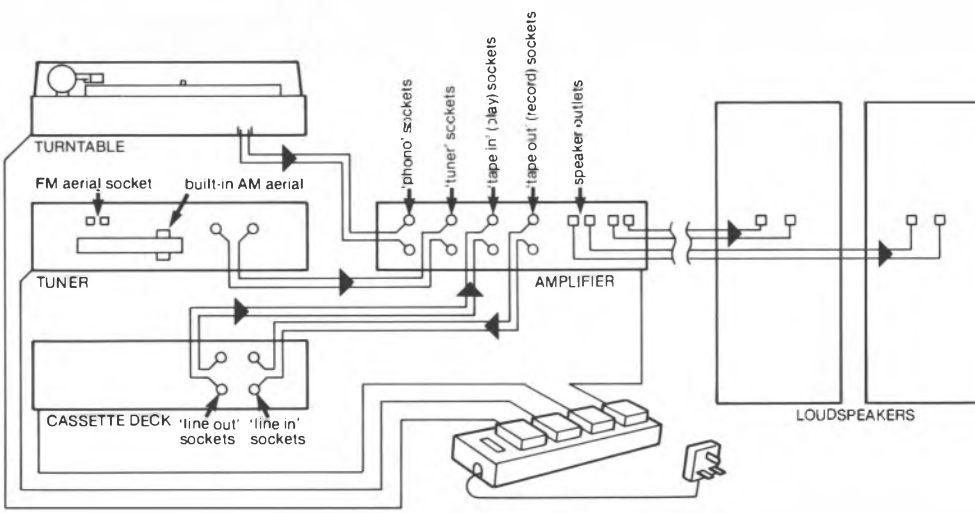
intended to make operation simpler and more foolproof. Instead of manually instructing the deck what kind of tape you've inserted, cassette decks are learning to recognise tape types for themselves using the notches on the rear of the cassette housings for the purpose. Another (perhaps less welcome) trend is to automatic record level control, or ALC. This means no record level adjustments and is an undoubted boon from the convenience point of view. But the trade-off can be severe, and takes the form of losses of dynamics and increased levels of background noise; this is because the ALC shunts the record levels up and down continuously in an attempt at making everything sound the same volume!

A number of systems lack microphone inputs, on both the cassette deck and the accompanying amplifier. It's perfectly true that the mic input is among the least used of all cassette deck features, so we have not reduced the rankings of any systems without. We've just noted the omissions for the benefit of mic users.

Elsewhere, the cassette deck has become relatively static in design terms. The most popular feature is one or other variety of programme search where the deck 'listens' for gaps between tracks when in fast wind/rewind mode, switching through stop to play when it finds the gap. This is of obvious use with popular or rock music (or when tapes are used to store a number of computer programs!) but the system tends to break down when presented with material with built-in gaps or long, quiet passages. Speech and much classical music are examples of such programme-search-busting material, and for this reason we were disappointed to see the relative eclipse of normal memory search features linked to the tape counter. It was also disappointing to find so few decks incorporating 'real time' tape counters – those which count in minutes and seconds, rather than in numbers linked only to the number of tape spool revolutions, which give an arbitrary reading.

Tape acceptance in most cases is standardised for the three major types: ferric (or standard bias), chrome (or high bias) and metal. So-called ferri-chrome tapes are not widely catered for, though a number of manufacturers suggest separate compromise settings for recording and playback use.

The very inexpensive decks fitted to the sub-£200 systems tended to follow their own rules. With mechanical transport controls and no search facilities, some of them are fitted with what the manufacturers call 'noise reduc-



How a complete system is connected up. In practice the amplifier will be stacked with the other units. The connecting leads between the units are pairs for left and right channels, and are always supplied with the units. Tuners are usually supplied with a suitable wire indoor aerial to be run up to a picture rail. Dealers will supply a suitable mains distribution box and help you with wiring up.

tion' which is neither of the Dolby variety nor in any way describable as noise reduction in the normal hi-fi sense of the term. Noise reduction is a term applied to any system (Dolby, dbx etc) which works whilst recording and playing back and which reduces tape and other hiss within the noise reduction 'loop' whilst leaving the tonal balance of the music more or less intact. In our opinion, the use of the term 'noise reduction' to describe what is a simple filter to reduce high frequencies of both music and hiss alike is clearly misleading and is to be strongly deplored. This practice has been highlighted, where it occurs, in the text of the reviews. Remember that Dolby B is essential for replaying prerecorded cassettes which carry the Dolby logo, if high quality sound is required.

Tuner

The tuner provides the means of listening radio broadcasts, and is commonly capable of reception over the three main broadcast bands of interest to UK listeners – FM, MW and LW.

Only FM broadcasts are inherently capable of high-quality results in stereo. FM can give a smooth, even frequency response to about 15kHz, which is close to the limit of most people's hearing. FM is also the only band where stereo broadcasting takes place. The snag with FM, apart from the relatively complex circuitry necessary to make it work effectively, is the fact that it is a short distance medium with a typical service area of only a 30 mile or so radius from the transmitter. Although indoor strip (wire) aerials are usually provided for FM reception, the use of such devices tends to be unreliable if good, hiss-free reception is required. This comment holds especially in the case of stereo reception, which requires typically ten times the signal needed for good mono reception. So where a portable (mono) radio may work perfectly adequately with a rod aerial, a stereo tuner will normally benefit from a multi-element (typically four or more elements) aerial mounted on the roof – or something similar. It's worth taking some time and trouble over the aerial, and employing a specialist local aerial erector who knows the neighbourhood reception problems. Aerial fitting is not usually expensive; note that even a high-quality, expensive tuner will not give of its best from an inadequate aerial.

A good aerial will provide more than just quiet, hiss-free reception. It will also provide a generally more reliable result, free from the impulsive 'crackling' interference and other reception problems.

The two AM bands, medium and long wave, offer longer distance reception, and provide the only way of listening to BBC Radio 4, for example, when the VHF band is given over to educational broadcasting. Radio 1 is also only sporadically represented on FM at present. AM sound quality though is very limited. At best it has very limited treble, and a generally uneven, closed-in kind of sound. The aerials supplied with the tuners – usually a ferrite loop or rod – are about optimum. They may need to be swiveled for best reception, but attempts to increase the signal level by adding an external long wire aerial are often met with increased interference levels too. But although reception and sound quality on AM are 'iffy' at the best of times, there turned out to be quite remarkable differences between the best and worst of the tuners tested. Remember that the AM Radio 4 broadcasts are still, at the time of writing, only available on LW in some parts of the country, so a tuner with FM and MW only may not cover all the options for the keen Radio 4 enthusiast.

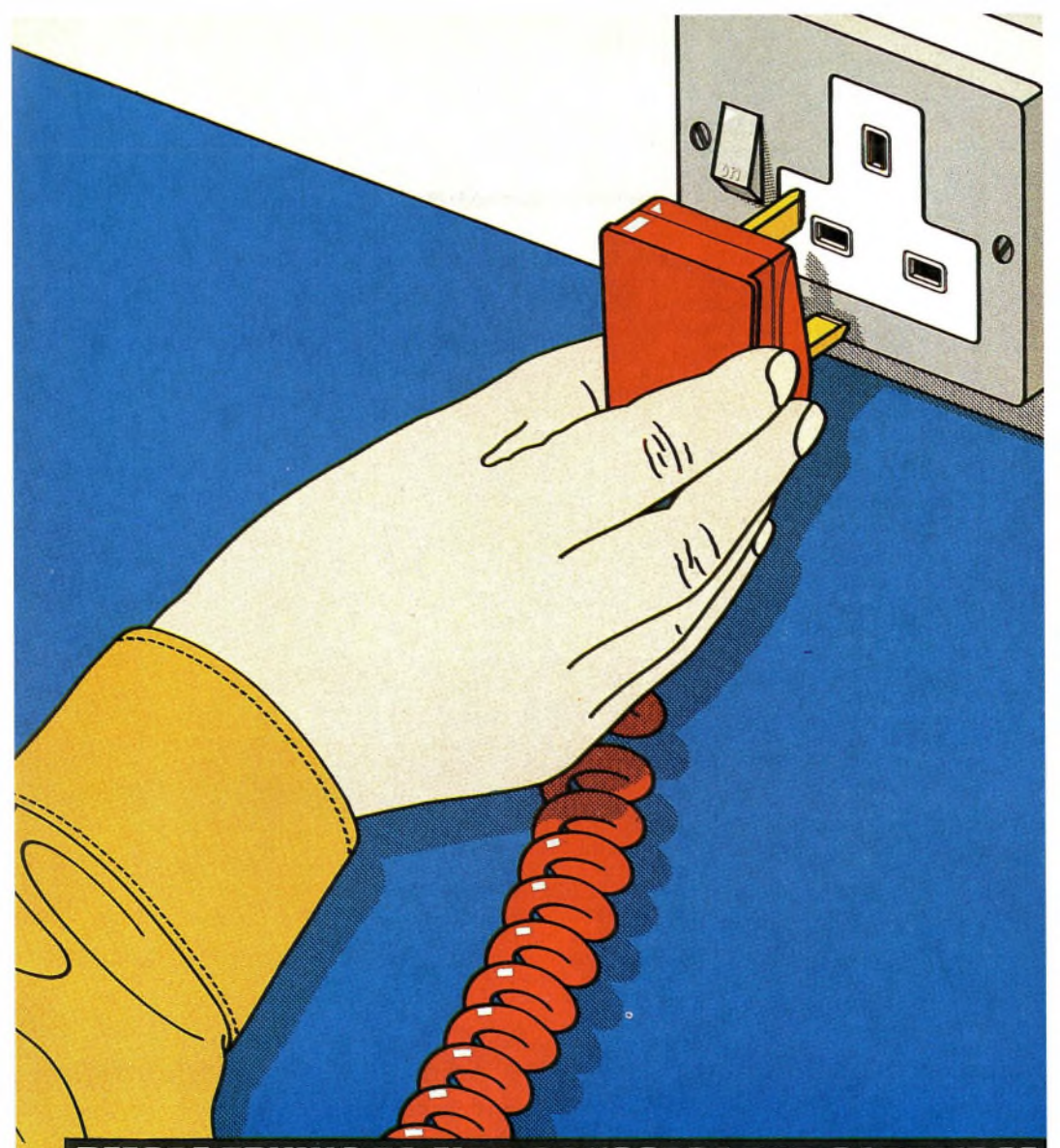
The tuners tested divide conveniently into two categories – the traditional analogue or scale-and-pointer tuner; and the digital or quartz synthesiser tuner. Although there are odd examples of analogue tuners in this project which incorporate pre-set tuning, this very useful feature is usually associated with the digital tuners which lend themselves naturally to this kind of facility. Digital tuning can also mean more accurate tuning, though there was evidence from the tests that this was not always the case.

Many synthesiser tuners also had other problems, in particular background whistles and buzzes in the less well engineered examples. The better synthesiser tuners were free of this defect though and were particularly easy to use in preset mode.

Amplifier

Aptly thought of as the heart of any system, the amplifier accepts the low-voltage outputs from the turntable, cassette deck and tuner, and boosts them to a level suitable for driving loudspeakers. It also performs a variety of subsidiary functions such as tone control, filtering and so on.

Although the amplifiers built into the systems came in a wide range of power outputs,



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this was usually related to price, the more expensive ones generally going louder – though not necessarily sounding better! The less expensive ones though were not unduly handicapped. Where loudspeakers were supplied with the systems, their high sensitivity generally made up for the limited power of the amplifier, so that the maximum available volume was still quite adequate.

A pair of conventional high-fidelity loudspeakers, Kef Coda III (see Technical Section), were also used during the listening tests, and in most cases the systems were fully able to drive these to high enough volumes to satisfy most requirements. The moral of this is obvious enough – it usually makes little sense to choose a system simply on the basis of its power output, unless you've an unusually large room to fill with sound, or you throw a lot of parties!

Sound quality and power output apart, the more up-market amplifiers tended to accumulate additional tone controls, filters and input facilities. Extra inputs may or may not be of use; for example, if you're likely to do a lot of copying of tapes, it makes sense to buy a system whose amplifier has two tape inputs (or a system with a twin cassette deck). Additional auxiliary (or line level) inputs may be useful if you intend buying (or adding in the future) a compact disc player. But many of the other features on offer are less than they seem. Leaving all theoretical considerations aside, a system that works well in the first place will not benefit greatly from using tone controls. Graphic equalisers, which are effectively a number of such controls, each responsible for a narrow band of frequencies, are merely gilding the lily. We tried 'correcting' known, measured response inaccuracies in loudspeakers by compensatory settings on graphic equalisers with some of the systems, with results that were generally worse, and certainly no better than the 'flat', unaided sound. It's interesting to note in passing that one system – the Rotel '820B system' has an amplifier with no tone controls or filters whatever, this being a 'first' in the rack system world, but an increasingly popular idea in high fidelity generally. Other systems had a range of pre-set tonal correction shapes rather than the normal variable tone controls. This arrangement has the advantage that excessive – and possibly loudspeaker-damaging – boost of output at specific frequencies is avoided at a stroke. The disadvantage is that minor, subtle corrections become impossible.

Loudspeaker

The loudspeaker is not, as is often thought, *the* determining factor for sound quality – the system as a whole is as good as its weakest link, no more. But the loudspeaker does have the crucial role of translating the electrical signal from the amplifier into the vibrations in the air we call sound. The simplest loudspeaker consists of a box housing a single drive unit, but most of them divide the sound into two bands, and channel the low bass frequencies to a large coned unit capable of moving large quantities of air, and the high frequencies to a smaller unit capable of responding accurately and quickly. A third, midrange unit of intermediate size is sometimes used as well, but it's worth making the point that it's extremely difficult to make a three-way loudspeaker work as well as an equivalently-priced two-way one.

This leads to a fairly generally-applicable rule with loudspeakers. The more ambitious the design, the harder it is to get right. The difficulties tend to increase dramatically with increasing size, and it cannot be assumed that a large, impressive three-way loudspeaker will perform better than a simple, small two-way one. Indeed the larger speaker may not even give better bass. It usually will give *more* bass, but often bass of a flaccid and boomy nature which is hardly worth having. These factors are examined in detail in the reviews.

There is one other crucial factor that determines how well a loudspeaker auditions – and this is how it's used. Only one loudspeaker tested came with any form of stand (the NAD) and this was, we thought, inappropriately designed for its task. It is important to support loudspeakers properly, preferably on tall, open stands of the type stocked by most specialist hi-fi dealers. It's equally important to place them correctly, which often means well away from walls and other obstructions, especially in the case of the larger models. Occasionally shelf (or wall bracket) mounting gives good results – let your ears be the guide – but placing loudspeakers on the floor and/or behind furniture is a virtual guarantee of unsatisfactory sound. Many systems are available with a choice of loudspeakers, or without speakers at all, and in such cases it should be possible to choose a small, relatively unobtrusive model (perhaps specifically designed for

wall proximity use) and still obtain good results.

One final point here. Most loudspeakers sound best with their grille covers removed. It might be worthwhile checking you can live with the appearance of an unclothed loudspeaker in your living room!

Compact Disc players

The digital compact disc is a recent development in audio – a means of storing information in digital form on a small (12cm) disc, recorded on one side only and giving continuous playing times equivalent to both sides of a long playing record strung together. The information is stored in a spiral arrangement of 'pits' which are read by a laser which follows, but does not touch the surface of the record. Very low background noise and great linearity of frequency response (up to the cut-off point near 20kHz) are the hallmarks of the system, together with a degree of robustness not associated with conventional records. Within reasons, small scratches, dust and fingerprints do not affect sound reproduction. CD reproduction is free of the 'pops and clicks' which mar LP sound.

Only three manufacturers submitted CD players for evaluation – Fisher, Marantz and Sony. Each of the systems they were supplied with can be bought without the CD player, of course. Conversely, many of the other systems have a matching CD player available, though if the aesthetics of front panel layout are not an issue, you could choose any player you like to match almost any of these systems. Their outputs vary little, and electrical matching considerations tend to be constant from player to player, and from system to system. To a first approximation, any compact disc player will work quite happily with any auxiliary input on the amplifier. Many amplifiers already boast a CD input, but usually this is no more than a relabelled auxiliary input. The only important matching problem that can arise occasionally is overloading of the amplifier input during very loud passages which can induce momentary distortion. Other matching problems are rare.

Rack housings

It would be nice to report here that the rack system manufacturers produced an imaginative and wide range of furniture styles, and good furniture finish on their racks. Unfortunately this was not the case. Apart from the least expensive systems which were generally supplied pre-assembled, most of the racks came in flat pack form, and assembled into housings of almost startling uniformity.

Very few of the racks were especially solid, and with castors in place they tended to be very wobbly, which is a severe disadvantage with turntables especially. It might be worth dispensing with the 'wheel-aside' facility in favour of a more solid base, propped up if necessary with strips of wood fastened to the under side of the rack. Another worthwhile alteration that should have a significant effect on record reproduction would be to fix the rack solidly to the wall behind.

Not one single rack housing came with a real wood finish. Indeed not many of them came even with a particularly good imitation! Current fashion dictates a slim, vertical, coffin-like appearance with just two manufacturers – Sony and Fisher – providing something rather more domestically-flavoured in their horizontal housings. No wonder perhaps, that shelf-type systems, which stand alone without a cabinet, are becoming more popular.

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TECHNICAL INTRODUCTION

Every review includes a table of laboratory test results. This chapter explains how each test was carried out and how to interpret the results.

This section describes the measurements, in the order in which they're listed with each review. Occasionally it proved necessary to alter the procedure, especially where the system concerned lacked the usual inputs and outputs, making it difficult to connect the test gear to it. In general, these alterations are described within the reviews themselves. Nearly all the measurements were conducted by my colleague, Robert King. The aim of the tests in all cases was to produce a set of measurements that would help illuminate the practicalities of each system's performance, as far as possible under normal, domestic operating conditions.

AMPLIFIER

Power Output: The figures presented are the RMS output in watts with both channels driven together to a point immediately prior to amplifier outout waveform clipping. Equipment used: Dual beam oscilloscope, dual 8ohm dummy load and Nakamichi T-100 audio analyzer, for both generating the sine wave signals at 20Hz, 1kHz and 20kHz, and displaying the output on its wattage scale.

RECORD DECK

Speed variations (wow and flutter): The measurement given is peak DIN-weighted, as measured using a 3kHz recorded tone from HFS 75 and the Nakamichi T-100.

Speed drift: This is an assessment (not a measurement) of long-term drift (low-rate speed variations) using the same test set-up as above.

Speed Accuracy: percentage error, derived from tests using the Ortofon TC 3000 test computer. The more accurate, the better – although of course a slightly incorrect speed is less serious than appreciable speed variations. 'Speed correct' indicates no error measurable by the test set-up.

Arm/cartridge resonant frequency: This is the lateral resonance, also derived from the Ortofon TC 3000 test computer. This frequency is related to the mass of the arm and cartridge, and the stiffness (compliance) of the cartridge cantilever (the thin rod that supports the stylus at its visible end, and which is secured loosely at the other end). Very low figures, below about 8Hz, may cause the cartridge to be easily disturbed by problems such as warped records, and (where fitted) turntable sprung suspensions. Sound quality may suffer – pitch reproduction can become unstable and low frequencies generally may become muddy and ill-defined. Too high a frequency – above about 16 Hz say, may result in a rather fluttery and under-characterised bass. The 'ideal' figure is 10-14Hz, but note that in describing a figure as 'acceptable' or otherwise, we have taken the design of the arm and turntable into account.

Cartridge channel balance: Again derived from the Ortofon TC 3000 test computer. The smaller the difference between the two channels, the better, of course.

Cartridge channel separation: This figure indicates the amount of left hand channel signal appearing on the right hand channel output – or vice versa, the 'worst case' figure being quoted each time. The higher the figure, the better the result. Test equipment again was the Ortofon TC 3000.

Cartridge tracking ability. This figure indicates the highest recorded velocity the cartridge can track at the quoted tracking force – so the higher the figure the better. The measurement is not a comprehensive test of tracking ability, but it gives a useful general indication. Any perceived shortcomings in tracking ability on music programme have been commented upon separately.

Cartridge frequency response: Left-hand channel, measured using JVC TRS-1007 test record. Equipment used included a B&K 4416 response test unit and Neutrik chart recorder. Each measurement run is of the test cartridge and turntable as supplied. In certain cases – where the turntable was integrated into the electronics for example – the JVC record could not be used as the output from it must be measured at a point before the amplifier input. For these systems we used instead the ⅓-octave pink noise test bands on B&K QR 2011, which is designed for system response checks. In this case, the signal measured was from the tape output of the system, unless otherwise stated.

Theoretically both the tests described above should give something approaching a straight-line response, but this never happens in practice. For reference, see the charted response of a Koetsu Black cartridge (fitted to a Linn Ittok arm and LP12 turntable) when measured

first using the JVC test record, and secondly using the B&K test record (the output in this case being from the tape feed of a Musical Fidelity preamplifier). As you can see, the B&K trace shows a slight loss of output at high frequencies compared to the almost ruler flat sine wave response from the JVC test record. The B&K responses therefore need to be 'corrected' in line with this result to be meaningful, as the JVC response is the accurate one.

Note that all cartridge responses were run with an expanded 25dB vertical scale which multiplies the error shown by a factor of two, compared to the more conventional 50dB scaling often used in cartridge tests. This was done to highlight non-linearities.

CASSETTE DECK

Tape used for tests: Measurements all refer to Type II (Chrome bias) tape. The brand chosen was either the manufacturer's recommendation, or in the absence of a firm recommendation, TDK SA, which is widely accepted as a market standard. Tapes used were always C90s.

Frequency response: The plot was made using the Type II tape selected as described above, and was run conventionally at −20dB ref 0VU on the deck's meters. Equipment used was a Neutrik sweep generator and chart recorder. The plots cover the complete record/replay chain, of course, and are displayed with an expanded vertical scale (see cartridge frequency response).

The upper and lower frequencies quoted in the test results are the frequencies at which the output is −3dB referred to the 1kHz output. All low frequency results below 20Hz have been rounded up to 20Hz since at very low frequencies the measurement becomes almost meaningless. Variations in output due to head/tape geometry effects can make the low frequency response rather erratic.

Speed variations (wow and flutter): Record/replay, DIN Peak weighted. Equipment used: Nakamichi T-100 audio analyzer. The lower, the better.

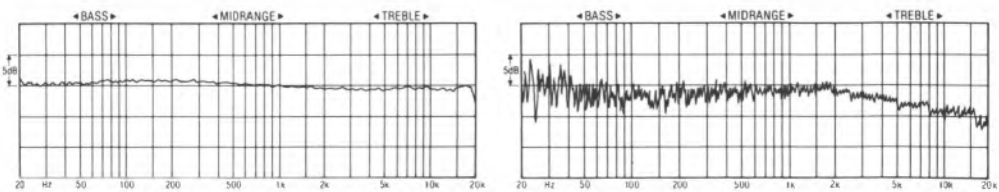
Speed drift: Exactly as for the equivalent measurement of record decks, this is an assessment rather than a measurement of long term drift (low rate speed variations) using the Nakamichi T-100.

Signal-to-noise: CCIR/ARM Weighted signal-to-noise ratio. The figure quoted is for the complete record/playback cycle at 400Hz and is referred to 0VU as indicated by the deck's meters. The higher the number the better. It is normal to make this measurement with any noise reduction switched out, but here the measurements were made with Dolby B noise reduction operative. A few of the less expensive systems did not have Dolby noise reduction, and in other cases the presence of automatic level record controls, where there is no stable reference point for the measurements, frustrated this measurement.

Distortion: Measured at 0VU on the decks meters, this should be read in conjunction with the signal-to-noise figure. A poor figure for the latter test may still be satisfactory in the light of a very low distortion figure (say 0.8%), because there will still be several dB of headroom to play with above 0VU. Conversely, an apparently good signal-to-noise result may in reality be no better than average if the distortion level is high (say 2-3%) at 0VU.

TUNER

Sensitivity and Signal-to-noise: These are assessments rather than measurements. A laboratory FM stereo generator, which can be pictured as a small transmitter that can encode any source connected onto FM, was used for these, and for a major part of the listening tests as described in the general introduction. The generator – a Radiometer SMG1 – has a range of outputs ranging from



Frequency response of a 'reference' cartridge, the Koetsu Black in Linn Ittok arm. Left, response using the usual JVC test record; right, B & K pink noise bands.

10μV, an extremely low level which is barely sufficient for good mono reception even with a sensitive tuner, to 100mV, approximately 100 times the amount necessary for good, low noise stereo. By feeding an unmodulated carrier to the tuner under test (that is, a transmission of silence) it was possible to obtain a reliable and repeatable idea of how sensitive and quiet each tuner was. As part of these tests, the tuner was also driven with a range of signal voltage levels using a very low-level piece of music which gave an idea of the annoyance value of noise in the presence of a music signal. The music signal was derived from a Marantz CD63 compact disc player.

LOUDSPEAKERS

Frequency response: One loudspeaker from each pair was measured in the room used for the listening. Each loudspeaker was driven from its accompanying amplifier, which is therefore taken account of in the tests – along with the room of course.

The listening room itself clearly has a significant effect on the loudspeaker measured response as reflections from the walls add to and subtract from the loudspeakers inherent response. To get some sort of feeling for what the room was doing, the main loudspeaker model used for the tests – the Kef Coda III – was measured in the room and also in Kef's own anechoic chamber. In theory, the difference between the two plots is simply the effect of the listening room, but in practice there are certain other factors to be taken into account. The test equipment used was different, and so was the method of measurement. The in-room response was made with a ½ octave sine wave signal, which is a normal sine wave modified so as not to excite room resonant modes unduly. The equipment was a Neutrik generator, calibrated microphone and chart recorder, the microphone being essentially flat (ie accurate) to 15kHz – there is a minor ripple between 15-20kHz.

Allowing for the differences in test procedures, there is a reasonable agreement between the two curves, the room being responsible for a suck-out at 200Hz and some

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Kef Coda III, our 'standard' speaker

boosting of the curve between 400-600Hz. The sharpness of these effects is critically dependent on the geometry of the loudspeaker itself. Where the bass unit is equidistant from the base and the two sides of the enclosure (as with the Coda) the effect is more sharply defined. Small changes in the microphone position also have a dramatic effect here, as they do at the top end of each drive unit's pass band, where drivers tend to become very directional.

Taking all these effects into account suggests that any in-room curves should be treated with a degree of trepidation, but we were able to obtain much useful information from them. First, we looked for an overall shape that was reasonably smooth and lacking in severe peaks and dips. Secondly, some idea of the frequency balance of a loudspeaker could be gleaned by looking at the area under the curve. Thus although the room is responsible for some modification to the response in the range of frequencies from 200Hz to about 1kHz, the energy output of a speaker in this region (represented by the total area under the curve between these two points) should be roughly equivalent to the trend elsewhere. So we looked for a smooth midrange and extended treble response – the Coda rates as good in these respects – and a smooth averaged-out response below 1kHz. Our comments on speaker performance, then, are based on these tests as well as on listening.

Maximum volume level: This was measured in a different room of approximately the same size, to determine how loud each system would go before the onset of distortion. The test was made with the amplifier and both loudspeakers from each system. Where loudspeakers were not supplied, Kef Coda loudspeakers were used instead. The Kefs are of representative sensitivity for most sub-£100 loudspeakers – they will produce roughly the same quantity of noise from a given input signal as the average for loudspeakers generally, though they tended to be less sensitive than most rack system loudspeakers. To produce the result, the loudspeakers were driven from a pink noise signal (whose spectral content approximates to that of music) and the reading was taken when the signal was on the point of clipping (distorting). The clipping point was determined from an oscilloscope display of the reproduced signal tapped off the loudspeaker feed.

Dimensions and prices: We have given dimensions of both the rack, or stacked system components where no rack is provided, and of the speakers. Prices quoted are typical retail prices including VAT. While to the best of our knowledge these were correct at the time of going to press, they obviously are subject to fluctuation from time to time, and this should be taken into account when interpreting our 'value for money' judgements.

LISTENING TESTS

A great deal of thought went into designing listening test procedures which would be repeatable and give consistently useful results. As far as possible, all test conditions were standardised, and system evaluation was based in the first instance on so-called 'substitution' tests. This involved careful listening to a 'reference' system was chosen as being one of good basic sound quality without being ludicrously expensive compared with the system under test. One at a time the components of the test system were then introduced into the reference system, and notes made on the performance in each case.

After this, the 'reference' system was set aside, and the system under test was assembled and listened to thoroughly as a whole, further detailed notes being made on the performance.

In each case, the cassette decks were evaluated for sound quality by listening to pre-

recorded cassettes, and by listening to the results of recordings made both from the standard system, and also the one being reviewed – records and Compact Disc being used for source material. Compact Disc was also used to drive a laboratory FM generator which fed a 'broadcast' signal to each tuner in turn, simple A-B switching between the tuner and a straight feed to the amplifier (in this case an A&R A60) being used to establish sound quality in a particularly repeatable way. Each tuner was also listened to off-air from a four-element roof-mounted aerial which provided a good quality and strong signal from local transmitters.

All listening was done with only the test pair of loudspeakers in the listening room – that is under 'single loudspeaker' conditions. While I made no attempt to keep to a selected batch of records, I did maintain consistency from system to system by keeping a number of records the same from one review to the next – but not always the *same* two or three records. There were several reasons for this, though it had a lot to do with wanting to keep a fresh ear and brain for each review. The clincher though is the often forgotten fact that records simply don't sound the same if you use them a lot, especially if that heavy use is concertinered into a short timescale. The consistency you might expect to get from keeping to just a few records for all the tests is an illusion!

EQUIPMENT USED FOR LISTENING TESTS

Rega Planar 3 turntable
Ortofon Concorde 10 and Nagaoka MP-15 cartridges
Rotel RA-820 and RA-820B amplifiers
Kef Coda III loudspeakers

This system is representative of good quality, medium price record playing systems. The loudspeakers, which were used with each system tested, are relatively easy to drive and efficient, as well as fitting the bill on sound quality grounds.

In addition, a **Marantz ST-8** tuner was used as a point of comparison for the AM tuner listening tests, as it has a particularly good AM performance. Two Compact Disc players were also employed throughout the tests. These were a **Marantz CD63,** used for part of the tuner listening tests, and a **Sony CDP-101,** which was used as a music source for part of each amplifier and cassette deck listening test.

PROGRAMME MATERIAL

Musical programme used for the listening tests included the following:

Records

Mahler Symphony No 6: Barbirolli/New Philharmonia (CFP 4424)
Britten Young Person's Guide: Britten/LSO and ECO (Decca SXL 6450)
Carmen in Paris: Barenboim/Orchestre de Paris (EMI ASD 2915)
Praetorius-Dances from Terpsichore: Praetorius Consort (CFP 40335)
Schubert Sonata D959: Arrau (Philips 6514 368)
Mendelssohn Fingal's Cave Overture etc: Peter Maag/LSO (Decca SPA 503)
Star Wars: Charles Gerhardt/National Philharmonic (RCA Gold Seal GL13650)
Nils Lofgren: 'Cry Tough' (A&M AMLH 64573)
June Tabor: 'Ashes and Diamonds' (Topic 12TS360)
Duke Ellington: 'Unknown Session' (CBS 82819)

Compact Discs

Schubert Songs: Elly Ameling (Philips 410 037-2)
Shostakovitch Symphony No 5: Haitink/Concertgebouw (Decca 410 017-2)
Bruckner Symphony No 4: Kubelik/Symphonie-Orchester des Byerischen Rundfunks (CBS Sony 38DC 6)
Peter Gabriel: 'Peter Gabriel' (Charisma 800 091-2)

Pre-recorded cassettes

Verdi/Mozart (sampler): Chailly/Ashkenazy etc (Decca BASF 1)
Liszt Ungarische Rhapsodien/Szidon: (DGG 3371018)
Chandos Sampler

Acknowledgements

First of all, my thanks to Robert King, who conducted the measurement programme for me. For loan and hire of hi-fi units and test equipment, thanks are due to Steve Harris of Marantz Audio *(no relation! – Ed)*; Farad Azima of Mission Cambridge; John Reddington of Ortofon UK; David Inman of Kef Electronics; and Stan Curtis of Jelgate Ltd.

Last but not least, thanks to my family, and especially to my wife Kathy, for perseverance (in the face of 50 complete systems) beyond the call of duty.

Aiwa V-300

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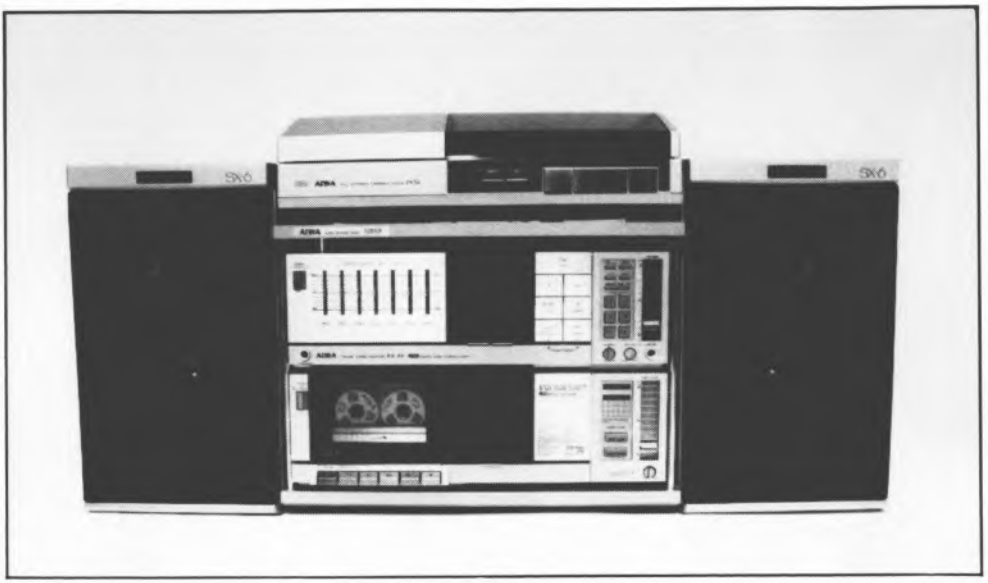


Based on LP-jacket-width components, the V-300 system also uses the space-saving idea of integrating the amplifier and tuner into a single receiver unit. So two pieces of equipment only are needed to provide the functions of a tuner, cassette deck, amplifier — and clock/timer. A neat tabletop housing accommodates this superbly finished equipment, and supports the turntable, which is the same width as the rack. Loudspeakers type SX-6 (as for the V-600 system) are optional, and the amplifier incorporates a 7-band graphic equaliser.

Turntable PX-30

This neat, fully automatic turntable is belt-driven from a synchronous motor. Fine speed control is not available — pity, as on test the turntable ran fully 1.8% slow. The arm is an unusually short device, with the arm tube offset from the pivot, and this arm geometry produced some distortion at the end of a record side. The deck had operational shortcomings too — it was extremely prone to external disturbance and even when well supported it went into 'howlaround' feedback at quite moderate sound levels, especially with the bass raised using Kef Codas. Additionally, the counterbalanced lid failed to remain in its open position unaided. The cartridge has a relatively sharp frequency response lift at high frequencies (+4dB at 20kHz), but was quite flat elsewhere. The arm/cartridge resonant frequency was found to be at an unusually high frequency (18Hz) which may be a contributory factor towards the player's excitability and readiness to enter self-sustaining feedback.

Cassette deck FX-30

Similar in a number of ways to the cassette section of V-600 system, the FX-30 differs principally in having less sophisticated controls and manual record level settings. The light-acting transport controls mechanically 'latch in', and cover the normal functions plus 'cue' and 'review' (fast forward/rewind with 'play' left engaged, allowing you to hear the tape speeded-up).

Metal/Chrome/Ferric tape switching is automatic, Dolby B and C noise reduction systems are provided — and a 'fine bias' control can be used to adjust high-frequency record/playback linearity to suit different tapes. The recommended settings were substantially inaccurate, we found, but a 'straight line' flat response can be achieved by appropriate tweaking of this control (it's easy to do by ear). Otherwise, the deck behaved well.

Receiver RX-30

This attractive product has a synthesiser tuner

with six pre-sets on FM, and six on AM (MW or LW). The tuning display is augmented by a seven-digit LED display of received signal strength, though this gives high readings at low received signal levels, showing six LEDs at 100μV/75ohm.

The amplifier section includes a seven-band graphic equaliser, providing ±10dB boost and cut, centred on seven frequencies, starting in the bass with 40Hz and 125Hz, and ranging up to 15kHz in the treble.

Loudspeakers: SX-6

Colour apart — the V-300's speakers are black to match the rest of the equipment — these speakers are indentical to those described in the V-600 review, and give similar measurements and sound quality. It seemed like a good idea to try improving the sound of the speakers, at least to a first approximation, by setting the inverse of the speaker's in-room frequency response on the graphic equaliser sliders. In fact the experiment was a total failure. The sound was if anything worse, with the speaker's resonant problem areas just as audible as before. However, using the equaliser for subtle response shaping with better speakers, such as the Kef Codas gave not unpleasing results.

In use . . .

Like the other Aiwa systems, the V-300 is extremely attractive and well finished; the timer, which can be used to make unattended recordings from the built-in tuner adds to its versatility. On audition it proved not very dissimilar to the V-600, though the cassette deck was a considerable improvement in that the FX-30's variable bias control did at least allow recordings to be made that were tonally neutral — but this control didn't operate on the Metal setting and so Metal tape was, consequently, unsuitable for high quality recordings on this deck.

Although the tuner had some synthesiser buzz as part of its background noise, it wasn't too disturbing in use, and FM sound was satisfactory in general, though a little on the thin and 'splashy' side of neutral. The turntable though was unsatisfactory. It had a rhythmically lax, 'slugged' sound, and although the cartridge had an open, analytical midrange performance, records sounded very coloured and 'slack', with apparent exaggeration of record surface noise.

Conclusion

There is a lot to recommend this system; not least its superb build and finish quality, and the useful additional features — notably the clock timer. At the end of the day though, the V-300 seems to fall between two stools. It lacks the depth of automation, scope of facilities and compactness of the V-600, and neither does it offer the sound quality of some other, more simply equipped systems at the price. Likable then, but below average for performance. The loudspeakers cannot be endorsed at all.

GENERAL DATA

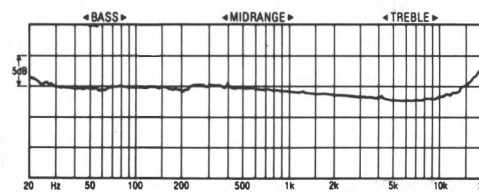
Amplifier: part of receiver, RX-30
Power output, per channel, at 1kHz ..... 26 watts

Record deck: PX-30
Speed variations (wow and flutter) 0.1%
Speed drift ..... average
Speed accuracy ..... 1.8% slow
Arm/cartridge resonant frequency ..... 18Hz, too high
Cartridge channel balance ..... within 0.2dB
Cartridge channel separation (crosstalk) ..... – 28dB
Cartridge tracking ability at 2g downforce 77μm

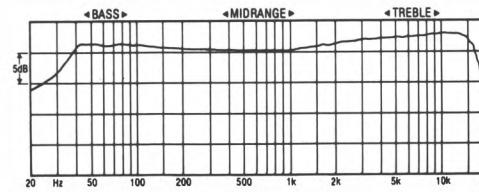
Cassette deck: FX-30
Tape used for tests ..... TDK SA (maker's recommendation)
Frequency response ('chrome' or 'II' position) .. 34Hz – 19kHz
Speed variations (wow and flutter) 0.08%
Speed drift ..... very good
Signal-to-noise ratio, with Dolby B 60.5dB
Distortion at OVU, with Dolby B 0.6%

Tuner: part of receiver, RX-30
Sensitivity ..... average
Signal-to-noise ..... poor

General
Maximum volume level in room (typical, with SX-6 speakers supplied) 98dBA
System dimensions (w x d x h) ..... 36 x 33.5 x 37.5cm
Speaker dimensions (w x d x h) ..... 19 x 26.5 x 32.5cm
Price ..... £350 (inc speakers, £400)



Disc: frequency response with cartridge supplied



Cassette: record/replay frequency response

Aiwa V-600

Aiwa Sales & Service (UK) Ltd, 163 Dukes Road, Western Avenue, London W3 0SY
Tel 01-993 1672

Almost in category of its own, the Aiwa V-600 is a complete system in miniature. It offers a high degree of automation — though not remote control. The cassette, tuner and amplifier are all built into a single midi-size 'casseiver' unit, barely wider than an LP sleeve, and the turntable, which is of similar width, can be sat on top, or alongside. There is no rack, and with this arrangement none is needed for shelf top use. Loudspeakers are optional.

Turntable LX-70

The LX-70 is a compact linear tracking turntable, direct-driven and incorporating a fine speed adjustment control. The turntable offers full automation, including a track selection facility. This allows up to seven tracks to be pre-selected for replay — or dubbing on to cassette — in any order.

Automatic speed selection — with manual override — is also provided, and the deck is therefore effectively 'grannyproof'. A number of other automatic features are fitted, including an 'intro play' device which plays the first few seconds of each track.

The fitted, non-interchangeable cartridge gave good separation but only moderate tracking ability measurements, and a response with a shallow drop in output spread over several octaves centered on about 4kHz. The turntable gave excellent wow and flutter and good drift characteristics.

Cassette/receiver CX-70

The tuner is a quartz synthesizer type, with six FM station pre-sets and another six to cover MW and LW. The received signal strength is indicated on a seven-LED display, and this has a variety of other functions, including that of a 'tape remaining' indicator (approximate values only) when recording, and power output indication at other times. As a cassette deck, the CX-70 recognises automatically the type of tape inserted (Ferric, Chrome or Metal), and no manual tape type selection is provided, so beware older tape types without the appropriate sensing lugs. Record levels are also set automatically, a built-in limiter preventing overrecording, so the deck is very easy to use, with very smooth-acting powered controls. Dolby B and C noise reduction systems are fitted. The amplifier section gave 26watts/channel output on test, though this was not maintained at the lowest frequencies.

The tuner worked well, AM sound being just slightly dull tonally, whilst FM had acceptable sensitivity and noise levels. There were some background buzzing and whistling noises,

though, of the type often associated with synthesiser tuners. The amplifier, despite its limited low-freqency output, was able to drive the supplied speakers to a high 99dBA in our subjective maximum-volume test in the listening room.

Loudspeakers SX-6

Immaculately finished, these loudspeakers have two paper cone drive units and a four-element crossover fitted into a smallish, sealed cabinet. The makers suggest placing them against or near a wall, but in our view this did not prove beneficial in use. Cabinet construction is light, and uses a plastic moulded baffle assembly.

The speakers' measured frequency responses proved extremely ragged, being dominated — on audition as on paper — by the 5kHz output peak, associated with the crudely-engineered tweeter fitted.

In use . . .

Setting the speakers aside, the V-600 system gave surprisingly good results, though it falls short of meeting normally accepted criteria for high fidelity in some areas. Thus the amplifier has an open, 'honest' if somewhat inarticulate, 'mechanical' sound; whilst bass performance was thought very shallow. The tuner exploited the amplifier's capabilities well, as did the turntable which performed much better than the majority of rack system turntables we have tested. Records reproduced with tidy, well controlled sound, the cartridge adding a slight 'lispy' colouration and just occasionally mistracking.

The tuner had a slightly 'splashy' feel at high frequencies, and showed some loss of information — recorded ambience especially — on the bench generator loop test. But sound quality was basically more than acceptable, except during very quiet passages or breaks in broadcasts where the background buzz was audible if the volume control was set high.

Cassette sound quality was clear, stable and articulate, but very bright (especially with Dolby C, which produced audible 'pumping' effects at low levels) on all tape types. Clearly factory alignment is substantially in error. Note that the cassette will not give a signal for dubbing on an external recorder. The real disappointment though was the loudspeakers, which cannot be recommended. They have a thin, raw sound, and produce odd 'phasey' effects with movements of the listener's head. The V-600 is available without speakers, and this is clearly a better option in our view.

Conclusions

Loudspeakers apart, the V-600 works very well. The control logic will take a while to learn, but having done so the inherent flexibility and simplicity of operation make this system an attractive proposition. Its special features make it especially suitable for use as a second system, say in the bedroom, but I suggest Aiwa should attend to cassette deck bias settings which were badly wrong on the review model.

GENERAL DATA

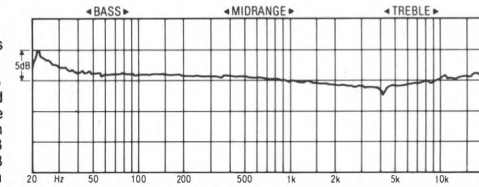
Amplifier: part of casseiver, CX-60
Power output, per channel, at 1kHz . . . . . 26 watts

Record deck: LX-70
Speed variations (wow and flutter) 0.06%
Speed drift . . . . . good
Speed accuracy . . . . . user adjustable
Arm/cartridge resonant frequency . . . . . 19Hz, too high
Cartridge channel balance . . . . . within 0.4dB
Cartridge channel separation (crosstalk) . . . . . – 30dB
Cartridge tracking ability at pre-set downforce 60μm

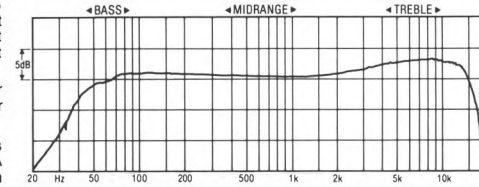
Cassette deck: part of casseiver, CX-60
Tape used for tests . . . . . TDK SA90 (maker's recommendation)
Frequency response ('chrome' or 'II' position) . . . . . see text.
Auto record level prevents accurate LF sweep measurement
Speed variations (wow and flutter) 0.05%
Speed drift . . . . . excellent
Signal-to-noise ratio, with Dolby B . . . . . see text
Distortion at OVU, with Dolby B . . . . . see text

Tuner: part of CX-60
Sensitivity . . . . . fair
Signal-to-noise . . . . . fair

General
Maximum volume level in room (typical, with SX-6 speakers supplied) 99dBA
System dimensions (w x d x h) . . . . . 33 x 33 x 20cm
Speaker dimensions (w x d x h) . . . . . 19 x 26.6 x 32.5cm
Price . . . . . £350 (inc speakers, £400)



Disc: frequency response with cartridge supplied



Cassette: record/replay frequency response

Aiwa V-700

Aiwa Sales & Service (UK) Ltd, 163 Dukes Road, Western Avenue, London W3 0SY
Tel 01-993 1672

This shelf-top system is near the top of Aiwa's V-series range, and incorporates a separate tuner, amplifier and cassette deck — the others being based around receiver or casseiver combinations — see V-300 and V-600 reviews. The electronics of all three systems have much in common, though the optional SX-7 loudspeakers suggested by the manufacturer for the V-700 are quite different to the SX-6 models used with the other systems. The V-700 is supplied complete with a attractive, well-finished and easy to assemble shelf housing in a black laminate to match the rest of the equipment. The quality of finish in this, as well as the other Aiwa systems is absolutely immaculate and the 'no spaghetti' wiring system eases installation considerably.

Turntable LX-70

This direct-drive, fully automatic linear tracking turntable is identical apart from the black finish to the model supplied with the V-600 system.

Cassette deck FX-70

A Dolby C cassette deck, the FX-70 has a superbly smooth operating transport control panel and good meters. Using special additional connections to the rest of the system, the deck incorporates a number of user features designed to simplify operation. Recording is initiated merely by pressing the record button corresponding to the source being recorded from, an action which when taping from records starts the turntable on its auto cycle, holding the cassette in 'record pause' mode until the arm descends to play the record.

Tape type identification is automatic, and in addition to a number of track-location functions, the deck incorporates a fine bias control for ferric tapes only so that a flat responses can be achieved.

Tuner TX-70

Essentially similar to the tuners in the other Aiwa systems, the TX-70 has six AM and six FM pre-sets, the former allocated to MW and LW stations according to the user's requirements. The tuner has interstation muting (with a variable threshold level, a feature of the V-300 and V-600 too), a five-LED signal-strength meter and switchable 'high blend' which reduces stereo separation and therefore noise on weak signals.

Amplifier MX-70

A compact design, the MX-70 incorporates a power level meter and excellent ergonomics, in part because all the minor controls — bass,

treble, balance and microphone mixing with an associated mic input — are hidden under a flap. on test, the amplifier gave 30watts per channel into an 8ohm load; whilst maximum usable volume, using the SX-7 loudspeakers supplied, was assessed at 98dBA

Loudspeakers SX-7

In many ways, this loudspeaker is built like a 'beefed up' SX-6, the driver complement being similar (a cone bass and large cone tweeter wired via a four-element crossover), but the enclosure size is rather larger.

Measurements of the SX-7 show it to have much the same broad frequency response trend as its cheaper cousin, except that there is significantly more energy in the 200-400Hz region, and the massive, dominating peak at 5kHz has been eliminated — a much better result overall.

In use . . .

Not surprisingly, record reproduction was much like the V-600 when using the Kef Coda loudspeakers. Mistracking was less noticeable with the V-700 though, in line with a better measured tracking ability result. Music via records veered to the 'dry' and 'thin' side of neutral, but the sound was basically well controlled and gave a stable stereo presentation.

FM radio was good too. The sound had a slightly bright and 'unfocused' sound at times, especially where a lot of high frequency information was present, and this was associated with a marginal loss of tonal colour. Results were well up to average though, and the synthesiser buzz was at a low enough level to be essentially innocuous.

Assessing the cassette deck performance though, proved rather problematical. This was not because of any identifiable shortcoming in the qualitative sense: on the contrary, cassette reproduction was clean, detailed and had a good stereo soundstage. It was the 'toppy' frequency responses on Type II and IV tapes that caused the problems which included a rather brittle, bright balance, and Dolby noise pumping — especially using Dolby C. Only ferric tapes could be made to reproduce with flat frequency responses, and these sounded very fine indeed — as did pre-recorded cassettes. Finally, the loudspeakers proved to be a significant limitation on system quality, though their colorations were relatively innocuous overall.

Conclusion

The V-700 really offered little more than the cheaper 'V' systems apart from better (but still poor) loudspeakers — system performance is otherwise similar. Choose your own speakers is again the best advice here; but even so the V-700 system is considerably more expensive than the other systems in the range, and the potentially very useful clock/timer is omitted. In any case, if our samples were typical, Aiwa should tighten up their cassette deck alignment procedures.

GENERAL DATA

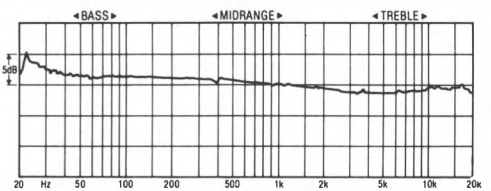
Amplifier: AX-70
Power output, per channel, at 1kHz . . . . . 30 watts

Record deck: LX-70
Speed variations (wow and flutter) 0.07%
Speed drift . . . . . good
Speed accuracy . . . . . user-adjustable
Arm/cartridge resonant frequency . . . . . 17Hz, too high
Cartridge channel balance . . . . . within 0.6dB
Cartridge channel separation (crosstalk) . . . . . – 26dB
Cartridge tracking ability at pre-set downforce 80μm

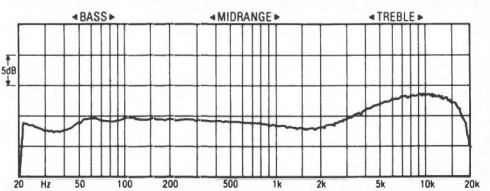
Cassette deck: FX-70
Tape used for tests . . . . . TDK SA (maker's recommendation)
Frequency response ('chrome' or 'II' position) . . 20Hz – 18kHz
Speed variations (wow and flutter) 0.07%
Speed drift . . . . . very good
Signal-to-noise ratio, with Dolby B 61dB
Distortion at OVU, with Dolby B 1.7%

Tuner: TX-70
Sensitivity . . . . . average
Signal-to-noise . . . . . average

General
Maximum volume level in room (typical, with SX-7 speakers supplied) 98dBA
System dimensions (w x d x h) . . . . . 33 x 34 x 39cm
Speaker dimensions (w x d x h) . . . . . 21 x 21.5 x 37.5cm
Price . . . . . £430 (inc speakers, £500)



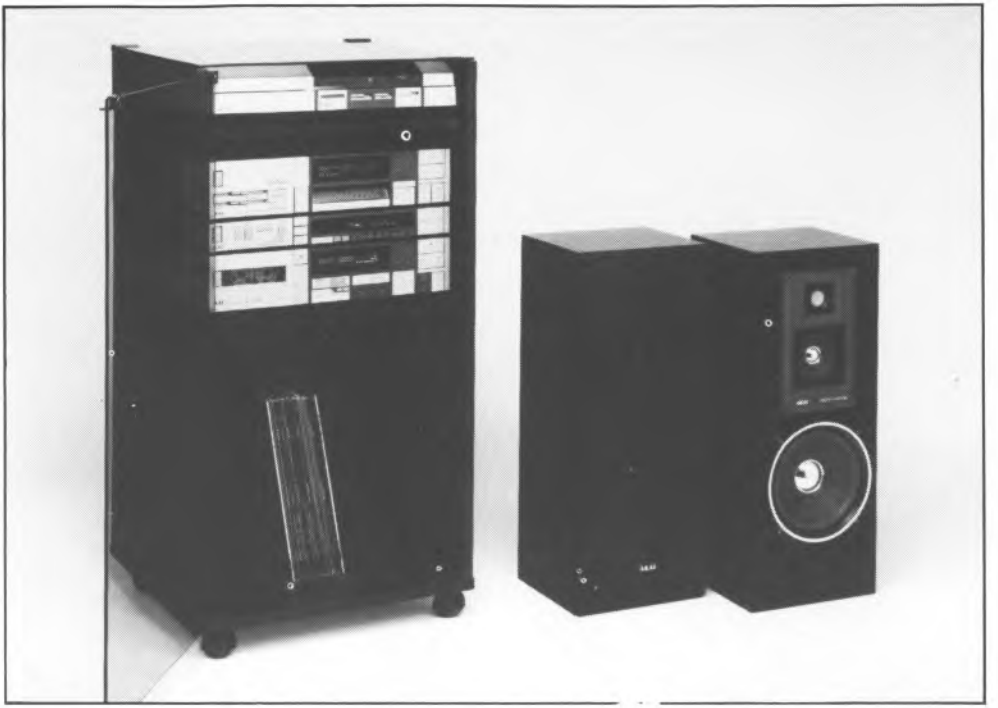
Disc: frequency response with cartridge supplied



Cassette: record/replay frequency response

Akai Pro E310

Akai (UK) Ltd, Unit 12, Haslemere Heathrow E state, Silver Jubilee Way, Hounslow, Middlesex
Tel 01-897 6388



Here is a futuristic-looking system, whose component fascias have been divided up into oddly-proportioned rectangles which perform the switching functions when lightly pressed. The amplifier sports a complex function display that graphically illustrates the current state of play — the source selected, which speakers are connected (useful for the deaf), the volume setting and so on.

The Pro-E310 comes with an options list as long as your arm. A system timer, for example, at £80, or a 10-band graphic equaliser at £70. There is an indoor powered aerial — not a total substitute for a loft or roof aerial, but a useful 'second best' for flat dwellers especially — which costs £40. A wired remote control for the cassette deck can be had for £20. An infra red one for the same purpose, but with additional facilities, costs about £90. The SR-HF5 speakers are not optional but compulsory.

One final extra for the Akai is their CD-D1 Compact Disc player, a full-features product that costs an additional £550. The item was not supplied for review.

Turntable AP-D3

Full arm set-down and end-of-side return is the main feature of this player. The direct-drive motor is coupled to a platter of medium-to-low mass, which in turn is fitted with a thin flat rubber mat. The plinth is of medium weight and rather resonant construction. The arm, finally, is a straight one with an offset detachable plastic headshell. There is an undesirable lack of rigidity at both ends of this structure, in the form of free bearing play and flexibility in the headshell and arm/headshell joint. The lid is unusual in being opaque — finished in the stippled silver plastic used for the player Plinth — except for a transparent plastic window over the arc traced across the disc by the stylus. The lid can be left off when the deck is used within the rack housing. The AP-D3 proved excessively microphonic and susceptible to acoustic feedback in the deep bass area for a player in an up-market system such as this one.

Tuner AT-S3

Here is an attractively laid out slim-line FM,

MW and LW quartz synthesiser tuner. It has a particularly clear layout of controls and displays which once learned should cause few operational headaches. Eight buttons gave a total of 16 pre-sets via a pair of 'shift' keys. Usefully, Akai have left the choice of which waveband to associate with which preset entirely to the user. There is no restriction — you can, if you wish, use them all for FM transmissions, or omit LW altogether.

In one sense at least the AT-S3 performed rather better than normal: FM was completely free of the synthesiser induced 'hash' and whistles so common elsewhere. The ultimate background hiss levels were very low given a strong enough signal (well above 1mV), but sensitivity was no better than average, Strangely, the muting (output silencing for interstation noise and very weak signals) was set to a very high level — the tuner is just 'switching on' at the 100μV level, which would suggest that this is not the tuner for exploring very weak, long distance transmissions. However, this may have been a sample fault.

Long and medium-wave AM sound quality was rather 'hard' and bass-light, but interference — mostly in the form of various high pitch whistles — was moderate. This tuner offered no way of checking the incoming signal strength on AM or FM.

Cassette deck HX-3

Akai's designation 'HX' does *not* imply the fitting of the Dolby HX system — but this deck is equipped with Dolby B and C noise reduction. It's also a very well thought out deck with an individualistic and highly satisfying control layout. A comprehensive display shows operating status (type of tape inserted, Dolby B or C, record/pause or record modes) and includes an LED type digital tape counter in addition to the usual record level indication. Tape type sensing is fully automatic. Curiously, the Akai is one of the few cassette decks from current rack systems not fitted with a track location system; but considering how unreliable these systems can be when faced with classical, jazz, folk music or even speech containing prolonged quiet passages, perhaps Akai have made the right decision. In any case its absence is more than made up for by the counter memory-triggered stop, repeat and auto-play functions.

This cassette deck proved reasonably well set up, but I was slightly disappointed to see the high-frequency roll-off which starts at 15kHz, presumably due to the MPX filter. This filter is there to prevent spurious 19kHz pilot tone signals from a tuner affecting operation of the Dolby circuitry when recording, but in a high-cost system the MPX filtering ought to be switchable so as not to affect high frequency performance (however marginally) from other sources. This small point aside, the deck worked well, with particularly pleasant control feel. The wow and flutter is partly cyclic in nature, which suggests a slight fault on the sample tried and so perhaps the result is not typical.

GENERAL DATA

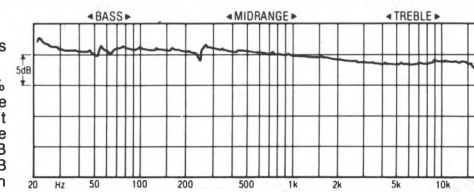
Amplifier: AM-U3
Power output, per channel, at 1kHz ..... 55 watts

Record deck: AP-D3
Speed variations (wow and flutter) 0.07%
Speed drift ..... average
Speed accuracy ..... speed correct
Arm/cartridge resonant frequency ..... 11Hz, acceptable
Cartridge channel balance ..... within 0.4dB
Cartridge channel separation (crosstalk) ..... – 28dB
Cartridge tracking ability at 2g downforce 80μm

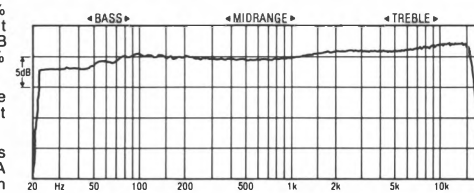
Cassette deck:
Tape used for tests ..... TDK SA (maker's recommendation)
Frequency response ('chrome' or 'II' position) .. 20Hz – 16kHz
Speed variations (wow and flutter) 0.14%
Speed drift ..... excellent
Signal-to-noise ratio, with Dolby B 61.5dB
Distortion at OVU, with Dolby B 0.8%

Tuner: AT—S3/L
Sensitivity ..... average
Signal-to-noise ..... excellent

General
Maximum volume level in room (typical, with SR-HF5 speakers supplied) 101dBA
Rack dimensions (w x d x h) ..... 49.5 x 46 x 95cm
Speaker dimensions (w x d x h) ..... 25 x 23 x 61.5cm
Price ..... inc speakers, £590



Disc: frequency response with cartridge supplied



Cassette: record/replay frequency response

Amplifier AM-U3

Power output of this amplifier was above that specified by Akai at 55watts/channel, and it was able to drive the supplied SR-HF5 loudspeakers to a healthy 101dBA. Two pairs of loudspeakers can be driven, independently or together.

If you've followed the story so far you'll not be surprised to hear that the amplifier incorporates a comprehensive display panel to tell you what source is selected, the position of the balance control, the output level and a few other things besides. There is no volume control as such, just a strip that is set by touching a point along its length — plus a rear panel control to set maximum volume output — useful with children! I didn't like the 'strip' volume touch control: there were too few, too widely-spaced steps in my opinion, and in any case the system was a bit erratic in following instructions.

Loudspeakers SR-HF5

Loudspeakers as supplied with rack systems all too often employ pretty basic design and construction principles. Akai have at least attempted something rather more ambitious here. There are three drive units: a pulp-cone bass unit, a similar but smaller midrange unit and a flat diaphram tweeter of unspecified construction. The box is heavy and well built, and the drive units well sealed against air leaks. Akai's efforts have not resulted in a speaker with a particularly smooth measured frequency response though — we noted a sharp 3.8kHz output peak.

In use . . .

For many years Akai's reputation was based primarily on its tape recorders. And it's the tape recorder, or rather the cassette deck, in this system that is its strongest feature. Recordings made from the other system components came over as extremely 'solid' and clean-sounding, the deck not detracting noticeably from stereo stability and depth, the weight and control in the bass or the general clarity of the original. There was just a slight 'rawness' or confusion noticeable with some musical material, but the effect was slight and entirely consistent with the nature of the cassette medium. Pre-recorded cassettes were very slightly dulled, presumably due to a minor record/playback head azimuth misalignment which should if necessary be quite easily correctable by the dealer.

Of the other sources, the turntable was the less satisfactory. Indeed this component seems rather out of place in this system with its generally woolly and vague sound quality, though the sound was more tonally neutral than was often the case due to a better than average cartridge. Particularly revealing was the way the player responded to loud passages by changing in sound character — becoming looser and more diffuse in feel — instead of just louder.

The tuner was rather better than this, though again there were shortcomings. Here the sound displayed a cold, rather mechanical feel with some obvious loss of detail and stereo separation at high frequencies. Overall its performance could be said to be average, but no better.

The major disappointment though was the performance of the loudspeakers supplied. They were, it is true, much better than those supplied with many rack systems, but they failed to meet a standard appropriate to the price, and Akai's decision not to market the system without them therefore seems unfortunate. Although not prominent in level, the bass had a rich, coloured feel, and an assertive character overall that made Compact Disc reproduction (using a Sony player in this case) especially aggressive and unpleasant. There were nasal effects, and the speakers lent a peculiar sound to much of the female vocal material as though the sound was coming from the roof of the mouth. Worst of all though was the obvious 'phasiness' through the midrange — a consequence no doubt of poor integration between the three drivers — and the 'tizzy' feel in the treble, an effect that corresponds to the treble peak noted from the measurements.

Conclusion

Certain conclusions are inevitable here. Akai's successful concentration on aesthetics, apart from making the cassette deck nearly indistinguishable from the amplifier from a distance, helps to conceal what is in effect a rather ordinary audio performance. Even the attractive control layout is not quite as innovative as it first looks; it's really no easier to see the operational status of the equipment from the comprehensive illuminated displays than it usually is from looking at the controls, and certainly these gadgets have swallowed up a significant percentage of the budget. Finally, the loudspeakers are clearly not up to a standard of sound quality appropriate in a system of this cost.

Amstrad TS81 (TS80 Mk II)

Amstrad Ltd, 1-6 Garman Road, London N17
Tel 01-808 4505

Amstrad claim the largest share of the rack system and hi-fi market – 36% by their reckoning at the time of writing. The model reviewed here is of quite recent design, and was chosen because it is probably the biggest selling model in the range. It comes complete with a basic infra-red (wire-less) remote control unit which has the following facilities: volume, balance, bass, treble, sound on/off and 'normal' which places the tone controls and balance in their flat or central positions, and the volume to an average, factory-set level.

The sample TS81 reviewed here was purchased by *Hi-Fi Choice* from a branch of Currys, as Amstrad did not wish to supply one for review. The TS81 is the Curry's numbered version of the TS80. Amstrad confirmed that the TS81 is identical in all respects to the TS80 Mk II which is the version available through other Amstrad dealers.

The rack housing, supplied pre-assembled apart from the door, is solidly built but of relatively poor finish quality. The door and lid do, however, have their corners protected by the rack housing itself, a good safety feature. A neat feature is the pictorial 'prompt sheet' which included a telephone number for technical assistance in the event of difficulties.

Turntable section

Made for Amstrad by BSR, the belt-driven record player has a one-piece plastic lightweight platter; there is no separate mat. The arm is also made from plastic, the construction and bearings allowing significant flexure. The cartridge is a ceramic device of much lower inherent quality than the magnetic types fitted to more expensive systems. The cartridge cannot be changed for a magnetic one, as the amplifier here is not designed for the lower output voltage of magnetic types. The deck functions manually – there is no auto-return.

Cassette deck section

Basic transport facilities are provided here, using very stiff mechanical latching controls. The deck claims to be suitable for metal tape, and whilst this is justifiable as regards playback (the standard playback equalisation is the same for chrome and metal tape types, so no switching is needed), recording on Type IV metal tape requires a still higher bias setting than chrome, and hence a separate bias switch position, which the Amstrad doesn't have. Any 'metal compatible' claim is therefore misleading and should be withdrawn. In fact, the recorder is underbiased for Type II (chrome position) tapes, giving the quite absurd response shown, and is best suited to ferric types. Even here the results were found uneven and extremely hissy. The 'Noise Reduction' controlled by another switch is not a noise reduction system of the Dolby type; it's a simple (and rather brutal) low-pass filter, no more. It cuts the treble content of the music as well as reducing hiss. Note the 30dB signal/noise performance for 3% distortion – worse than many portable cassette players.

Tuner section

This is an FM, MW and LW tuner with a clearly-marked scale. However, the calibration was found to be inaccurate when tuning to the output of the FM test signal generator. I eventually found images of the generator transmission (placed at 100MHz) all over the dial. I settled on a scale reading of 95.5MHz as offering the best sound, but reception – even using a high signal level from the generator – was still extremely hissy and distorted. AM reception quality was much better, with medium interference levels.

Amplifier section
In addition to the tone controls on the remote handset, the amplifier has a seven-band graphic equaliser and a 'loudness' function – plus 'high' and 'low' filters and a stereo/mono switch. The system is less well equipped with inputs; there is no feed for an external tape recorder for example. The only inputs accepted from the outside world are microphones. Power output could not be measured conventionally due to mic input clipping problems; the 7 watts 1kHz output being measured from a test tone on a record. A very low 90dBA subjective maximum usable volume was recorded using the Amstrad loudspeakers.

Loudspeakers
Internal examination of these speakers proved impossible without risk of damaging the cabinets. They are of lightweight build and contain three cone drivers mounted behind the baffle. There is no significant bass output below 100Hz, but the response is otherwise fairly smooth as measured to a low 10kHz upper limit.

In use . . .
Easily the best performing section of the system is the turntable. Even so, records sounded 'crude', 'mechanical' and 'boxy', with continuous rumble and hiss to accompany the music. Cassette reproduction was also accompanied by horrific amounts of hiss. Stability of high frequency output was a problem, especially in the first few moments of use. Pre-recorded cassettes gave a reasonably neutral playback response and ferric cassettes worked better than chrome or metal types, but the sound was still very 'peaky' and thin. Metal tapes gave an incredibly thin, bass light sound on test, with noise almost drowning the signal (with the record level indicators well into the red overload zone on peaks!). No serious evaluation of sound quality from the FM tuner was possible due to constant RF reception problems akin to those described earlier in connection with the bench tests. What could be gleaned suggested that the basic FM sound character is extremely bright and thin, though not as bad as the cassette deck.

The loudspeakers, though, were much better than those supplied with many rack systems at the price. Despite a very coloured, nasal and phasey midrange and a warm, loose bass, there was a suggestion of treble clarity and – to a degree – neutrality. This only served to highlight the shortcomings elsewhere, unfortunately.

Conclusion
In my judgement, this system's sound quality is unacceptable using any reasonable criteria of assessment, price included. The cassette deck and FM tuner in my view are especially weak performers, and the electronics generally are very poor indeed. These comments may seem harsh in view of the unit's low price, but should be compared with those made on other models in same class.

GENERAL DATA

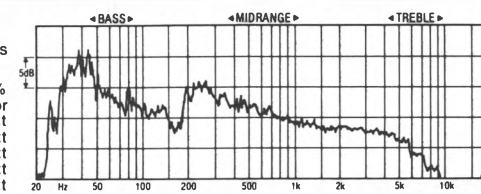
Amplifier: part of main unit
Power output, per channel, at 1kHz ..... 7 watts

Record deck: part of main unit
Speed variations (wow and flutter) 0.14%
Speed drift ..... poor
Speed accuracy ..... see text
Arm/cartridge resonant frequency ..... see text
Cartridge channel balance ..... see text
Cartridge channel separation (crosstalk) ..... see text
Cartridge tracking ability at g downforce ..... see text

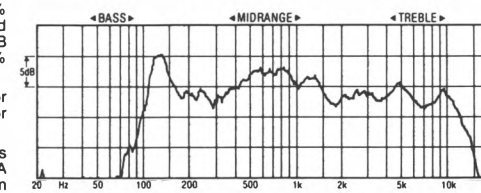
Cassette deck: part of main unit
Tape used for tests .... TDK SA (no maker's recommendation)
Frequency response ('chrome' or 'II' position) .. 700Hz – 9kHz
Speed variations (wow and flutter) 0.25%
Speed drift ..... good
Signal-to-noise ratio, 'NR' off 30dB
Distortion at OVU, 'NR' off 3.0%

Tuner: part of main unit
Sensitivity ..... poor
Signal-to-noise ..... poor

General
Maximum volume level in room (typical, with speakers supplied) 90dBA
Rack dimensions (w x d x h) ..... 42.5 x 39.5 x 84cm
Speaker dimensions (w x d x h) ..... 26 x 20.5 x 52cm
Price ..... inc speakers, £180



Disc: frequency response with cartridge supplied



Loudspeaker in-room frequency response

Bang & Olufsen Beosystem 2200

Bang & Olufsen (UK) Ltd, Eastbrook Road, Gloucester GL4 7DE
Tel (0452) 21591

This is the only music centre included in this edition, though of course the one-piece audio 'tower' systems could technically be described as 'music centres' despite their shape. Music centres have often been inexpensive, low-performance pieces of equipment, but this one, B&O say, 'is presented as a furnishing option, not as an alternative in sound quality'. In any case, the Beosystem is not cheap, so it doesn't fit the usual stereotypes.

To my eyes, the 2200 is without question the most elegant system tested, even though the list includes the Beosystem 5000 as well. It is a treat for the eyes, though its strong, uncompromising lines and unusual use of black and brushed aluminium will not suit all surroundings. All this you can see in the photograph; what you cannot see is the genuinely immaculate standard of fit and finish, and the smooth, 'Rolls-Royce' feel of the controls.

On a more functional level, the Beocentre 2200 includes the usual complement of record deck, cassette deck, tuner and amplifier. Loudspeakers were included for review, the system with speakers being known as the Beosystem 2200.

Only two small points offset the advantages of the 'all-in-one' design approach. First, the ability of the 2200 to communicate with the outside world, by plugging in external components, is strictly limited. Secondly, the scope for upgrading specific components in the future is strictly limited, though more expensive (B&O only) cartridges, or better speakers (from any manufacturer) can be accommodated.

Beocentre 2200: turntable section

In principle this turntable is not dissimilar to the one used as part of the more expensive 5000 system (see review). It is belt driven, evidently well-engineered and with good overall speed stability, although B&O's integrated design makes it impossible to carry out the usual turntable measurements. The drive system incorporates a split platter arrangement, the thin top platter sitting on, and being damped by, the sub-platter underneath which is driven by the belt. The player is fully automatic, including record

size/speed sensing (with speed over-ride, which allows you to play 12in singles), the arm movements being carried out at a fair rate of knots. Most automatic players are tortuously slow by comparision.

The cartridge's tracking ability measured very well, as did its stereo separation but note that these assessments required different test records to those normally used, and results are not strictly comparable to others in this book. Cartridge frequency response could only be measured indirectly by using the B&K QR2010 system test record, which includes the pre-amplifier in the test 'loop'.

Cassette deck section

A neat and uncomplicated mechanism, this cassette section has most of the features of a separate cassette deck including auto tape-type sensing (which for some reason only works on ferric or chrome-bias tapes, so you need to switch manually to metal), Dolby B-only noise reduction. Manual record level setting is provided, along with clear, easy to read bar-graph meters. The meters' 0VU setting corresponded to 3% distortion of TDK SA (Type II) tape, so this point should not be exceeded when recording. On test, the tape deck gave a basically well-tailored frequency response, with a mild depression in the midrange. Operational facilities include a 'next' button, which looks for the next programme gap and resumes play from that point, but there is no tape counter. Light-touch controls are used for all transport functions, and you can switch from fast wind directly to play and vice versa without stopping the tape.

Tuner section

Although this is an analogue tuner (using a rather difficult-to-decipher map-like tuning scale), four pre-sets are included for FM use only. When under power, the right-hand black panel section lights up to give the tuner information. No signal strength meter is incorporated. There is a minor background whistle on FM, but even taking this into account, the B&O is an unusually quiet tuner, and a sensitive one too. AM (LW and MW) interference levels are low too, but sound quality here was rather wooden and harsh, with very poor bass and treble extension even by AM standards.

Amplifier section

Source switching is automatic — press 'phono', for example and the record starts and is connected to the amplifier. A front-panel five-pin DIN socket allows an external piece of equipment to be monitored over the speakers, but only with the cassette deck in 'record' mode. It also supplies a signal from the system for an external tape recorded. The input characteristics made it difficult to measure true power output (under test conditions the tape copy input overloads at some frequencies before the power amplifier) but the figure is inferred to be around 22watts.

Loudspeakers: Beovox X25

This is a compact two-way loudspeaker with

GENERAL DATA

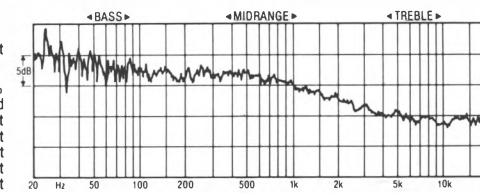
Amplifier: part of Beocentre 2200
Power output, per channel, at 1kHz ..... see text

Record deck:
Speed variations (wow and flutter) 0.10%
Speed drift ..... good
Speed accuracy ..... see text
Arm/cartridge resonant frequency ..... see text
Cartridge channel balance ..... see text
Cartridge channel separation (crosstalk) ..... see text
Cartridge tracking ability ..... see text

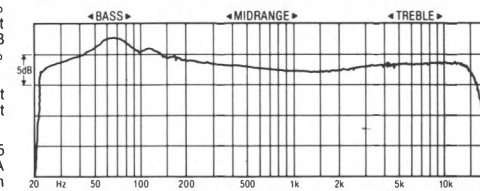
Cassette deck: part of Beocentre 2200
Tape used for tests ..... TDK SA (maker's recommendation)
Frequency response ('chrome' or 'II' position) .. 20Hz – 17kHz
Speed variations (wow and flutter) 0.09%
Speed drift ..... excellent
Signal-to-noise ratio, with Dolby B 64dB
Distortion at OVU, with Dolby B 3.0%

Tuner: part of Beocentre 2200
Sensitivity ..... excellent
Signal-to-noise ..... excellent

General
Maximum volume level in room (typical, with Beovox X25 speakers supplied) 92dBA
Main unit dimensions (w x d x h) ..... 24 x 9 x 32.5cm
Speaker dimensions (w x d x h) ..... 21.5 x 15.5 x 32.5cm
Price ..... £365 (inc speakers, £400)



Disc: frequency response with cartridge supplied



Cassette: record/replay frequency response

Bang & Olufsen Beosystem 2200

cone bass and treble units, a three-element crossover and a liberal filling of sound absorbent material inside the well constructed cabinet. The measured frequency response looks well tailored.

In use . . .

The cassette deck's lack of a tape counter is surprising and undoubtedly can be a nuisance. The system is otherwise pleasant to use, and to listen to.

Two interesting points emerged from audition. First, the cassette deck gives cleaner, more dynamic sound on Type II (Chrome position) tapes than on metal; though the sound is always a little soft and 'masked', it is certainly very stable. Second, the system as a whole has a slightly 'steely' character in the treble, attributable to the amplifier, though this was not enough to prevent the system from performing in a clean and relaxed way.

Maximum power output is clearly limited, and even within its limits the system is, I feel, hardly one likely to fire listeners' adrenalin — but records, tapes radio all provide evenly competent results. FM sound quality is extremely neutral and 'open' in fact, while the turntable gave a sweetness in the treble and a surefootness in the bass that was most impressive. The record player was not easy to 'catch out'; unlike many system turntables, it is well protected from shocks and feedback, though some occasional speed variations were noted on audition.

The loudspeakers proved excellent. Without pretending to plumb the depths of the bass region, and sounding very slightly 'shut in' in the treble, they gave crystal clear and unboxlike stereo and a well articulated sound. They're clearly a bargain.

Conclusion

An excellent no-hassle system, the 2200 can be heartily recommended. The only black marks concern the lack of a tape counter, and the fact that a fair percentage of the budget has clearly gone to elements of the design not directly concerned with sound quality. But the 2200 should last well and it gives a very acceptable if slightly undemonstrative sound, with a trace of 'transistory' glare in the treble. And its looks are stunning . . .

If you've ever danced the night away at the Hong Kong Hilton, The Heliopolis Sheraton Cairo, Cinderella Rockerfellers in Chicago, the Singapore Hilton . . .

Alright, so you haven't!

However, you may still have experienced a little of the atmosphere of these exotic nightspots right at home in your own front room.

For they are just a handful of top international clubs and discotheques who use the budget-priced KEF Coda III speakers.

Bookshelf hi-fi speakers in a discotheque? The idea sounds absurd. But not according to the company whose brainchild it is – The Juliana's Group.

Anyone in the club or hotel business will know that Juliana's are the world's biggest and most experienced discotheque company.

They supply a custom designed complete discotheque package, calculating the exact sound requirements, then designing and supplying a complete system of sound, lighting and video, much of it built themselves by their manufacturing company, Beam Electronics.

Beam were called in to overcome some of the problems in lighting Peter Stringfellow's extravaganza – the Hippodrome, London, designing and building a wiring loom that took some five miles of cable.

In an entertainment world that is becoming more and more hi-tech, innovative and spectacular, custom designing a complete sound system becomes increasingly complex.

So how do KEF Codas help?

Alex Munro, Technical Director of Juliana's London Division and Tony Hamza, Managing Director of Beam Electronics, explained:

"In the kind of international discotheque we're talking about, there are two distinct sound requirements.

One is the high energy sound we get from the big speakers on the dance floor itself. In hi-fi terms it is not a particularly accurate or a high quality sound. But it's there for dancing to, not listening to.

If this sound was directed at the whole area, it would become very irritating, because the volume would be too loud to talk over and because the high frequencies would get soaked up by the soft furnishing of the surrounding areas where you end up with a low-grade sound.

So we contain this high energy sound within the hard reflective surfaces of the dance floor itself.

Then we use a further sound system for the surrounding areas. This is where the KEF Codas come in. The sound here is of hi-fi quality. It still contains all the excitement of the dance floor sound, but at a less obtrusive level that you can talk over.

The art is not to have an obvious change-over point, so that the sound appears consistent throughout, although in reality it is quite different."

But can the small KEF domestic speakers really supply the volume, even at listening levels, in such large areas which are usually crowded with people?

"Certainly. We do, of course, use as many as we have to. In the Hong Kong Hilton, for example, we used seventy.

Also, we use them with a line transformer. This makes use of a big amplifier with a very high voltage output and a transformer close to each speaker. So we can totally control the power to each speaker, giving more volume or less wherever we need it.

By having more small speakers with individual control, we can achieve great flexibility. This is important because every sound system we design is a 'one-off', custom built for its particular location. And the smaller speakers are ideal because we can hide them and interfere as little as possible with the design and decor."

Juliana's have pioneered another entertainment concept which they call the Music Room. This is a multi-function lounge, bar, tea room and night club which runs from late morning until the early hours. A series of DJs provide music to suit the hour of the day, ranging from classical through to jazz to the late night disco music.

Again, KEF Codas and Chorales are used extensively.

"The quality of sound is particularly important here, especially in the quieter day-time hours. The music is an important feature. It is 'live' in the sense that it is being presented by a DJ. The ambience is crucial. It must have presence, but again without preventing or intruding on conversation."

Juliana's started using KEFs about a year ago. They now have hundreds in use and are ordering more all the time.

"We haven't had a single one back, which is quite a remarkable record. We have clubs and discotheques from Australia to the Arctic Circle and we have to service every one of them, so the reliability is a bonus. But really, the quality of sound is what we look for, and in a small speaker at this kind of price we haven't found anything to beat the KEF Codas."

FOOTNOTE:

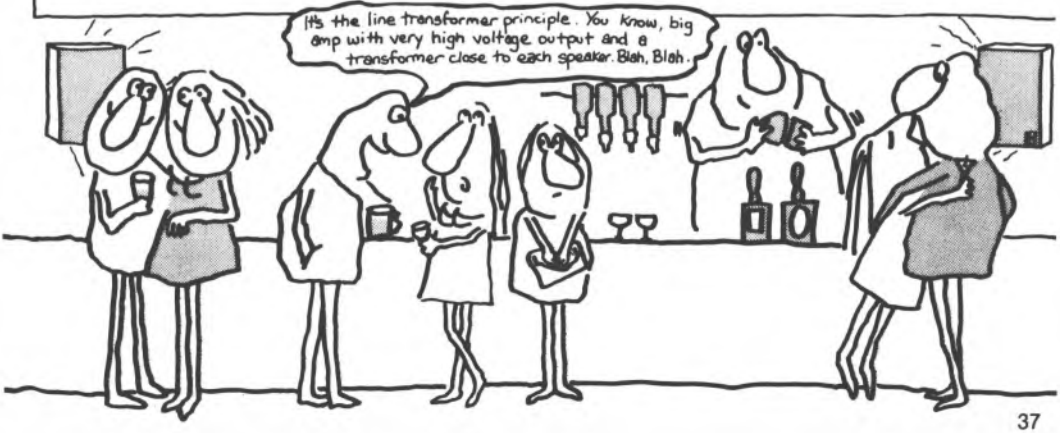
KEF Speakers have been manufactured for 22 years. KEF have the largest development and design team of any loudspeaker manufacturer and have been in the forefront of every important speaker development over the past two decades.

KEF speakers are internationally recognised as being the finest in the world and many of the leading hi-fi manufacturers have studied the KEF methods of testing and manufacturing at their Kent factory.

They range in price from £9,000 to less than £100 a pair, and KEF's continuous programme of advanced research and development benefits their budget speakers every bit as much as the professional studio models.

Any reader wishing to receive a complete information pack on KEF speakers should telephone, or write to the address below:

KEF Electronics Limited, Tovil, Maidstone, Kent ME15 6QP. Tel: 0622 672261.



Bang & Olufsen 5000 System

Bang & Olufsen (UK) Ltd, Eastbrook Road, Gloucester GL4 7DE
Tel (0452) 21591

Though still not common, the idea of adding remote control to an audio system is no longer a novel one. Usually remote control involves adding extra cabling between the units of the system, while the hand-held controller covers just the primary operating functions of the system — record player start and stop, selecting tuner pre-sets and so on.

With the System 5000, B&O have turned this concept on its head. It must be the first audio system to be totally built around the idea of remote control, which is achieved via the Master Control unit. All the important system controls are on here, including a number that are not fitted to the hi-fi units themselves — indeed in normal use few of the controls on these are readily accessible. But B&O's system does more than just this. The Master Control can also display graphically the status of each item from reports it receives via the system every time an operating command is executed. If you ask the 5000 system to start a recording, say, and there's no tape in the cassette deck, the Master Control will tell you so. It also give a graphic read-out of volume, balance and many other functions including the present time. The clock is associated with the timer which allows a week's worth of forward programming of up to 12 different instructions.

The 5000 system also allows the possibility of several sets of extension speakers in other rooms, up to four in all. In the future, slave power amplifiers will be available to extend this capability further. To prevent power amp overload when using extra speakers, the amp limits maximum output gently as its operating limits are approached. Extension speakers in another room are wired via a device called the Master Control Link, this having a small infra-red sensor to receive commands from the Master Control, giving identical two-way facilities as are available in the main listening room, but tailored to that room. Thus, if you ask the system to play a record in a kitchen, say, it will switch on the speakers in that room only. All timer programming etc can also be done from there. B&O will supply a smaller,

simplified remote control unit, or further Master Control units as required. This list of facilities and option extends beyond this brief description, but these are the main ones.

Leaving the control systems aside, the audio aspect of the equipment is also of interest, and in many ways extremely novel. Major points include Dolby HX Pro on the cassette deck; this is a system that makes tape accept high-level signals in a more linear fashion, and from past experience makes a worthwhile contribution to cassette sound quality. Tapes recorded with HX Pro can be played back on any non-HX-Pro equipped player, and still show the advantage of this processing.

I believe that there will be many people for whom the B&O's unique control system will come as a boon, and to B&O's credit an enormous amount of effort has gone into the 'human engineering' of this system to make it easy to operate. It isn't perfect though.

First, there is going to be an inevitable learning process involved, especially if you want to get the most from the system. The instruction manuals are a model of their kind, but their sheer length is proof that time needs to be taken. Secondly, the Master Control uses battery power, and an LED readout of equipment status. LEDs have quite an appetite for batteries, a problem B&O have 'solved' by not allowing the lights to stay on for more than a few seconds at a time. Had they used LCD (Liquid Crystal Display) elements instead, the readouts could have been left on all the time which would help in several respects, not least during timer programming procedures.

Finally, although the controls are logically and imaginatively grouped for ease of use, B&O could have done even better by taking a lead from the car industry and having different shaped controls for different purposes. One neat feature of the Master Link design though, is that it has infra-red cells at each end, so you don't need to 'point' it towards the equipment.

The system comprises a receiver, a cassette deck and a turntable. Each item can be bought separately, but they really belong together. Other manufacturers' speakers can sensibly be employed with this system though, and this is the way we have chosen to review it. Note that B&O advertise future availability of a matching compact disc player, for which operating controls already exist on the Master Link. Just before this publication went to press though, I spoke to a director of B&O in Denmark who said that they were not satisfied with the sound quality performance of the CD players currently available to them from other manufacturers (they are not contemplating making their own), or with that of most current discs. Plans to introduce this player, it seems, must wait until this problem can be resolved.

Turntable: Beogram 5000

The Beogram 5000 is a fully automatic player incorporating record size and speed sensing. The automation for once gives extremely rapid

GENERAL DATA

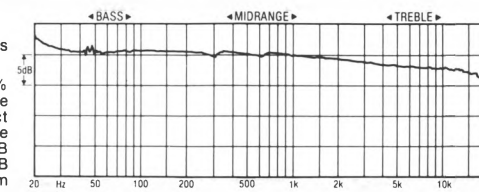
Amplifier: part of Beomaster 5000
Power output, per channel, at 1kHz ..... 80 watts

Record deck: Beogram 5000
Speed variations (wow and flutter) 0.13%
Speed drift ..... average
Speed accuracy ..... speed correct
Arm/cartridge resonant frequency ..... 12Hz, acceptable
Cartridge channel balance ..... within 1.2dB
Cartridge channel separation (crosstalk) ..... – 26dB
Cartridge tracking ability at 1.2g downforce 80μm

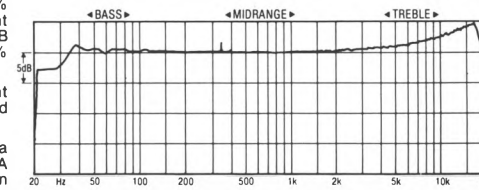
Cassette deck: Beocord 5000
Tape used for tests ..... TDK SA (maker's recommendation)
Frequency response ('chrome' or 'II' position) ..29Hz – 19kHz
Speed variations (wow and flutter) 0.06%
Speed drift ..... excellent
Signal-to-noise ratio, with Dolby B 66dB
Distortion at OVU, with Dolby B 3.0%

Tuner: part of Beomaster 5000
Sensitivity ..... excellent
Signal-to-noise ..... good

General
Maximum volume level in room (typical, with Kef Coda speakers supplied) 98dBA
System dimensions (w x d x h) ..... 42 x 33 x 23.5cm
Speaker dimensions ..... —
Price ..... £1000 (inc speakers, £1150)



Disc: frequency response with cartridge supplied



Cassette: record/replay frequency response

Bang & Olufsen 5000 System

Remote 'Master Control' for the 5000 system

arm movement to and from the record. The deck is belt-driven, the platter and arm being mounted on a subchassis with a full and very effective floating suspension system to iron out knocks, acoustic feedback and so on. The player is almost impervious to outside disturbances, whatever the cause. The arm is of low mass with (unusually) a stainless-steel arm tube fitted with one of the new B&O ultra-low mass cartridges. Apart from remote operation via the Master Control, you can start a disc playing by merely tapping the right-hand side of the front panel. Hit the left-hand side and the lid opens! The cartridge has a gently declining response at high frequencies, but all other cartridge measurements were fine. Turntable speed was accurate, but wow and flutter was higher than average, not helped presumably by the very low platter weight.

Receiver: Beomaster 5000

For once, here is a tuner section that does not use one of the off-the-shelf synthesiser tuner chips, though this is a synthesiser tuner. Each of the nine pre-sets can be used on any of the three wavebands, and in the case of FM stations the pre-set 'remembers' whether they should be received in mono or stereo. There is another unique feature: where most synthesiser tuners operate in fixed 50kHz (sometimes 25kHz) steps on FM, the B&O uses 12.5kHz steps to get close to the transmission, then unlatches its synthesiser circuit and continuously tunes itself to the exact transmission frequency. FM noise levels are low, apart from a very faint background whistle. AM performance was fine, though the sound quality was slightly 'wooden' compared with the Marantz tuner used for reference here.

Power output from the amplifier section is very substantially in advance of that specified by B&O, though on the pink noise maximum volume test (more representative of actual use) maximum usable volume was a more realistic 98dBA with the test Kef Coda loudspeakers. The Beomaster makes extensive use of DIN sockets (with extra 'data link' pins for the control system) for both signal and (unfortunately) loudspeaker connections. Some phono sockets are provided to interface with non B&O equipment, the Beomaster accepting outputs from a second tape recorded and an auxiliary item in addition to the other components in the system. A further item (such as a graphic equaliser) can also be inserted in circuit, and finally a pre-amp output is available, possibly to drive a 'slave' power amp. Two pairs of speakers can be connected for use together or separately, but this can be extended to five pairs in total using the Master Control Link — see opening remarks.

Cassette Deck: Beocord 5000

This is a drawer loading cassette deck which is very easy to use either via the remote control or using the controls exposed when the drawer slides open. A programme search facility is fitted, which can look for pauses between tracks up to eight selections in either direction, reverting to 'play' from that point. The recording meters are the usual bar-graph type, with red segments above 0VU for ease of reading. A number of other search and automatic functions are also fitted. Noise reduction is by Dolby B and C, and performance is further enhanced by the HX Pro system already mentioned. The Beocord as received was incorrectly set up for the recommended Type II tape, TDA SA, giving a substantial 5dB treble boost with Dolby B switched in. The responses was very extended in the treble though, and other parameters checked out well, wow and flutter being notably good. Note that the recording meters are set for 3% distortion at 0VU (Type II) so this point should be treated as the practical ceiling.

In use . . .

This system proved a pleasure to use after the initial acclimatisation process — I made extensive use of the programming facilities to record radio plays and the like. Happily, the system proved just as pleasurable to listen to as it was to just play with! Despite the rising treble on the cassette deck (easily correctable by a properly equipped dealer who can adjust the bias), cassette sound quality was remarkable for the clean and unusually dynamic and solid perforamance it gave. There was also an

unusually stable feel to the stereo image in particular and high frequency reproduction in general. Dolby HX Pro undoubtedly plays its part here, but there is also evidence of better-than-average tape-to-head contact, through good transport mechanics. Metal tape gave the best performance overall, but the difference between the three tape types was small.

The tuner, too, sounded excellent, with a clean, open and spacious feel on FM, though it was rivalled, if not exceeded, by several less expensive models tested as part of this project. The turntable was not quite as impressive as the other items, though the cartridge invests record reproduction with a remarkably sweet, clear sound which is especially impressive at mid and high frequencies. The sound on disc lacked punch in the bass though: there was clear loss of information in this region, and the general feeling was that the bass sounded a little 'slow' and 'flat'. Stereo images too tended not to crystallise very firmly around the loudspeakers. Substituting the Rega Planar III turntable for the B&O unit gave a sharper and clearer sound, without losing any of the relaxed 'easy-on-the-ear' quality of the B&O.

The amplifier worked extremely well, though again with a very slight 'thickening' and loss of impact at low frequencies. It went loud without distress though, and without changing in sound character; its consistency in this and other respects, plus its general clarity and positiveness saw it through. It was less happy driving low-impedance loads or more than one pair of loudspeakers at a time, producing a rather flattened and congested sound.

Conclusion

This is not a cheap system, and it must be said that if sound quality is the main aim you can do better for less, especially if a strong record playing ability is important. But then you'd probably have to look outside the area of packaged audio altogether: the B&O does offer very fine sound quality at a price, and consistency between records, radio and cassette. As for the facilities it offers — well, if you've read the introduction you'll know if they're for you! This system must be recommended.

Binatone Studio 5

Binatone International Ltd, Binatone House, Beresford Avenue, Wembley, Middlesex HA0 1YX
Tel 01-903 5211

Styled to look like a components system, the Binatone Studio 5 comprises a one-piece electronics module fitted within a simple but adequate rack housing. A pair of two-way loudspeakers, with a large frontal area but shallow in depth, completes the picture. The rack is covered in a none-too-smoothly-finished wood-effect vinyl, and is supplied ready assembled apart from the door. The bottom half of the rack housing is divided into record and cassette storage space. Unlike the makers of some expensive systems reviewed as part of this project, Binatone have so designed the door and lid that when closed the glass corners are protected by the wooden side panels – a good safety feature. General external fit and finish is reasonable for the price, and the controls were satisfactory for the most part. The exceptions are the cassette deck transport controls, which felt rather 'crude', and the turntable.

Turntable section

The turntable is made by BSR, and is a simple sprung-chassis device in a direct line of descent from the Garrard and BSR music-centre turntables of old. Drive from the DC motor is by belt to an inner rim on the lightweight one-piece plastic platter. There is no mat, though the top surface is styled to look as if there is. The centre spindle does not rotate with the record, and this implies potential speed instability especially with tight-fitting centre holes.

The deck is a form of semi-automatic; the arm is pulled outwards to start the motor, positioned above the record and then lowered using a non-damped cueing lever. At the end of a side, the mechanism stops with the stylus left in the groove. The stop point varied during the tests, and was sometimes triggered before the end of side – sometimes not at all. A ceramic cartridge is fitted, rather than the superior magnetic type fitted to more expensive (and to some equivalently-priced) systems. The system frequency response (see Introduction) measured from the record deck to the headphone output shows a rising response to 5kHz, the treble sharply falling thereafter. On test, the turntable gave poor overall speed stability, though wow and flutter was satisfactory. Rumble was constantly audible.

Cassette deck section

There are two cassette mechanisms here, one capable of recording and playback, the other of playback only, dubbing being possible at normal speed between them. Record levels are set manually with the aid of bar-graph metering. Chrome (type) and ferric tapes can be used for recording. Metal tapes should be used for playback only (playback equalisation for metal tape is the same as for chrome, of course).

A so-called 'Noise Reduction' system is fitted, but this is not Dolby or any other for record-and-playback process able to reduce noise without affecting the music. It is simply a steep treble filter which, contrary to the information provided by Binatone, has a strong effect on recordings if switched on. The deck's frequency response with the 'noise reduction' switched off is on a rising trend to 6kHz on record and playback. When 'noise reduction' is used while recording, there is a 4dB loss at this frequency, increasing to about 7dB if used on playback as well. Perhaps even more important than this portable-cassette-standard frequency response is the evident dist··'ion present when playing cassettes, the

excessive noise at all times, and the fact that the recording deck will not properly erase recordings when making new ones. The transports are purely mechanical and work adequately, but speed instability (heard as wavering pitch) was very bad. Normal measurements could not be conducted as the unit lacks the hi-fi type input and output socketry needed to connect the test equipment.

Tuner section

This clear-scaled analogue three-band tuner was judged rather more successful than the cassette deck. MW and LW sound quality was very good, though high-pitched whistles and mains harmonics spoilt things a little. FM sensitivity was about average, but there was fairly considerable hum and a variety of spurious background whistles.

Amplifier section

Power output was assessed at 8watts above 1kHz, and 3watts at 20Hz; these figures are for continuous power per channel and so give a more realistic comparison with other units than Binatone's impressive-looking figure of 40watts 'total peak music power'.

Loudspeakers: 01/1134C

A crude design, the 01/1134 uses two cone drive units mounted behind the baffle, the tweeter being offset to allow room for a port. The inside of the speakers was not examined as this might have damaged them. Build quality externally was unexceptionable but the speakers were very light in weight. Maximum volume in the listening room measured 94dBA. There was a rising response trend, a lack of bass and the treble 'shut off' at 6kHz.

In use . . .

Whilst the tuner was easily the most satisfactory source on this system, the amplifier sounded gritty and the sound unextended, rather like poor AM radio, even using the Kef loudspeakers. The supplied loudspeakers do not meet any reasonable criterion for good sound reproduction. They sound 'loud' and aggressive at any volume, with a 'blaring' and boxy quality, subjectively (and measurably) lacking in treble and bass extension. Records sounded particularly shallow and crude, this probably due largely to the ceramic cartridge, whilst under all conditions of use the cassette deck gave a gritty, noisy and distorted performance.

Conclusion

The Binatone is an inexpensive system by any standards, and it would have been unreasonable to expect the system to aspire to conventional standards of high fidelity. Even taking price into account though, the performance is in my view unacceptable. There are many portable radio cassette players which give musically more revealing and satisfying sound quality than this. In the very reasonable desire to offer the most comprehensive package for the price Binatone have it seems compromised unduly on sound quality. Not recommended.

GENERAL DATA

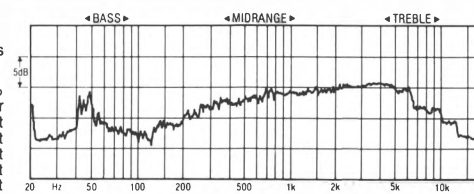
Amplifier: part of main unit
Power output, per channel, at 1kHz ..... 8 watts

Record deck: part of main unit
Speed variations (wow and flutter) 0.15%
Speed drift ..... poor
Speed accuracy ..... see text
Arm/cartridge resonant frequency ..... see text
Cartridge channel balance ..... see text
Cartridge channel separation (crosstalk) ..... see text
Cartridge tracking ability ..... see text

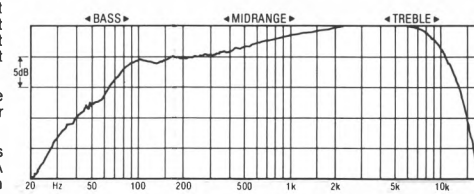
Cassette deck: part of main unit
Tape used for tests .... TDK SA (no maker's recommendation)
Frequency response ('chrome' or 'II' position) . 300Hz – 10kHz
Speed variations (wow and flutter) ..... see text
Speed drift ..... see text
Signal-to-noise ratio ..... see text
Distortion at OVU ..... see text

Tuner: part of main unit
Sensitivity ..... average
Signal-to-noise ..... poor

General
Maximum volume level in room (typical, with speakers supplied) 94dBA
Rack dimensions (w x d x h) ..... 42.5 x 41.5 x 83cm
Speaker dimensions (w x d x h) ..... 25.5 x 12.5 x 48.5cm
Price ..... inc speakers, £180



Disc: frequency response with cartridge supplied



Cassette: record/replay frequency response

Binatone Music Tower 2

Binatone International Ltd, Binatone House, Beresford Avenue, Wembley, Middlesex HA0 1YX
Tel 01-903 5211

Still under the 'magic' £200 mark, the Binatone Music Tower Mk 2 features a twin cassette deck mechanism and infra-red (wireless) remote control. Note that this does not allow remote switching between the inputs, starting or stopping of records or tapes or tuning of the radio tuner. The remote control is solely to control the amplifier section of the system, and its buttons allow setting of volume levels, balance, bass, treble, sound 'off' (but with all other system circuits working) and 'normal' – a function that sets bass, treble, balance and volume to their average or central positions. The rack housing is similar to the one supplied with the Studio 5 system, and is of more than adequate quality for the price, and, as with most of the cheaper systems, has the advantage of being pre-assembled with the equipment in place. Only the door has to be fitted – an easy task.

Turntable section

The Music Tower includes a BSR belt-drive semi-automatic (but not arm-return) turntable identical to that in the Studio 5 rack system. Despite this, long-term speed stability (steadiness of pitch) and wow and flutter were both improved, reaching a reasonable standard in the Music Tower, whilst the cartridge – again the same type as before – shows a rather different response curve measured via the system. The balance looks a little more even on paper, but high frequency response is similarly limited. Sample variations in the cartridge or differences in the amplifier circuits, or both, are probably responsible.

Cassette deck section

Aesthetically, the twin cassette deck here could hardly look more different from the one in the Studio 5 system, but in practical terms they are fairly similar. One transport is designed for playback only, and both are fitted with stiff mechanical controls. A 'Noise Reduction' switch is fitted – this gave the same treble cut as the corresponding switch on the Studio 5. The normal meaning of the term 'Noise Reduction' as applied to tape mechanisms takes in so-called 'complementary' record/replay processes which manipulate the music signals during recording to pull them away from the low-level noise ('encoding'), the tonal balance being restored on playback by reversing the initial manipulation ('decoding'). This generalised description applies to Dolby B, C, dbx and other such systems, but clearly does not apply to the Binatone system, which is better described as a tone control or filter.

Unfortunately, the record/replay response had to be omitted from this review, as there was no input available to record the test signals on to tape. Playback-only responses (using a pre-recorded test tape) though were generally in line with the response shown in the Studio 5 review, peaking in this case around 6.3kHz and falling sharply thereafter. No other measurements were possible.

Tuner section

This is a straightforward analogue (scale-and-pointer) tuner that works on FM, MW and LW. Additional facilities include automatic frequency control and muting (to cut interstation noise while tuning) on FM. Both worked satisfactorily. FM performance was limited by very high hiss levels, even on strong signals (10-100mV) and significant levels of mains hum. AM was spoiled in much the same way, whistles being a major additional

problem. A pity this, as AM sound quality is in fact very good.

Amplifier section

Power output measurements proved impracticable as there were no suitable inputs to use. From listening experience, the power output is roughly comparable to that of the Studio 5. So too are most of the facilities, the main exception being the fitting of a seven-band graphic equaliser in addition to the remote-control-only bass and treble tone controls. As usual, the use of the equaliser controls gave no real musical improvement in practice. Attempting to 'flatten out' the speaker frequency response merely made the speaker resonances and other problems even more obvious.

Loudspeakers: 01/1134C

These are identical to the speakers supplied with the Studio 5 system – please refer to that review for details.

In use . . .

Sound quality of this system was little different to that of the other Binatone system. In practice, the loudspeakers proved to be a dominating factor: they had little or no real bass or treble; just a hard, ill-separated and extremely coloured mass of mid-frequency noise – there is no kinder word. With the Kef test loudspeakers, things were predictably better, but the 'AM radio-like' quality, with musical information restricted to the midband and with severely compressed dynamics, remained whether using radio, tape or records.

The cassette deck was the least satisfactory source of music. High frequencies came over with a harsh, grating kind of distortion on the output and with obvious instability of both pitch and level. Recordings made from the other sources lacked 'body' or depth – they sounded thin and splashy. Records reproduced slightly better, but the bass was shallow and the tonal balance dull. Severe compression and hardness was also noted, attributable largely to the crude cartridge. Much the most satisfactory source was the tuner, but even here the sound was rather unnatural, and there were frequent splutterings and sibilance on speech.

Conclusion

Again, the major part of the manufacturing cost is clearly attributable to the wide range of near-useless facilities that have been tacked onto what is a very basic standard of equipment. With the sub-£200 systems reviewed in this edition, I was looking for sound quality broadly equivalent to that of a good battery portable or, say, a television set. The Music Tower failed to provide this, and the general control feel, the loud transient noises through the speakers when sources were switched over (remove headphones when you do this!) and the constant background hum and noise (mechanical and electrical) did not make this a particularly reassuring piece of equipment to use. Not recommended.

GENERAL DATA

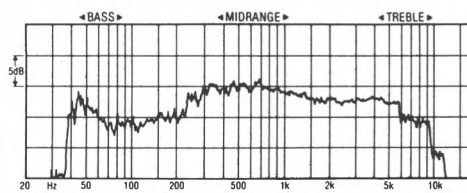
Amplifier: part of main unit
Power output, per channel, at 1kHz ..... see text

Record deck: part of main unit
Speed variations (wow and flutter) 0.11%
Speed drift ..... average
Speed accuracy ..... see text
Arm/cartridge resonant frequency ..... see text
Cartridge channel balance ..... see text
Cartridge channel separation (crosstalk) ..... see text
Cartridge tracking ability ..... see text

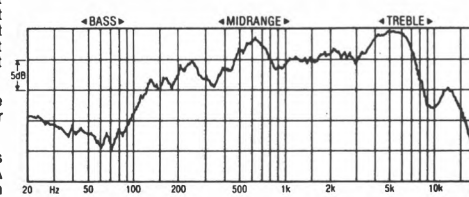
Cassette deck: part of main unit
Tape used for tests ..... see text
Frequency response ('chrome' or 'II' position) ..... see text
Speed variations (wow and flutter) ..... see text
Speed drift ..... see text
Signal-to-noise ratio ..... see text
Distortion at OVU ..... see text

Tuner: part of main unit
Sensitivity ..... average
Signal-to-noise ..... poor

General
Maximum volume level in room (typical, with speakers supplied) 93dBA
Rack dimensions (w x d x h) ..... 42.5 x 41.5 x 83cm
Speaker dimensions (w x d x h) ..... 25.5 x 12.5 x 48.5cm
Price ..... inc speakers, £200



Disc: frequency response with cartridge supplied



Loudspeaker in-room frequency response

Dual System 1

Hayden Laboratories, Hayden House, Chiltern Hill, Chalfont St Peter, Bucks SL9 9UG
Tel (0753) 888447

Supplied without loudspeakers, the System 1 shows some of the first fruits of Dual's take-over by Thomson, the French-based electronics multinational. The tuner and amplifier, which bear the Dual name, are in fact made by Thomson in France.

Dual's range of components is such that there is a degree of flexibility of choice for those purchasing a complete system. Because of the way Dual's dealer prices are structured, the dealer should be able to offer, for example, the turntable from System 3 in place of the 'correct' one for just the difference in cost between them.

The rack housing is a fairly modest affair, of adequate finish, but there is a very sharp and awkwardly-shaped aluminium trim stip along the edge of the glass lid which could snag and tear clothing.

Turntable: CS514

This new budget turntable marks the end of Dual's allegiance to mains-locked synchronous motors on their low-price belt-drive turntables. This one employs a DC motor and servo speed control system, which at first sight looks like an expensive way of saving money!

The design is quite clever. The platter is a thin aluminium disc, but it is well damped from above by a good, heavy mat, and from below by a separate sub-platter which accepts drive via a belt from the motor. There is a form of sub-chassis carrying the bearing/platter and the arm, but it is only very stiffly suspended. The arm is a simplified version of the standard Dual design, with a fixed headshell (an improvement over the old detachable type) and simple but well adjusted arm bearings and a mildly decoupled counterweight. Engineering of this auto-return turntable is a considerable improvement on traditional rack system designs, and there were no measured problems other than a slightly fast running speed and a mildly falling upper frequency response from the cartridge. Resistance to acoustic feedback and shock was a little better than average.

Cassette Deck: C802

This very simple deck has excellent ergonomics but plain styling, and is well finished. There is no cassette door, though a removable head cover is supplied. This makes for easier loading and unloading but slightly noisier cassette running than usual. On the other hand, the transport is basically quiet and all controls operate smoothly. The only minor failing is in having both record level LED meters (which have a rather narrow working range of 18dB) in one line which makes reading both together slightly awkward. Tape type selection is manual but clearly laid out, and noise reduction is by Dolby B only. Record/replay response with TDK SA Type II (Chrome position) tape was satisfactory and signal-to-noise ratio just satisfactory. The 0VU meter indication is set high though – don't over-record too much on the meters.

Tuner: CT1120

Here is a rarity amongst budget tuners – an analogue scale-and-pointer model with mechanical pre-sets. There are seven of these, and each can be assigned to any transmission on any of the three wavebands – FM, MW and LW. They work well and stayed accurately on tune during the review period. The manual tuning scale has only moderately clear frequency markings, but tuning is aided by a cursor which changes colour when correctly tuned. There is, however, no signal-strength indication. The manual tuning knob has a 'well-

engineered' feel, and the cursor LED has a very tight operating range, giving quite unambiguous and accurate tuning, though there was some asymmetry between sides of the correct tuning point. Also noted was an error in the FM scale calibration, reading approximately 0.55MHz low. FM sensitivity and noise levels were both quite satisfactory though, whilst AM gave a rather dim sound but moderately well-controlled interference levels.

Amplifier: CV1120

Here is a neat, uncomplicated product, and the first Dual amplifier to be made in France rather than Germany. It delivers a substantial 40watts output (35watts at 20Hz) from its single pair of output terminals. Inputs provided include two for tape recorders (one DIN based, the other phono), plus tuner and record player (moving-magnet) inputs. Volume, balance, bass, treble and loudness controls complete the picture – there are few frills and no operational difficulties.

In use . . .

No loudspeakers are available from Dual to complete this system, which was therefore tested using Kef Codas.

The single factor that sets this system ahead of the majority of its competitors at the same price is the quality of record reproduction, although the turntable and the cartridge fall short qualitively of the standards set by the CS-505 in the more expensive System 3 (see separate review). Bass is a little full and uncontrolled from this source, but the cartridge sounds smooth, and is subjectively 'flatter' than the frequency response indicates. The essential characteristic, though, is of a fine, stable and clear performance off records, with good stereo.

The amplifier was less successful, results via the turntable input especially being a little 'wooden' and lacking dynamics. It wasn't unpleasant sounding, just a bit ordinary. The cassette deck too sounded fairly average. Noise levels were slightly higher than usual, and there were signs of unsteadiness and slightly excessive levels of dropout. Metal tapes gave no discernible advantage on audition and pre-recorded cassette replay standards were poorer than usual, though tonally near flat. The tuner, happily, gave an excellent FM stereo soundstage, but with a quality that was veering in the direction of sounding hard.

Conclusion

This is an honestly-conceived and executed system that presents itself as purposeful rather than fashionable. I have reservations about some of the components, the amplifier especially, but the good turntable quality and the freedom of choice concerning loudspeakers makes this a potentially good buy at a very moderate price, especially for those who are mostly concerned with records. Though it doesn't have the distinguishing qualities of a 'Best Buy', it is recommended.

GENERAL DATA

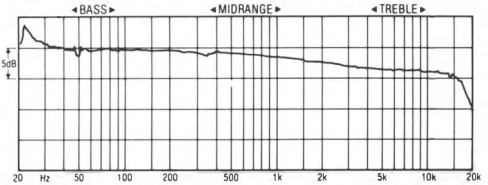
Amplifier: CV1120
Power output, per channel, at 1kHz ..... 40 watts

Record deck: CS514
Speed variations (wow and flutter) 0.07%
Speed drift ..... good
Speed accuracy ..... 0.9% fast
Arm/cartridge resonant frequency ..... 15Hz, acceptable
Cartridge channel balance ..... within 0.3dB
Cartridge channel separation (crosstalk) ..... – 26dB
Cartridge tracking ability at 2.5g downforce 73µm

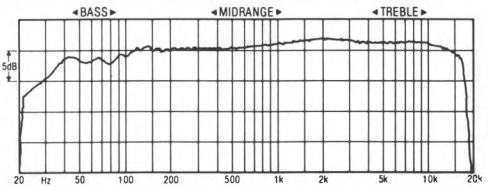
Cassette deck: C802
Tape used for tests ..... TDK SA (maker's recommendation)
Frequency response ('chrome' or 'II' position) ..39Hz – 16kHz
Speed variations (wow and flutter) 0.1%
Speed drift ..... excellent
Signal-to-noise ratio, with Dolby B 63dB
Distortion at OVU, with Dolby B 2.0%

Tuner: CT1120
Sensitivity ..... good
Signal-to-noise ..... good

General
Maximum volume level in room (typical, with Kef Coda speakers) 98dBA
Rack dimensions (w x d x h) ..... 48 x 46 x 85cm
Speaker dimensions (w x d x h) ..... —
Price £380



Disc: frequency response with cartridge supplied



Cassette: record/replay frequency response

Dual System 3

Hayden Laboratories, Hayden House, Chiltern Hill, Chalfont St Peter, Bucks SL9 9UG
Tel (0753) 888447

Some of the features of this system are unusual, even idiosyncratic, but in the main it can be described as a purposeful system of high power and sensible ergonomics. The electronics are all made in Germany, and the system is supplied without loudspeakers, leaving the choice up to the purchaser.

Dual supply a first-class rack housing, with the door well inset behind the overhanging base and smoothly finished lid.

Turntable: CS505-1

This turntable is possibly the best known sub-£100 model on the separates market; it both looks and behaves quite differently from most 'rack system turntables' in a number of ways. It is quite substantially built and the top plate which carries the platter and arm assemblies is fully spring-decoupled from the plinth. The arm is a low-mass design with extremely fine bearings and a reasonably secure interchangable headshell insert arrangement which is in turn fitted with a low-mass Ortofon cartridge. The platter is belt driven from a synchronous motor having an expanding-pulley mechanism to provide speed (pitch) adjustment, which can be set by reference to a platter-edge stroboscope. The arm lifts, but does not return to its rest at the end of side, while the excellent cueing mechanism includes a unusual 'resetting' facility which means the arm is always in its raised position when moved away from its rest – a valuable safety feature. The deck resisted feedback and externally-applied shocks well. The cartridge supplied gave slightly 'iffy' measurements on test, the most significant of which was a falling frequency response at high frequencies. The turntable itself gave acceptable wow/drift results, but excellent wow and flutter.

Cassette deck: C816

Some features of this cassette deck look almost archaic – such as the DIN-level input/output facilities (based on a DIN flying lead) and the moving-coil record level meters. The latter worked well, though I would have liked to have seen at least a supplementary peak level LED, and the choice of DIN-standard connections is of no consequence in a system context.

In other respects, the C816 is thoroughly modern! It has Dolby C in addition to the standard B system, whilst tape-type sensing is automatic. The transport section is beautifully engineered, with direct (no door) loading for the cassette which can be safely pulled out without having to press 'stop' first. As the cassette is grabbed for withdrawal, micro-switches disengage the transport whatever mode is selected. A simple track-location device and a counter memory ease programme finding, and the transport keys have a satisfyingly expensive feel, though the internal mechanics sound quite 'busy' when fast winding. Noise levels were no better than satisfactory, but the Type II tape record/replay response was reasonably accurate.

Tuner: CT1260

A digital synthesiser tuner covering FM, LW and LW, the CT1260 has a total of 15 pre-sets, the last seven of which are selected by pressing two adjacent pre-set buttons together! Each pre-set can be allocated to any frequency on any waveband. Although the tuner has the usual scanning and manual tuning facilities, it is unique in my experience for having a fine tuning facility on FM (operating in 12.5kHz steps) for use where, for example, adjacent transmissions cause reception problems.

Sound quality on the two AM bands was satisfactory, if rather dull and rich sounding.

The FM side was near faultless. Noise levels were exceptionally low, and sensitivity high. The Dual even had a five-LED signal strength meter which had an extremely useful dynamic range.

Amplifier: CV1260

Described prominently on the front panel as 'Class A', the Dual has a 'non-switching' output configuration but is more fairly described as class A/B. It's also an unusually powerful amplifier by rack system standards, and gave a healthy 70watts/channel on test, a result fully reflected by the free and easy way it went loud on audition. An unusual touch is the moving-coil output level metering, but facilities are otherwise straightforward. Additionally, two pairs of loudspeakers can be connected for use either independently or together.

In use . . .

With the choice of loudspeakers left to the buyer, this was easily one of the most musically capable rack systems in the entire review programme. The tuner displayed one or two oddities, such as slightly mistuning itself occasionally (despite synthesiser circuitry) when cold! But this should not obscure the fact that FM sound quality was simply excellent. There were none of the common side effects of synthesiser operation – speech sounded well integrated and clean, and music well-focused and 'believable'.

Cassette reproduction set at least as good a standard in relation to other cassette decks. Sound quality from pre-recorded cassettes was especially convincing; the piano recording used sounded, for once, like a piano with body, top and projection against an even backcloth of low-level tape hiss, and this was a far cry from the brittle, unstable results heard on many decks.

Best of all the sources in absolute terms was the sound from the record player. Despite a perceptibly dim tonal balance and some lack of low frequency control and pitch stability, the Dual System 3 'shaped' music properly. Stereo images were resolved well in depth as in width and 'stayed put' rather than shifting; likewise detail resolution was clearly much better than usual. The result was an easy-on-the-ear relaxed kind of presentation that fulfilled the essential musical requirements of an audio system in a convincing way. These abilities were upheld to no small extent by the amplifier which was also well above average in performance. Subjectively very powerful, the CV1260's outstanding characteristic was its sharply-etched and dynamic presentation, and the lack of strain it displayed whether playing soft or very loud indeed.

Conclusion

Here is a racked component system whose performance would be a credit to many separates systems of similar cost. It has an even spread of abilities across radio, tape and record playing departments, and an amplifier that copes well. A clear Best Buy.

GENERAL DATA

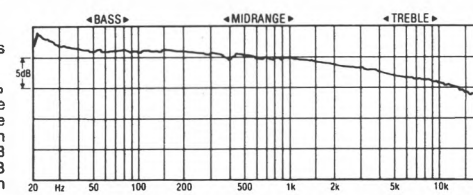
Amplifier: CV1260
Power output, per channel, at 1kHz ..... 70 watts

Record deck: C5505
Speed variations (wow and flutter) 0.07%
Speed drift ..... average
Speed accuracy ..... user adjustable
Arm/cartridge resonant frequency ..... 18Hz, too high
Cartridge channel balance ..... within 0.1dB
Cartridge channel separation (crosstalk) ..... – 23dB
Cartridge tracking ability at 1.5g downforce 65μm

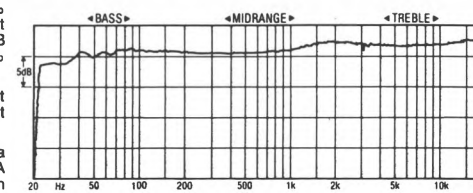
Cassette deck: C816
Tape used for tests ..... TDK SA (maker's recommendation)
Frequency response ('chrome' or 'II' position) .. 20Hz – 18kHz
Speed variations (wow and flutter) 0.1%
Speed drift ..... excellent
Signal-to-noise ratio, with Dolby B 60.5dB
Distortion at OVU, with Dolby B 0.9%

Tuner: CT1260
Sensitivity ..... excellent
Signal-to-noise ..... excellent

General
Maximum volume level in room (typical, with Kef Coda speakers) 101dBA
Rack dimensions (w x d x h) ..... 49.5 x 48.5 x 89.5cm
Speaker dimensions (w x d x h) ..... —
Price £500



Disc: frequency response with cartridge supplied



Cassette: record/replay frequency response

Ferguson Stereomaster 3A04

Thorn EMI Ferguson Ltd, Cambridge House, Great Cambridge Road, Enfield, Middlesex EN1 1UL
Tel 01-363 5353

Ferguson's 3A04 sits at the top end of the volume-sales low-cost systems market. It follows the pattern of the breed, with a pre-assembled rack housing, non-optional loudspeakers and a one-piece electronics package — removable from the housing in this case. Although the Ferguson is slightly cheaper than, for example, the Sentra 850 system, the latter offers remote control as part of the package; and the 3A04 actually 'looks' a little more expensive than its counterparts from Amstrad, Binatone and others.

The extra money has gone on some obvious features, such as the double cassette deck, but there is a much higher-quality 'feel' to the construction and the controls.

Turntable section

The Ferguson turntable shares with all the £200-plus systems tested (Sentra 850 apart) a magnetic rather than a ceramic cartridge. Measured via the rear line-level auxillary in/output DIN socket, the cartridge doesn't look much flatter than some of the ceramic ones, but it does roll off much more gently in the treble, and also in the bass. More importantly, the sound it produces is in a different league, though objectively this is a dull-sounding magnetic with a nonetheless rather harsh and sibilant feel. The player itself is fully automatic, quite fiddly to adjust and driven by belt. The platter is a thin pressing, but the mat is quite heavy and well made. Wow and flutter was acceptable, but drift was audibly and measurably poor, though nor disastrously so. Interface problems with the test equipment prevented other measurements from being carried out.

Cassette deck section

Here is another of the double cassette decks that allow tape-to-tape dubbing, only one transport being adapted for recording purposes. Continuous play is also possible, the unit switching to the second tape when the first is finished. Dolby B noise reduction is fitted, on both transports thankfully, but switching to 'dubbing' correctly lifts the Dolby circuitry from both sides of the deck. This allows proper transfer of Dolby-encoded tapes to the newly recorded tape without being 'decoded' en-route. The deck is metal tape compatible and transport controls are actuated by soft-touch latching buttons. The cassette deck record/replay frequency response is far from even on Type II tape (TDK SA), rolling off strongly at high frequencies, but Philips chrome gave better subjective results. Most ferric tapes and all metal ones were a little underbiased in this machine, producing a bright tonal balance.

Tuner section

An illuminated LED is the cursor for this scale-and-pointer (analogue) tuner section. Though clearly marked, the FM frequency scale underread the tuned frequency by approximately 0.3MHz. There were some RF problems: images (copies if you like) of received transmissions often appeared at various places with the FM band, selectivity being low enough for occasional breakthrough at the test site on to wanted, tuned frequencies belonging to other transmissions. Ferguson have also omitted to fit a mono switch, necessary to cut the hiss level on weak FM transmissions — a significant failing.

FM sensitivity qualified as average, but noise levels — primarily in the form of a particularly buzzy hum — were higher than usual. A five-LED signal-strength meter is fitted, but it turned out to be useless for

monitoring signal levels, as it saturates with less than 10μV of signal — this is not enough for acceptable mono, much less stereo reception.

Amplifier section

The amplifier side of the Ferguson is of low power, producing just 10watts into the test load (7.5watts at 20Hz). A rear panel DIN socket gives an output signal for use outside the system, and acts as an auxilliary socket. Controls are conventional. The only minor problem with the amplifier was the constant and high level mechanical hum from its transformer. It could be clearly heard outside the listening room, without music playing of course!

Loudspeakers: 39007

Build quality of this two-way design is fairly lightweight and crude; the two drive units are mounted on to the baffle from behind — a poor practice. The measured frequency response is typical of a low cost rack system loudspeaker.

In use . . .

The loudspeakers in this system do indeed lack extension (at both ends of the frequency band) and sounded extremely coarse. The 3kHz peak on the frequency trace was specifically identified on audition before the measurements were carried out. There were nasal colourations and significant losses of recorded information compared to results via the Kef test loudspeakers. In the final analysis, the Ferguson speakers are little different (and musically no more transparent) than the ones supplied with the cheaper systems in this project. They are generally easier on the ear though.

The turntable made records sound a little shallow and harsh, even sibilant in the treble — all characteristics noted earlier in connection with the cartridge. Surface noise and rumble were not too obvious though, and records reproduced with a tolerably open and dynamically wide ranging quality — though the Ferguson falls far short of the better £300-plus systems in these areas. Cassettes were generally a success with the Ferguson, a European chrome tape of the type made by BASF, Agfa or Philips giving the best overall price/performance balance. The sound had a quality of depth and precision missing from many of its peers. Only the tuner disappointed. FM had a dull tonal balance but the noise/hum levels were sufficient to render any finer qualities redundant.

Conclusion

An outright recommendation is missed here, partly because of tuner shortcomings, but mostly because of the unacceptable-at-any price loudspeakers. These things apart though, the Ferguson is clearly so much better in build and performance terms than all the equivalently or cheaper priced systems tested (except the Tensai Compo 10) that it almost becomes the obvious choice at the price by default!

GENERAL DATA

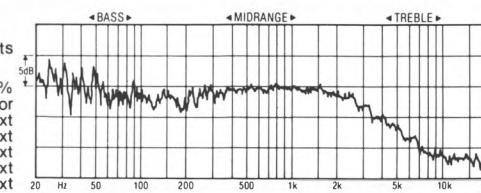
Amplifier: part of main unit
Power output, per channel, at 1kHz . . . . . 10 watts

Record deck: part of main unit
Speed variations (wow and flutter) 0.15%
Speed drift . . . . . poor
Speed accuracy . . . . . see text
Arm/cartridge resonant frequency . . . . . see text
Cartridge channel balance . . . . . see text
Cartridge channel separation (crosstalk) . . . . . see text
Cartridge tracking ability . . . . . see text

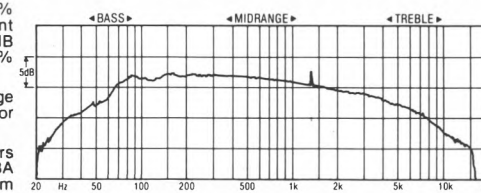
Cassette deck: part of main unit
Tape used for tests . . . . TDK SA (no maker's recommendation)
Frequency response ('chrome' or 'II' position) . . . 55Hz – 4kHz
Speed variations (wow and flutter) 0.14%
Speed drift . . . . . excellent
Signal-to-noise ratio, with Dolby B 60dB
Distortion at OVU, with Dolby B 1.0%

Tuner:
Sensitivity . . . . . average
Signal-to-noise . . . . . poor

General
Maximum volume level in room (typical, with 39007 speakers supplied) 94dBA
Rack dimensions (w x d x h) . . . . . 41.5 x 42 x 84cm
Speaker dimensions (w x d x h) . . . . . 27 x 17.5 x 46.5cm
Price . . . . . inc speakers, £230



Disc: frequency response with cartridge supplied



Cassette: record/replay response

Fisher System 55

Fisher Sales (UK) Ltd, 1-4 Walter Lawrence Estate, Otterspool Way, Watford, Herts
Tel (0923) 31974

Although now produced in Japan by a division of the large Sanyo organisation, Fisher equipment forms a slightly more 'up-market' and distinctive range of products.

The designation 'System 55', actually covers a range of systems which share the same amplifier, tuner and turntable. The buyer has the choice of single or double (dubbing) cassette decks, an optional Compact Disc player and alternative horizontal and vertical racks, versions of which are available to accept the CD player. Loudspeakers are also optional. The system is tested here in its simplest form with vertical rack and single cassette deck.

Turntable: MT-100

Essentially, this is a straightforward lightly-built belt-driven semi-automatic (that is, auto-return) turntable following the pattern established by other Japanese decks in similar systems. The arm is straight and fitted with an offset interchangable headshell that lacks structural rigidity.

The player had low resistance to acoustic feedback and general shocks, which the rack did little to counteract. The cartridge frequency response tilts downwards at high frequencies, though the other cartridge measurements were fine. The player itself exhibited acceptable wow and flutter, but general pitch stability was poor.

Cassette deck: CR-77

Also available as part of the 77 system, this is a Dolby B and C equipped deck with manual tape selection and a simple hybrid electro/mechanical set of transport keys. There are no track search facilities. The deck is basically well laid out, and functionally designed, but 'record' and 'play' indicator lights are well separated from their respective control buttons whilst front panel lettering looks very cluttered. The major annoyances with this deck are the high level of noise from the capstan/pinchwheel whenever the unit is under power, and, to a lesser extent, the poor 'feel' of the controls.

Tuner: FM-55

This is an analogue tuner which covers FM,

MW and LW with the aid of a five-LED signal strength meter – four of the LEDs are alight, though, at the unnecessarily low level of 100μV. The edgewise tuning itself is accompanied by an amazing variety of background whistles and other noises that are very difficult to tune out. FM sensitivity is average, but noise levels are below average, whilst AM sound quality was about average.

Amplifier: CA-55

The CA-55 has an auxiliary input in addition to the inputs required by the rest of the system, and accepts two pairs of speakers in an either/or arrangement. The control layout is essentially simple and functional, though the loudness button is uniform with the source switching, and the balance and volume sliders are poorly differentiated. The amplifier is completed by a five-band graphic equaliser which may be an attractive selling feature but which in our view serves little useful purpose.

Loudspeakers: ST-55

The ST-55 loudspeakers are lightly-built and contain two paper-cone units, the tweeter incorporating a shiny centre 'dome', which is actually a dust cap. Frequency response is extremely ragged, and dominated by the massive 6kHz tweeter peak.

In use . . .

Loudspeakers apart, the 55 system has more to recommend it than the negative comments above might suggest. The system price is, after all, quite low if the speakers are set aside; with listening test notes on these include such comments as 'coloured mid, hard, dull balance and unforthcoming', this is just as well.

Surprises here were the tuner and cassette deck. The former was a shade bright in balance, but if carefully tuned gave very acceptable quality, with a lively, natural feel. The cassette deck sounded rather bright and a little coloured, but gave stable, clean stereo, on all types of tape, especially Type II and IV (metal) formulations (TDK used for tests).

The turntable was rather less satisfactory. It exhibited a loose, unfocused bass and stereo imagery that wandered between the speakers in an unpredictable fashion. High frequency reproduction was a little raw, though fairly incisive, and clearly a better cartridge would help to produce a subjectively flatter response.

Conclusion

Although we would regard the loudspeakers supplied here as unacceptable in any terms, the remaining electronics performed adequately given the low price involved, and could prove an attractive proposition despite a number of operational and ergonomic shortcomings. I was not happy with the construction of the rack housing though. Apart from the potential danger to young children careering into the sharp, unprotected lid corners, the general construction does not inspire confidence that, for example, the hinges on both door and lid will not give long-term problems. Overall, a recommendation must be witheld.

GENERAL DATA

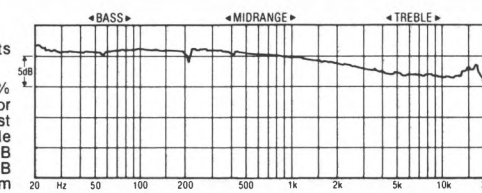
Amplifier:
Power output, per channel, at 1kHz ..... 26 watts

Record deck: MT-100
Speed variations (wow and flutter) 0.10%
Speed drift ..... poor
Speed accuracy ..... 0.9% fast
Arm/cartridge resonant frequency ..... 12Hz, acceptable
Cartridge channel balance ..... within 0.5dB
Cartridge channel separation (crosstalk) ..... – 30dB
Cartridge tracking ability at 2gdownforce 80μm

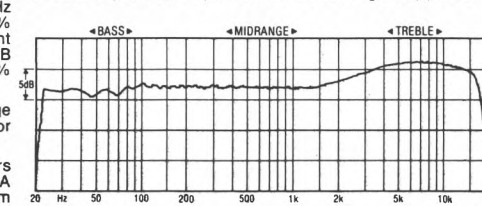
Cassette deck: CR-77
Tape used for tests ..... TDK SA (maker's recommendation)
Frequency response ('chrome' or 'II' position) ..20Hz – 17kHz
Speed variations (wow and flutter) 0.15%
Speed drift ..... excellent
Signal-to-noise ratio, with Dolby B 62dB
Distortion at OVU, with Dolby B 1.4%

Tuner: FM-55
Sensitivity ..... average
Signal-to-noise ..... poor

General
Maximum volume level in room (typical, with ST-55 speakers supplied) ..... 99 BA
Rack dimensions (w x d x h) ..... 43 x 41 x 82cm
Speaker dimensions (w x d x h) ..... 25 x 20 x 50cm
Price ..... £315 (inc speakers, £360)



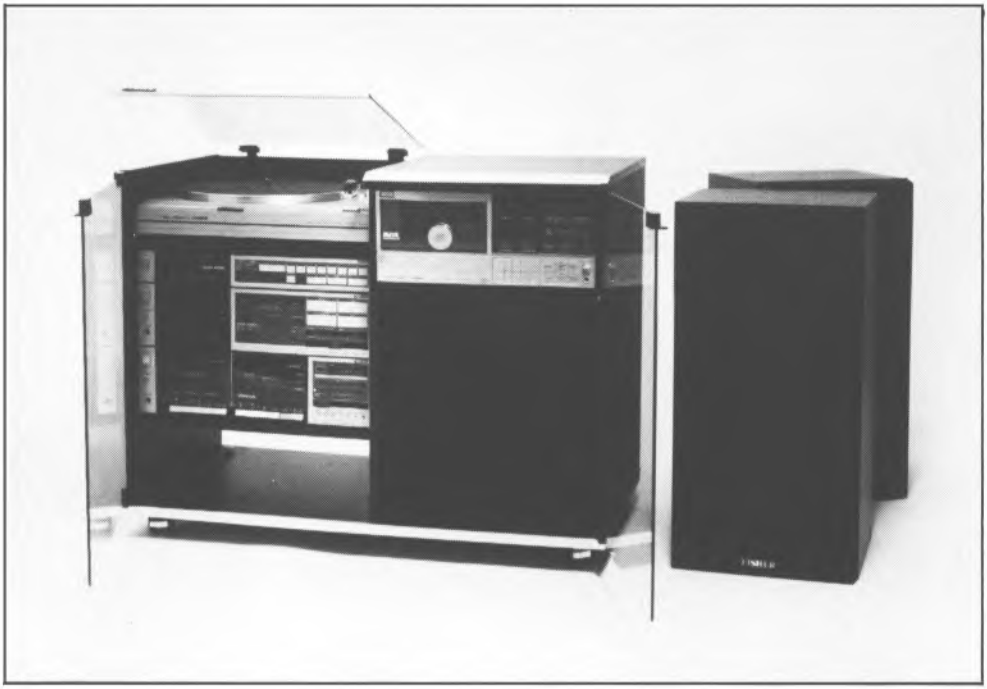
Disc: frequency response with cartridge supplied



Cassette: record/replay frequency response

Fisher System 77

Fisher Sales (UK) Ltd, 1-4 Walter Lawrence Estate, Otterspool Way, Watford, Herts
Tel (0923) 31974



Like the less expensive 55 system, Fisher's System 77 can be bought in a number of different forms. The version tested here which includes a double cassette deck, the horizontal rack with accommodation for a CD player and the CD player itself, is the most expensive version available, apart from a similarly-priced vertical-rack version similarly equipped with the CD player.

Alternatively the System 77 can be supplied less CD player and with the rack housing described as part of the 55 system; and it can also be bought with the conventional CR-77 cassette deck, also reviewed as part of the 55 system.

Turntable: MT-125

This turntable is more than superficially similar to the one used in the cheaper Fisher system. It shares the same basic arm design, a similar lightweight and microphonic chassis and is also semi-automatic – that is, the arm returns automatically at the end of side, initial set down being manual and assisted as usual by a damped cueing device.

Again, the arm pillar is unsecured, and can be lifted several millimetres. The cartridge fitted is identical to the one fitted in the cheaper MT-100, and has an almost identical measured performance characterised by the falling high frequency response but good tracking ability, separation and channel balance. The major difference between the two decks is that where the MT-100 is belt driven, the MT-125 has a direct-drive motor which gives much better general speed stability (steadiness of pitch) and some improvement specifically to wow and flutter.

Cassette deck: CR-W77

Here is a cassette deck with two separate transports, both of which can replay, but only one of which can record. Dubbing is possible between them, either in 'real time' (normal speed), or at twice normal speed. Note that double speed should be treated as a convenience feature – sound quality takes a strong hammering. There is a severe loss of high frequencies on the dubbed tape and also a noticeable drop in pitch. Tapes dubbed in real time though sounded satisfactory, though there is some loss compared to the original, as

would be expected. There are two operational problems connected with the dubbing feature though. One is that although both Dolby B and C are available, it is not possible to replay a Dolby B tape and record with Dolby C – or vice versa, which would have been extremely useful for making tapes for the car, say. The other problem is that if the 'high speed' dub switch is left depressed during playback (which happens at normal speed), there is a loss of high frequency information from the replay-only transport.

The deck has automatic tape-type sensing and controls similar to the ones on the CR-77. Ergonomics are complicated by the sophistication of the machine, but are not unacceptable. The deck runs quietly. Although speed stability measures well, both transports appear to suffer from poor tape/head contact, resulting in some rather 'shuddery' sounding piano recordings, for example. Replay-only results were poor, with limited high frequencies and prominent noise, apparently an azimuth problem and easily adjustable by a competent dealer. Record/replay responses had the same odd characteristics seen on the CR-77, though other parameters checked out well enough – except that one tape wrapped itself around the pinch wheel of the record transport, jamming the mechanism firmly – luckily after the tests had been concluded!

Tuner: FM-77

This is a slim synthesiser tuner, equipped with LW, MW and LW and, naturally, preset operation. Eight presets, a very useful number, are provided for FM, while a further eight can be allocated as desired across the MW and LW bands. This means you can have one preset for LW (Radio 4) and seven for MW – a good idea. Most of the switches are of the light-touch membrane (pressure) type, and the fascia is completed by an LED frequency read-out. No signal strength indication is provided. This tuner is of high sensitivity and low background noise levels, and there were none of the synthesiser-induced whistles and the like that plague so many tuners of the type. AM performance is rather muffled, and interference levels were not better than moderate.

Amplifier Model CA-77

Many of the features of the CA-77 are similar to those of the CA-55 (see System 55 review); common to both, for example, are the graphic equaliser and the either/or switching for two pairs of speakers. Source switching, here by membrane switches, offers no spare inputs once the CD player is included.

Loudspeakers: ST-77

This is a quite large, two-way loudspeaker design with the cone tweeter offset to one side, and a damped port alongside. The tweeter is similar to the one used on the ST-55. The listening-room frequency response shows a crudely-behaved tweeter, but an even midband over the 500Hz-3kHz region, some of the unevenness below that being attributable to wall reflections. Maximum usable volume reached was 98dBA.

GENERAL DATA

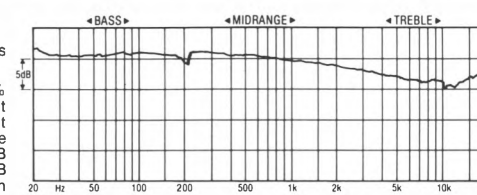
Amplifier: CA-77
Power output, per channel, at 1kHz ..... 50 watts

Record deck: MT-125
Speed variations (wow and flutter) 0.06%
Speed drift ..... excellent
Speed accuracy ..... speed correct
Arm/cartridge resonant frequency ..... 12Hz, acceptable
Cartridge channel balance ..... within 0.3dB
Cartridge channel separation (crosstalk) ..... – 30dB
Cartridge tracking ability at 2g downforce 80μm

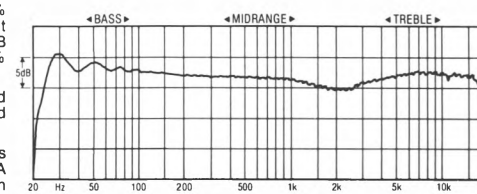
Cassette deck: CR-W77
Tape used for tests ..... TDK SA (maker's recommendation)
Frequency response ('chrome' or 'II' position) ..22Hz – 17kHz
Speed variations (wow and flutter) 0.15%
Speed drift ..... excellent
Signal-to-noise ratio, with Dolby B 63dB
Distortion at OVU, with Dolby B 1.2%

Tuner: FM-77
Sensitivity ..... good
Signal-to-noise ..... good

General
Maximum volume level in room (typical, with ST-77 speakers supplied) 98dBA
Rack dimensions (w x d x h) ..... 79 x 41.5 x 60.5cm
Speaker dimensions (w x d x h) ..... 28 x 23 x 56cm
Price ..... £360 (inc speakers, £400)



Disc: frequency response with cartridge supplied



Cassette: record/replay frequency response

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WESTON-SUPER-MARE
414423

Compact Disc player: AD 800

This CD player has a large number of membrane switches which control a variety of programming functions not unlike those available on the Marantz CD63 (and equivalent Philips model). The difference is that the Marantz is much simpler to operate and manages with many less buttons, but the Fisher gives more complete feedback to the user in the form of various time and function displays. The player loads from above which means the player has to be pulled forward from the rack, but Fisher have thought of this and the shelf used by the CD player slides forwards on runners. The player takes some acclimatisation to learn, and does not seem as carefully thought out (or as quiet in action!) as its rivals from Marantz, Philips and Sony.

In use . . .

Leaving the Compact Disc player to one side for now, let us look at the rest of the system.

The cassette deck had a number of problems on audition, whilst neither the turntable nor the amplifier were beyond reproach. But both the tuner and the loudspeakers performed excellently.

The tuner especially was quite excellent, and unquestionably one of the best in this project. It has an open, clear and lucid sound quality on FM, with a neutral tonal balance free from harshness or, as noted, the spurious noises so often found on synthesiser tuners. There was no trace of temperament either: the FM-77 worked evenly regardless of signal strength except, of course, when the signal was very weak indeed.

The loudspeakers too were excellent, and as they add only about £50 to the cost of the system, which is well below the cost of most specialist models, they can be endorsed for purchase within the system. They were not as good as the considerably more expensive Kef Coda model, of course, and suffered to a degree from a rather pushy, forward balance and a slightly 'pinched' effect in the midband.

Bass from these speakers though was generally firm, clean and uncoloured, if a trifle 'lean'. On the whole, their sins were relatively innocuous in that they did not 'sit' on the music too much: they were relatively transparent if you like, and therefore not obstructive in the musical sense.

The amplifier too was not wholly unsatisfactory, though it could not be regarded as a high-quality amplifier even in its price category. The main failings were to be found in the phono input stage, which tended to reduce perceived instrumental separateness and identity, and imposed a degree of harshness and confusion to the sound which increased at high recorded levels (during the loud passages).

Cassette sound quality was not in the same class as the rest of the system. It suffered from the 'shuddering' effects noted earlier, poor pre-recorded cassette replay standards, and noise pumping with Dolby C, perhaps due to incorrect Dolby setting-up.

The sound quality available off records also left a lot to be desired. The deck proved very excitable at low frequencies, and exhibited obvious bass overhang, and some 'randomising' of stereo information. The basic sound balance was soft and laid back, partly attributable to the cartridge which can, however, be changed. Generally music reproduced with a rather 'hard' feel, and lacking atmosphere; not unpleasant, but equally not very informative compared to the results from better players.

The CD player worked with the system well, providing a degree of tautness and control not available from most of the sources. Nevertheless the Fisher clearly brought to mind a number of the long-standing criticisms of CD players generally, and sounded rather harsh and uninformative. It lacked perceived dynamic range in the sense that instruments tended to congeal in busy passages, losing separateness of instruments; and that crucial quality of transparency (which means not, as a component, making an identifiable audible contribution to the sound of the system) was missing as a result.

Conclusion

In isolation, the CD player cannot be recommended in its current state of development – the originators of the medium still have a real performance edge to offer at the present time. We were also unhappy about the rack housing and some of the operational aspects of this system as highlighted earlier. Nevertheless if the CD player is left aside, the remainder of the system is moderately priced, and works well on radio especially. The standard does not quite meet the requirements for outright recommendation though, primarily because of the standards of the turntable and cassette deck.

Hitachi S2SM

Hitachi Sales (UK) Ltd, Hitachi House, Station Road, Hayes, Middlesex UB3 4DR
Tel 01-848 8787

This is a midi system, about the width of an LP sleeve ('jacket size'), and is supplied complete with a simple open rack designed to be stood on a shelf. Compact three-way loudspeakers are also part of the package — the system is not available without them. The rack itself is simple to assemble and well finished in dark brown plastic laminate, but the shallow 'feet' could scratch a polished surface.

Turntable: HT-L33

A neat fully automatic player, the HT-L33 is a belt-drive model with a parallel tracking arm housed in the lid. The cartridge fitting is of the 'P' mount type, and can be freely interchanged with any other 'P' mount cartridge without any adjustment The turntable's electronics include the facility to repeat any chosen section of the record. This is not limited to complete tracks — short passages of a few seconds can be repeated with a surprising degree of accuracy.

Basic wow and flutter was just fair, though the meter reading would intermittently go much higher — and although the absolute speed was quite accurate, there was a considerable amount of drift. The cartridge has a sagging response in the upper midrange typcial of inexpensive cartridges, but the effect was not severe, whilst channel balance, crosstalk and tracking ability were all satisfactory. The deck gave only poor isolation from external shock, such as footfalls, though.

Cassette deck: D-MD1

Allow yourself a spare evening with the instruction book for this deck — the operating procedure is opaque, to say the least! As the photograph shows, the Hitachi accepts two tapes at a time, offering a number of operating modes including tape-to-tape dubbing (copying) in real time or at high speed, and continuous playback of two tape sides on separate tapes, the start of the second tape being triggered by the end of the first.

The high-speed duplicating feature, which works at only 1.5 times normal speed and is mechanically very noisy, is purely for entertainment-quality results. Indeed there is quite a loss of sound quality even when dubbing at normal speed, as is to be expected.

Tuner/amplifier: HTA-MD1

Although the tuner and amplifier are physically separate, they share one model number. The power supply for both units is housed in the amplifier. A short 'umbilical cord' feeds low voltage DC to the tuner, which cannot be used separately. Both components are compact in size, with styling reminiscent of the 1950s.

The tuner has a non-illuminated tuning scale, cursor position being indicated by an LED. The tuning control is an edge-wise knob, which lacks flywheel assistance and is low geared. There is no tuning indicator as such, though a three-step LED signal strength meter gives some guidance. The long- and medium-wave AM bands were very prone to interference and whistles, and sensitivity was on the low side. The quality of AM sound was very poor, with a limited subjective bandwidth, even by AM standards.

The amplifier has inputs for the record and cassette decks, the tuner, plus one other high level input for CD and so on. Power output measured close to that specified at 18watts per channel. Not surprisingly therefore, the maximum sound pressure level even with the fairly efficient Hitachi loudspeakers supplied was a modest 94dBA.

Loudspeakers: SSMD2

These compact loudspeakers are made in Denmark to Hitachi's specifications. Using a conventional chipboard box neatly covered in dark brown laminate to match the rack, each speaker has three paper cone drive units.

In use . . .

Record reproduction in particular was basically very enjoyable. There was a feeling of thinness and of brightness, partly a tonal balance anomaly, but the music was surprisingly spacious and airy. Nevertheless, searching programme material showed a lack of precision and dynamics.

Radio reception was good, even on relatively weak signals, though the fairly high noise floor of the FM circuitry was sometimes a problem. Noise apart, the tuner gave clean, natural FM results. The cassette deck worked well too in normal mode, providing Dolby B was used. Dolby C, especially with metal tape, gave a thickened, blurred output.

Many of these characteristics could be heard when the amplifier was used outside the system: it was pleasant to listen to, but warm and 'loose' sounding in the bass.

Not so the loudspeakers: they compensated to an extent for shortcomings elsewhere by sounding crisp, open and alive — though not without some midrange 'nasal' colourations.

Conclusion

This could make an attractive proposition for a small room, or as a second system. My reservations reside in some ergonomic shortcomings — it's all to easy to catch records under the bottom of the lid when placing them on the platter, for example — and the price, which seems high for what's on offer.

GENERAL DATA

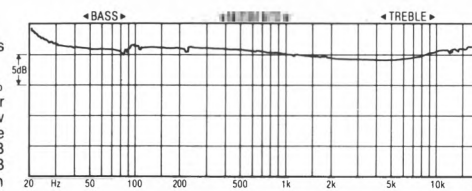
Amplifier: HA-MD1
Power output, per channel, at 1kHz ..... 18 watts

Record deck: HT-L33
Speed variations (wow and flutter) 0.10%
Speed drift ..... poor
Speed accuracy ..... 0.3% slow
Arm/cartridge resonant frequency ..... 14Hz, acceptable
Cartridge channel balance ..... within 0.8dB
Cartridge channel separation (crosstalk) ..... – 29dB
Cartridge tracking ability at 1.25g downforce 80μm

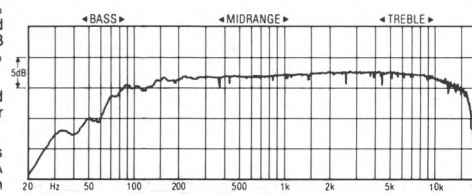
Cassette deck: D-MD01
Tape used for tests . Maxell UDXLII (maker's recommendation)
Frequency response ('chrome' or 'II' position) . . 80Hz – 16kHz
Speed variations (wow and flutter) 0.18%
Speed drift ..... good
Signal-to-noise ratio, with Dolby B 60dB
Distortion at OVU, with Dolby B 1.1%

Tuner: FT-MD1
Sensitivity ..... good
Signal-to-noise ..... poor

General
Maximum volume level in room (typical, with SSMD2 speakers supplied) 94dBA
System dimensions (w x d x h) ..... 35.5 x 33.5 x 37cm
Speaker dimensions (w x d x h) ..... 26 x 20 x 42cm
Price ..... inc speakers, £460



Disc: frequency response with cartridge supplied



Cassette: record/replay frequency response

Hitachi System S4M

Hitachi Sales (UK) Ltd, Hitachi House, Station Road, Hayes Middlesex UB3 4DR
Tel 01-848 8787

This system is distinguished by its relatively small size – principally in width, rather than depth or height. It's a shelf-top system, and is supplied with a very simple box-style housing with glass side cheeks which is both well finished and extremely simple to assemble. Each item of equipment makes extensive use of flat membrane switches in addition to rather small press button switches geared, I suggest, to average Japanese finger sizes rather than European ones.

Styling is distinctly unusual. The basic colour scheme is a rather mournful black, brown and silver (brushed aluminium) with odd dashes of colour from some of the switches. In my opinion the system looks distinctly old-fashioned in many ways, but compared to the over-technical looking bright aluminium fascias of most of its competitors, the softer, more domesticated face the Hitachi presents to the world may well find favour with many people. Construction and finish quality is excellent, though the membrane switches have a heavier feel that might be expected from their dainty good looks.

Turntable: HT-L5

Undoubtedly the prime technical feature of Hitachi's 4M system that sets it apart from most of is peers is the drawer loading turntable – though such decks have been available intermittently from one or two sources over the last few years. Hitachi say the advantage of this construction is that it makes stacking with the other system components easier, and this is true as far as it goes. Most significant is the fact that the turntable can be placed below the other components, which has the benefit of providing a mechanically more stable operating location.

There are drawbacks with drawer loading turntables like these though. The first is the tedious slowness (and noise) of the drawer mechanism that brings the front half of the platter out towards the user, and withdraws it again for 'play'. Another is the difficult access provided for the record, which is easily scratched. Yet another is the difficulty of cueing individual tracks on the record. Internal illumination in this case is all but non-existent, and although the arm positioning can be done with the platter in its forward position (with the lift/lower and cueing switches usefully interlinked) this is a time-wasting task that may prove annoying. Indeed the whole operation of this deck is very slow. But the record is well protected in use, and although the deck is rather microphonic, the integrity of sound reproduction remains relatively consistent even at high volume levels.

The platter is driven by Hitachi's 'Unitorque' variant of the direct-drive principle, claimed to give smoother platter rotation. The arm is a parallel tracking device, and is controlled by servo motors. The deck can be set for automatic play between any two pre-set points on the record, or to repeat whole sides if required. Arm set-down and return at the end of side is, of course, automatic.

On test the deck gave a very respectable measured performance with excellent wow and flutter and general speed stability (steadiness of pitch). The cartridge had a poor response curve for a player at this price, and did not track very well. Although the other cartridge measurements were generally satisfactory, it had lower-than-average measured stereo separation. The good news is that as the cartridge is of the T4P ('P-Mount') type, it can be readily interchanged for any of the P-Mount cartridges available from other sources.

Cassette deck: D-MD5

A thoroughly modern deck, the D-MD5 is equipped with Dolby C in addition to Dolby B noise reduction, and a variety of play and 'search' modes which can seek out, for example, the fifth track back from where the tape is currently playing. Although the transport engages with a very loud 'click' as the solenoids switch in, the transport itself works smoothly and quietly, whilst the transport keys are extremely well laid out and have a sensible operating logic. Twin LED meters have a 27dB dynamic range and 3dB resolution near 0VU, recording levels being set by a single level control, slightly crude in feel, with a separate balance slider. Neat touches include the cassette well illumination and the clear LED tape counter.

Tested with the maker's recommended tape (from Maxell, which is actually part of the Hitachi group), the deck gave a fairly well set up record/replay frequency response using Type II stock, with just a 1dB or so rise in response at high frequencies. The frequency response is not especially extended, but signal-to-noise performance is excellent. Wow and flutter was just average, though overall speed stability was good.

Tuner: FT-MD5L

If there is one respect in which this system is predictable, it is that none of the components behaves exactly as you might expect! The tuner is a case in point. It is a quartz synthesiser tuner offering FM, MW and LW reception and pre-set operation, but the similarity to other pre-set tuners ends there. A total of 12 pre-sets are offered, these controlled by six switches which can be 'shifted' like a typewriter keyboard to cover the two ranges. Any of the pre-sets can be allocated to any frequency on any band, FM or AM, so that stations can be freely mixed at will. From that point on, stations can be recalled by pressing the appropriate button (and shift key if necessary), or the pre-sets can be cycled through in numerical order using a button called 'pre-set scan'. This arrangement is an extremely useful one in practice: programmes can be placed where it seems most logical to the user, and waveband switching is no longer required. The only shortcoming of the Hitachi control layout is the necessity of shifting. Two separate banks of six switches would have made more sense.

A three-digit LED display gives a rough indication of received signal strength, two LEDs lighting with 100μV applied to the aerial terminal and all three on with 1mV. Sensitivity on FM is high, with low levels of background hiss when receiving a strong signal, but there are some background whistles and hum of the type so often associated with synthesiser tuners. AM performance was fair, interference being well suppressed, but at the cost of a rather dim treble characteristic leading to muted-sounding speech and music.

GENERAL DATA

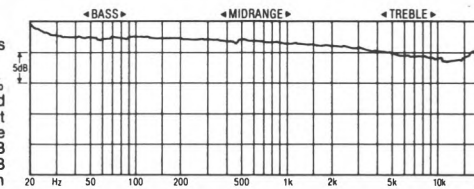
Amplifier: HA-MD5
Power output, per channel, at 1kHz ..... 50 watts

Record deck: HT-L5
Speed variations (wow and flutter) 0.06%
Speed drift ..... good
Speed accuracy ..... speed correct
Arm/cartridge resonant frequency ..... 11Hz, acceptable
Cartridge channel balance ..... within 0.1dB
Cartridge channel separation (crosstalk) ..... – 20dB
Cartridge tracking ability at pre-set downforce 62μm

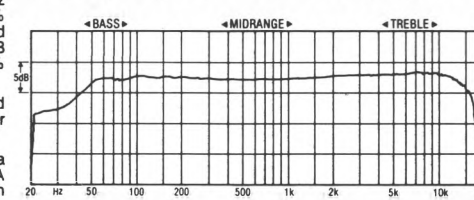
Cassette deck: D-MD5
Tape used for tests .Maxell UDXLII (maker's recommendation)
Frequency response ('chrome' or 'II' position) .. 40Hz – 16kHz
Speed variations (wow and flutter) 0.14%
Speed drift ..... very good
Signal-to-noise ratio, with Dolby B 64dB
Distortion at OVU, with Dolby B 1.2%

Tuner: FT-MD5L
Sensitivity ..... good
Signal-to-noise ..... fair

General
Maximum volume level in room (typical, with Kef Coda speakers) 98dBA
System dimensions (w x d x h) ..... 36 x 40 x 40.5cm
Speaker dimensions (w x d x h) ..... —
Price £600



Disc: frequency response with cartridge supplied



Cassette: record/replay frequency response

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Amplifier: HA-MD5

Like the other units of this system, the HA-MD5 amplifier has some unusual functions and controls. Rather than fit conventional tone controls, for example, Hitachi have chosen to provide six switches which apply a predetermined degree of boost or cut in the bass, boost or cut in the treble or midrange boost – plus a 'flat' (unboosted) position. The advantage appears to be that excessive amounts of possibly loudspeaker-damaging bass or treble boost is simply not possible. The disadvantage is that the available tonal corrections are in no case particularly subtle. Hitachi have provided a switch option which allows the tonal correction (more correctly perhaps 'manipulation') to be fed through onto tape when a recording is being made.

Rather than use a straightforward volume control, the HA-MD5 uses a power operated control. Unlike some other similar arrangements on other amplifiers though, the volume does not come on at low level when the unit is switched on (unless it has been left for several days). It reverts to its previous setting, which of course may be inappropriately high (*for the 'morning after'! – Ed*).

One set of loudspeakers only can be connected, and the power available into them measures 50watts/channel.

In use . . .

System 4M was supplied for review without loudspeakers, and was therefore tested with the Kef Coda model, which we have used as a 'standard' speaker in this project. However Hitachi do sell a number of loudspeakers which can be used with this system.

On audition, the Hitachi 4M system turned out to be a mixture of good and mediocre. One point in its favour though is the relative consistency of the different sources: cassette, records and radio.

Record reproduction was characterised in the main by its slightly recessive, almost 'hollow' coloration which emphasised the rather heavy, 'slow' bass and the clean, well-focused treble at the expense of the midband. This is clearly at least partly a reflection of the frequency balance of the cartridge, but it also reflects the way the Hitachi turntable behaves in the bass. Also, stereo information tended to polarise around the speakers, rather than spread between them. Overall the sound wasn't bad, but in the context of a £600-plus system, really not quite good enough.

The tuner also displayed a fairly individual kind of sound, FM reproducing with a degree of tonal 'richness' (not in itself unpleasant), plus a distinct loss of detail information associated with the rather thin sounding top end. These effects were not severe though, and relate primarily to the FM generator-based listening tests. Off-air, given the prevailing quality of transmissions on most programmes, the Hitachi sounded more than acceptable.

Replay of pre-recorded cassettes was beset by an azimuth error that led to a perceived frequency balance weighted towards the bass, plus relatively high levels of hiss. This was probably a sample fault though, and can certainly be corrected by a competent dealer – it's a fairly routine adjustment. Home made recordings though (where head azimuth has no effect because record errors are exactly compensated by the same errors when playing back) were very fine indeed. Reproduction was essentially subtle and cleanly presented stereo soundstage, notwithstanding the only moderate wow and flutter measurement. There was little to be gained by using metal formulation tapes though.

Easy on the ear, the amplifier did itself have something of the same characteristic that was noted from records and FM radio – a slightly 'fat', 'slow' bass quality. The amp did not have the tautness or definition in this region to really allow bass lines to project forcefully without sounding bloated, and to this extent anyway the Hitachi was a little disappointing. Nevertheless, there was generally a quality of refinement and an impressively stable sense of stereo to help things along. Even if the amp wasn't particularly good, it was generally enjoyable and reasonably unobtrusive.

Conclusion

If this system was sold for, say, £400, which would put the system price at about £500 with good quality loudspeakers, it would in our view merit a recommendation. The high price must be accounted for by the expensively engineered front-panel facilities as much as anything else, and although they worked well enough they do not justify the obviously fairly heavy premium involved. None of the components, with the possible exception of the cassette deck, work substantially better than much cheaper ones from other manufacturers, and although the power output on test was quite high, it did not prevent the sound deteriorating audibly at high replay levels with the Kef speakers.

JVC GX-111

JVC (UK) Ltd, JVC House, 12 Priestley Way, Eldonwall Trading Estate, Staples Corner, London NW2 9BA
Tel 01-450 2621

This system looks more expensive than it is. In most respects the components are solidly built and have that 'busy' or 'technical' appearance Japanese audio manufacturers are so good at. Supplied with non-optional type S-40 loudspeakers, the GX-111 comes also with what at the price is quite a well-made and finished rack housing. The glass lid has a protective trim along the front edge, with rather sharp corners. There were no other problems though, and assembly was straightforward.

Turntable: L-A100

A simple belt-drive turntable, the LA-100 gives auto-return at the end of a record side and has a detachable headshell. This is a rather flexible plastic moulding, but on the positive side the arm bearings are much better-adjusted than most, with no discernible free play. The deck features what JVC call an 'independent suspension system'; the part of the chassis supporting the arm and platter is separate from the plinth, and mounted on a very stiff 'springing' medium, presumably rubber. Because it is so stiff, the effect of the suspension is not great, but the deck did prove less prone to feedback and shock disturbance than usual, except at the very lowest frequencies. The perspex cover too is unusual; it can be left in place when used within the rack housing since the hinge design means virtually no overhang to the rear.

JVC's cartridge has a significant upper midband suck-out (about −2dB at 4kHz) followed by a +2dB peak at 15kHz. These figures are typical of inexpensive cartridges as supplied with rack systems, and are not the subject of special criticism. All other measured parameters checked out well.

Cassette deck: KD-V11

Again a straightforward model with simple facilities, the cassette deck is equipped with Dolby B noise reduction and manual tape selection. Notwithstanding its operational simplicity, JVC have still managed to engineer in the odd unhappy feature. The two input level controls for left and right channels are physically separated, making co-ordinated fades difficult. The LED level indicators cover only a 16dB range (the 'minus infinity' LED is just a 'power-on' light) and the indicator scales for the two channels work in opposite directions, one to the right, and one to the left. Finally, although JVC label this deck 'logic control', in my view it doesn't behave like one. It is impossible to go directly from play to fast wind, and the operational feel is similar to other power assisted set-ups, but not to 'full logic' ones. The deck was found slightly underbiased for the recommended Type II (Chrome position) tape, TDK SA, and wow and flutter was found to be on the high side. Signal-to-noise, on the other hand, was satisfactory.

Tuner: T-K11L

This is an analogue three-band tuner (FM, MW and LW) with a long, easily legible scale, a three-LED signal strength meter and a 'tuned' light which changes colour at low levels to indicate operation of a circuit called QSC (Quieting Slope Control), designed to reduce noise on weak signals.

AM performance was below average, sound quality being somewhat 'wooden' and unextended in the treble, whilst interference levels were higher than usual. On the FM side, the JVC had rather lower sensitivity levels than usual but noise levels were satisfactory – just!

Amplifier: A-K11

Good ergonomics and very simple facilities are

the most obvious features here. Inputs are provided for the record player, cassette deck, tuner and an auxiliary device (this input is labelled 'video' by JVC). Only one pair of loudspeakers can be connected and the amplifier is neat and functional, though the rather gaudy tone control display is in my view strictly non-functional. Power output measured an ample (and well above spec) 38watts at 1kHz, this well above the maker's specified figure.

Loudspeakers: S-40

Superbly finished, the loudspeakers for the GX-111 system have two drive units apiece, the tweeter (a large 7cm cone unit looking more obviously suited to life as a midrange unit) mounted off-centre from the bass driver. The reason for the large tweeter is apparent from an internal examination: there is no electrical crossover whatever in this design, which relies instead on the electromechanical characteristics of the drive units to balance the frequency response. The cabinet is lightly built and damped, and the magnets used on the bass units are very small, but the outside of the speaker is very smart and well finished. The overall frequency response plot tells a story of a midrange prominent balance and a declining, uneven treble output.

In use . . .

Mounted on tall open stands, the loudspeakers were a disappointment. They have an abrasive, forward balance, an obvious lower-treble resonant peak that makes them in our view very tiring to listen to for more than a few moments at a time, a lack of treble extension and an unfocused stereo soundstage. Not a happy catalogue of attributes! FM performance too was below par. There was obvious high frequency distortion – a sort of 'gritty' overlay to the music – and a lack of treble leading to a 'closed in' sound with obvious loss of detail information.

On the brighter side, records reproduced acceptably well, though with a slightly inarticulate hollow sounding midrange and some loss of detail and instrumental separation. The sound was pleasant nevertheless, and the bass end was tidier than some whilst the deck was relatively immune to shock and feedback. The amplifier too worked very well. It had a slightly 'distant' feel, but again it gave a pleasant, fairly articulate performance with a warmish bass quality. The cassette deck was also fine on audition. There was touch of brightness, especially with Metal tape types, but this was hardly significant in the system context, whilst reproduction was firm and clear, with an adequate apparent dynamic range.

Conclusion

Although the tuner is a weaker performer than the other electronics, it is the loudspeaker performance – and the fact that the system cannot be purchased without them – that lets this system down. Not recommendable, despite many strong points.

GENERAL DATA

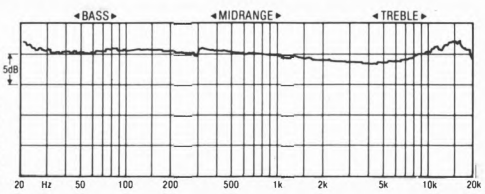
Amplifier: A-K11
Power output, per channel, at 1kHz ..... 38 watts

Record deck: L-A100
Speed variations (wow and flutter) 0.08%
Speed drift ..... good
Speed accuracy ..... 0.6% slow
Arm/cartridge resonant frequency ..... 13Hz, acceptable
Cartridge channel balance ..... within 0.7dB
Cartridge channel separation (crosstalk) ..... – 30dB
Cartridge tracking ability at 2g downforce 80μm

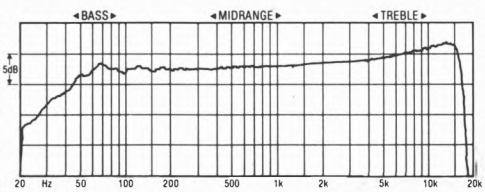
Cassette deck: KD-V11
Tape used for tests ..... (maker's recommendation)
Frequency response ('chrome' or 'II' position) .. 45Hz – 16kHz
Speed variations (wow and flutter) 0.15%
Speed drift ..... excellent
Signal-to-noise ratio, with Dolby B 61dB
Distortion at OVU, with Dolby B 1.7%

Tuner: T-K11
Sensitivity ..... below average
Signal-to-noise ..... average

General
Maximum volume level in room (typical, with S-40 speakers supplied) 99dBA
Rack dimensions (w x d x h) ..... 49.5 x 43.5 x 86.5cm
Speaker dimensions (w x d x h) ..... 28 x 22 x 52cm
Price ..... inc speakers, £369



Disc: frequency response with cartridge supplied



Cassette: record/replay frequency response

JVC GX-222

JVC (UK) Ltd, JVC House, 12 Priestley Way, Eldonwall Trading Estate, Staples Corner, London NW2 9BA
Tel 01-450 2621

In general terms, the GX-222 is an upmarket, upgraded version of the GX-111. It is supplied with the same very adequate and well finished rack housing as the 111 and most of the electronics share the same basic mouldings and control layouts – though the tuner and loudspeakers are quite different. The other difference, a crucial one, is that the GX-222 system can be bought with or without loudspeakers.

Turntable: QL-A200

As the model designation implies, the QL-A200 is a quartz-locked direct-drive player. The arm returns to its rest automatically at the end of a side. Construction is similar to that of the L-A100 supplied with the GX-111 system, with the same very stiffly-suspended platter and arm asembly, to reduce susceptibility to external shock and feedback. The QL-A200 appeared notably less successful here than the cheaper deck, and perhaps this is because the arm/cartridge resonant frequency is lower, making the assembly wider open to the effects of external disturbance at low frequencies. The arm is similar to the one on the cheaper deck, and has equally well-adjusted bearings, but the cartridge is a different type with a much smoother frequency response.

Cassette deck: KD-V22

This deck has simple operational facilities virtually identical to the deck in the GR-22 system. However the KD-V22 has Dolby C noise reduction in addition to Dolby B, whilst one of the former's minor shortcomings, in the form of the two record level LED meters working in opposite senses, has been rectified on this model. Again though JVC have provided only 16dB of dynamic range on the meters which means that low level passages will fail to register at all and the so-called 'logic' controls still operate like the more mundane power-assisted type (see general introduction). The deck sample supplied had excessive levels of wow and flutter at 0.23% weighted, but the deck has been well set up for the recommended tape Type II formulation (TDK SA) giving the ruler flat response shown.

Tuner: T-X22

The T-X22 is equipped for FM, MW and LW reception and is of the quartz synthesiser type with a digital read-out of the tuned frequency and pre-set operation. Seven presets are available on FM, plus four on MW and three on LW. Apart from the fact that much of the minor switching has been incorporated into the row of preset buttons, which necessarily makes the tuner a little less obvious to operate without looking carefully at the control legends, the JVC is functionally sound.

The tuner worked quite well on AM, though interference was not well suppressed. Both sensitivity and signal/noise were satisfactory on FM though, the noise being essentially free of whistles and other synthesizer induced spurii except under low signal conditions.

Amplifier Model: A-K22

This is a straightforward amplifier with inputs for one additional line-level component (a CD player perhaps, or a second tape recorder for playback and dubbing purposes only) as well as the other system components. Indicator lights are incorporated for the source selected and tape monitor (making the 'power on' indicator redundant by the way) and two pairs of loudspeakers can be connected, though only one pair can be used at the time. These details, plus more output power, are all that distinguish the A-K22 from the A-K11 as used in the GR-11 system. Power output was generously in advance of that specified by JVC.

Loudspeakers: S-P33

JVC have supplied a quite substantial-looking three-way loudspeaker, employing cone drivers throughout, to go with this system. A simple two-element crossover connects the drivers to the amplifier, and enclosure design, which is immaculate from the outside, is very simple indeed internally. The measured frequency response is quite encouraging in that the energy trend is essentially even, though the tweeter output is a little spiky. JVC are not very specific with suggestions for placement, but experiment suggested that use on open stands well away from room boundaries is advisable.

In use . . .

Used with the Kef Coda test loudspeakers, this system gave a very good account of itself via tape and radio especially, though record reproduction was slightly disappointing because it failed to match that of the cheaper GR-11 system. The amplifier demonstrated itself to be a taut and lean performer, more obviously in control and more detailed than many amplifiers in this group – some mild hardness notwithstanding. The cassette deck had a trace of this hardness too, especially on Metal tapes which reproduced on the bright side of neutral to start with. This hardness may be partly a side effect of the poor wow and flutter, though this would appear to be a sample fault on the unit supplied for review. Certainly cassette reproduction from ferric and chrome (or chrome bias) cassettes was on the whole excellent. The sound was basically firm, stable and easy to follow.

Record reproduction was marred to a degree by poor low frequency control and definition. There was little sense of depth or 'airiness' from records as a whole, though the cartridge was obviously quite sweet and smooth. The tuner, though, was beyond reasonable criticism for what is a relatively inexpensive synthesizer design. FM reproduction was on the whole transparent and clean, with well defined stereo and – again – just a trace of hardness.

Finally, the S-P33 loudspeakers cannot be recommended. They are severely beset with odd 'phasy' effects, lending a confused, oppressive overlay to music. There is also an extremely obvious 'whistly' sounding resonance that was excited much of the time.

Conclusions

With high standards of construction and finish, the GR-22 also has a fairly logical and simple layout of controls. Provided it is bought without the loudspeakers, this system can be recommended, especially so for those who place the importance of tape and radio higher in the scheme of things than records.

(Note: A sample KD-V22 deck tested in HFC Cassette Decks and Tapes, No 32, gave acceptable wow and flutter and a 'Best Buy' performance overall.)

GENERAL DATA

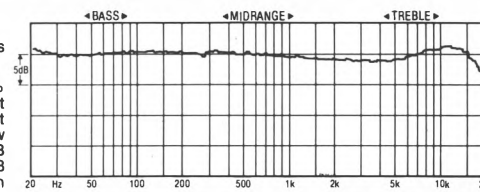
Amplifier: AK-22
Power output, per channel, at 1kHz . . . . . 50 watts

Record deck: QL-A200
Speed variations (wow and flutter) 0.07%
Speed drift . . . . . excellent
Speed accuracy . . . . . speed correct
Arm/cartridge resonant frequency . . . . . 10Hz, too low
Cartridge channel balance . . . . . within 0.2dB
Cartridge channel separation (crosstalk) . . . . . – 30dB
Cartridge tracking ability at 1.75g downforce 80μm

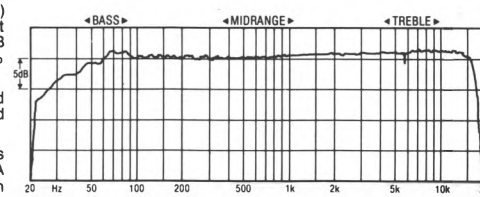
Cassette deck: KD-V22
Tape used for tests . . . . . TDK SA (maker's recommendation)
Frequency response ('chrome' or 'II' position) . . 40Hz – 16kHz
Speed variations (wow and flutter) . . . . . 0.23% (see text)
Speed drift . . . . . excellent
Signal-to-noise ratio, with Dolby B 63dB
Distortion at OVU, with Dolby B 1.4%

Tuner: T-X22
Sensitivity . . . . . good
Signal-to-noise . . . . . good

General
Maximum volume level in room (typical, with S-P33 speakers supplied) 101dBA
Rack dimensions (w x d x h) . . . . . 49.5 x 43.5 x 86.5cm
Speaker dimensions (w x d x h) . . . . . 28 x 22 x 52cm
Price . . . . . £425 (inc speakers, £495)



Disc: frequency response with cartridge supplied



Cassette: record/replay frequency response

JVC 2001FS

JVC (UK) Ltd, JVC House, 12 Priestley Way, Eldonwall Trading Estate, Staples Corner, London NW2 9BA
Tel 01-450 2621

Here is a unique system that gets away from the old familiar clichés of rack system design with what (if I'm not mistaken) is a distinctly Japanese-home-market flavoured presentation. The rack housing, if you can call it that, is in fact a small box with castors and a glass door; the inside being fitted out for record storage in the usual way. In size and appearance it looks like nothing so much as a bedside table, though with a matt silver metallised finish.

But in addition to this simple cabinet with a door, there is a top shelf that can be raised or lowered using four vertical rods with screw locking devices. The major part of the equipment comes in a single housing that slips on top of the main box, the top shelf being positioned immediately above to support the turntable. The standard of finish is first class, but the styling is rather angular and likely to prove happiest in rooms with fairly modern decoration.

The main part of the equipment refered to above compromises a 'home' unit into which the cassette deck, the pre-amplifier and the tuner slip in and out using simple catches on each side. The home unit looks like a hollow box with internal edge connectors to take the necessary electrical interconnections to each item when it is inserted. It also contains the power amplifier – the part of any amplifier that does the real work of amplifying without the necessity of the switches and controls of the low level preamplifier circuits.

From the description above, the 2001 system may just sound like a 'sham' components system that should logically have been built as an integrated whole. But there is a point to the detachable tuner and cassette deck either of these can be removed from the main system and inserted into a bedside clock/amplifier unit (with built-in stereo speakers) and used as an unusually sophisticated clock/alarm! The clock/amplifier is called the DBE 55, and it costs no less than £109 extra. Another option is a graphic equaliser called the SEA-55. This costs £99.

The system was supplied for review with the

floor-standing loudspeakers (hence the FS designation) but is also available, less cabinet, with bookshelf speakers instead. In this form it is called simply 2001, at around £200 less.

Turntable: QL-E55

The accent in this system is on automation – it's an 'everything with chips' kind of package and capable of some very useful tricks especially for those who regularly record cassettes from records. The QL-E55 can be programmed to play tracks in any selected order; up to eight different tracks and fifteen different instructions can be programmed into its memory. You can then start a recording on the cassette deck (the turntable and cassette link together to perform synchronised starts in this mode) and the disc will be recorded with the tracks arranged in the sequence you've chosen.

The arm is a parallel tracking type, and is unique among the systems tested in being fitted with a high-output moving-coil cartridge rather than the usual moving magnet type; the one fitted here sounded extremely bright and had a measured frequency response elevated a full 5dB at high frequencies. All other measured results were satisfactory.

Cassette deck: D-E55

Like the tuner and pre-amplifier, this cassette deck receives its power supply from the base or 'home unit' which contains the M-E55 power amplifier (or from a DBE-55 unit). It is not a stand-alone unit, and cannot be used in any way on its own.

Most of the minor switching of this deck is incorporated under a flap at the bottom of the unit – this includes the two record level slide controls, Dolby B and C switching and the switches that control the auto reverse mechanism. The deck can record on both sides of the tape (though it will always stop when it has completed the second side of the tape – that is one complete pass), but playback can be of just one side, both sides or continuous.

The deck gives a fairly flat record/playback frequency response, though some output variations are noticable on the plot. Wow and flutter was about average, but signal-to-noise and distortion figures were fully satisfactory.

Tuner: T-E55L

A slimline synthesiser tuner, the T-E55L is equipped with six pre-sets on FM, and a further six which can be allocated as desired between the LW and MW bands. Controls and indicators are perfectly standard, and include a three-LED signal strength meter with a useful operating range of up to approximately 1mV. There was one operational quirk in that the tuner occasionally stopped 50kHz short of the required frequency when using the bench generator (tuned to 100MHz and 10mV output voltage – a moderate level) the result being extremely poor reception. This apart, the tuner worked satisfactorily though in common with a large number of synthesiser tuners reception quality was spoilt to a degree by the presence

GENERAL DATA

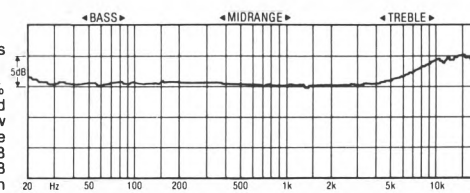
Amplifier: P-E33 pre-amp, M-E55 power amp
Power output, per channel, at 1kHz ..... 70 watts

Record deck: QL-E55
Speed variations (wow and flutter) 0.06%
Speed drift ..... good
Speed accuracy ..... 0.3% slow
Arm/cartridge resonant frequency ..... 10Hz, acceptable
Cartridge channel balance ..... within 0.4dB
Cartridge channel separation (crosstalk) ..... – 27dB
Cartridge tracking ability at 1.4g downforce 80μm

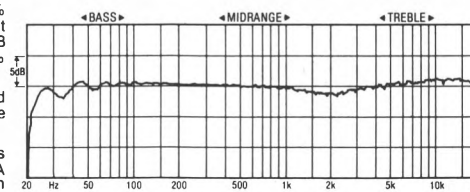
Cassette deck: D-E55
Tape used for tests ..... TDK SA (maker's recommendation)
Frequency response ('chrome' or 'II' position) .. 23Hz – 19kHz
Speed variations (wow and flutter) 0.14%
Speed drift ..... excellent
Signal-to-noise ratio, with Dolby B 61dB
Distortion at OVU, with Dolby B 0.5%

Tuner: T-E55L
Sensitivity ..... good
Signal-to-noise ..... average

General
Maximum volume level in room (typical, with S-F550 speakers supplied) 101dBA
Rack dimensions (w x d x h) ..... 39 x 40 x 75cm
Speaker dimensions (w x d x h) ..... 23 x 22.5 x 66cm
Price ..... inc speakers, £889



Disc: frequency response with cartridge supplied



Cassette: record/replay frequency response

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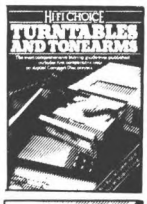

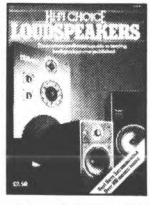

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of background whistles; in the JVC's case these varied considerably with level, being most annoying with very weak and very strong signals (below 1mV and near 100mV). Noise levels would have rated as good without this; as it is the rating is downgraded to average, though sensitivity is certainly high. The AM bands sounded satisfactory but were far from the best. The sound quality is best described as a little boomy and dull, with moderate levels of interference, this sounding similarly dulled, and hence sounding more, rather than less obtrusive.

Pre- and power-amplifier: P-E33E and M-E55

The only unfamiliar pre-amp facility is likely to be the SEA record button which allows a graphic equaliser to be plugged in the back and incorporated in the feed to the cassette deck, a practice in our view only likely to make most recordings sound worse from a hi-fi point of view.

The volume control is motorised, which is much less convenient than a normal control, and slower, of course; for some reason the bass, treble and balance controls are situated well away from the other pre-amplifier controls on the bottom of the home unit. These minor inconveniences apart, the system is easy to operate and reasonably foolproof by most standards. Power output from the M-E55 measured 70watts per channel at 1kHz.

Loudspeakers: S-F550

The shape of these loudspeakers is unusual but functional – they're designed to be placed directly on the floor. There are signs from the way the speaker is constructed that more care has been taken over quality than is often the case. Three drive units are used: a cone bass unit, a similar-sized cone midrange unit (with a quite different magnet structure) and a smaller cone tweeter, each covered with rather rattly mesh covers. The measured listening room frequency response was extremely uneven, especially in the domain of the tweeter and midrange units.

In use . . .

Under all conditions of use, the sound of the 2001 system was dominated by the loudspeakers. They have two obvious features. In their reproduction of low frequencies they boom unpleasantly, and exhibit no real dynamic ability or clarity in the way they reproduced bass in general; bass was in every way overwhelming, even when used well away from walls and other obstructions. Reducing the level of bass on the amplifier only reduces the level of bass, but does not restore the quality of control and definition that is so important to truly solid bass performance.

At the other end of the frequency range the speakers exhibit a forward, assertive and very obviously coloured quality that is extremely tiring to listen to. The sum total of these shortcomings is to reduce drastically any sense of variety of tonal colour or any natural flow of dynamic shadings in the music. It also leaves the sound box-bound; there is no real sense of stereo images forming outside the speakers themselves.

The remainder of the equipment showed a rather disappointing level of performance for what is after all not an inexpensive system. Some of the features of good musical reproduction were there – the amplifier goes comfortably to quite high volumes with the JVC and Kef Coda loudspeakers used, and both cassette deck and turntable return a good performance in some respects. The turntable sounds stable and is not as the microphonic or as boomy as some, though there is more than a trace of midband colouration – a sort of nasal quacky quality, that increases with volume, and is therefore probably a feedback induced effect.

The cassette deck worked well, period. At worst cassette reproduction seemed a little shut in and restrained, but generally sound quality was clear and firm, with metal tapes showing a worthwhile performance edge, specifically a more solid and realistic sense of dynamic range. But some discs proved difficult to record satisfactorily. Those with sharply defined transients (a Kurt Weill recording of (largely) brass instruments springs to mind here) sounded 'fluffed'; the sharp beginnings of notes being softened in impact. A more serious flaw exists when playing records though.

The cartridge (which cannot be changed for a different model) is extremely, I would say almost piercingly bright, emphasising record surface noise and giving records a slightly uncouth, uncomfortable 'glare'.

Conclusion

What is not in doubt here is JVC's ability to make a system that is innovative, well put together, pleasing to the eye (though ergonomically slightly messy and initially at least confusing to get to grips with), and likely to last. Generally though, I was disappointed to find that sound quality criteria had so clearly taken a back seat to these other virtues.

Marantz MS300

Marantz Audio (UK) Ltd, 15-16 Saxon Way Industrial Estate, Moor Lane, Harmondsworth, Middlesex UB7 0LW Tel 01-897 6633

A moderately-priced 'conventional' rack system, the MS300 reflects the introduction of a new range of Marantz electronics, replacing a very successful series which remained substantially current for about three years, and that had received generally good reviews in the hi-fi press. Large soft-touch buttons and sliders now replace the rotary controls of old, but the design priorities remains as before; as does the pale gold finish, the Marantz house colour.

The rack supplied with this system came in an attractive dark imitation wood finish, with standard glass fittings, but constructing it was tedious, and the quality of finish was uneven. Marantz have informed us though, that current production racks have an improved finish.

Turntable: TT130DL

This is a typical Japanese low-cost belt-drive turntable with the minimum of fussiness in its control arrangement. The usual two running speeds are available, and the damped cueing platform is set in action by a front-panel push button. Operation is semi-automatic, with automatic motor switch-on as the arm is pulled towards the record, and auto-return at the end of the side. The unit is lightly constructed, with just soft rubber feet as a token attempt at isolation from feedback and shock.

The turntable has no trouble meeting reasonable standards of speed accuracy (running just 0.3% fast) and speed stability (I measured 0.09%) though. The cartridge has a frequency response that rolls off at the high end just prior to tip mass resonance, and channel balance was sufficiently poor on the review sample to make a little tweaking of the amplifier balance control worthwhile.

Cassette deck: SD230

More expensive systems from Marantz have Dolby C noise reduction in addition to Dolby B, but this one has 'B' only. Tape type switching and the setting up of record levels, using the two-colour LED meter display, is an easy task, and the lack of superfluous facilities makes for a straightforward product to use. One disappointment though is in the transport controls; they are mechanical, but power-assisted (rather than true electronic or 'logic' controlled) and work only after a series of loud 'clanking' noises. Indeed the deck was found mechanically noisy on fast wind anyway, and on our sample the capstan/pinch-wheel motor emitted a continuous whine wherever the power was on.

At the low-frequency end of the frequency band, Marantz appear to have decided on high-pass filtering (−3dB at 38Hz) perhaps to prevent very low frequency 'rubbish' from the turntable interfering with the deck's performance. The SD220 is well set up for the recommended TDK tape though, and it displayed a broadly satisfactory electrical and mechanical performance elsewhere.

Tuner: ST320L

This well laid out slim-line tuner has three bands (FM, MW and LW) and is of the dial-and-pointer type better known these days as 'analogue'. The tuning scale is long and well scaled, though you may have to crouch to read it in the rack. A five-LED signal strength meter and a centre tune indicator make for fast and accurate tuning.

The first sample of the tuner supplied suffered from constant spurious whistles on FM, but a second one proved satisfactory. It displayed adequate sensitivity and noise levels that were quite low-but not as good as

some others. AM sound quality was generally reasonable, if unimpressive, with rather lower sensitivity than some, but correspondingly less interference in most cases. AM sound was a little warm and 'woolly' when compared to the same brand ST-8 used as a 'reference' in these tests.

Amplifier: PM230

Superceding the well-liked PM310 amplifier is the slimline PM230. Again, our sample suffered a slight fault, in the form of radio breakthrough on to the record (phono) input with the tuner switched on. A second sample was near faultless in this respect.

The design of the amplifier is basically conventional though Marantz claim that the dynamic power delivery (in other words the kind of power yields needed for typical music signals rather than test tones of a continuous nature) is considerably higher than the power specification would suggest. There was some evidence – though nothing dramatically obvious – to suggest that this claim is justified, meanwhile on the bench the PM230 gave 30watts output into 8ohms, and maximum usable volume levels in the listening room of 96dB, which is about average.

In use . . .

The amplifier turned out to be the key item in this system, as its abilities and limitations were apparent through every source. Luckily, there were more of the former than there were of the latter: the PM230 showed itself on audition to have a very precise and stable sound, with a solid and tuneful bass and a very well presented stereo soundstage; both in width and in the way it suggested depth. The first sample had some hum when playing via its phono input, but a second one was both quet and hum free.

Record reproduction via the simple Marantz player was surprisingly good: the sound had plenty of body and openness through the midrange, though the sound was a little dull tonally and much of the music tried had a rather confused and ill-separated quality. The tuner though was very good indeed on FM, with a clean, positive presentation, whilst the cassette deck, apart from a little woolliness overall, performed well too. However, the whine from the transport could be clearly heard during quiet passages. Bass from the cassette though was relatively crisp and tight – the bass end roll-off appears not to have caused any audible problems. Type II tapes gave the best cost/performance mix.

Conclusion

A neat system this, with good, crisp sound reproduction and excellent stereo. The turntable, whilst it showed some shortcomings, was not as obviously a weakness as in many competitive systems. The MS300 does miss being an outright Best Buy because of the large number of small niggling problems noted with the review system, but can be recommended.

GENERAL DATA

Amplifier: PM230
Power output, per channel, at 1kHz ..... 30 watts

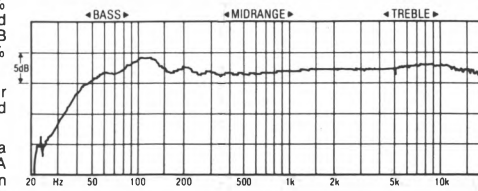
Record deck: TT130
Speed variations (wow and flutter) 0.09%
Speed drift ..... good
Speed accuracy ..... 0.3% fast
Arm/cartridge resonant frequency ..... 13Hz, acceptable
Cartridge channel balance ..... within 2.1dB
Cartridge channel separation (crosstalk) ..... – 24dB
Cartridge tracking ability at 2g downforce 75μm

Cassette deck: SD230
Tape used for tests ..... TDK SA (maker's recommendation)
Frequency response ('chrome' or 'II' position) .. 38Hz – 17kHz
Speed variations (wow and flutter) 0.10%
Speed drift ..... good
Signal-to-noise ratio, with Dolby B 62dB
Distortion at OVU, with Dolby B 1.0%

Tuner: ST230L
Sensitivity ..... fair
Signal-to-noise ..... good

General
Maximum volume level in room (typical, with Kef Coda speakers) 96dBA
Rack dimensions (w x d x h) ..... 46.5 x 46.5 x 86.5cm
Speaker dimensions ..... —
Price £410

Disc: frequency response with cartridge supplied



Cassette: record/replay frequency response

Marantz MX250

Marantz Audio (UK) Ltd, 15-16 Saxon Way Industrial Estate, Moor Lane, Harmondsworth, Middlesex UB7 0LW Tel 01-897 6633

Ultra-fashionable and very compact is this new system from Marantz. The equipment has a distinct 'hi-tech' appearance, and some users may find the controls and displays rather arcane, if not downright obstructive – the peculiar tuner frequency readout (to give just one example) being open to criticism on these grounds. There is no doubting the MX250's superb finish though. The muted gold colour has a seductive way of glinting in subdued lighting that has a lot of appeal!

Based on components that measure just 320mm wide in each case, the system stacks vertically and comes complete with a simple table-top housing. Options available include LD20 loudspeakers and the CD63 top-loading Compact Disc Player, which is the same width as the rest of the equipment and can be stacked on top. Both these items were supplied with the review system.

Efforts have been made in this design to keep the system fairly simple to use, with an automatic source selection feature. As an example of how this works, pressing 'play' on the cassette deck automatically switches the amplifier to its 'tape replay' mode.

Turntable: TT333

This unit can be placed at the bottom of the equipment stack. Although it is the same width as the other system components, it is naturally much bulkier.

Model TT333 is, of course, a drawer loading turntable (even though it looks like a cassette deck!), the door flapping down and the platter emerging half out of the cabinet on command. Record size, speed and arm set down and return are all handled automatically, with manual over-ride where appropriate. Auto-repeat of complete sides is possible, but manual cueing can only be done with the record retracted and therefore almost invisible. In any case, the cueing buttons were tardy in operation (which may have been a sample fault) and the arm tended to overshoot (which wasn't). The arm is a low mass parallel tracking device. Marantz appear to have forgotten this fact when they chose the cartridge: note the excessively high arm/cartridge resonance which probably helps obscure low frequency musical definition. There is a gain here, though, in that the deck proved relatively impervious to shocks and feedback. The cart-

ridge response generally is indicative of a typical low-price design. The turntable ran a little slow (0.9% – unusual for a direct drive player) but other measurements were all satisfactory.

Cassette deck: SD233

Only the electro/mechanical latching transport buttons identify this product as a cassette deck – at least until you press the 'eject' button and the cassette tray slides forward. The deck is equipped with both Dolby B and C type noise reduction, whilst tape type switching is manual using clearly labelled controls. The mechanical tape counter is rather recessed, and cannot be read properly if not placed at eye level, whilst the short single record level meter (which reads the highest level of either channel) only covers a very narrow range of 16dB. The record-level slide control (there is no means of adjusting the channels independently) is rather short, but the deck is otherwise functionally laid out, and a possible candidate for the smallest hi-fi cassette deck available. On Type II (chrome position) tape, record/replay frequency responses were well extended and fairly linear – though the machine appears to underbias a little for TDK SA and consequently the sound is slightly bright. Wow and flutter reaches a good standard and signal/noise is good – but the 0VU point on the meters has been set quite high, so don't allow recordings to peak much beyond this point.

Tuner: ST333L

This amazingly thin FM, MW and LW tuner – just over 4cm high! – offers the extraordinary combination of quartz synthesiser tuning with an analogue tuning scale. The latter is very short and the frequency tuned is indicated by one of just 18 LEDs spread across the band, which means that only a very approximate idea indeed is given of the frequency selected. There is just one LED per MHz on the FM band! Eight pre-sets are provided for FM use, and a further eight for the two AM bands. A separate memory can store any 6 frequencies, one of which will be called up from the programmed sequence each time power is applied to the unit – by a timeswitch coupled to the cassette deck, for example. A three-LED signal strength indicator is also fitted, but it has the quite useless property of showing all three LEDs lit for an input voltage of less than 10μV – this signal level is less than is required for good mono reception! Both sensitivity and noise levels on FM are below average, and the tuner produces a variety of synthesiser induced whistles which vary with signal strength, but are nearly always audible. AM is also plagued by low-level high frequency noises, but basic sound quality is clear if rather dry.

Amplifier: PM233

Identical in size to the cassette deck – and close enough in appearance to get confused on occasion – the PM233 delivers 28watts/channel at 1k and 20kHz, and 22watts at 20Hz

GENERAL DATA

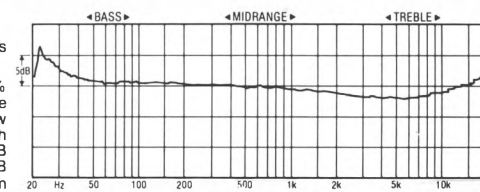
Amplifier: PM-233
Power output, per channel, at 1kHz ..... 28 watts

Record deck: TT333
Speed variations (wow and flutter) 0.07%
Speed drift ..... average
Speed accuracy ..... 0.9% slow
Arm/cartridge resonant frequency ..... 20Hz, too high
Cartridge channel balance ..... within 0.4dB
Cartridge channel separation (crosstalk) ..... – 26dB
Cartridge tracking ability at 1.5g downforce 80μm

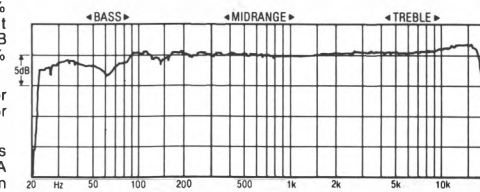
Cassette deck: SD233
Tape used for tests ..... TDK SA (maker's recommendation)
Frequency response ('chrome' or 'II' position) .. 22Hz – 18kHz
Speed variations (wow and flutter) 0.11%
Speed drift ..... excellent
Signal-to-noise ratio, with Dolby B 64dB
Distortion at OVU, with Dolby B 2.2%

Tuner: ST333L
Sensitivity ..... poor
Signal-to-noise ..... poor

General
Maximum volume level in room (typical, with LD20 speakers supplied) 96dBA
Rack dimensions (w x d x h) ..... 32 x 36 x 30cm
Speaker dimensions (w x d x h) ..... 23 x 25 .5 x 36.5cm
Price ..... £470 (inc speakers, £549)



Disc: frequency response with cartridge supplied



Cassette: record/replay frequency response

which is close to the specifications. The unit accepts inputs from a record player, tuner, an auxiliary source (or CD) and two tape recorders. Both tape recorders can record and play back through the system. Additionally Marantz have fitted a microphone input with mixing facility. 20dB of muting is provided to answer phones and the like without disturbing the volume setting, and instead of the almost ubiquitous 'loudness' control, the PM233 includes a 'Super Bass' function which boosts deep bass with the intention of making small speakers sound like large ones. Sadly, in my view this feature doesn't really work. The amplifier hasn't the power headroom to provide this boost convincingly and most speakers don't respond well to this kind of treatment anyway. Source switching uses neat light touch controls if the auto source selection feature isn't employed.

Loudspeakers: LD20

Here is something of a rarity amongst the rack system loudspeakers – a model designed to meet full high-fidelity criteria. Indeed this model is also available as a 'stand alone' product. The box is not over large, and is bass reflex loaded. The pulp bass unit is married to the 25mm dome tweeter via a complex seven-element crossover – the inside also shows a proper level of care over such details as sound absorbing filling and wiring quality. The frequency response plot suggests a carefully optimised design with just a minor loss of output around 2.5kHz and some loss of very high frequencies indentifiable – apart, of course, from the known room effects. The amplifier extracted a moderate 96dBA maximum output from the LD20.

Compact Disc Player: CD63

A badge-engineered version of the Philips CD100, this is the smallest, and, control-wise, the simplest CD player on the market. It loads from above and can be placed on top of the other equipment. Simple controls allow access to a random selection of tracks and high speed search – equivalent to a cassette deck's fast wind function with no sound from the speakers whilst it is going on. There is no time display to aid in searching through tracks either – just a row of LEDS, one per track, plus a parallel row which provides the position cursor and other such functions. But if the CD63 is not the most elaborately equipped CD player on the market, it does more than enough to meet any reasonable requirement, and its sheer useability is second to none.

In use . . .

Surprisingly, and perhaps uniquely among the systems tested, in the MX250 it is the electronics that fails to do justice to the loudspeakers to a degree, though the former are in the main good enough to make the system as a whole a viable recommendation.

But not, perhaps, for FM radio lovers. Those who put this aspect of system performance above most others will find the system lacking. The ST333L has enough facilities to keep anyone happy, but despite the technical appearance the tuner is only really suitable for local transmissions. It's noisy on weak signals, and if noise (and whistles!) are not a problem, the loss of clarity with weak signals will be.

To a degree, the turntable gave a musical performance that was rather better than some similar designs, but the bass sounded untidy and had a lightweight, papery feel. Generally in fact the sound was on the crude side, and stereo imagery was none to precise. Nevertheless, the Marantz gave quite a taut, well defined sound overall, and the bass was under better control – notwithstanding the negative comments above – than in some similar systems. The player was not especially pleasant to use though. The tardy control action, the slow (and noisy) way the deck moved the platter in and out of its playing position and the uncertainty of cueing individual tracks all conspired to make full use of this player a rather slow and deliberate affair.

The cassette deck was also an uneven success. Recordings made on the deck using chrome type and metal tapes sounded a little bright and slightly brash. Pre-recorded cassettes on the other hand had a rolled-off top end, probably due to a head alignment (azimuth) error which may be a sample fault and is in any case readily corrected by any well equipped dealer service department. There were occasional signs of speed instability too, but generally the performance of machine recorded tapes was satisfactory.

The amplifier, too, was a satisfactory performer if it wasn't driven too loud. With the volume very high there were signs of messiness and confusion, especially in the bass – a good argument for not using the 'Super Bass' feature. Within its natural limitations though the amplifier sounded detailed and clear, veering in the direction of hardness on occasions.

So the electronics are a mixed bag in many

ways, but record and tape reproduction especially is on a par with most other similarly priced rack systems, and the loudspeakers are very much better. They're slightly coloured and hollow sounding in the midrange, but the bass end is full and clean and the treble clear and incisive. They easily meet the requirements of satisfying musical reproduction in the areas of resolution (clarity), dynamics, bass quality and definition – and in the firm, well defined sense of a solid stereo soundstage they evoke. For best results though they should be used well clear of walls and other obstacles, and should be sited on tall, open stands. A good dealer should be able to advise, but the rather utilitarian looking QED SD24 stands used for these tests suited the purpose admirably.

Finally, we turn to the CD63 Compact Disc player. The model submitted for review shows some significant improvements over earlier production and by current CD standards this inexpensive player performs extremely well. Whilst CD sound quality in general remains a matter of controversy, the CD63 exploits the medium well, providing an almost unique sense of stereo depth, resolution and lack of harshness combined with a free and easy way of going loud without stress. It copes with scratched discs well, though not quite as well as the recent Sony sample (see separate review). The Marantz system worked well with CD, though the characteristic slight hardness of the amplifier was easily provoked by the player if used at high volume levels.

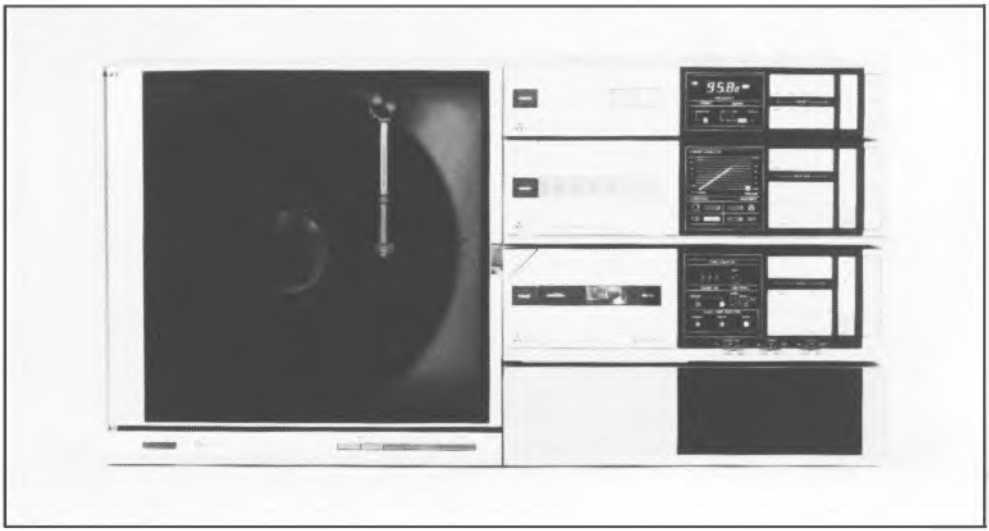
Conclusion

Whilst there are clear signs of imbalance in performance between different items in this system, there are not many single-manufacturer rack system combinations where the components are more compatible with each other. If the faults noted above fall outside your main areas of interest, this system could be of interest. It just scrapes a recommendation.

Finally, the CD player is arguably the best of its type, but with the present availability and price of discs, the medium still only just looks viable. The extra £399 might be better invested in a simpler system with better components from day one – or more records and tapes.

Mitsubishi System 43

Mitsubishi Electric (UK) Ltd, Otterspool Way, Watford, Herts WD2 8LD
Tel (0923) 27737



Mitsubishi's contribution to this edition of *Choice* is highly distinctive. The vertical turntable is the most striking feature, of course, though what may not be as immediately obvious is the fact that this is unusually solidly built for a system component turntable. The remaining electronics are all designed along compact lines, each item being a little wider than an LP sleeve at 330m. In use, the turntable is normally placed alongside the rest of the electronics; which are designed to stand on the self-contained drawer unit (for storage of cassettes and other bits and pieces) that Mitsubishi have thoughtfully included with the package.

Space precludes a full description of the facilities offered by System 43, but here is the basic outline. Special auto-function connection cables between amp, turntable, cassette deck and tuner, mean that operating any of the sources (turntable, tuner, or cassette) switches the amplifier input accordingly. The amp itself has a digitally operated volume control which fades from source to source, and fades up gently when switching on. Only one mains lead is required. Generally, the design of the electronic control system is a success, but personally I feel that whoever worked out the aesthetics ought to be transferred! The system looks at first sight as if it will be impossibly complicated to use, an impression not dispelled by the fact that each component has been made to look as much as possible like its neighbour. A couple of times I managed to start a cassette playing when I thought I was pressing the volume control!

This system was supplied for review with a pair of SS-43 loudspeakers. Note that these are *not* optional.

Turntable: LT-15V

This vertical turntable is belt-driven and quite solidly built, with a heavy cast platter. The player is covered when not in use by a hinged door that incorporates a record clamp on its inside surface. The arm is a parallel tracking device with an interchangeable headshell and cartridge. The deck functions fully automatically, including speed selection, but 'manual' (motor driven) arm positioning requires that the arm be lifted clear of the record beforehand – these two functions are not interlinked, unfortunately. Cartridge output is muted unless the stylus is on the record.

Operationally, there are just two problems; some care (or practice) is required not to scratch records when placing them on, or removing them from the platter. And despite have a large (tinted) window, the door makes it very difficult to see the scrolls between tracks on the record in place. An internal light that switched on during arm positioning would cure this shortcoming.

The player proved remarkably resistant to external shock and feedback, the sound

remaining clean even at high volumes. Turntable measured performance though was rather less satisfactory, with significant levels of wow and flutter noted – and general speed instability occasionally audible as fluctuations in pitch. The cartridge fitted has a very sharp (+5dB) peak due to tip mass resonance near 12kHz – a very poor result indeed. Buyers should consider changing the cartridge, which is easily accomplished. Finally, the construction of the turntable is such that very shallow shelves (about 18cm deep) will accept it.

Cassette deck: DT-43P

The cassette transport mechanism adopted for this system is relatively complex, using separate reel and capstan motors (which gives smooth, fast tape wind in either direction) and attractive 'pressure key' operation. The cassette can be ejected directly from any mode (record, fast forward and so on) and an auto-location device 'looks' for blank spaces between tracks (in either direction) resuming play from that point. In an attempt at simplifying operation, the recording level control is hidden at the back, and is normally set to a central detent position which serves most purposes adequately. One single front panel peak reading LED stands in for a recording level meter – not really a satisfactory aid for setting recording levels. A number of auto play/record functions are also provided as part of the package.

This is a Dolby C deck with automatic tape type sensing. On test the deck measured well on all counts; Type II (chrome position) record/replay frequency responses were fairly flat and the measured mechanical parameters fine. Note that when the front panel peak reading LED is glowing faintly, distortion (Type II tape) is already around 2%, so when recording, this light should only be allowed to come on very occasionally.

Tuner: DA-F43P

From a distance, only the slimness of its build gives this component away as the tuner. In fact it's quite an 'unfussy' digital quartz synthesiser design. It has seven presets available on FM four on MW and three on LW. The usual variety of auto/manual tuning options are provided, the only slightly unusual fitting being the signal strength indicator that changes in colour to show signal strength.

This signal-strength meter does at least have a useful working range, the highest indication being triggered by a signal close to 1mV. This is a fairly quiet tuner in signal-to-noise terms, although there was a little background hum that increased in intensity slightly when a strong broadcast was being received (around 100mV). Sensitivity was about average. Unfortunately, AM was very much the poor relation on this tuner. It had a very sharply cut-off high frequency response, giving a much dulled and often almost unintelligible audio performance. Interference was subjectively reduced by the lack of treble, but this is not an

GENERAL DATA

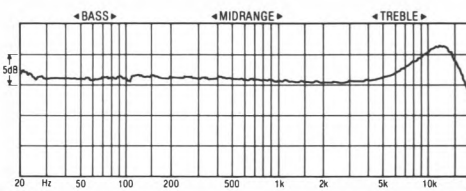
Amplifier: DA-U43P
Power output, per channel, at 1kHz ..... 40 watts

Record deck: LT-15V
Speed variations (wow and flutter) 0.10%
Speed drift ..... poor
Speed accuracy ..... 0.6% fast
Arm/cartridge resonant frequency ..... 11Hz, acceptable
Cartridge channel balance ..... within 0.4dB
Cartridge channel separation (crosstalk) ..... – 28dB
Cartridge tracking ability at 2g downforce 80μm

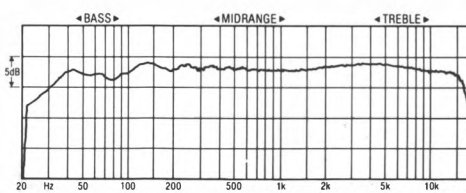
Cassette deck: DT-43P
Tape used for tests ..... TDK SA (maker's recommendation)
Frequency response ('chrome' or 'II' position) ..30Hz – 16kHz
Speed variations (wow and flutter) 0.09%
Speed drift ..... excellent
Signal-to-noise ratio, with Dolby B 64dB
Distortion at OVU, with Dolby B 2.0%

Tuner: T-M55L
Sensitivity ..... average
Signal-to-noise ..... good

General
Maximum volume level in room (typical, with SS-43P speakers supplied) 99dBA
Stack dimensions (w x d x h) ... 33 x 27 x 26.5cm, excl turntable
Turntable dimensions (w x d x h) ..... 36 x 16 x 36cm
Price ..... inc speakers, £529



Disc: frequency response with cartridge supplied



Cassette: record/replay frequency response

HI-FI CHOICE

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interference free design. It can be heard all right, but in a dulled form, which if anything is more annoying than the usual 'undoctored' interference.

Amplifier: DA-U43P

I referred earlier to what I regard as Mitsubishi's tactical error in making the amplifier look as much like the cassette deck as possible. There is even a cassette style door which in this case hides the minor controls such as tone, microphone mixing, headphone and microphone sockets.

Main amplifier controls are out on the front panel (masquerading as cassette deck transport keys, my notes say!). These include source selectors to override auto source selection if desired, the volume up/down key (associated with a 'preset' key which can be set to any volume level desired by the user) and a diagonal row of LEDs which act as a volume indication or a power output meter. The amp includes a 'sleep' function which removes power from the system (there are some exceptions; recordings in progress are not disturbed, for example) after 30 or 60 minutes. On test, the amplifier gave a measured 40watt/channel output (38watts at 20Hz) and 99dBA of output volume during the pink noise test.

Loudspeakers: SS-43P

Model SS-43P is a compact two-way loudspeaker with excellent standards of finish, though it has a rather fussy front panel design by traditional standards. The chipboard box – almost unlined internally by the way – has a matt silver paint finish of a type and quality that only Japanese manufacturers seem able to accomplish.

The speaker behaves fairly evenly at low and mid frequencies according to our listening-room measurement, but the treble is dominated by a massive output peak centred on 4.5kHz, output dying away rapidly thereafter. This can be expected to take its toll on audition.

In use . . .

On test, it rapidly became apparent that System 43 was quite a capable box of tricks but let down, as is so often the case, by loudspeakers that were in my view quite incapable of reproducing music intelligibly. A decent tweeter and crossover was probably all that would have been required to get these speakers to work as they should – that, or the option of buying the system without loudspeakers so that a choice can be made from the ranges offered by the specialist manufacturers. Sadly, this option is not on offer.

Positioning of the speakers is not critical in practice: Mitsubishi suggest using them against a wall, but whether or not this is adhered to the bass end sounds boxy and thin. The most obvious aural characteristic of this model, though, is its extraordinarily assertive and forward sounding treble, the speaker sounding rather 'coarse' through this region too. The effect on music was to reduce the variety and distinctiveness of tonal colours and dynamics, and to overlay a recognisably 'samey' coloration on whatever music was being played.

The most impressive part of the system was undoubtedly the turntable, though the cartridge was not to the same standard, with its over-sharp and exaggerated top end. Musically this did relatively little to spoil what was by most standards a very crisp, tidy and well behaved performance off records, and one which produced a stable stereo image and which did not alter in character with volume. As already mentioned though, there were occasional signs of speed instability.

The tuner sounded slightly bright, but gave well-characterised stereo (partly because high frequencies carry the main burden of stereo information) and a generally likeable sound to go along with the satisfactory reception performance. The cassette deck, finally, was entirely satisfactory, mimicking the sound of the tuner and turntable accurately when making recordings from them. Metal tapes though failed to show any significant advantage over Type II tapes like TDK SA, and there were very slight but nonetheless real masking effects – a slight blurring of fine detail – with Dolby C switched into circuit.

Conclusion

The prime requirement of any system is not that any one component be outstanding, but that the system as a whole should have an even spread of abilities so that no one item dominates the sound, and so that each component extracts something like the best from its partners. This the Mitsubishi very nearly accomplishes. Indeed with the Kef Coda loudspeakers in use this was in fact the case and the system was essentially enjoyable and rewarding to listen to. More's the pity then that the importer does not sell the system without the loudspeakers – this being the determining factor in witholding a recommendation.

NAD System

Hi-Fi Markets Ltd, Cousteau House, Greycaine Road, Watford, Herts WD2 4SB
Tel (0923) 27737

Here is an exception to the general rule of rack system design and marketing. In the majority of cases, the components of a rack widely available separately, having been designed from the ground up to sell as a packaged system. The NAD is different, in that each of the components – some of which have been around for several years – is widely available on the separates hi-fi market, the rack system with the housing featured here being a late addition to the range. The amplifier is perhaps the best known component in the NAD range; it has established for itself a firm (and as we shall see, well deserved) reputation at or near the top of the low cost amplifier market, and although the tuner and cassette deck are in some respects fairly old-fashioned in their design approach, both have had a quite successful career in their own rights.

The turntable is relatively new, and in some ways at odds with the requirements of a rack system turntable. The design of the arm in particular is extremely unusual, though in its way quite effective, but of more relevance in rack system terms is the fact that the initial assembly and setting up procedures for this player are extraordinarily long-winded and cumbersome. The instructions – like those supplied with the other NAD components – are discursive and clear, but extremely long, and my experience is that if the setting-up recommendations are not followed carefully, there is no doubt that the performance of the player will be extremely prejudiced.

Because the system is made from components that sell widely as separates, it is not necessary to buy the system complete. You can buy any part of it, omitting the loudspeakers, say, if required. By the same token, it should be possible to buy just the record playing part of the system, adding on the other components as funds permit.

Turntable: 5120

Many of the ideas behind this product came from Czechoslovakia, and arose from a need to make a practical, high performance player without the benefits of expensive metal working or tooling. The platter is a thin aluminium disc which is covered by a heavy rubber mat. The arm is made from a flat sheet

of phenolic printed circuit board material, with printed circuit tracks substituting for the usual arm wiring (except for the headshell leads), soldered-on pins forming a plug to push into the bearing assembly socket. A similar pin engages in the arm rest.

The cartridge supplied is a NAD 9200 model, this being manufactured specially for NAD by ADC. It attaches conventionally to the front section of the arm, which is also available separately as a spare, if required.

The arm is relatively stiff laterally, but extremely flexible vertically, the idea being that as it is almost impossible to make a non-resonant arm, you may as well design the resonances in and cope with them by placing them at frequencies below those where the musical information is found. The counterweight is a complex assembly with adjustable arm damping built in – and this is where many of the setting-up problems lie.

The player is belt driven from a synchronous (fixed speed) motor, and the arm and platter are mounted on a freely-suspended sub-chassis. There are awkwardnesses in use – there is no finger lift on the arm, for example, and on the review sample the arm return mechanism was adjusted incorrectly, and had to be disconnected to complete the review programme. There was also some hum which could not be totally eradicated. The player resists shock and feedback extremely well in normal use, but the arm in particular is extremely microphonic at very low frequencies – just try handling the arm with the amplifier volume raised! Very low frequency noise from record surfaces could prove troublesome unless the setting up is just right. The temptation is to make the counterweight resonance adjustment, and if it isn't quite right, to 'smother' the problem with excessive damping. There is a serious loss of bass control and quality generally if this is done, and unfortunately the instructions don't make this point sufficiently explicit.

In measurement terms, the NAD performed excellently on all counts. Note that the arm resonance figure (10Hz) was as tested, but its effect is subject to user adjustment as part of preparing the player for active duty.

Cassette deck: 6040A

As one of the very few remaining hi-fi cassette decks to have both mechanical lever transport controls and mechanical scale-and-pointer record level indicators, the 6040A looks like a rather old-fashioned design, an impression not dispelled by the inclusion of Dolby HX. This is not the B&O-developed HX Pro system used on the B&O 5000 system (and elsewhere) to improve high frequency linearity, but is the original Dolby Labs HX circuit design – more complex and less effective than HX Pro, and not without some technical problems.

Old fashioned or not, the 6040 is extremely functional and easy to use, with the design biased in the direction of operational sim-

GENERAL DATA

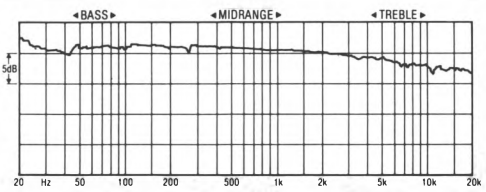
Amplifier: 3020A
Power output, per channel, at 1kHz ..... 34 watts

Record deck: 5120
Speed variations (wow and flutter) 0.08%
Speed drift ..... good
Speed accuracy ..... 0.3% fast
Arm/cartridge resonant frequency ..... 10Hz, acceptable
Cartridge channel balance ..... within 0.1dB
Cartridge channel separation (crosstalk) ..... – 27dB
Cartridge tracking ability at 1.5g downforce 78μm

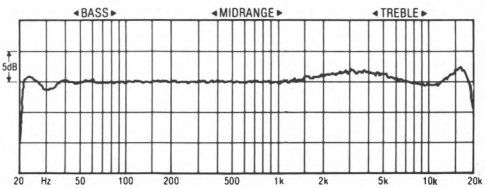
Cassette deck: 6040
Tape used for tests . Maxell UDXLII (maker's recommendation)
Frequency response ('chrome' or 'II' position) . . 20Hz – 19kHz
Speed variations (wow and flutter) 0.07%
Speed drift ..... excellent
Signal-to-noise ratio, with Dolby B 60.5dB
Distortion at OVU, with Dolby B 1.1%

Tuner: 4020A
Sensitivity ..... good
Signal-to-noise ..... good

General
Maximum volume level in room (typical, with NAD1 speakers supplied) 101dBA
Rack dimensions (w x d x h) ..... 48 x 43 x 93.5cm
Speaker dimensions (w x d x h) ..... 26.5 x 25.5 x 62cm
Price ..... £515 (inc speakers, £634)



Disc: frequency response with cartridge supplied



Cassette: record/replay frequency response

plicity rather than having complex track search and memory functions and the like. Tape-type switching is manual and Dolby B type noise reduction is fitted – not Dolby C. Some output instability is visible on the frequency response trace, and the high frequency response is uneven, though close to being correct in overall energy terms. There was some indication that both bias and equalisation were incorrectly set on the review sample, though a properly-equipped dealer service department can easily put this to rights. Wow and flutter rated as excellent, and signal-to-noise performance was satisfactory.

Two points about this cassette deck gave cause for concern. One was that the record level meters responded to signal changes very slowly, meaning that it is easy to underestimate the amount of signal going on to tape. More important than this, though, was the high level of electrical hum the 6040 produced through the system loudspeakers in any mode. This was presumably a sample fault, but purchasers should check this point when buying.

Tuner: 4020A

This is an analgue 'scale and pointer' tuner, the scale being exceptionally clear and easy to read. Facilities are simple, and include a very effective three-LED centre tune indicator, but no signal strength meter. Another omission, and a more significant one for AM users, is the absence of the LW band.

As to performance, FM noise levels were low, though there was a very faint background whistle, and sensitivity too was good, though not exceptional. AM performance was exempliary in all respects; interference levels were average or below, and the sound quality open, extended in the treble (within the limitations of AM in general, of course) and extremely natural. More's the pity, then that LW was omitted.

Amplifier: 3020A

The subject of a number of detail modifications and improvements over the years – the most recent of which was the addition of an input for low-output moving coil (MC) cartridges – the NAD 3020 is a long-established design that when first released virtually redefined the 'state of the art' in budget amplifier design. Although it is now fairly long in the tooth, the design remains fully competitive, and still rather unusual in some respects. The pre- and power amplifiers can be used independently, and the latter has two inputs with slightly different electrical characteristics. On test, the 'lab' input gives perceptibly better results; the 'soft clipping' switch on the back should be used only for parties.

Inputs are provided for the other system components plus one other item via the auxillary input. One pair of loudspeakers can be connected and other facilities are conventional. The 3020 gave a healthy power output, well above that specified.

Loudspeakers: NAD 1

The NAD 1 is a medium-sized, two-way ported loudspeaker using good quality drive units (including a 1in dome tweeter) and respectable internal standards of construction; it includes a four-element crossover, a worthwhile amount of internal sound-absorbent material, and bracing between the front and rear panels. The external veneered finish is excellent, easily meeting normal furniture standards. The speakers are supplied attached to the short pedestal stands shown in the photograph. These stands are far too short for best results – the bass and (particularly) midrange clarity of the speakers is much improved if they are lifted a further 12-18in. The measured frequency response is clearly a little erratic, the 2kHz peak being a possible crossover effect between the two drive units. Maximum volume with the 3020A was a high 101dBA.

In use . . .

If we take the hum problem noted in connection with the cassette deck and turntable as being non-typical, the only really disappointing feature of this system is the rather 'wallowy' bass and sharp, forward treble of the loudspeakers. The midband is nicely integrated and detailed, apart from a mild nasal coloration, but the problems encountered at the frequency extremes led to a rather forward, cluttered and boomy account of music being reproduced.

The system can be bought without speakers though, and it is on this basis that the recommendation is given. Having been in the contact with the 3020 amplifier only intermittently over the years, I had been aware that the amplifier has slowly but steadily improved in performance, but I was not prepared for just how thoroughly competent the current version now is. The 3020A is in my view still the most cultured and relaxed – indeed 'expensive sounding' – of all budget price amps, more recent competitors such as the equally good Rotel designs (see separate reviews) bettering

the NAD in ultimate resolution and dynamics – rather than in listenability. The NAD is, admittedly, slightly 'warm' in tonal balance, an effect that is not consistent with volume (it lessens, the response becoming subjectively flatter and more even at high volumes), but there are no other foibles: the 3020A is a magnificent heart for any rack system.

FM reception is no less good. The 4020A is very slightly dull tonally, but has a supremely natural bass and clear, open midrange. The sense of stereo depth and the sheer unambiguity of sound from this tuner was second to none in this project.

The turntable is slightly less satisfactory, though still good. The sample of the cartridge supplied for review had a slightly coarse treble characteristic, not typical of other samples of this cartridge in my experience, but was otherwise smooth and likeable (*Most budget cartridges are prone to wide variation between samples – Ed*). The turntable itself though sounded rather like a parody of the amplifier: it had the same easy going, warm and relaxed quality on audition, but there was a clearly audible loss of information and control that failed to exploit the quality of sound available off most records. The cassette deck though was fine, ignoring the hum noted earlier. Pre-recorded cassettes reproduced well, and recordings made on the deck had an open, alive quality, especially when using metal tape, allied to a slight roughness that may have been attributable to relatively slightly erratic tape-to-head contact.

Conclusion

Assuming the hum problems are not representative (and past experience suggests they're not), the system is clearly deserving of the highest praise for its excellent and well-spread musical abilities. The turntable is undoubtedly fiddly in operation – and to set up – but the limitations it displayed on audition should be seen in context: it remains amongst the best four or five system turntables tested for this edition, is supplied with an excellent cartridge, and works into a superb phono input on the amplifier. Our hearty recommendation, though, relates to the system as reviewed but without the loudspeakers.

Onkyo System 22

Goodmans Loudspeakers Ltd, Downley Road, Havant, Hants
Tel (0705) 486344

Onkyo is a specialist Japanese hi-fi manufacturer, whose products have at various times been distributed in the UK by a number of companies in this country, with mixed success. The range is now being marketed by Goodmans, who are of course best known as manufacturers of loudspeakers.

System 22 is a conventional full-size rack set-up which is supplied with a rack housing, but no loudspeakers. The majority of loudspeakers from the specialist manufacturers will prove suitable; for this test the Kef Codas were used. The rack is well finished in a light vinyl wrap wood type covering. Supplied with spare shelf pegs – a good idea – it proved easy to assemble, though the instructions we had were obviously meant for a different version of the rack!

Turntable: CP-1022A

This is a straightforward belt-drive turntable with auto-return at end of side (or when the 'reject' button is pressed). When the arm is moved by hand over to the record, the motor starts automatically; the arm may then be lowered using its well-engineered damped cueing platform. The turntable is fitted with a straight arm, with acceptable bearings but a rather flexible detachable headshell fitting. The magnetic cartridge can be replaced by a higher-quality alternative if required, as a standard mounting arrangement is used. Finally, the CP-1022A is unusual in providing a degreee of sprung isolation for the platter and arm; but Onkyo have made the springing very 'stiff', presumably to make the deck easier to handle, and this reduces its effectiveness at isolating from feedback and shock.

In our tests the turntable ran fully 1.5% fast, with considerable speed drift, but other measurements gave good results. The cartridge has quite a flat frequency response, even at high frequencies, whilst both channel balance and tracking ability proved fine.

Cassette deck: TA-2022

Fitted with only a simple mechanical tape counter, having no memory device, this is a well-laid out cassette deck with single-button tape selection facilities and very smoothly-operating light-touch transport controls; these can be used freely without having to pass through 'stop'. There is a single record level control with a concentric balance control, which in conjunction with the seven-LED record level meters on each channel (red above 0VU) make setting up for a recording extremely easy. The cassette compartment is not illuminated, but like the amplifier and tuner the meters and operating status indicators are brightly lit. Dolby C is provided.

The deck has a smooth and fairly well extended frequency response, which ties in with good distortion and signal/noise results to give a good all-round electrical performance. Mechanically the deck was on less firm ground; whilst speed drift was negligible, wow and flutter was on the high side at 0.13%.

Tuner: T-22L

This is a neat, slim-line analogue tuner with FM, MW and LW. The long, easy-to-read tuning scale reads nearly 0.5MHz high (at 100MHz) and the minor switching is rather untidily executed, but the tuner is otherwise easy to use. Tuning is aided on all wavebands by a four-LED signal strength meter but no centre-tune indicator, which can make FM tuning a

little uncertain. On FM, the tuner proved to need relatively little signal voltage from the aerial to give noise-free results, and with a good signal the noise is very low indeed. AM was of rather low sensitivity and prone to whistles, but the basic sound quality was fair.

Amplifier: A22

The amplifier follows the pattern set with the other components in being ergonomically sound and relatively free of unnecessary gadgetry. Inputs are provided for the tuner, turntable and cassette deck, plus an extra set of in- and outputs for a second tape recorder if required. There is also a front-panel mono jack socket marked 'keyboard' (for your home computer, perhaps?). Outputs are provided for two pairs of speakers. These are wired in series to protect the amplifier, which gives reduced output to each pair when both are used together. An unusual but very sensible feature reduces bass and treble control boost at very high volume levels, which should prevent a few accidents at parties!

The A22 delivers a healthy 50watts/channel on test, and in the listening room produced a useful 98dBA maximum volume with the Kef Codas.

In use . . .

The turntable gave generally rather mediocre results, the sound being generally harsh and gritty, and presumably this is mainly attributable to the cartridge. The other components though were excellent. Although the amplifier had a slightly hard, 'grainy' characteristic, this did little to detract from its surprisingly lusty, open and clean sound. The tuner gave clear, open FM sound quality, with very low noise levels and a natural feel. Via the FM generator, it was all but indistinguishable from the source; there was just a touch of brightness, and a suggestion of narrowing of the stereo soundstage.

The cassette deck too worked very well. The relatively poor wow and flutter performance was not in itself obvious (as pitch fluctuation) on audition, but there was some obvious loss of fine detail, and a slackness in the extreme bass – but these things tend to be trademarks of cassette decks in general. Via the Kef loudspeakers, the system as a whole gave some slight 'boxy' effects indicative of a slight loss of control in the upper bass regions, but the midrange was open and clear.

Conclusion

All components here bar the turntable are of genuine hi-fi quality, and even the turntable is little different from average. The absence of speakers leaves the choice of this critical component to the buyer; and a careful choice here will help get the best from this easy-to-use and mostly well put together system. Better speed accuracy and a better springing arrangement on the turntable would have made this an even more satisfactory all-rounder, but the system can certainly be recommended as it stands.

GENERAL DATA

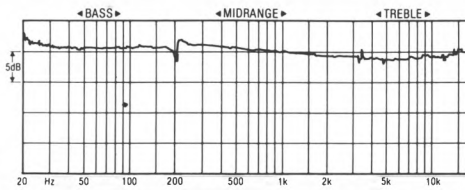
Amplifier: A-22
Power output, per channel, at 1kHz . . . . . 50 watts

Record deck: CP-1022A
Speed variations (wow and flutter) 0.12%
Speed drift . . . . . poor
Speed accuracy . . . . . 1.5% fast
Arm/cartridge resonant frequency . . . . . 10Hz, acceptable
Cartridge channel balance . . . . . within 0.6dB
Cartridge channel separation (crosstalk) . . . . . – 30dB
Cartridge tracking ability at 2g downforce 80μm

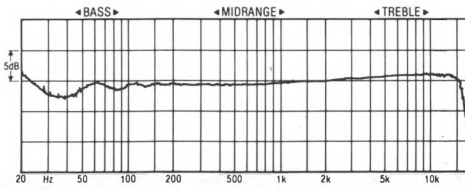
Cassette deck: TA-2022
Tape used for tests . Maxell UDXLII (maker's recommendation)
Frequency response ('chrome' or 'II' position) . . 20Hz – 17kHz
Speed variations (wow and flutter) 0.13%
Speed drift . . . . . excellent
Signal-to-noise ratio, with Dolby B 63dB
Distortion at OVU, with Dolby B 0.7%

Tuner: T-22L
Sensitivity . . . . . high
Signal-to-noise . . . . . excellent

General
Maximum volume level in room (typical, with Kef Coda speakers) 98dBA
Rack dimensions (w x d x h) . . . . . 48 x 44.5 x 89cm
Speaker dimensions (w x d x h) . . . . . —
Price £416



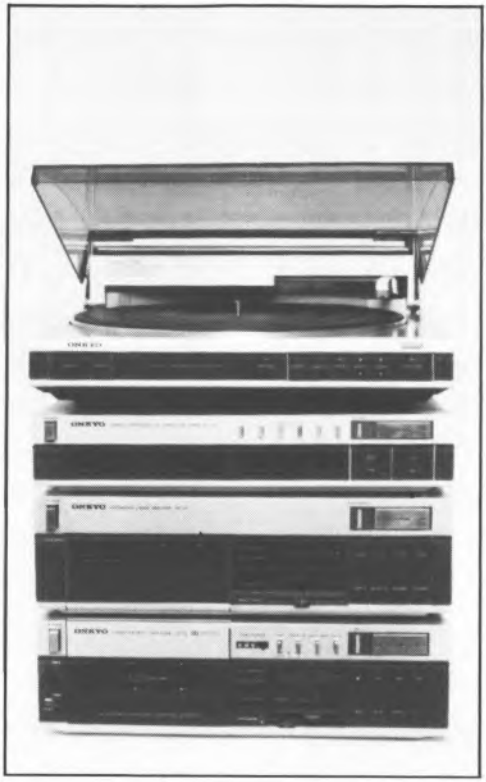
Disc: frequency response with cartridge supplied



Cassette: record/replay frequency response

Onkyo Radian

Goodmans Loudspeakers Ltd, Downley Road, Havant, Hants
Tel (0705) 486344



Dressed to kill in its sexy dark blue perspex and brushed aluminium trim, the Radian is a compact system, little wider than an LP sleeve. A simple shelf-top rack is available if required, as are matching loudspeakers and a 10-band graphic equaliser. All these are options though – and the system supplied by the distributer for review had none of these extras. Note that here as elsewhere, it is hard to justify a graphic equaliser on sound quality grounds, even taking into account variations in room acoustics and other factors for which equalisers are often suggested. For this test, Kef Coda loudspeakers were used.

Turntable: PL-33

This is a direct-drive fully automatic player with a tangential (parallel tracking) arm and a repeat option. The latter works over whole record sides, or parts of them, and is not restricted to just the bands between tracks. This facility worked with quite a fair degree of accuracy on the test sample. Because the deck is of restricted width, the arm is always over the record, so Onkyo have provided a motorised arm lift that also lifts the rear section of the deck that overhangs the record itself. It's still a slightly 'iffy' procedure trying to put records onto the platter without scratching them though, and the same goes for removing them afterwards. This apart, the deck was a pleasure to use – and to look at! It also worked well, wow and flutter was held to a good standard, whilst long-term speed stability and absolute speed accuracy were excellent. The cartridge too measured well on all counts apart from the rather severe fall in output at high frequencies, just prior to tip mass resonance. The turntable was also unusually resistant to shock and feedback – although Onkyo use only springy feet, not a fully suspended sub-chassis. The only point I did not like was the fixed cartridge which rules out upgrading this component in the future. The stylus is readily replaceable, of course.

Cassette deck: PC-33

Unusually in a medium price cassette deck, the PC-33 has two drive motors. One drives the reels and gives rapid spooling, while the separate capstan motor should maintain correct tape speed during play and record without compromise. Even so, wow and flutter was only average, but longer-term speed stability was excellent, and the wind functions worked faster and more responsively than usual. The deck is otherwise conventional, and surprisingly perhaps doesn't have Dolby C – though Dolby B is fitted, of course. The PC-33 has neatly arranged controls, and not too many of them. The only overt piece of gadgetry is the fitting of the increasingly popular circuit that searches for the beginnings of tracks, and plays the first few seconds of each one found sequentially until you elect to listen to the whole track by pressing 'play'. Onkyo's version works in the forward and reverse direction.

Tuner: PT-33

A digitally-tuned synthesiser tuner, the Onkyo PT-33 has six pre-sets on FM and six on medium-wave AM. Note that there is no long-wave on this tuner, which means that when educational programmes (and certain others) are being broadcast on FM, BBC Radio 4 will be out of reach of listeners in many parts of the UK; quite a significant failing, I feel. This apart, the tuner has simple controls and works well. Sensitivity and hiss supression are first class

on FM, though there was some high pitch background buzzing (synthesiser switching noise?), and AM too suffered excessive interference and a rather 'splashy' sound.

Amplifier: PA-33

Minor switches are hidden under a flap on this amplifier; with the flap closed just the power switch, source switching and motorised volume control (associated with a sliding 'marker') are visible. The hidden controls cover tone, and treble, including a circuit to reduce boost at the frequency extremes as the volume control is advanced beyond 12 o'clock, stereo/mono switching, a headphone outlet and so on. Connections are available for a second tape recorder, with a spare input for a Compact Disc player perhaps. Power output reached 33watts per channel at 1kHz and 20kHz, and maximum volume with the Kef Codas was 97dBA to waveform clipping – a modest figure for a 30watt amplifier.

In use . . .

Within certain clear limitations, this proved to be a neat and well behaved system, capable of reproducing music in a believable fashion given suitable loudspeakers, appropriately placed.

Record reproduction especially was very satisfactory. Despite the incorrect frequency balance of the cartridge, the sound was tonally natural (perhaps because of compensating capacitive loading within the amplifier) and the presentation of music was smooth and sweet. The tuner was satisfactory also, but a rather 'rounded-off' character was noted – the sound was rather dim and soft on FM, with a noticeable loss of ambience. Bass too seemed rather ill-controlled at times, and the background whistles could be annoying. Cassette reproduction was tonally bright, an effect exaggerated when using Dolby C, and exaggerated further using Metal tape. Rebiasing by the dealer would help – but qualitatively the sound was excellent, with unusually good solidity of sound and stereo imagery. Used on its own, the amplifier was acceptable but a little coloured and 'fat' at bass frequencies – but again the system as a whole treated these characteristics sympathetically.

Conclusion

In the Radian, Onkyo have produced a system with a number of weaknesses in certain areas – though not untypical ones for this type of product – that tend to cancel themselves out when used together as a system. The tuner's background whistles on FM need improving, as do the bias settings on the cassette deck. Nevertheless, the Radian gives a highly satisfactory overall result, and does it with some style and within compact dimensions. This system, then, can be recommended. Most loudspeakers in the price band up to £100 or so will prove suitable, but avoid large models with extended bass.

GENERAL DATA

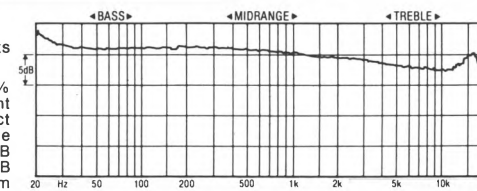
Amplifier: PA-33
Power output, per channel, at 1kHz ..... 35 watts

Record deck: PL-33
Speed variations (wow and flutter) 0.08%
Speed drift ..... excellent
Speed accuracy ..... speed correct
Arm/cartridge resonant frequency ..... 13Hz, acceptable
Cartridge channel balance ..... within 0.8dB
Cartridge channel separation (crosstalk) ..... – 28dB
Cartridge tracking ability at 2g downforce 80μm

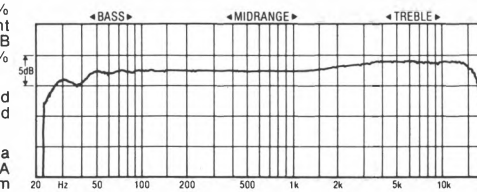
Cassette deck: PC-33
Tape used for tests . Maxell UDXLII (maker's recommendation)
Frequency response ('chrome' or 'II' position) . . 23Hz – 15kHz
Speed variations (wow and flutter) 0.12%
Speed drift ..... excellent
Signal-to-noise ratio, with Dolby B 61dB
Distortion at OVU, with Dolby B 1.8%

Tuner: PT-33
Sensitivity ..... good
Signal-to-noise ..... good

General
Maximum volume level in room (typical, with Kef Coda speakers) 97dBA
Rack dimensions (w x d x h) ..... 33 x 25 x 26.5cm
Speaker dimensions (w x d x h) ..... 33 x 31.5 x 12.5cm
Price ..... £525 (inc PS-33 speakers, £611)



Disc: frequency response with cartridge supplied



Cassette: record/replay frequency response

Philips 134 System

Philips Electrical Ltd, City House, 420-430 London Road, Croydon, Surrey CR9 8QR
Tel 01-689 2166

Although this system is European in origin, it is clearly intended to compete with the 'typical' Japanese rack system, with which it compares in terms of appearance, facilities and, indeed, sound quality. The rack housing supplied is tall, partly so that it can accommodate a Compact Disc player. The CD model intended to match this system on appearance grounds is a new model called the 303, which includes a digital display switchable to show elapsed time from the beginning of the disc, or from the beginning of the current track.

The rack has a dark imitation wood grain finish of rather bumpy appearance on the review sample – as though the vinyl covering had been laid over a wood panel covered in wood chippings! Bright edges are used for styling purposes, and the construction is generally adequate.

Turntable: F7230

A belt drives a small inner hub on which the pressed lightweight platter sits. The player features fully automatic operation after the record speed it set. The arm includes a non-detachable Philips cartridge, though the stylus can, naturally, be replaced as necessary. An unusual inclusion is a spring balance in the arm rest that gives a read-out of tracking force.

Construction of this player is none too impressive, unfortunately. The platter and main bearing assembly is very loose, the platter being free to rock with very little provocation, and the arm bearings being very loose indeed. The internal mechanics connected to the front mounted controls are also very clanky and feel loose in operation. On the test bench, the cartridge gave the rather sharply rolled-off response shown, output recovering towards tip mass resonance, which is presumably near 20kHz.

Cassette deck: F6133

A straightforward product, the F6133 is a typical budget price deck in most respects. Noise reduction is by Dolby B (not Dolby C), and clearly-marked manual switching is used for setting the deck to use ferric, chrome type and metal tapes. The transport controls take the form of power-assisted latching buttons. They work smoothly, but are inconveniently close together and labelled in a way that may cause some initial confusion. No special transport functions or programme search functions are included. No current Philips brand cassettes were available or supplied with this unit, but tests made with Marantz chrome (Marantz tapes are made by Philips) gave the generally satisfactory response shown. Speed stability and noise/distortion levels were satisfactory.

Tuner: F-2133

The F-2133 is a synthesiser tuner, capable of storing the frequencies of eight FM, one LW and three MW stations. Calling-up of these pre-sets uses the up/down tuning switch – an unusual arrangement, but one that allows cycling through all the pre-sets on a band using a single button. Apart from a slight background whistle, FM noise levels are low. AM sound quality is sharp and well defined, with low interference levels.

Amplifier: F4132

Power output measured well above spec at 40watts/channel. Two pairs of loudspeakers can be used, but they're wired in series when used together to protect the amplifier from

overload, a measure that reduces available power output in this mode.

Loudspeakers: F9236

There are few if any technical justifications for using three drive units in a loudspeaker of this type and size, but three there are – pulp cones in the case of the bass and midrange drivers, and a soft-dome tweeter. The frequency response in the listening room was rather uneven above 7kHz, and bass output is clearly limited, but the response shape otherwise looks well judged. Maximum output with the accompanying amplifier is 97dBA.

In use . . .

The Philips 134 doesn't give particularly high standards of finish, and proved rather more cumbersome to use than necessary – human engineering is clearly not a concept that has percolated through to the designers here. Nevertheless, with one glaring exception, everything worked rather well.

The exception concerns record reproduction, though the problem involves the amplifier, which on its phono input had very obvious hum that was audible at all but the lowest volume levels (see Philips 235 system review). The turntable was none too inspiring either. There were good qualities: the sound was lively and open, and as a result quite involving. But it was also rather uncontrolled with a light but boomy upper bass and only a rather amorphous stero image. The cartridge was clearly capable of quite open and articulate sound, but the turntable wasn't allowing it to do its job properly.

Elsewhere though the system proved fine. The tuner was especially good, if very slightly 'mechanical' sounding. The cassette deck was a little rough in feel, especially at high frequencies, but it had a clean, neutral quality on chrome and metal tapes – chrome having a slight dynamic range advantage on audition. The deck was also well adjusted for pre-recorded cassette replay.

The amplifier had the positive, alive but slightly raucous quality noted in the turntable. It had good resolving powers and went loud cleanly, though the maximum absolute volume level was only moderate, and the sound was slightly coloured, despite a rather cluttered, 'pushy' quality and a coloration that gave a falsely exaggerated sense of depth on some material, and dulled transients (on percussive instruments like the piano, especially). The good qualities easily outweighed the bad though. In character with the rest of the system, the speakers gave a positive, detailed and approachable performance, and sounded surprisingly integrated and seamless.

Conclusion

This system misses outright recommendation by a hair's breadth, and largely because of the hum problem and turntable performance. It represents a worthy effort by Philips to try and meet their competitors on their home ground, if unfortunately also including a number of their weaknesses.

GENERAL DATA

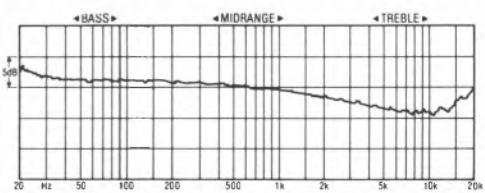
Amplifier: F4132
Power output, per channel, at 1kHz . . . . . 40 watts

Record deck: F7230
Speed variations (wow and flutter) 0.07%
Speed drift . . . . . average
Speed accuracy . . . . . 0.9% fast
Arm/cartridge resonant frequency . . . . . 12Hz, acceptable
Cartridge channel balance . . . . . within 0.6dB
Cartridge channel separation (crosstalk) . . . . . – 27dB
Cartridge tracking ability at 2g downforce 70μm

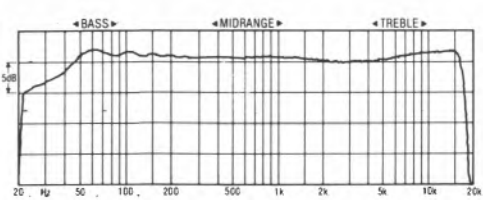
Cassette deck: F6133
Tape used for tests Marantz MC2 (no maker's recommendation)
Frequency response ('chrome' or 'II' position) . . 40Hz – 16kHz
Speed variations (wow and flutter) 0.13%
Speed drift . . . . . good
Signal-to-noise ratio, with Dolby B 61dB
Distortion at OVU, with Dolby B 1.4%

Tuner: F2133
Sensitivity . . . . . good
Signal-to-noise . . . . . good

General
Maximum volume level in room (typical, with F9236 speakers supplied) 97dBA
Rack dimensions (w x d x h) . . . . . 46 x 42.5 x 95cm
Speaker dimensions (w x d x h) . . . . . 25 x 19 x 43cm
Price . . . . . inc speakers, £429



Disc: frequency response with cartridge supplied



Cassette: record/replay frequency response

Philips 235 System

Philips Electrical Ltd, City House, 420-430 London Road, Croydon, Surrey CR9 8QR
Tel 01-639 2166

It seems extraordinary that Philips — the largest electronics multi-national outside Japan — should have had such limited success in the hi-fi field in the UK. Their reputation for audio in this country has never equalled the respect their name achieves over much of Europe, although they have successfully marketed portables, unit audio and TV both under their own name and through their Pye subsidiary.

Philips must be hoping their greatest technological achievement in the hi-fi area — digital Compact Disc, a Philips idea co-developed with Sony — will turn the tide for them.

Compact Disc will not achieve this on its own, though it has given Philips a higher profile in hi-fi than they have had for years. With the rack featured in this review, Philips show some of the technology they can bring to bear on other parts of the system.

Two things in particular set this system apart. One is known obscurely as 'Aztec', and is a novel way of ensuring that tape head azimuth is always correct. The other is the use of flat diaphragm drive units in the loudspeakers. Neither of these technologies is completely new; flat-diaphragm drivers have been used by a number of Japanese companies for several years, and in this country Kef were producing the B139 flat-diaphragm bass drive unit (still in production) several years before that.

'Azimuth' is the term used to denote the alignment of the tape head; the head gap should be at exactly 90° to the direction of tape travel. If every cassette deck (and cassette) was perfectly made, there would be no problems, but in the real world cassettes recorded in one machine may be incorrectly orientated when played back in another machine, resulting in losses of high frequency output — a dim sound, if you like. Normally, an engineer can reset the azimuth by adjusting the head mounting screws. Correcting replay azimuth automatically for any tape is hard but not impossible, and helps restore to the cassette medium the universality and interchangeability it was supposed to have from the beginning, but didn't. Nakamichi and others do this with an active azimuth adjustment system using stepping motors and cams — an expensive but worthwhile device.

Philips do not give correction for tapes recorded on other decks, but simply ensure that 'Aztec' – equipped decks don't cause azimuth errors, regardless of deck adjustment or cassette housing variations. 'Aztec' is a novel tape guide where the bottom half of the tape is bent outwards and forced by the geometry of the system against the upper, accurately-aligned guides. The usual tape 'weaving' problems are thus eliminated.

Turntable: F7235

Labels on the F7235 mentioning 'Quartz PPL' and 'Direct Control' — plus a small light marked 'Lock' — do not mean that this is a direct-drive unit. In fact, it is a belt-driven turntable using a DC motor whose servo-control is driven by a quartz element. The player thus has an almost identical drive system to the turntable used in the 134 system, and indeed the players look substantially identical.

The player is fully automatic — just set the

record speed, then the arm cueing and return at the end of side are done for you. Setting the player up shouldn't cause any ulcers either. Setting tracking force for example is simply a matter of rotating the arm counterweight until the tracking-force balance integrated into the arm rest shows the right number — about 2grams in this case. But you still end up with a very loose-feeling assembly that proves to be extremely microphonic and excitable by external disturbances, even if well supported on a solid surface.

Test results showed the cartridge to have the same basic characteristic as the cheaper one used in the 134 system, though the tip mass resonance is less sharp — that is, better controlled. But note the lack of smoothness in the plot due to poor stability somewhere within the structure of the player. The other measurements were all very acceptable for a turntable of the price.

Cassette deck: F6335

The major special feature of this deck — the Aztec azimuth error elimination system — was discussed in the introduction. Even without this though, the F6335 is well equipped. Both Dolby B and C type noise reduction systems are used. There is a switchable MPX filter, the purpose of which is to remove any residual 19kHz pilot tone from stereo broadcast transmissions when recording from a stereo tuner.

Tape-type switching is manual using three clearly marked switches whilst record level settings are monitored on good quality bar graph meters with a 26dB operating range. No special tape search facilities are fitted, but the light touch transport keys are a delight to use. I was less happy about the minor switching though which seem to have been arranged with the intention of giving an attractive appearance, rather than of grouping controls logically by function. There were no important shortcomings though, and on our test measurements the deck acquitted itself well. Note that the 0VU point has been set quite high: this level should not be exceeded by much when recording.

Tuner: F2355

If you listen to a large number of different radio stations, this is the tuner for you. No less than 19 frequencies can be stored for FM, and another 19 for MW programmes. You can even have nine LW frequencies stored! These programmes can be recalled by 'dialling up' the pre-set identification number on the row of numbered buttons, or by cycling through the pre-sets in numerical sequence using just the up/down tuning buttons. Very sensibly, Philips have seen fit to include a neat slide-out tray on which you can put names (BBC4, for example) against pre-set numbers.

A five-digit LED signal strength meter fitted gives a reasonably useful indication as two LEDs illuminate for 10μV input and four illuminate with 100μV. Full house is somewhere

GENERAL DATA

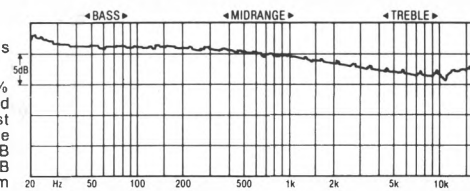
Amplifier: F4235
Power output, per channel, at 1kHz ..... 60 watts

Record deck: F7235
Speed variations (wow and flutter) 0.07%
Speed drift ..... good
Speed accuracy ..... 0.3% fast
Arm/cartridge resonant frequency ..... 12Hz, acceptable
Cartridge channel balance ..... within 0.2dB
Cartridge channel separation (crosstalk) ..... – 24dB
Cartridge tracking ability at 2g downforce 80μm

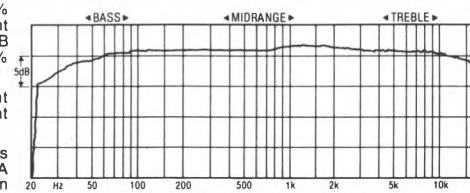
Cassette deck: F6335
Tape used for tests Marantz MC2 (no maker's recommendation)
Frequency response ('chrome' or 'II' position) ..35Hz – 16kHz
Speed variations (wow and flutter) 0.09%
Speed drift ..... excellent
Signal-to-noise ratio, with Dolby B 64dB
Distortion at OVU, with Dolby B 1.9%

Tuner: F2355
Sensitivity ..... excellent
Signal-to-noise ..... excellent

General
Maximum volume level in room (typical, with F9430 speakers supplied) 96dBA
Rack dimensions (w x d x h) ..... 46 x 42.5 x 95cm
Speaker dimensions (w x d x h) ..... 27 x 26 x 55cm
Price ..... £550 (inc speakers, £690)



Disc: frequency response with cartridge supplied



Cassette: record/replay frequency response

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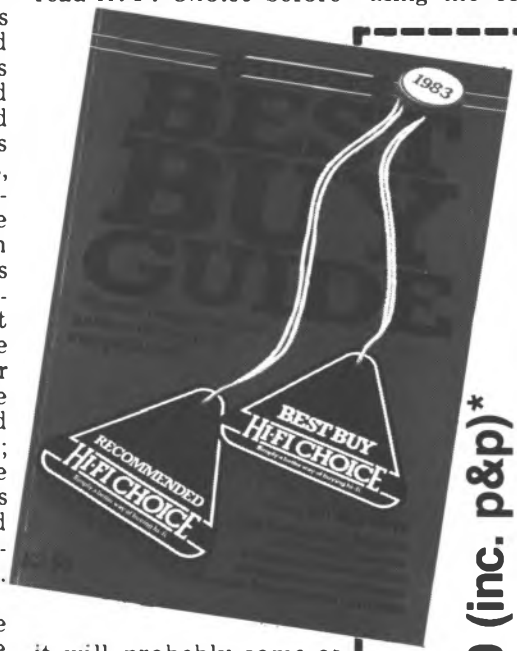

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before 1mV, and roughly corresponds to the point where reliable, quiet reception is assured on both mono and stereo programmes. FM sensitivity is excellent, and noise levels low apart from a low-level constant background whistle. AM (LW and MW) interference levels are also satisfactory, but sound quality on these bands is marred by a dulled, wooden characteristic.

Amplifier: F4235

Apart from DIN loudspeaker output socketry for two speaker pairs, this is a straightforward amplifier but one well endowed with inputs. Along with those required by the other system components, there is a second tape circuit (both tape circuits have off-tape monitoring if required), an auxiliary and a CD input. Low and high-pass filters (treble and bass cut respectively, are also fitted, plus the usual array of tone controls, a long slide volume control and power output metering. Maximum output was in advance of that specified by Philips, at around 60watts-per-channel.

Loudspeakers: F9430

Flat diaphragms and the sculpted front-panel mouldings around the drive units notwithstanding, this is a fairly simply-constructed loudspeaker. The cabinet is large but insufficiently solid or internally damped by conventional standards. The system is a two-way one, with a dome tweeter of reasonable quality and fitness for purpose and a flat diaphragm bass unit whose high moving mass (a flat diaphragm weighs more than most cones due its thickness, necessary to keep it stiff) is at least partly counteracted by having a heavier than usual magnet. The bottom rectangular unit is passive — that is, it is an 'ABR' (auxiliary bass radiator) driven by internal air pressure, and in effect is used to 'tune' the enclosure in the bass. The measured frequency response doesn't look out of line with expectations, though high frequency response looks a bit erratic.

In use . . .

It's a measure of Philips engineering competence that the two systems we reviewed shared basic characteristics of sound quality. The most noticeable system sound characteristic, here as with the System 134, is a lively, outgoing and positive quality, leaning in the direction of harshness and loss of control. Of itself, this audio 'character' is no bad thing, but the weaknesses of the cheaper system are repeated here, which is particularly galling as the cost of this system is so much greater. The amplifier phono input suffers from excessive levels of hum which has an annoyingly 'buzzy' nature. The other major shortcoming also concerns record reproduction which although a little sweeter, smoother and more controlled than the treble in the 134 system (due presumably to the sweeter cartridge), is in essence as 'over the top' in the upper bass and as coloured as before.

On the other hand, though, the cassette deck and tuner are better — much better in the case of the tuner which builds on the strengths of the tuner in the 134 system, but manages to sound more relaxed and natural still. The cassette deck, though, conspired to show some signs of mild instability, notwithstanding the good wow and flutter readings and the Aztec tape guidance system.

The benefits of Aztec are difficult to assess without very long-term use, but certainly cassettes recorded on this deck gave a very repeatable performance, and in any case the real advantages come when switching tapes between two or more Aztec-equipped decks. The inherent mechanical and electrical limitations of the recorder — similar to those of the cheaper Philips deck — set the ceiling on what can be accomplished. The most satisfactory results were with Dolby C and Type II (chrome) tape.

Sounding a little less coloured than its cheaper counterpart, the amplifier had a more dynamic and 'freer-running' sound to noticeably higher maximum volume levels — it's quite a powerful, gutsy design. Unfortunately the loudspeakers were a disappointment on audition. They are quite relaxed and in their own way clear and articulate, but they are quite strongly coloured too, hollow box-like effects and a warmish overall balance predominating. Listening notes describe the loudspeakers as 'slow' with a curiously distant, uninvolving quality at odds with the rest of the system. The problems appear to be due mostly to inadequate box stiffness and damping rather than being related to the drive units, though the tweeter was much less open and sweet than the similar one fitted to the smaller (and in our view considerably better-sounding) Philips speakers.

Conclusion

A recommendation is not in order here, not just because of the problems noted above, but also because this system fails to sound more musically satisfying than the much cheaper Philips System 134.

Pioneer XA3 System

Pioneer High Fidelity (GB) Ltd, Field Way, Greenford, Middlesex UB6 8UZ
Tel 01-575 5757

An inexpensive system, the XA3 is supplied only complete with loudspeakers and, of course, a rack housing. The rack is slightly more squat than normal, and unusually it does not encase all the equipment, the turntable sitting on a simple half-open shelf protected by its own hinged perspex cover. The rack itself is well made and finished, assembly causing no more headaches or flattened thumbs than usual. One small point though — the glass door has little protection from the top projecting trim panel, and could prove easy to catch with clothing in a confined space.

Turntable: CT-210

This is a straightforward belt-driven two-speed turntable with auto-return of the arm at the end of side. Like the cassette deck, it is powered from a low voltage DC source via a flying lead to the rear of the receiver, so only one mains lead is needed to power the complete system. The arm appears to be rather more solidly constructed than average for this price level, though the detachable headshell is a plastic moulding of no great rigidity. The turntable mat, on the other hand, is better made than usual, a comment that applies equally to the arm bearings.

The turntable ran just slightly fast, though wow and flutter was surprisingly well controlled. The cartridge frequency response was exceptionally flat and smooth, and although the other measurements indicated good cartridge performance, the arm/cartridge resonant frequency was fairly low at 10Hz. The deck proved quite excitable in response to shock, and could be easily induced into feedback at high levels. The arm/cartridge resonance may have been contributory in this.

Cassette deck: CT-120

Like the turntable, the CT-120 cassette deck is powered from a DC outlet on the receiver, so it cannot be used on its own. This is a simple deck, with Dolby B noise reduction on board.

Tape selection switches are near indecipherable even to the trained eye, but the power assisted transport keys work smoothly and are clearly laid out. The recording level meters cover just 16dB, so don't expect quiet passages to register, and the Pioneer has no facility to alter channel balance whilst recording. Wow and flutter was just below average, but signal-to-noise measured fine. Record/replay frequency responses, on the other hand, were decidedly bright, indicating under-biasing on Type II tape.

Receiver: TA-210L

Although the tuner and amplifier appear to be separate items from a distance, they are in fact integrated into a single box — a receiver in other words. The tuner is an analogue (continuous tuning) type covering FM, MW and LW, but with a digital read-out of tuned frequency. A 'tuned' indicator light is fitted, but there is no signal strength indication. Interstation muting is combined with the mono/stereo switch.

The tuner does work quite well on fairly low input signal levels, but background hiss levels are always somewhat higher than average — this on FM. I also noted some breakthrough of strong, unwanted nearby channels when trying to receive a weak one. The other two bands — MW and LW — worked very well indeed, with moderately low interference levels and excellent basic sound quality.

The amplifier side has very simple operational facilities, all of which are laid out in a logical and neat way. The only disappointment was the absence of a spare input for, say, an

external CD player or a second tape deck. Power output was found surprisingly high at 50watts per channel, a figure that deteriorated a little at low frequencies. Maximum volume with the speakers supplied was a high 101dBA.

Loudspeakers: CS-210

Pioneer's CS-210 is a large but lightly built three-way loudspeaker using pulp cone units throughout. Just a single capacitor wired in series with the two smaller units stands in for a crossover proper, and cabinet construction, though neat externally, is somewhat insubstantial. Although frequency response plots do not by any means tell the full story about a speaker, it is difficult to take seriously any design that behaves in as ragged a way as this one. There are severe suck-outs centered on 250Hz and 2.5kHz, and a generally rising response with increasing frequency elsewhere.

In use . . .

On audition, the loudspeakers were thought truly awful — there is no other word for it. Used on tall, open stands, well away from walls, they sounded hollow and boxy in the midband, and 'fierce', with obvious drive units resonances in the treble. The bass end simply sounded soggy.

The cassette deck was none too inspiring either, though not because of any inherent limitations but simply due to incorrect setting-up. Recordings on metal and chrome-bias tapes of all brands reproduced with a tonally bright balance, exaggerated by the influence of Dolby B, and with obvious 'pumping' effects due to incorrect Dolby level tracking. The tuner was rather better on FM; it lacked incisiveness and clarity in absolute terms, but it sounded pleasing and smooth in system context. The turntable suffered from a rather soft presentation; it imparted a 'bloom' in the bass whilst the cartridge was slightly dim tonally. The amplifier too had something of the same kind of characteristic, but it remained perhaps the best part of the system. Lacking in clarity and the 'outgoing' relaxed presentation of a first class amp, the Pioneer one was a little soft in feel, but powerful enough for any reasonable application and pleasant to listen to.

Conclusion

Two things let this system down. First, and most obvious, is the quality of the loudspeakers supplied. Even the low price of the system is not ample compensation for a performance that makes a mockery of the reproduction of music. The other is the cassette deck alignment for the recommended tapes — a simple matter for the manufacturer to cure by proper quality control and setting-up procedures at the factory. As the loudspeakers are not optional, it's difficult to recommend this system, and this is a pity since the neat and sensible control layout, the generally good showing of the electronics — and of course the low selling price all combine to make this a superficially attractive proposition.

GENERAL DATA

Amplifier: part of receiver tuner/amplifier TA-210L
Power output, per channel, at 1kHz . . . . . 50 watts

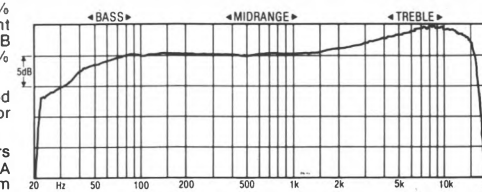
Record deck: CT-210
Speed variations (wow and flutter) 0.07%
Speed drift . . . . . good
Speed accuracy . . . . . 0.6% fast
Arm/cartridge resonant frequency . . . . . 10Hz, too low
Cartridge channel balance . . . . . within 0.8dB
Cartridge channel separation (crosstalk) . . . . . – 0.8dB
Cartridge tracking ability at 2g downforce 76μm

Cassette deck: CT-120
Tape used for tests . . . . . TDK SA (maker's recommendation)
Frequency response ('chrome' or 'II' position) . . 31Hz – 16kHz
Speed variations (wow and flutter) 0.14%
Speed drift . . . . . excellent
Signal-to-noise ratio, with Dolby B 61dB
Distortion at OVU, with Dolby B 0.6%

Tuner: part of receiver TA-210L
Sensitivity . . . . . good
Signal-to-noise . . . . . poor

General
Maximum volume level in room (typical, with CS-210 speakers supplied) 101dBA
Rack dimensions (w x d x h) . . . . . 49 x 39 x 84cm
Speaker dimensions (w x d x h) . . . . . 28 x 23 x 48cm
Price . . . . . inc speakers, £299

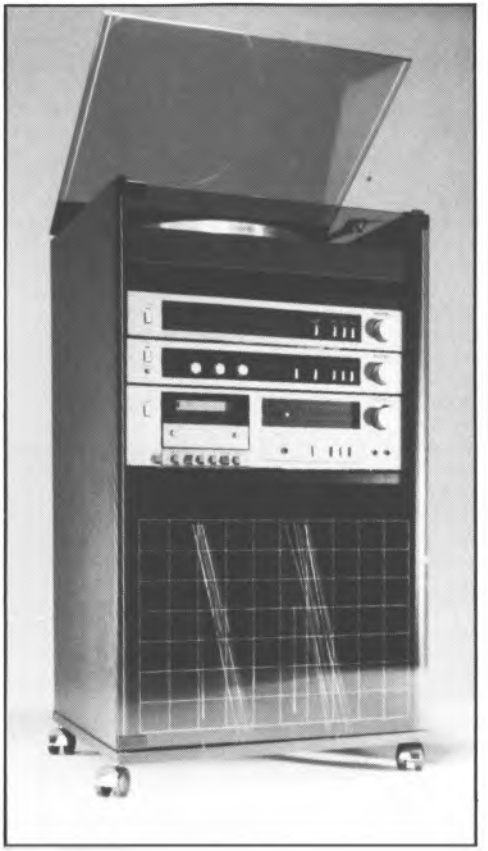
Disc: frequency response with cartridge supplied



Cassette: record/replay frequency response

Rotel '820 system'

Rotel Hi-Fi Ltd, 2-4 Erica Road, Stacey Bushes, Milton Keynes, Bucks MK12 6HS
Tel (0908) 317707



Strictly speaking, this is not a system at all — it is an *ad hoc* collection of components which match visually and which can be bought in the rack housing shown in the accompanying photograph. Each item is sold individually which means that a much simpler system, omitting the cassette deck, tuner or rack housing (say) can be bought, and built up into the complete system at a later date.

The cost of this system is simply the sum of the individual components which are listed as follows: RP-830 turntable, around £100 (a suitable cartridge would add another £15-£30); RA-820 amplifier, £80; RT-820 tuner, £70; RD-820 cassette deck, £85; RL-850 loudspeakers, £80 per pair; and the rack housing, £60. With a system of this calibre, it is essential for best results to support the loudspeakers on stands, which may cost £20-£50.

The rack itself is of straightforward design and adequate finish, though its aluminium trim has rather sharp corners.

Turntable: RP-830

In both design and construction, the RP-830 breaks new ground in rack system turntable design. The construction is based on a substantial wooden box section, on which the arm and platter are mounted. The platter is fairly heavy and topped with a thick, flat mat, and is belt-driven from a synchronous (mains-locked) motor which is decoupled from the baseboard. The arm is superbly built. The bearings on the review sample had no noticeable slack whilst the arm tube is optimised for rigidity by having a large cross-sectional area. The headshell is quite different to the norm; it can be rotated on the end of the arm tube for adjustment purposes, and is made from magnesium to reduce flexure and provide a stable platform for the cartridge. The arm height is adjustable, all fastenings being via Allen screws. No cartridge is supplied, so the unit was tested with a Nagaoka MP11 cartridge. The player ran a little fast on test (0.9%), but wow and flutter measured well. Other tests with the Nagaoka suggested that a medium-to-low compliance cartridge is required — your dealer can advise on this. Note that speed change involves manually repositioning the drive-belt after removing the mat, and that the arm does not lift out of the record groove or return to its rest at the end of side. This player has been optimised for sound quality which has meant a loss of some of the usual convenience features.

Cassette deck: RD-820

We're on slightly more familar territory with this cassette deck. The RD-820 is an entirely straightforward, no-frills product. Noise reduction is by Dolby B (not Dolby C) and there is manual tape switching for the usual tape types. For reasons best known to the manufacturer, the Type II (chrome or pseudochrome) tape position has been labelled 'special', but the switching is otherwise clear and unambiguous. The transport has simple electromechanical controls that enagage reasonably quietly, and which offer cue and review (fast wind whilst the finger is on the button, which reverts to play when released). For some reason this facility is unannounced on the fascia. The speeded-up sound from tape is still fed through to the amplifier in this mode, and at unreduced level. This could cause loud-

speaker damage (or ear damage if the user is wearing headphones!) unless a careful hand is kept on the volume control. The meters, which have an adequate 26dB range and 2dB resolution near 0VU, are excellent. This deck then, is very simply equipped, but unusually easy to use. Wow and flutter was a little higher than average, but all other parameters, including the Type II record/replay frequency response, checked out well.

Tuner: RT-820L

This tuner parallels the cassette deck for the purposefulness and simplicity of its design. It's an analogue tuner with a scale-and-pointer tuning arrangement and a well weighted tuning knob that ran in rather stiff bearings. The scale is easy to read, the cursor taking the form of a glowing LED, but the latter was set slightly inaccurately, reading about 100kHz (0.1MHz) low at 100MHz on FM. A three-LED signal strength meter is fitted, but on the review sample all three were lit at the absurdly low level of 10μV, at which point even mono reception is more or less unusable. This can only be treated as a sign that a transmission is being received — it is quite useless as a guide to the quality of signal!

FM reception suffered from a continuous background medium-pitch tones which could occasionally be heard during quiet periods of music or speech, and the tuner needed tuning carefully to avoid whistles. There were also RF breakthrough problems of unwanted transmission unless the signal being received was very strong. Typically, in excess of 10mV is needed to guard against this problem, and for most areas this will mean a first class external aerial installation. Sensitivity was found a little lower than average, and background noise levels were similarly higher than normal.

Amplifier: RA-820

Although there is no external indication of the fact, this amplifier has been heavily revised since its first introduction into the UK. The revisions involve the use of a new smaller printed circuits board, better power supply components and other such details. There is a worthwhile sound quality improvement with this version, which can be identified by the fitting of a mono switch in place of the loudness control fitted previously.

The RA-820 has straightforward facilities for the most part. Two pairs of loudspeakers can be used, but note that the 'A' pair cannot be switched off — the idea being to reduce the number of breaks due to switch connections in the signal path to the main loudspeakers. The input arrangements are fully standard except that the auxiliary/CD input is of reduced sensitivity to suit the high output voltage of most CD players. Power output on test was 30watts/channel — slightly less at frequency extremes.

Loudspeakers: RL-850

The RL-850 is built in Denmark to Rotel's specifications, using design criteria

GENERAL DATA

Amplifier: RA-820
Power output, per channel, at 1kHz ..... 30 watts

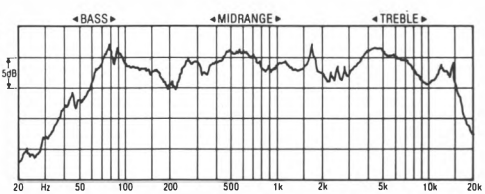
Record deck: RP-830
Speed variations (wow and flutter) 0.07%
Speed drift ..... good
Speed accuracy ..... 0.9% fast
Arm/cartridge resonance ... 8Hz, too low (with Nagaoka MP11)
Cartridge channel balance ..... not tested
Cartridge channel separation (crosstalk) ..... not tested
Cartridge tracking ability ..... not tested

Cassette deck: RD-820
Tape used for tests ..... TDK SA (maker's recommendation)
Frequency response ('chrome' or 'II' position) .. 51Hz – 16kHz
Speed variations (wow and flutter) 0.23%
Speed drift ..... excellent
Signal-to-noise ratio, with Dolby B 63dB
Distortion at OVU, with Dolby B 0.9%

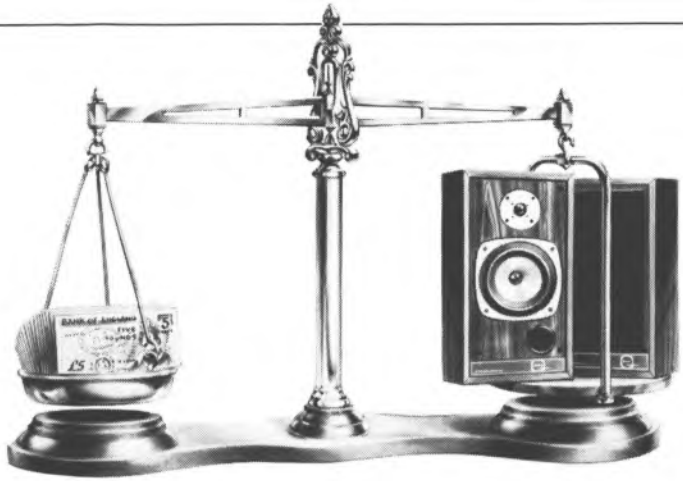
Tuner: RT-820L
Sensitivity ..... below average
Signal-to-noise ..... below average

General
Maximum volume level in room (typical, with RL-850 speakers supplied) 95dBA
Rack dimensions (w x d x h) ..... 46.5 x 46 x 85.5cm
Speaker dimensions (w x d x h) ..... 25 x 25 x 44cm
Price ..... £395, or, inc speakers, £475 (cartridge extra)

Cassette: record/replay frequency response



Loudspeaker in-room frequency response



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You will certainly need a loudspeaker capable of reproducing the full dynamics of music that can be revealed by the latest digital and analogue recording and playback systems. The Mercury has the wide frequency response and dynamic characteristics necessary to ensure you will hear all the highs and lows, plus those fleeting transients that give music its real live character, which most other similarly priced loudspeakers simply do not register.

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essentially in tune with the mainstream of British high fidelity loudspeaker design.

Two drive units are used, both of European manufacture. The bass unit has a doped fabric or pulp cone, the tweeter being a 25mm dome unit identical to that used on many British-made loudspeakers of low to medium cost. By rack system standards, this is not a sensitive design — it needs greater power to produce a given volume level than usual. This accounts for the low maximum usable sound level in the listening room of 95dBA with the RA-820 amplifier, but in practice — and partly because the amplifier can be safely overdriven on music programme without distress — the Rotel system will go loud enough for most purposes in anything up to moderately large rooms. Nevertheless, this is not the system for very high continuous volumes. The in-room measured frequency response indicates an even overall trend, despite the many localised peaks and troughs.

In use . . .

From the description above, you may not be surprised to find that the tuner was thought the weakest of the items within the system. The weakness was not a great one though, certainly nothing like as great as I had expected from the discouraging RF problems. Given a strong enough signal the sound was in fact very good, with a precision and clarity (but slightly vague stereo), in contrast with the poor sound obtained from weak, distant programmes.

The cassette deck was similarly satisfactory. Not only was it extremely easy to use (though the fast wind was annoyingly slow), but it also gave very satisfactory sound quality on Type II tape, and when replaying pre-recorded cassettes. Reproduction suffered a little from the stereo instability noted, the vagueness at low frequencies and the 'splashiness' at high frequencies that characterises all but the best of the cassette medium, but it was only with metal tapes that the sound really deteriorated. Here the sound acquired an uncomfortable harsh and thick, ill-separated feel, despite a neutral tonal balance, that suggested that the deck was a little out of its depth.

Where the Rotel system stands out though is in its ability to play records properly. The sound with this turntable is almost unrecognisably more solid and stable in feel than most of its rack system peers. The stereo soundstage is well defined, and with a good cartridge fitted there is a clarity, precision and evenness of reproduction that allows the music to sound lively and vivid. Record surface noise is well suppressed and dynamics convincing. A very slight cloudiness at very low frequencies is all that remains to be criticised, and this can be minimised by careful cartridge selection and by supporting the player on a suitable base; this can have a surprising effect on sound quality. A light, stiff table proved vastly superior to the rack housing supplied by Rotel, but the latter could perhaps be improved by securely fixing it to the rear wall using a couple of screws near the top of the rack.

The amplifier is only moderately powerful, but again it is characterised by an even-tempered, easy-to-listen to quality. The bass was firm and clean, and the treble clear and lacking in harshness. The amplifier's ability to reproduce detail and dynamics seemed very slightly less than the best, the sound being objectively a little 'de-focused', but it was always pleasant to listen to.

Finally the loudspeakers. In price context, there are no reasonable grounds for criticism; the RL-850 fully meets all the criteria for reproducing music in an informative and unobtrusive way. They're essentially uncoloured and smooth with a well controlled and quite powerful bass and an overall lively, forward feel. Depth images were suppressed and there was a little high frequency harshness, but for most of the time the speakers didn't intrude. With the rest of the system well set up and with the speakers sited on tall (24in) stands about two feet forward of the nearest wall, the music didn't seem to be coming from the boxes at all.

Conclusion

No excuses need be made for this system. Quite clearly, its performance is something special, due in the main to an excellent turntable, amplifier and loudspeakers. Whilst the cassette deck and tuner were not outstanding, the cassette was still average-to-good, and tuner was reasonably satisfactory when used with local stations and when plugged into a good aerial. Record reproduction was outstanding by rack system standards — for once here is a record player that is not a poor relation. The same comment applies equally in the case of the loudspeakers, often a badly compromised component in a rack system. The system comfortably achieves a 'Best Buy' rating.

Rotel '820B system'

Rotel Hi-Fi Ltd, 2-4 Erica Road, Stacey Bushes, Milton Keynes, Bucks MK12 6HS
Tel (0908) 317707

The second system we have assembled from Rotel components uses the 'next models up' in the case of the turntable, amplifier and loudspeakers. In the case of the cassette deck and tuner, the same models RD-820 and RT-820, were included, and by the time this is published these units should be available in a black finish to match the RA-820B amplifier.

Alternatives to the tuner and cassette deck are available in the range. The RD-840, for example, is almost identical to the RD-820 cassette deck except that Dolby C is incorporated as well as Dolby B. There is also an RT840 tuner, which uses quartz synthesizer tuning and offers five FM presets and five on MW – LW is not included at all. These two models were not available in time for this review.

As with the less expensive RA-820-based system, this is a purely optional collection of items from the Rotel range. The units can of course be bought in any other combination that suits the requirements of the purchaser.

Turntable: RP-850

Superficially, the RP-850 looks very like the RP-830, which is covered in the review of the cheaper Rotel system. The two turntables do in fact use the same medium-weight platter and belt-drive system, and they are both completely manual – you have to return the arm to its rest by raising it with the lift/lower device and moving it across.

But there are important differences under the skin; the main chassis of the RP-850 is very much heavier and more solid. It is built of three layers of metal and wood, sandwiched together to form an inert, composite structure that sits on slightly springy feet. The arm is very similar to the 830's, but the bearings are of higher grade still. Other points concerning the arm include the solid magnesium headshell which can be adjusted for tilt by loosening an Allen bolt, and the rigid, wide diameter arm tube. No cartridge was supplied so measurements were run with the Nagaoka MP11 cartridge. Wow and flutter was excellent, and general speed (pitch) stability good.

Cassette deck and tuner: RD-820 and RT-820L

These two units are discussed fully in the first Rotel system review.

Amplifier: RA-820B

This model was derived directly from the RA-820, but has had all tone controls removed. The idea has been to simplify the signal-carrying circuits to promote better sound quality – on the grounds that each additional stage of electrical processing inevitably (however slightly) degrades sound quality. This approach accepts the view that manipulation of tone is not an aid to good sound quality in a good audio system. Omission of tone controls is now standard practice amongst the more popular high cost amplifiers; but this is the first time to my knowledge that such thinking has been incorporated into a rack system.

There is more to the 820B than absence of tone controls though. Both the internal power supply and output stage have been made very robust in the electrical sense, and such normal features as output protection circuits and second speaker terminals have been omitted, again to improve sound quality. A headphone socket is fitted, but you'll have to disconnect the speakers to silence them.

Inputs cover the usual turntable, auxiliary/CD, tuner and tape. With just a single split-concentric volume control (each part can be

used separately to alter balance), source switching and a mono button, the 820B is extremely easy to use. Power output measured just slightly in advance of the RA-820 at 30 watts/channel.

Loudspeakers: RL-870

This is a fairly large, two way sealed loudspeaker, heavily built and incorporating a high quality 20mm dome tweeter and doped bass unit. Internal examination was not possible due to the permanent bass unit gasket seal employed, but every indication is of a well-constructed model whose design is similar to a number of specialist high-fidelity separate loudspeakers of similar cost. The frequency response in the listening room was satisfactory, though showing a slight excess of energy in the midband. Sensitivity was found quite low; but when driven by the RA-820B they produced 97dBA on test, an adequate figure for most purposes.

In use . . .

Turntable, amplifier and loudspeakers models all build in the strengths of the cheaper versions. In sound quality, the turntable is recognisably of the same mould, but has a sharper and more positive way of reproducing a stereo soundstage, though as with the 830 this player really needs a stiff, solid surface to work at its best. Essentially the sound is positive and articulate, dynamics being well portrayed and record surface noise well suppressed. The amplifier sounds very much like a 'honed' version of the 820. It can sound a little harsh when presented with poor programme material, but in the main it sounds very positive and alive, with a more focused presentation of low level musical information (recorded ambience, for example, or very quiet instruments). This amplifier is very much an 'open window' on the musical performance. Everything can be heard very clearly, good or bad.

The RL-870 loudspeakers are harder to sum up, though in the main they are excellent performers. The best features are the crisp, and well defined treble, and the powerful but well controlled bass. In between, the sound is slightly softened in impact, this to an extent dependent on where the speakers are pointing in relation to the listener. They can sound slightly 'shut in', but in the main they sounded very solid and powerful, a description that applies equally to the system as a whole.

Conclusion

This system is highly recommended as offering the abilities of a good separates system with the visual appeal of a rack system. The price is not low, and potential buyers may wish to consider the possibility of buying this system with the cheaper RL-850 loudspeakers if the 870s are out of reach. Despite the lack of automation, the system is extremely approachable and easy to use.

GENERAL DATA

Amplifier: RA-820B
Power output, per channel, at 1kHz . . . . . 30 watts

Record deck: RP-850
Speed variations (wow and flutter) 0.06%
Speed drift . . . . . good
Speed accuracy . . . . . 0.6% fast
Arm/cartridge resonance . . . 7Hz, too low (with Nagaoka MP11)
Cartridge channel balance . . . . . not tested
Cartridge channel separation (crosstalk) . . . . . not tested
Cartridge tracking ability . . . . . not tested

Cassette deck: RD-820 — see '820' system review

Tuner: RT-820L — see '820 system' review

General
Maximum volume level in room (typical, with RL-870 speakers supplied) 97dBA
Rack dimensions (w x d x h) . . . . . 46.5 x 46 x 85.5cm
Speaker dimensions (w x d x h) . . . . . 26 x 25.5 x 49cm
Price . . . . . £459, or, inc speakers, £599 (cartridge extra)

Sansui IS-330

Sansui (UK) Ltd, Unit 10A, Lyon Industrial Estate, Rockware Avenue, Greenford, Middlesex UB6 0AA Tel 01-575 1133

A receiver-based system, the Sansui IS-330 features a clean, attractive control layout and simplified operation packaged around a medium power amplifier. The system can be bought with or without loudspeakers.

The rack housing is of simple design, quite smart with no sharp corners to catch clothing, but no protection strip along the front edge of the glass lid either. There were minor assembly problems — some of the rack sections didn't align particularly well, but with a lot of manipulation and persuasion everything finally fitted satisfactorily.

Turntable: P-D20

The build quality of this direct drive player is no match for its excellent finish. The plinth is light, as is the platter itself, whilst the straight arm with its detachable headshell and cartridge has quite a high friction level in both lateral and vertical planes.

The front-panel description 'automatic' is very misleading; in fact this player is semi-automatic, offering auto-return only. Unusually for a direct drive turntable, our P-D20 sample ran some 0.6% slow, but wow and flutter and general speed stability (steadiness of pitch) were of a good standard for the price. The cartridge gave a fair set of measured results, but note the declining high frequency response and the severe arm resonance indicated by the 'notch' in the curve near 170Hz.

Cassette deck: D-55M

No effort has been spared to make this deck as simple and as painless to use as possible. Apart from the usual latching power-assisted transport controls, which allow direct movement from fast wind to play and vice versa, only an on/off switch and a Dolby B switch adorn the fascia; that is, if you ignore the strange-looking central function panel which shows tape type, whether record and Dolby are selected and so on. Tape-type switching is automatic as is the record-level setting.

Although the effect of auto-record level control is almost inperceptible for much of the time — it shifts levels around very gently, and is one of the better devices of its type — there is an inevitable loss of level during loud passages and increase in hiss levels during quiet ones. Ideal for making 'compressed' tapes for the car, but not exactly an audiophile's dream! A simple mechanical tape counter is fitted, but there is no track search function. Wow and flutter was found slightly higher than normal, and the frequency response rises a little at the high end.

Receiver: R-606

Disregard the 'Compu-Select' feature advertised on the front panel, as this auto source selection device only works with certain cassette deck and turntable models other than the ones supplied here! Like the other units, the receiver has very simple controls and a central function mode display and frequency readout. The tuner is equipped for FM and MW reception, but not LW please note, with six presets available per waveband. No signal strength metering is fitted, and the frequency display on the review sample was set 0.1MHz too high, reading 100.1MHz when presented with a 100MHz signal. There were some background whistles of continuously varying pitch, but FM noise levels were just satisfactory overall, whilst sensitivity rated as good. AM sound quality was good, with adequate reception quality to suit.

Turning to the amplifier section, two pairs of loudspeakers can be used in any combination,

whilst inputs provide for two tape decks (or one tape and an auxiliary item such as a CD player). Some of the minor switching is a little muddled, but on the whole this is an easy and pleasant amplifier to use — a comment that applies to the system as a whole.

Loudspeakers: S-410

The usual recipe for inexpensive rack system loudspeakers is followed here. The cabinet is large and undamped, though there is a little sound absorbing material inside. Wiring standards are inadequate, connection being via a short captive lead through an unsealed hole at the rear. The paper-cone bass unit is matched to a tweeter that looks like a million dollars, but turns out to be a crude 50mm cone unit; the only crossover is a tiny capacitor in series with this. External finish, on the other hand, is immaculate.

There are shades of 'mutton dressed as lamb' here, but in Sansui's defence, there has been an element of craft at the design stage and, of course, the system can be bought without speakers if desired. The measured listening-room frequency responses looks very erratic.

In use . . .

The loudspeakers, predictably, were no ball or fire. From a list of shortcomings as long as your arm, the main ones include a hollow 'cupped hands' type of colouration and considerable losses of information from the signal being reproduced. The basic balance is rich, though the bass lacks resolution and control. The treble is tonally colourless and lacking in level.

The rest of the system though is quite capable. The tuner, despite very occasionally audible background whistles, gave a clean, crisp and fairly refined account of itself on FM. The cassette deck was definitely better than most auto level record models; pre-recorded cassettes played back very well apart from a slight high-frequency instability noticeable only on some programmes. Metal tapes sounded a bit ill-at-ease and coloured, but Type II (chrome position) tapes gave a crisp, clean and generally believable sound, with a slight richness. The latter was a characteristic also of the amplifier, the listening notes relating the rest of the story as a nice, powerful, slightly soft and easy on the ear kind of sound.

Finally, the turntable was most open to criticism for what it couldn't do; the bass lacked weight, power and definition, and the cartridge/arm combination gave a slightly 'phasey' sound at times. On the whole though records came over well, the system with the Kef speakers having a crisp, smooth and fairly informative sound.

Conclusion

If the system is bought without speakers, it is clearly a good value-for-money package and warrants a 'Best Buy' for its smooth, easy-on-the-ear sound quality, clean styling and ergonomics and its welcome simplicity.

GENERAL DATA

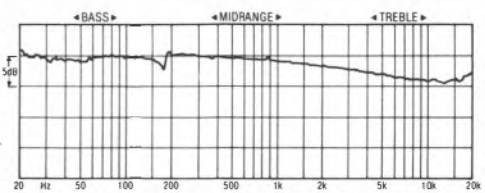
Amplifier: part of receiver, R-606
Power output, per channel, at 1kHz . . . . . 38 watts

Record deck: P-D20
Speed variations (wow and flutter) 0.08%
Speed drift . . . . . average
Speed accuracy . . . . . 0.6% slow
Arm/cartridge resonant frequency . . . . . 13Hz, acceptable
Cartridge channel balance . . . . . within 0.2dB
Cartridge channel separation (crosstalk) . . . . . – 23dB
Cartridge tracking ability at 2.5g downforce 66μm

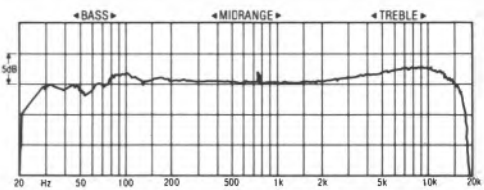
Cassette deck: D-55M
Tape used for tests . . . . . TDK SA (maker's recommendation)
Frequency response ('chrome' or 'II' position) . . 25Hz – 17kHz
Speed variations (wow and flutter) 0.10%
Speed drift . . . . . excellent
Signal-to-noise ratio, with Dolby B . . . . . see text
Distortion at OVU, with Dolby B . . . . . see text

Tuner: part of receiver, R-606
Sensitivity . . . . . good
Signal-to-noise . . . . . average

General
Maximum volume level in room (typical, with S-410 speakers supplied) 100dBA
Rack dimensions (w x d x h) . . . . . 46.5 x 42.5 x 95cm
Speaker dimensions (w x d x h) . . . . . 28 x 23.5 x 50cm
Price . . . . . £295 (inc speakers, £350)



Disc: frequency response with cartridge supplied



Cassette: record/replay frequency response

Sansui M-55

Sansui (UK) Ltd, Unit 10A, Lyon Industrial Estate, Rockware Avenue, Greenford,
Middlesex UB6 0AA Tel 01-575 1133

Although wider than the LP jacket-width systems, Sansui's M-55 system is still quite narrow and compact. There is no rack housing as such, but Sansui do provide a pair of plastic mouldings that can be attached to the rear of the electronics when stacked to hide the spaghetti-like loom of wiring at the rear, and to provide support for the rear feet of the turntable when placed on top. The turntable would otherwise overhang the electronics considerably. The units can, though, be used side-by-side.

Apart from its compact size, the other obvious attraction of the M-55 is automatic source switching, which switches the amplifier input to tape, phono or tuner when any of these units are operated. Extra wiring is used between the units to accomplish this task, hence the 'spaghetti' comment.

Supplied and tested for this review with the SM-77 loudspeakers, the system can be bought without loudspeakers if required, saving about £80 on the purchase price.

Turntable: P-M55

This turntable adopts an increasingly popular gambit for saving width — it has a parallel tracking arm, in this case fitted with a T4P (or simply 'P' mount) interchangeable cartridge fitting.

Deck functions are entirely automatic. The arm can also be positioned 'manually' at any point on the record by using an arm motor controlled by two direction keys on the front panel, but Sansui have not linked these with the left/lower device as logically they might have done. This means you have to first lift the arm, then leave a short pause before moving it sideways — there has to be a break between the two operations otherwise the lateral keys will not work.

Wow and flutter and long-term speed stability (steadiness of pitch) are both acceptable, but this direct-drive player is very prone to shock and severe feedback at high volumes. The cartridge has a smooth, but gently declining response at high frequencies.

Cassette deck: D-M55F

Note first that the front-panel 'Compu-Edit' function is redundant in this particular system. The deck is an essentially straightforward device offering Dolby B noise reduction and a very smooth operating set of transport keys, though the transport engages with loud clicks, possibly from the solenoids. Tape-type switching is manual, but recording levels are set automatically (with a back-up row of LEDs as a recording level indicator). On playing back tapes made on this deck, the effect of the auto-level record device can be heard slowly restoring large shifts in music volume as and when they occur. This is the trade-off for omitting the manual record level function in the cause of simplicity of operation. So is slightly increased tape hiss (and hum in this case) during quiet passages. Although the deck gave good measured speed stability results, occasional slow-rate speed variation could be heard (as a 'wobble' in pitch), and hum levels were very high — well above the noise floor. TDK SA tape was considerably under-biased, resulting in a 3dB response rise in the treble.

Tuner: T-M55L

An ultra-slimline FM, MW and LW analogue tuner, the T-55L has a very short and rather awkward-to-read tuning scale and an illuminated pointer which changes colour with a programme correctly tuned. This is backed up by a three-LED signal strength meter which is fully illuminated at the absurdly low level of 100μV. Another operational shortcoming concerned the tuning knob which is poorly engineered with considerable backlash, making accurate tuning difficult. Electrically though, the tuner was on firmer ground on FM with fair sensitivity and fairly low levels of background noise, albeit acompanied with a little hum. AM sound quality, whilst not unacceptable, sounded tonally thin and suffered from quite high levels of interference.

Amplifier: A-M77

This is a low-power amplifier that is extremely easy to use, not least because of the automatic source selection already referred to. One pair of loudspeakers can be used, and although the amp has an extra line-level input (marked 'Tape 2'), this input cannot be used to tape on to the accompanying cassette deck. There is a 3.5mm mini-jack socket on the front panel specifically for this purpose though. This obscure arrangement means that you can listen to an additional source (tape, CD etc), or record from it, but not both at once — and in any case using different input sockets! Tape 2 does not provide an output for recording.

Finally, there is a microphone input with mixing control. Power output measured 30watts per channel and maximum usable volume in the listening room with the speakers supplied was 101dBA.

Loudspeakers: S-M77

This heavily-styled loudspeaker is of compact dimensions and is based on a reasonably solid

GENERAL DATA

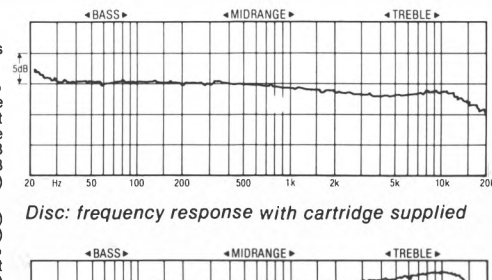
Amplifier: A-M77
Power output, per channel, at 1kHz ..... 30 watts

Record deck: P-M55
Speed variations (wow and flutter) 0.08%
Speed drift ..... average
Speed accuracy ..... 0.3% fast
Arm/cartridge resonant frequency ..... 13Hz, acceptable
Cartridge channel balance ..... within 0.3dB
Cartridge channel separation (crosstalk) ..... – 24dB
Cartridge tracking ability at pre-set downforce .80μm (see text)

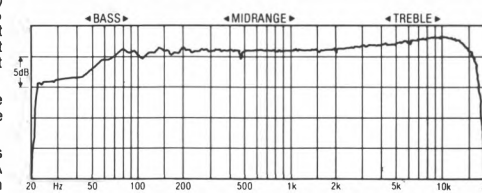
Cassette deck: D-M55F
Tape used for tests ..... TDK SA (maker's recommendation)
Frequency response ('II' position) .... 50Hz – 16kHz (see text)
Speed variations (wow and flutter) 0.07%
Speed drift ..... excellent
Signal-to-noise ratio, with Dolby B ..... see text
Distortion at OVU, with Dolby B ..... see text

Tuner: T-M55L
Sensitivity ..... average
Signal-to-noise ..... average

General
Maximum volume level in room (typical, with S-M77 speakers supplied) 101dBA
System dimensions (w x d x h) ..... 34.5 x 36 x 22cm
Speaker dimensions (w x d x h) ..... 21 x 22 x 28cm
Price ..... £320 (inc speakers, £400)



Disc: frequency response with cartridge supplied



Cassette: record/replay frequency response

silver painted box. Two cone drivers are used, the tweeter being a large elliptical unit, in addition to which Sansui have fitted an undriven 'drone' auxiliary bass radiator (ABR) of very small dimensions. They can be used against the rear wall.

In use . . .

Both amplifier and tuner were basically satisfactory but the other components suffered more or less severe problems on audition. The turntable, for example, sounded superficially smooth and clean, but subjectively it proved difficult to pick out the important strands in music, rhythm and pitch information sounding messy and indistinct.

Stereo information was also confused and unstable whilst the cartridge exaggerated record surface noise and mistracked audibly — and frequently. The cassette deck was similarly disappointing, with poor stereo soundstage stability and occasional speed stability problems audible. Reproduction was also a little bright and thin. The amp and tuner, on the other hand, were satisfactory, though the amplifier sounded strained when loud and both units had an audibly soft and dull overall balance. They were both quite detailed and smooth though, and were consequently not obstructive musically.

The loudspeakers, in my view, fell only slightly short of being totally unacceptable. They have an assertive, forward balance that detracts severely from reproduced tonal colour and that seems to 'shout' when loud. They also severely exaggerated record surface noise. Room positioning was not critical.

Conclusion

The chief attractions of the system are its neat packaging and simple operation. Finish is a little better than acceptable but sound quality is not — except from FM radio and when used with other loudspeakers than the S-M77s. Even the ergonomics have the odd blot on their copybook; merely brushing the tuning knob when altering the volume, for example (they're adjacent) can stop a recording from the record deck as the auto source select device switches inputs and halts tape movement. Unfortunately, we cannot recommend this attractive system here.

Sanyo GXT-200

Sanyo Marubeni (UK) Ltd, Sanyo House, 8 Greycaine Road, Watford, Herts
Tel (0923) 46363

The Sanyo GXT200 is representative of a new trend in the market where a small but increasing number of Japanese manufacturers are importing rack systems into the UK to compete with the UK-branded (though also largely Far Eastern-sourced) systems.

Sanyo's contribution to the 'under-£200' systems market is distinctive in a couple of ways. First, the GXT200 is clearly very much better finished than the majority of its peers; and as far as can be gathered, equally superior in build quality. There's less of an emphasis on fitting a multitude of gadgets and facilities of dubious merit or value – the GXT200 is relatively straightforward and purposeful though there are some oddities. Particularly welcome is the fitting by Sanyo of a 'proper' magnetic cartridge – theirs is the only sub-£200 system we tested that was so equipped. The GXT200 follows convention otherwise: it's supplied already fitted to a pre-assembled rack housing of quite good constructional quality and finish. The electronics too are well finished and operate smoothly, though the similarly priced Tensai Compo 10 has the edge here even on the Sanyo. Loudspeakers are supplied and, as expected, are not optional.

Turntable section

Record deck operation is semi-automatic (that is it has auto-return at the end of side) and a damped cueing platform is fitted to a conveniently mounted switch that also gives a reject facility, if you want to stop play before the end of side. The deck itself is a very lightweight idler-driven sprung unit, and the platter is a one-piece plastic moulding with a fake 'stroboscope'. The arm, finally, has slack bearings and a plastic non-detachable headshell; it's fitted with a conventional replaceable magnetic cartridge with a detachable stylus.

Measured performance was less than inspiring. The integrated nature of the package defied normal measurement procedures, but the measured cartridge response (which includes a contribution from the amplifier up to the headphone outlet) showed severe losses of output at the frequency extremes. Wow and flutter was high at 0.22% but drift (overall speed stability) checked out well.

Cassette deck section

A unique and unfortunate feature of the cassette deck is the facility to accept metal (Type IV) tapes but not chrome bias ones for recording purposes. Noting the additional cost and limited additional performance of metal over chrome Type II tapes can only lead to the conclusion that the manufacturer is indulging in 'specmanship' here. Recordings on Type II tapes will sound very trebly or 'bright'. The deck is otherwise conventionally equipped with Dolby B noise reduction, manual record level setting (using adequate record level meters which double as power output indicators) and a straightforward, purely mechanical set of transport controls. No special tape search or memory facilities are available, but the overall 'feel' of the deck is favourable. Measured frequency response using metal (Type IV rather than the usual chrome or Type II) tape was well extended in the treble and fairly even through the midband. The limitations of the deck are seen in the poor low frequency response and the very poor signal-to-noise result for what at 0VU on the record level meters is a very high distortion level. These results are very disappointing, a comment that applies equally to the high measured wow and flutter. Note that the

'metal' switch positon can be used for chrome (Type II) replay only.

Tuner section

Very simply equipped, the Sanyo tuner covers FM, MW and LW with a straightforward scale and pointer frequency indicator. The tuning scale is short but clearly marked, the cursor rather than the tuning scale being illuminated. No signal strength meter or any other kind of tuning aid (other than the ubiquitous LED to indicate a stereo transmission) is fitted. FM reception was accompanied on test by a constant background whistle, moderately high background hiss levels and very low sensitivity. There were also RF problems in the form of poor image rejection – repeats of strongly received transmissions at various places on the dial – and some ambiguity in determining the optimum tuning point. AM reception quality was fair, though both interference and wanted signal alike sounded annoyingly dulled.

Amplifier section

There are no external inputs to this system except a mono microphone input for the cassette deck. Normal tone, balance and volume controls are the only user facilities and the amplifier was capable of 10 watts per channel on test.

Loudspeakers

These sealed loudspeakers are light in weight, of none-too-solid construction and enclose a single drive unit mounted from the rear of the baffle. A port is fitted where the tweeter would normally reside. Finish is adequate. Note the absence of output below 150Hz in the bass (extremely poor) and the peaks in treble output centered on 4.5kHz and 11kHz (ditto).

In use . . .

All inputs were dominated by the same coarse, hollow and 'smeared' sound characteristic. Neither record nor cassette deck was ever free of this, unfortunately, and the extraordinary lack of definition was retained along with high distortion levels during heavily modulated passages via the tuner as monitored using headphones. It's impossible to ascribe blame to any particular part of the system, but there were strong indications that the amplifier section is more than partly responsible for the shortcomings. Even using the Kef Coda test loudspeakers, the sound was in my view worse than an average transistor radio fed through the same speakers. The Sanyo speakers themselves had a peculiar 'poppy' bass quality and a thick, agressive midband which exaggerated the shortcomings elsewhere.

Conclusion

The high quality of external finish and the straightforward, purposeful nature of the design had led me to expect something reasonable. Unfortunately, while the GXT200 has some apparent strengths, not least in build quality and probable longevity, sound quality is far behind what can be expected from much simpler, portable equipment.

GENERAL DATA

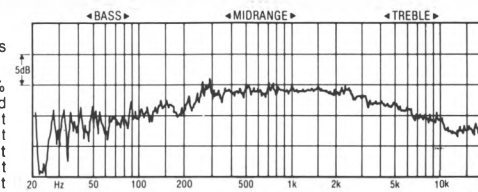
Amplifier: part of main unit
Power output, per channel, at 1kHz ..... 10 watts

Record deck: part of
Speed variations (wow and flutter) 0.22%
Speed drift ..... good
Speed accuracy ..... see text
Arm/cartridge resonant frequency ..... see text
Cartridge channel balance ..... see text
Cartridge channel separation (crosstalk) ..... see text
Cartridge tracking ability at 2g downforce ..... see text

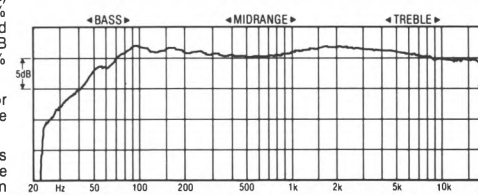
Cassette deck: part of system
Tape used for tests ..... TDK SA (maker's recommendation)
Frequency response ('metal' position) 40Hz – 15kHz (see text)
Speed variations (wow and flutter) 0.25%
Speed drift ..... good
Signal-to-noise ratio, with Dolby B 55dB
Distortion at OVU, with Dolby B 2.3%

Tuner: part of main unit
Sensitivity ..... poor
Signal-to-noise ..... below average

General
Maximum volume level in room (typical, with speakers supplied) ..... not measurable
System dimensions (w x d x h) ..... 45.5 x 42.5 x 73cm
Speaker dimensions (w x d x h) ..... 23.5 x 17 x 36cm
Price ..... incspeakers, £180



Disc: frequency response with cartridge supplied



Cassette: record/replay frequency response

Sanyo 2220

Sanyo Marubeni (UK) Ltd, Sanyo House, 8 Greycaine Road, Watford, Herts
Tel (0923) 46363

This system from Sanyo was one of the cheapest separates systems tested in the project. There are no options with the 2220, and it cannot be bought without speakers. The rack itself is of moderate solidity and has reasonably well-protected glass corners, but the usual magnetic door catch is absent and the top lid hinges were only moderately tight.

Turntable: TP220

Sanyo's inexpensive TP220 turntable is an extremely lightly-built belt-drive product, with automatic arm return at the end of side. The arm has a straight arm tube, the offset headshell being rather flexible. Given the very low platter and chassis weight and the rather 'loose' constructional feel, it was no surprise to find that resistance to feedback was very low. At high volumes, the bass end booms alarmingly, and under unfavourable circumstances it is easy to induce uncontrolled feedback.

Wow and flutter (fast cyclical variations of pitch) was well controlled in this design, but general long-term speed stability was found poor, both audibly and measurably. The cartridge, which is interchangeable if required, has a typical response for an inexpensive model.

Cassette deck: RD220

This is a simple Dolby B cassette deck, with rather 'clanky' electro-mechanical controls that do, however, allow for direct switching between play and fast wind and vice versa. Wow and flutter (pitch variations) rated good on test, whilst the available dynamic range was just slightly limited. Frequency responses using the recommended Type II tape (Maxell) were found generally fine, and the slight treble lift indicated just mild underbiasing.

Tuner: JT220L

As the 'L' model designation implies, this tuner covers LW in addition to MW and, of course, FM. This is an analogue tuner with a rather stiff tuning knob. The tuning process should be aided by the three-LED signal strength meter; but all three LEDs are alight when the aerial signal is still at a very low level, less than 100μV, so it does not give a lot of practical assistance. The FM section is of just below

average sensitivity, and has rather higher background noise levels than usual. This tuner draws its power from the amplifier, and so cannot be used separately.

Amplifier: JA220

Untidy front-panel aesthetics apart, the JA220 is a simple, straightforward product to use, with the usual minimum level of facilities for a budget rack system amplifier. Best power output measured was 22watts at 1kHz. Maximum volume in the listening room was 98dBA with the speakers supplied.

Loudspeakers: HF-220

What can be gleaned by looking through the fixed grille cloth is that the speaker is ported, and has two crude-looking cone drivers mounted on the back of the front baffle. This method of mounting makes for cheap assembly, but does not usually give good audible results. Frequency response, measured in the listening room, was distinctly uneven.

In use . . .

Given the description above, it may not come as a surprise that the loudspeakers were found uninspiring. They gave no real sense of tonal colour, and exhibited an obvious midrange 'ringing' resonance that made singing voices sound as though they were shouting. There was little or no apparent upper treble, and these loudspeakers are, in my judgement, unsatisfactory even for a very inexpensive system.

The rest of the system was much better although subjectively the amplifier sounded dynamically compressed and tonally dim. The result was not unpleasant, but it was rather uninformative and, rhythmically, gave the music a 'plodding' effect at times. The turntable too sounded ill-controlled and boomy in the bass, and recessive in the midband, though the treble was quite sharp and incisive. Occasional harsh-sounding mistracking was also noted. The tuner had a slightly heavy, dull feel, but was basically satisfactory. The cassette deck was even better, giving good if slightly noisy pre-recorded cassette replay quality and excellent record/replay performance. Type II (Maxell) tapes sounded a little bright, but metal tape sounded very even and clear, if a little rough at times.

Conclusion

Measured against the rest of the system (and its price) the amplifier's shortcomings don't seem too serious, and even the turntable could be forgiven – especially if the user is more interested in radio or tape. But two other things badly let this system down. One, the extremely 'unmusical' results provided on music programme by the loudspeakers; and two, Sanyo's decision not to sell the system without them. Adding the cost of another, better pair of speakers to the complete system total makes it a little too expensive to warrant a firm recommendation.

GENERAL DATA

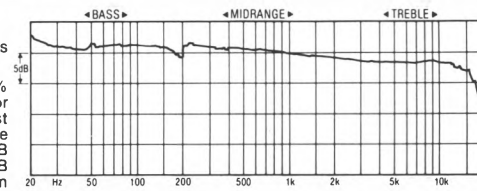
Amplifier: JA220
Power output, per channel, at 1kHz ..... 22 watts

Record deck: TP220
Speed variations (wow and flutter) 0.08%
Speed drift ..... poor
Speed accuracy ..... 0.6% fast
Arm/cartridge resonant frequency ..... 12Hz, acceptable
Cartridge channel balance ..... within 0.6dB
Cartridge channel separation (crosstalk) ..... – 30dB
Cartridge tracking ability at 2g downforce 66μm

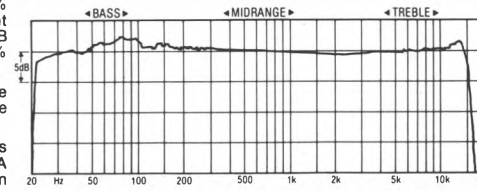
Cassette deck: RD220
Tape used for tests . Maxell UDXLII (maker's recommendation)
Frequency response ('chrome' or 'II' position) . . 25Hz – 14kHz
Speed variations (wow and flutter) 0.09%
Speed drift ..... excellent
Signal-to-noise ratio, with Dolby B 60.5dB
Distortion at OVU, with Dolby B 1.3%

Tuner: JT220L
Sensitivity ..... below average
Signal-to-noise ..... below average

General
Maximum volume level in room (typical, with HF220 speakers supplied) 98dBA
Rack dimensions (w x d x h) ..... 44.5 x 42 x 82.5cm
Speaker dimensions (w x d x h) ..... 25 x 20.5 x 46.5cm
Price ..... inc speakers, £280



Disc: frequency response with cartridge supplied



Cassette: record/replay frequency response

Sanyo 3230W

Sanyo Marubeni (UK) Ltd, Sanyo House, 8 Greycaine Road, Watford, Herts
Tel (0923) 46363

This is a more expensive and better-specified combination than the Sanyo System 2220. In addition to a more powerful amplifier, better loudspeakers and a better-behaved tuner, System 3230W features a double cassette deck so that you can copy tapes – at high speed if required. The system is supplied in a rack that has a similar door to the other Sanyo system; again it lacks magnetic catches, and doesn't stay closed very effectively. The finish standard of the rack though is quite good, and the way the glass edges and corners are capped and/or protected is a feature in its favour, although there were assembly and fit problems with the review sample. The 3230W system comes complete with non-optional loudspeakers.

Turntable: TP250

Following the pattern established by the cheaper TP220 in the other Sanyo system, the auto-return 250 has a similar straight arm with a detachable headshell/cartridge assembly. Again, the construction of the player is very light and it resists feedback and shocks poorly; but the character of the feedback is different, being biased more towards upper bass/lower midrange frequencies. This player differs in one other respect too. Rather than being driven by a mains-locked (AC synchronous) motor, it has a DC motor and front-panel adjustable pitch control which can be set using a built-in illuminated stroboscope with markings corresponding to 33.3rpm. A small disc that slips over the record spindle does the same job for 45rpm. Note that if the house mains (room lighting) frequency is wrong, the stroboscope will tell you the player is going at the wrong speed even if it's right – the very problem a DC motor drive system is designed to cure! So much for stroboscopes . . .

With slightly better long-term drift, the TP250 actually gave slightly worse wow and flutter figures than the TP220. The cartridge had a flatter midrange response but did show a sharp rise at high frequencies, which was obvious also on audition. Tracking ability though was much better and did not attract adverse comment on music.

Finally, the arm/cartridge resonant frequency was too low due to excessive cartridge compliance (sample variations may be responsible) and this undoubtedly played its part in giving the unit a rather 'rumbly' low frequency performance.

Cassette deck: RD-W360

Complex pieces of equipment like double cassette decks are often quite difficult to get to grips with – but this Sanyo is an exception. Just one button starts dubbing from one transport to the next, the unit setting the recording level automatically and dubbing direct without prior Dolby decoding regardless of the position of the Dolby (B only) switch. Tapes can be copied in 'real time' or at 2.5 times normal speed, without significant loss of high frequency linearity in the latter case, though there are other performance penalties in the 'high speed mode'.

In normal use, recording levels are set manually with the aid of the meters, which have only 16dB range. A simple mechanical tape counter (mis-spelt 'countor' on the front panel!) is fitted, as is a simple track location device which looks for the last or next track only. Although rather 'clanky', the transport controls worked well enough, and their layout, as with the other associated switching, was easy to follow. The review sample deck was poorly-set up for Type II tapes giving the rising response trend shown, but the other measurements were satisfactory.

Tuner: JT250L

This is a simple FM, MW and LW analogue tuner, which takes its power from the amplifier and so cannot be used separately. It is much like the JT220L (see 2220 review), but has an easier-to-read tuning scale. The three-LED signal-strength meter also has a more suitable range. Sensitivity on FM was a little below average, but noise levels were quite low and both hum and whistle-free. AM performance was good, giving clean, open sound.

Amplifier: JA-350

Two pairs of loudspeakers can be used with this amplifier, together if required, and inputs accepted include an auxiliary (for a CD player etc) plus those required for the rest of the system.

There are some extra gadgets and flashing lights with this product – power output meters, a five-band graphic equaliser and so on – none of which has much bearing on how the equipment performs. The graphic equaliser couldn't 'straighten out' the sound of the speakers, for example. The control layout was neat and functional notwithstanding. Power output measured 40watts/channel (a little less at frequency extremes) and a high 101dBA was obtainable in the listening room with the supplied loudspeakers.

Loudspeakers: HF-250W

The HF-250 is neatly finished (even on the front baffle) in wood-look vinyl, and it is made to higher standards than the HF-220, with front-

GENERAL DATA

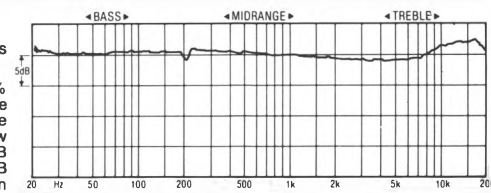
Amplifier: JA350
Power output, per channel, at 1kHz ..... 40 watts

Record deck: TP250
Speed variations (wow and flutter) 0.11%
Speed drift ..... average
Speed accuracy ..... user-adjustable
Arm/cartridge resonant frequency ..... 9Hz, too low
Cartridge channel balance ..... within 0.6dB
Cartridge channel separation (crosstalk) ..... – 28dB
Cartridge tracking ability at 2g downforce 80μm

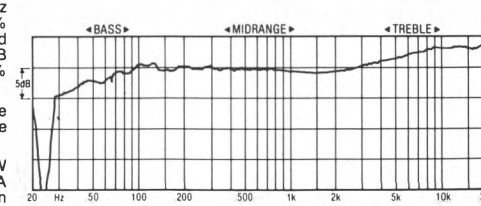
Cassette deck: RDW360
Tape used for tests . Maxell UDXLII (maker's recommendation)
Frequency response ('chrome' or 'II' position) . . 30Hz – 18kHz
Speed variations (wow and flutter) 0.16%
Speed drift ..... good
Signal-to-noise ratio, with Dolby B 61.5dB
Distortion at OVU, with Dolby B 0.9%

Tuner: JT250L
Sensitivity ..... below average
Signal-to-noise ..... average

General
Maximum volume level in room (typical, with HF250W speakers supplied) 101dBA
Rack dimensions (w x d x h) ..... 46 x 42 x 82.5cm
Speaker dimensions (w x d x h) ..... 26 x 19 x 49cm
Price ..... inc speakers, £400



Disc: frequency response with cartridge supplied



Cassette: record/replay frequency response

mounted drivers and 'proper' loudspeaker terminals instead of captive leads. The tweeter is still a simple large cone unit though, and no proper crossover is used in the near-undamped cabinet. Measured in the listening room, the frequency response looked well-tailored apart from a significant 'hump' in the octave above 2.5kHz.

In use . . .

As might be expected from their construction, the loudspeakers are much better than those supplied with the cheaper Sanyo system, but in our view they still sound rather like hollow boxes with a boomy, over-the-top bass and a harsh, gritty top. Midrange information is recessed and the stereo soundstage notable by its absence.

The cassette deck also gave rise to important reservations. Record/replay sound quality on Type II (chrome position) tapes sounded bright and clean, but with obvious Dolby 'noise pumping' (noise level varies with music level) leading to some strange and unsettling sonic effects. Metal tapes sounded compressed and gave even more obvious Dolby misalignment problems plus some recorded hum. Tapes copied well at normal speed but sounded 'smeared' and distorted when dubbed at high speed. Overall there were some subjective problems of pitch stability on audition (though they did not show in the measurements), and at all times the sound from the cassette deck had an edgy effect.

Both tuner and amplifier worked well. The amplifier was found far from neutral-sounding; on all inputs it has a distinct and obvious forwardness in the upper-midband that made vocals sound very 'breathy' and gave music generally a forward, alive feel. This effect isn't 'high fidelity', of course, but it proved quite effective most of the time. The tuner didn't sound too natural either, but it did sound neutral enough with a clean, open sound and a slightly 'splashy' top end.

Conclusion

The cassette deck has some severe limitations as described above. Even so, the system is close to meriting at least a cautious recommendation, and would have done so had the loudspeakers been either optional, or better!

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Sentra 840

Sentra Consumer Products, Wood Street, Brighouse, West Yorkshire HD6 1PW
Tel (0484) 714355

Sentra's 'tower' systems are aimed squarely at market leaders Amstrad and Binatone, the most obvious selling feature being the extremely presentable appearance – though seen close up, the finish is not too hot – with attractive 'hi tech' styling.

The vinyl wood effect covering on the pre-assembled rack is a little rough, but in general the rack housing is of acceptable quality. The main glass door is well protected by the overlapping side panels of the rack, but the lid has a fairly sharp corner to the trim strip.

Turntable section

Made by BSR, the record deck is a sprung-chassis belt-drive turntable with a conventional pivoted arm and a ceramic cartridge rather than the better quality magnetic type as fitted to more expensive systems. The light metal platter is topped with a lightweight mat of rubber-type material. The arm returns automatically at the end of side and a pitch control is also part of the package.

A sensibly-made damped cueing platform gives gentle stylus treatment when being lowered onto the record surface. Due to the nature of the system, frequency response could not be measured in the normal way, but the system response plot (see technical introduction) with the signal extracted from the headphone output shows an uneven response with limited bass and treble output. Most of the other measurements could not be run at all – the exception being wow and flutter (found to be acceptable) and speed drift (poor).

Cassette deck section

Twin cassette transports are fitted here – one for playback only, the other for both recording and playback purposes. Continuous playback of one side of each of two tapes can be programmed – a boon for parties. The decks are extremely basic in design, using mechanical controls throughout. Automatic recording level control makes for operational simplicity, but tends to reduce musical dynamics and increase noise during quiet passages.

Few measurements were possible with this deck, but the frequency response was finally captured with the rather horrific response shape shown. In fairness, the operation of the auto-record-level circuits may have distorted the response shape to an extent, and playback only frequency responses (and sound quality) were much better than the overall frequency response suggests. There were tape/head contact problems leading to significant dropout, but speed stability on both transports was acceptable. Like Amstrad and Binatone, Sentra fit a treble-cut filter and label it 'Noise Reduction'.

Tuner section

The neatly laid out analogue tuner section of the Sentra 840 suffered a severe reception problem when used from a good, roof mounted aerial at the test location in the form of multiple reception of more than one transmission at a time across most of the FM band. This indicates extremely poor selectivity and could be a major problem in most areas of the country if typical, and on test I found it made the tuner an effective write-off as a means of listening to broadcasts. Fed with FM radio signals from the lab generator the Sentra behaved somewhat better, the FM circuits being of average sensitivity, but above average hiss levels. On AM, both MW and LW sounded rather wooden and dull, and were accom-

panied by higher-than-average background noise levels.

Amplifier section

Power output from the 840 is not wildly different to its competitors at 7 watts per channel. Access to the amplifier can be gained via a rear DIN record/replay socket which worked adequately except when trying to make a recording on the internal cassette deck; an activity which when we tried it was constantly beset with torrents of noise that effectively swamped whatever music signal was being processed. The amplifier is completed by the normal array of tone controls, 'high' and 'low' filters and a 'loudness' switch.

Loudspeakers

These loudspeakers are unlabelled and unnamed, though Sentra credit Goodmans with the dual-cone drive unit fitted. This is mounted from behind the baffle. Internal examination was not possible as the enclosures are sealed. Checks on the frequency response in the listening room showed effectively no bass output below 150Hz – a poor result even for a compact enclosure like this – and a declining response at higher frequencies, the treble effectively coming to a stop at about 10kHz. A low 92dBA maximum usable sound level was produced in our listening room.

In use . . .

As noted earlier, the tuner suffered from a serious flaw which on test resulted in more than one transmission being received at a time. This spoilt an otherwise respectable FM performance, thought the tuner's sound balance was slightly hard.

The remaining electronics were of a uniformly low quality that was just good enough to give reasonable listening pleasure for some of the time. Tape playback was fairly clean and even, if a little hissy. Records reproduced with rather high levels of hum, and the cartridge tended to compress the music and add a harsh, gritty overlay that invested records with an overall uniformity – but results were certainly no worse than on some other systems at or below £200. The major limitation was, as so often, with the loudspeakers. They were among the worst we tested, giving a dull, 'grey' and hard tonal response that masked almost all the subtlety and tonal variety in music. As a result, the system tended to sound aggressive and 'loud' at almost all volume levels, and musical detail was blanketed and woolly.

Conclusion

A recommendation is clearly not in order here. The electronics were, at best, so-so; the loudspeakers much worse than that. What can be said is that this system is one of the better models (though not the best) of its type at £200 or below. This comment must be put in context, though, using the criteria adopted for the other inexpensive systems; in our view the Sentra 840 still sounds far worse than a good quality portable radio or full size television set. It's worth spending a little more.

GENERAL DATA

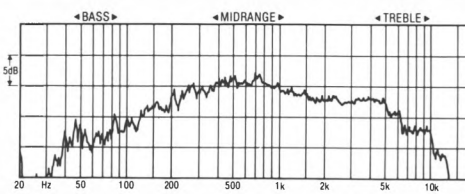
Amplifier: part of main unit
Power output, per channel, at 1kHz . . . . . 7 watts

Record deck: part of main unit
Speed variations (wow and flutter) 0.10%
Speed drift . . . . . poor
Speed accuracy . . . . . user-adjustable
Arm/cartridge resonant frequency . . . . . see text
Cartridge channel balance . . . . . see text
Cartridge channel separation (crosstalk) . . . . . see text
Cartridge tracking ability at g downforce . . . . . see text

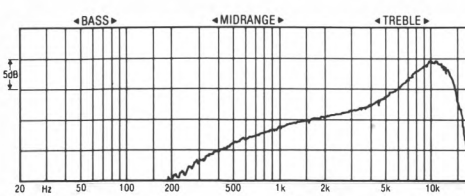
Cassette deck: part of main unit
Tape used for tests . . . . TDK SA (no maker's recommendation)
Frequency response ('chrome' or 'II' position) . 500Hz – 16kHz
Speed variations (wow and flutter) . . . . . see text
Speed drift . . . . . see text
Signal-to-noise ratio, with Dolby B . . . . . see text
Distortion at OVU, with Dolby B . . . . . see text

Tuner: part of main unit
Sensitivity . . . . . average
Signal-to-noise . . . . . poor

General
Maximum volume level in room (typical, with speakers supplied) 92dBA
Rack dimensions (w x d x h) . . . . . 45 x 43 x 81.5cm
Speaker dimensions (w x d x h) . . . . . 26 x 17 x 41cm
Price . . . . . inc speakers, £200



Disc: frequency response with cartridge supplied



Cassette: record/replay frequency response

Sentra 850

Sentra Consumer Products, Wood Street, Brighouse, West Yorkshire HD6 1PW
Tel (0484) 714355

This is the top model in the Sentra line-up at the time of writing, with a double cassette deck for dubbing. There are various other differences between this and the 840 system (reviewed separately), some of which are for the better and some of which are not. On the plus side, the cassette deck has proper Dolby B noise reduction instead of a worse-than-useless 'noise reduction' filter fitted to the cheaper system. The tuner here is a digital synthesiser type, offering preset operation and (more importantly) improved selectivity over the cheaper one. The loudspeakers have acquired a second drive unit, the tweeter that was missing from the 840.

Less satisfactory is the 'improvement' made to the record player. Rather than attempt a real improvement by fitting a magnetic cartridge (as used to good effect on the similarly-priced Ferguson system for example), Sentra have merely dressed up the same cheap cartridge by putting it in a more glamorous-looking parallel-tracking arm. 'Half way house' remote control is also provided.

Turntable section

Like so many manufacturers of budget systems, Sentra make use of turntable units supplied by BSR – in the case of the 850, the deck's parallel- or linear-tracking arm is fully automatic and quite neat. The rest of the mechanism is less inspiring though, with its the one-piece plastic mat-less platter (as on the Binatone and Amstrad systems), poor quality ceramic cartridge and high wow and flutter on test. The frequency sweep (the signal being monitored at the headphone socket) documents a severe loss of output above 5kHz or so. Other cartridge and turntable tests had to be omitted from the measurement programme because the Sentra would not interface properly with the test equipment used.

Cassette deck section

Again, this is a dual-transport deck, one deck being equipped for recording and playback, the other playback only. Although it's not exactly obvious from a quick examination of the fascia, Dolby B is used only on deck 'A'. The correct procedure for copying Dolby encoded cassettes (say pre-recorded ones) is to dub with the Dolby treatment transferred intact – or as intact as the performance of the deck on record will allow.

In fact the frequency response was found not too bad – the low frequency roll-off is partly caused by the operation of the auto record-level control, and the tape is only moderately underbiased, though there was considerable dropout on audition. Wow and flutter was found to be extremely high, and general speed (pitch) stability poor. Other measurements again were not possible.

Tuner section

There are six available pre-sets on FM, and a further six which can be allocated at random between the MW and LW bands. The frequency read-out is a large, visually excellent LED display, but this was incorrectly set with the tuning indication 0.05MHz high on the test sample. In performance terms, the tuner was surprisingly (and gratifyingly) good. Sensitivity was high, and noise levels average – as monitored at the headphone socket. Unfortunately the amplifier adds some hum to the tuner feed.

Amplifier section

A DIN record/playback socket is fitted at the rear, a good point, but the amplifier is otherwise bereft of inputs. Power output was low at

6 watts. The volume control takes the form of a couple of light-touch buttons (for 'up' and 'down') which cause the volume to continuously adjust in steps, each step being accompanied by a loud 'click' through the speakers.

The remote control, an infra-red wire-less device, adjusts volume, switches between inputs and provides access to the tuner presets. It also switches the system on and off (actually to 'standby'). What it does not do is start the record deck or tape deck in motion – these have to be controlled on the system.

Loudspeakers

The major difference between the speakers supplied with the cheaper 840 system and these is the inclusion of a separate tweeter – and a large badge on the front that proclaims 'Sentra by Goodmans'. The tweeter is of crude design, a fact evident from the peaky nature of the high frequency response measured in the listening room. Maximum volume on test in the room was 95dBA.

In use . . .

The loudspeakers were a severe letdown on audition. Listening notes described their performance with the Sentra system as hard and with 'woody' and 'tunnelly' colourations, speech sounding as though the speaker was overloading the microphone. To meet an acceptable standard a loudspeaker has to have a degree of transparency so that the listener can reconstruct the original performance in his brain from the clues provided by the system. The Sentra system signally failed to provide sufficient such clues for even an unambiguous first approximation most of the time, and the speakers sounded little better than the single driver speakers with the 840 system.

Apart from an absurdly fast-acting volume control, the system worked satisfactorily in most other respects. The tuner proved to be satisfactory on FM, with a natural, clean but rather hissy sound, spoilt only by amplifier hum, which was present to a greater or lesser degree on all other inputs too. The cassette deck was also very hissy at all times, but sound quality, though a little coarse and dry, was generally fine using TDK SA tape (metal formulations are not suited).

Music on disc suffered from the dreadful cartridge, which sounded characteristically coarse, congested and compressed – and simply distorted for much of the time. Records had a poor dynamic range. Surface noise and rumble, plus considerable levels of hum, were constantly part of the package.

Conclusion

There are signs with this system that the manufacturer is attempting to provide something a little better, and his efforts have succeeded, by and large, in the case of the tuner and cassette deck. The turntable, though, is incredibly crude-sounding, hum and noise levels are high on all inputs, and the loudspeakers fail to deliver the goods. For the sound quality offered, the 850 is overpriced.

GENERAL DATA

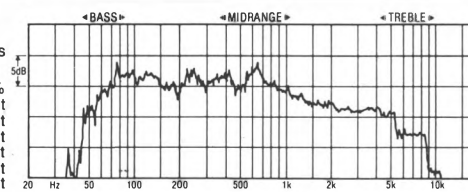
Amplifier: part of main unit
Power output, per channel, at 1kHz . . . . . 6 watts

Record deck: part of main unit
Speed variations (wow and flutter) 0.25%
Speed drift . . . . . excellent
Speed accuracy . . . . . see text
Arm/cartridge resonant frequency . . . . . see text
Cartridge channel balance . . . . . see text
Cartridge channel separation (crosstalk) . . . . . see text
Cartridge tracking ability . . . . . see text

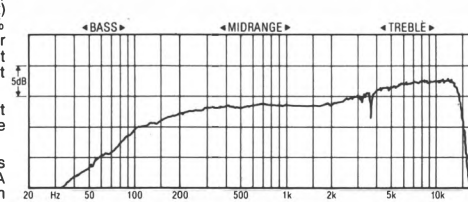
Cassette deck: part of main unit
Tape used for tests . . . . . TDK SA (maker's recommendation)
Frequency response ('II' position) . . . 125Hz – 14kHz (see text)
Speed variations (wow and flutter) 1.5%
Speed drift . . . . . poor
Signal-to-noise ratio, with Dolby B . . . . . see text
Distortion at OVU . . . . . see text

Tuner: part of main unit
Sensitivity . . . . . excellent
Signal-to-noise . . . . . average

General
Maximum volume level in room (typical, with speakers supplied) 95dBA
Rack dimensions (w x d x h) . . . . . 45 x 43 x 81.5cm
Speaker dimensions (w x d x h) . . . . . 26 x 17 x 41cm
Price . . . . . inc speakers, £270



Disc: frequency response with cartridge supplied



Cassette: record/replay frequency response

Sharp 103

Sharp Electronics (UK) Ltd, Sharp House, Thorp Road, Manchester M10 9BE
Tel (061) 205-2333

This unusual system is designed to sell as a stand-alone unit, and is not therefore supplied with a rack housing. The 103's unique feature is the turntable, which can play both sides of an LP or single without having to turn the record over. It does this by having two arms and cartridges, one above and one below the record, and a number of automatic play sequence facilities have been incorporated to take advantage of this inherent flexibility. The system is adequately but not elaborately finished, the system showing clear signs of having been engineered down to a price.

Turntable: RP-103

In addition to the 'both sides' capability, the RP-103 is also unusual in using a drawer loading mechanism which allows the turntable to be placed at the bottom of the components when stacked, which is the most stable position. The deck is belt driven, and uses linear tracking arms, the controls allowing auto-play of both sides, or continuous repeat cycles of them. Sharp's APSS (Automatic Programme Search System) allows the user to search out the beginning of the next or last track, and resume play from that point.

Clearly the fact that the deck plays both sides of the record means that a conventional platter cannot be used – it would get in the way of one of the arms – so a rotating record-label clamp is used instead.

Operation of the player is easy but the drawer loading mechanism is slow and noisy. Considering there no platter (to give a smoothing flywheel effect), the deck gave acceptable measured wow and flutter, though a little high by conventional standards; overall, steadiness of pitch was good. The cartridge (upper one tested) measured quite well, the 'spikes' at low frequencies presumed to be arm resonance (and possibly bearing) characteristics.

Cassette deck: RT-103

An 'APSS' search facility is also incorporated here, but the deck is otherwise entirely conventional. Noise reduction is by Dolby B only, and tape-type switching is manual, using two of the most confusingly-labelled press buttons I can recall! In fact the transport controls form a long row of identical power-assisted buttons which means that operating the deck requires some deliberation and label reading.

Recording level is set using a slider with a central indent position for 'normal' use, while a balance control is fitted on the rear. The LED level meters have a limited (16dB) dynamic range, so quiet passages won't register. The deck measured satisfactorily though on all counts, with a flatter measured frequency response than many decks in this project.

Receiver: SA-103

The SA-103 is styled to look like two separate products, but in fact it is a single tuner/amplifier unit – in other words, a receiver. The

tuner section, unusually, combines of analogue tuning (using a traditional scale and pointer), with seven pre-sets, for use on the FM band. LW and MW stations must be tuned manually, using the slow-acting edge-wise tuning wheel. There are simple press buttons for waveband switching, AFC (Automatic Frequency Control) and stereo/mono. The AM section of the tuner was adequate in reception and sound quality terms, whilst the FM section was fairly sensitive and offered reasonable noise levels – but with noticeable hum.

The amplifier delivered 22watts per channel (20watts at 20Hz) and gave a moderate maximum usable volume with the supplied speaker; 97dBA in our listening room.

Loudspeakers: CP103

These are compact, two-way ported loudspeakers which use a 16cm bass unit and a large 5cm cone tweeter. The units have mesh protective covers (the larger ones being rather resonant when excited) and the completed units have a 'camera-class' finish – much better in fact than the the rest of the system. Measured in the listening room, the frequency response of the CP-103 was found erratic – note especially the peak at 2kHz, and the rapid decline in output above 6kHz.

In use . . .

A thoroughly mixed bag, this system, with the turntable and tuner (FM section) being relative weaknesses. The amplifier has no special ability, but works well enough not to be a limiting factor. It doesn't go very loud though – subjectively, it drove the Ked Codas rather less hard on music programme than a number of 30watt amplifiers included in other systems.

Records reproduced with a strange character that was hard to get to grips with. Essentially, the sound was tonally neutral, the cartridges being apparently of quite good performance; but the midband had a peculiarly confused, messy and harsh feel – 'inarticulate' was a word used in the listening notes. Musical extracts that seemed distant and congealed on the Sharp had life, clarity and a sense of distinctness on other turntables (for example, NAD, Rotel). The tuner too had problems though of a different nature – FM sound was dull tonally and soft dynamically. The cassette deck performed to a better standard than the other sources. It was no better on metal than on chrome – position (Type II) tapes (a common finding), but it gave a reasonably accurate facsimile of what it was fed with some stereo imprecision and modest levels of added harshness.

Conclusions

On balance, the sound of the Sharp 103 system was found disappointing: you pay a very high price in performance terms for the undoubted convenience of the 'both sides' record deck feature. The poor FM performance and indifferent ergonomics provide further weight to this assessment; better sound can be had for the price.

GENERAL DATA

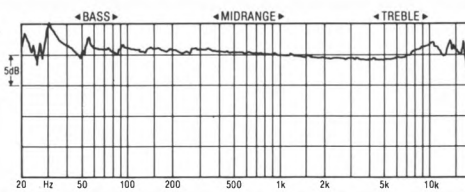
Amplifier: part of receiver, SA-103
Power output, per channel, at 1kHz . . . . . 22 watts

Record deck: RE-103
Speed variations (wow and flutter) 0.11%
Speed drift . . . . . good
Speed accuracy . . . . . 0.9% fast
Arm/cartridge resonant frequency . . . . . 19Hz, too high
Cartridge channel balance . . . . . no error
Cartridge channel separation (crosstalk) . . . . . – 30dB
Cartridge tracking ability at 2g downforce 80μm

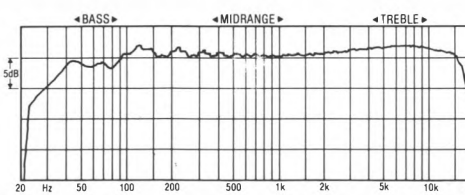
Cassette deck: RT-103
Tape used for tests . Maxell UDXLII (maker's recommendation)
Frequency response ('chrome' or 'II' position) . . 34Hz – 15kHz
Speed variations (wow and flutter) 0.11%
Speed drift . . . . . excellent
Signal-to-noise ratio, with Dolby B 64dB
Distortion at OVU, with Dolby B 1.1%

Tuner: part of receiver, SA-103
Sensitivity . . . . . good
Signal-to-noise . . . . . fair

General
Maximum volume level in room (typical, with CP-103 speakers supplied) 97dBA
System dimensions (w x d x h) . . . . . 33 x 34.5 x 31cm
Speaker dimensions (w x d x h) . . . . . 21 x 23.5 x 32cm
Price . . . . . inc speakers, £390



Disc: frequency response with cartridge supplied



Cassette: record/replay frequency response

Sony FH-9

Sony (UK) Ltd, Staines House, 158-162 High Street, Staines, Middlesex TW18 4AZ
Tel Staines 61600

Some systems create more instant interest than others: this one was the subject of almost continual comment by visitors from the moment it was unpacked. Most of them instantly fell in love with the diminutive, jewel-like packaging of the system as a whole, and expressed incredulity (or downright scepticism!) about the turntable. The components are all true micro size, just 21.5cm wide.

The FH-9 system consists of the pre- and power-amplifiers, the tuner and the cassette deck. The turntable, which is called the PS-Q7, is an optional extra. So too are loudspeakers.

Although the amplifier, tuner and cassette deck look like separates, and are indeed packaged separately, they are not available individually and are totally 'dedicated' within the FH-9 system.

Turntable: PS-Q7

Almost certainly this must be the smallest turntable made anywhere. The unit is only just big enough to accommodate a small record-label size platter in one corner of the square shaped deck, and the arm pivot diagonally opposite in the far corner. The lid incorporates a record clamp which is mounted on bearings and spins with the record. The PS-Q7 is a direct-drive turntable, and it's fully automatic once record size and speed have been set on a small rotary control. There appears to be no direct way of interrupting play without the arm returning to its rest unless the lid is first lifted and the arm manually restrained. The PS-Q7 has its own headphone socket.

Not surprisingly there is a price to pay for the fact that there isn't a full-size platter, an item that usually acts as a flywheel, smoothing the almost inevitably pulsed or 'cogging' effects in the motor's rotation.

In this case Sony have done well to keep measured wow and flutter down to 0.11% and wow alone to low levels, but in practice records sounded intermittently 'wobbly' in pitch to a considerably greater extent than normal. The unit was also very microphonic, though the high arm/cartridge resonant frequency (high because the arm mass is low) has made the player a little less susceptible to disturbance at very low frequencies than it might otherwise have been. The cartridge frequency response, checked on two samples, rolled off severely at high frequencies.

Cassette deck: TC89 (part of FH-9)

The cassette deck is easily the largest part of the system, measuring at twice the height of any of the other units. It has every excuse for added bulk, though, as it includes a very slick power operated transport and auto-reverse playback operation. The controls themselves are large, well laid out and engage the transport with quiet decorum.

Noise reduction is by Dolby B and C, whilst type-type recognition is automatic. The recording levels, which can be monitored on a simple record level meter, are also set automatically which results in frequent and obvious compression resulting in clear 'holding back' during loud passages, whilst very quiet passages have more obvious tape hiss than usual. The recommended tape type UCX-S was clearly underbiased on the review sample, leading to some tonal brightness. Wow and flutter (steadiness of pitch) was acceptable.

Tuner: ST-89L (part of FH-9)

This is an FM, MW and LW quartz synthesiser tuner with five pre-sets per waveband, but no signal strength meter, no auto-scan tuning and (most significantly) no stereo/mono switch, which would have been useful with very weak programmes for reducing background hiss.

The frequency read out is helpfully back-lit, and this tuner is easy to operate. FM sensitivity and noise levels were rather below average, and there were some whistles on FM with signal levels below 10mV. AM sound quality was bass light and dry in feel, and noise levels were distinctly high.

Amplifier: TA-89/AC-89 (part of FH-9)

Power output measured 26watts at 1kHz, and lower in the bass and treble, a moderate 97dBA maximum volume being obtainable from the Kef test loudspeakers. The pre-amplifier, TA-89, is a separate unit and has a five-band graphic equaliser. As well as inputs for the other system components it has an auxiliary input using a front panel jack socket which takes precedence over the phono input. Note that the AC-89 power amplifier, which accepts one pair of speakers and distributes power for the other FH-9 components, also provides the single power on/off switch for the system.

In use . . .

Sony claim that the FH-9 is the equal of larger systems in audio quality terms; and although this begs the question of which larger systems Sony is referring to, the FH-9 does have a pretty good tuner and amplifier. But in our view the turntable and cassette deck, let the side down, each in quite different ways.

The turntable is really not a serious high fidelity performer, though it could be a very superior executive-style toy. Speed instability apart, the dullness of the supplied cartridge and flabbiness of reproduction in the bass are enough to rule it out.

In fact, the cassette deck was much better. Although pre-recorded cassette replay was a little noisy and slightly unstable in speed consistancy, results using blank chrome type and metal tapes were clear, clean and incisive – if a little bright. The problem here is the operation of the auto-level recording circuitry which on wide dynamic range material has a tendency to squeeze the life and dynamics from the sound.

The tuner though was excellent given a strong signal (for which the built-in rod aerial is hardly likely to be sufficient). There is just a slight paring away of the atmosphere and the stereo integrity of the music being reproduced, but the sound was essentially clear and likeable.

Conclusion

Not an obvious first choice at its price, the FH-9 may still be just right for someone looking for a simple-to-operate and very inconspicuous system for a small room. The compressed sound on tape recordings might even be a boon for cassettes destined for in-car use, and there are no problems with the pre-recorded variety. Anyone contemplating the FH-9 though should consider carefully the possibility of buying a separate normal size turntable with a magnetic cartridge in the £70-£100 price range to improve record reproduction.

GENERAL DATA

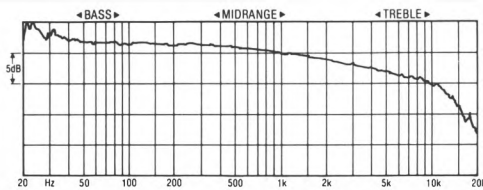
Amplifier: TA-89, part of FH-9 unit
Power output, per channel, at 1kHz ..... 26 watts

Record deck: PS-Q7
Speed variations (wow and flutter) 0.11%
Speed drift ..... good
Speed accuracy ..... 0.6% fast
Arm/cartridge resonant frequency .... 17Hz, too high (see text)
Cartridge channel balance ..... see text
Cartridge channel separation (crosstalk) ..... see text
Cartridge tracking ability ..... see text

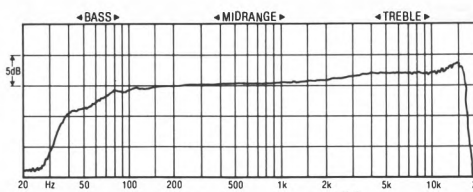
Cassette deck: TC-89, part of FH-9
Tape used for tests .... Sony UCXS (maker's recommendation)
Frequency response ('II' position) .... 60Hz – 16kHz (see text)
Speed variations (wow and flutter) 0.15%
Speed drift ..... excellent
Signal-to-noise ratio, with Dolby B ..... see text
Distortion at OVU, with Dolby B ..... see text

Tuner: ST-89L, part of FH-9
Sensitivity ..... below average
Signal-to-noise ..... below average

General
Maximum volume level in room (typical, with Kef Coda speakers supplied) 97dBA
Rack dimensions (w x d x h) ..... 21.5 x 23.5 x 26cm
Turntable dimensions (w x d x h) ..... 21.5 x 23.5 x 6cm
Price ..... £370 (inc PS-Q7, £470)



Disc: frequency response with cartridge supplied



Cassette: record/replay frequency response

Sony SR-1 System

Sony (UK) Ltd, Staines House, 158-162 High Street, Staines, Middlesex TW18 4AZ
Tel Staines 61600

Although an inexpensive system, Sony's SR-1 comes with a superbly finished rack with all its glass edges well protected and neat, rounded-off sides as seen from the front. The rack comes with one of the best thought-out manuals – Sony set a high standard in this respect. The SR-1 may be purchased with or without the SS-E24 speakers.

Turntable: PS-LX22

Sony label the turntable 'automatic', though it is in fact just a straightforward auto-return (ie semi-automatic) deck. Its design follows conventional lines: it has a direct-drive motor and a straight arm (with unimpressive bearings) and a detachable headshell. Sony can supply a normal headshell with ½in mounting centres for those who want to choose and fit their own cartridge. Susceptibility to external shock is about average, aided perhaps by a more stable than average rack. Absolute speed is slightly low, but more significantly, medium-term speed stability is definitely poor – and so too is measured wow and flutter. The cartridge has the usual upper midrange 'droop' in output, but behaves well otherwise.

Cassette deck: TC-FX25

Representative of modern, budget cassette deck design, the TC-FX25 has Dolby B, but no Dolby C noise reduction, but it does have a superbly laid-out set of transport controls as standard equipment. In addition to the normal functions, the soft-touch buttons give cue and review facilities, plus auto-play following rewind if required. Tape type sensing is automatic, and apart from the two physically-separated record-level LED meters, which mean some eye-swivelling when setting levels, everything has been done to make the deck as easy and as foolproof in action as possible.

The deck has a rather limited frequency response in the treble (–3dB at 14kHz), and mechanical speed stability proved dependent on the tape – typically wow and flutter was poorer than average. Signal/noise though was fine.

Receiver: STR-VX10L

This product has a control layout which is unique in my experience. Ten numbered buttons serve a number of functions. They can be used to call up any radio transmission frequency, rather like dialling a telephone number of a press-button 'phone. In this mode, eight programmes can be pre-set for instant recall at any time, these being on any mixture of wavebands that happen to suit the user. So if you use the presets you do not have to bother with waveband switching. Normal auto-seek tuning is also available (but very slow operating). The numeric pad is also used to select different inputs – the record deck or an external line-level input.

The tuner displayed a little hum on FM, and appeared to be of lower-than-average sensitivity and gave rather higher-than-average background hiss. Nevertheless, the RF performance of the tuner should be good enough for local reception with a good aerial system – a simple indoor aerial may prove inadequate. Sound on AM was pleasantly free of interference (relatively speaking, that is) but was deficient in quality, with a dim balance and weak bass. The amplifier gave 30 watts/channel on test, and using the very efficient loudspeakers supplied, no less than 101dBA usable volume was achieved in the listening room.

Loudspeakers: SS-E24

This is a UK-made design, of medium bookshelf dimensions. Fitted with two drive units, the front grille is fixed in place, and as no instructions were supplied with the review pair, I have few details of their construction. However, the drive units are fitted to the rear of the baffle – a bad sign, since tweeters especially don't usually take kindly to firing through what in effect is a short tube. The cable is permanently attached, and emerges from an unsealed hole in the rear. On tests the speakers displayed a ragged on-axis response with obvious peaks centred on 200Hz and the 7-8kHz region. The SS-E24 also has limited extension at both ends of the frequency spectrum.

In use . . .

Most of the electronics proved quite satisfactory, especially when the modest price is taken into account. Unfortunately, something appears to have gone wrong when the speakers were designed, and it is this component that dominates the sound, to the detriment of the system as a whole.

The turntable was tonally neutral, and whilst it became rather inarticulate and 'slow'-sounding and even confused during loud or complex passages, in relation to other similarly-priced models performance was no worse than average.

A better performer was the tuner, though the bass weakness apparent on AM was also part of the FM side on audition – this using the 'tape out' feed on the amplifier into the external 'benchmark' system used for comparison. The cassette deck had a very marginally 'edgy' character when using Type II tapes, but this was far from being a limiting factor in system context. Not so with metal tape however: as with a number of other system cassette decks, the 'metal' setting clearly gave totally inappropriate bias levels resulting in a wildly inaccurate tonal balance and other problems. In this case, metal tape was under biased, and the treble was consequently very thin and bright, with an unpleasant 'piercing' quality.

The amplifier had audible shortcomings too. It had a somewhat thin, wispy top, and a squashed sense of recorded dynamics – plus a thick, sluggish bass quality. But these shortcomings paled into insignificance next to the loudspeakers. They were in our view truly awful, with a 'tubey' hollow sound, without any real high frequency extension and a 'wooden' hollow bass. 'Hard', 'unrelaxed', 'crude', 'poor sense of tonal colour'. . . these are typical of the descriptions appearing on the listening notes made during auditioning.

Conclusion

This system cannot be recommended with the SS-E24 loudspeakers, and fails to warrant recommendation without, due to a generally undistinguished performance from most of the components.

GENERAL DATA

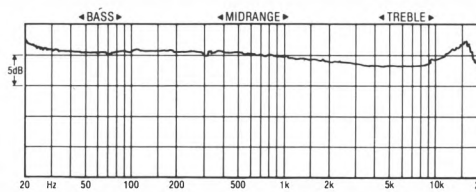
Amplifier: part of receiver, STR-VX10L
Power output, per channel, at 1kHz . . . . . 30 watts

Record deck: PS-LX22
Speed variations (wow and flutter) 0.12%
Speed drift . . . . . poor
Speed accuracy . . . . . 0.3% slow
Arm/cartridge resonant frequency . . . . . 12Hz, acceptable
Cartridge channel balance . . . . . within 0.6dB
Cartridge channel separation (crosstalk) . . . . . – 30dB
Cartridge tracking ability at 1.8g downforce 80μm

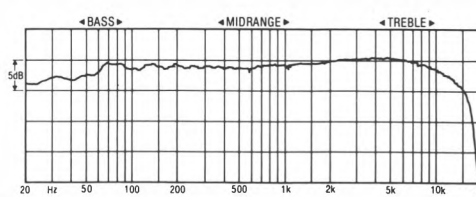
Cassette deck: TC-FX25
Tape used for tests . . . . Sony UCXS (maker's recommendation)
Frequency response ('chrome' or 'II' position) . . 24Hz – 14kHz
Speed variations (wow and flutter) . . . . . 0.11-0.25% (see text)
Speed drift . . . . . excellent
Signal-to-noise ratio, with Dolby B 65dB
Distortion at OVU, with Dolby B 3%

Tuner: part of receiver, STR-VX10L
Sensitivity . . . . . fairly poor
Signal-to-noise . . . . . fairly poor

General
Maximum volume level in room (typical, with SS-E24 speakers supplied) 101dBA
Rack dimensions (w x d x h) . . . . . 42 x 49 x 88cm
Speaker dimensions (w x d x h) . . . . . 24 x 19.5 x 44cm
Price . . . . . £350 (inc speakers, £400)



Disc: frequency response with cartridge supplied



Cassette: record/replay frequency response

Sony Compact 33

Sony (UK) Ltd, Staines House, 158-162 High Street, Staines, Middlesex TW18 4AZ
Tel Staines 61600

Distinguished by their relatively narrow width of 355mm, the Sony 'Compact' systems are small enough to stack up within a shelf-top rack as supplied for review, but still big enough to sit in a floor-standing rack and not look out of place. Though reviewed here in 'table-top' form, the Compact 33 system is also designed to fit Sony's furniture-style rack in either vertical or horizontal free-standing configurations.

Turntable: PS-LX20

Labelled 'automatic' on the front panel, this deck has an arm which needs to be manually positioned above the lead-in groove of the record. A button push then starts the direct-drive motor, and cues the arm onto the record. The arm returns automatically at the end of a side. Despite the turntable's small size, the arm is a conventional pivoted type, but with an unusual space-saving offset bearing assembly. The deck is lightly built and the arm has considerable play in its bearings. The cartridge is non-interchangeable, though the stylus can be replaced as usual. The cartridge gave measurements typical of an inexpensive model, though tracking ability and separation are excellent. In terms of speed stability (steadiness of pitch), the turntable itself displayed highish levels of speed drift but acceptable wow and flutter.

Cassette deck: TC-V3

With well laid-out controls and a very smooth transport actuation, this straightforward deck is equipped with Dolby B and C, a simple track location system and a timer record facility. A useful feature not often found on inexpensive decks is automatic tape-type sensing – a very good idea indeed. Good quality metering and (switchable) automatic reversion to play following rewinding completes the story. Although on our tests the frequency response looked a little uneven (with an unexplained 'break' near 1.6kHz) the overall trend is even enough. The deck has very low tape hiss levels but, I found, rather erratic wow and flutter measurement. Different tapes gave wildly different readings on test.

Tuner: ST-V3L

A synthesiser tuner, the ST-V3L offers five pre-sets on each of the three bands, FM, MW and LW. An excellent back-lit frequency display is provided, but for some reason Sony have omitted auto-scan. This doesn't matter if you will only use pre-set stations, but it does otherwise, and in some areas just five FM pre-sets may prove a little limiting. FM sensitivity is high, though noise levels are only moderate, but at least those spurious whistles, so common with digitally tuned models, were almost absent here.

Amplifier: TA-V3

Inputs are available for the other system components and one additional line-level item. The control layout is simple and ergonomically grouped, with a large display to indicate the source in use ('tuner', 'tape' and so on). This display is of an unusual dot-matrix type, rather than the back-lit LCDs of the tuner. Power output measured 32watts per channel into 8ohms (note that Sony specify power into 6ohms to match their speakers).

Loudspeakers: SS-X180

These speakers are made by Sony in Germany. They are simple two-way sealed models, of bookshelf dimensions, using modern European drive units. They are adequately, if not elaborately, constructed, while the finish, a dark wood-effect vinyl, is excellent of its type. On test in the listening room, the X180 had very limited bass output, and showed a slowly rising response through the midrange and treble. The speakers are optional.

In use . . .

This is a well-thought out system in a number of ways. On the practical level, there are some neat features; the 'no spaghetti' wiring, recesses in the top plates of the components so that they stay neatly stacked without moving.

Sound-wise, there were deficiencies in the turntable especially; it had a very shallow, tonally-dim kind of sound, with vague stereo imagery and no great stability. The cassette deck and tuner, on the other hand, both behaved very well indeed for the price. FM sound quality was excellent in fact, with an airy, spacious and clean presentation. The cassette deck was quite 'transparent', mimicking the sound of the other components well when recordings were made from them. The deck seemed well set up, too, and Dolby C gave usefully lower noise levels than Dolby B without significant loss of quality when using Type II tape. There was some 'thickening' of the midrange using metal, but generally all tapes gave an incisive, well-defined sound.

The amplifier proved rather disappointing when used separately, but in a system context, and when used with the rather light, thin-sounding speakers supplied, its deficiencies were masked by the characteristics of the other components. Some listeners may find the speakers on the bright side, and a careful audition using known records or tapes is recommended before purchase. Tonal balance apart though, the X180 is a detailed and basically unobtrusive transducer with a lively presentation.

Conclusion

Weak point of this system is its turntable; the other components work well together, off-setting each others' shortcomings. The attractive presentation and good control layout, as well as the flexibility inherent in the different housings that can be bought, all help to recommend this system.

GENERAL DATA

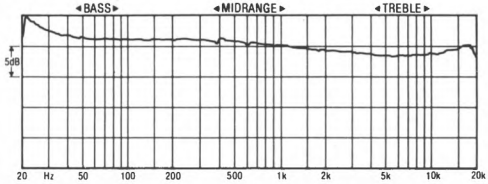
Amplifier: TA-V3
Power output, per channel, at 1kHz ..... 32 watts

Record deck: PS-LX20
Speed variations (wow and flutter) 0.10%
Speed drift ..... poor
Speed accuracy ..... 0.3% fast
Arm/cartridge resonant frequency ..... 17Hz, too high
Cartridge channel balance ..... within 0.6dB
Cartridge channel separation (crosstalk) ..... – 30dB
Cartridge tracking ability at 2g downforce 80μm

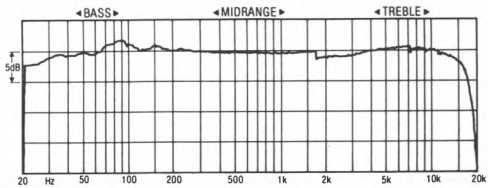
Cassette deck: TC-V3
Tape used for tests .... Sony UCXS (maker's recommendation)
Frequency response ('chrome' or 'II' position) .. 22Hz – 15kHz
Speed variations (wow and flutter) ..... 0.10-0.22% (see text)
Speed drift ..... good
Signal-to-noise ratio, with Dolby B 63dB
Distortion at OVU, with Dolby B 1.7%

Tuner: ST-V3L
Sensitivity ..... good
Signal-to-noise ..... fair

General
Maximum volume level in room (typical, with SS-X180 speakers supplied) 98dBA
Rack dimensions (w x d x h) ..... 35.5 x 33 x 37cm
Speaker dimensions (w x d x h) ..... 21.5 x 22 x 36cm
Price ..... £320 (inc speakers, £400)



Disc: frequency response with cartridge supplied



Cassette: record/replay frequency response

Sony Compact 77

Sony (UK) Ltd, Staines House, 158-162 High Street, Staines, Middlesex TW18 4AZ
Tel Staines 61600

With this system, Sony prove that they take the 'furniture' aspect of rack system design more seriously than most of their competitors. The most distinctive features of the system as supplied for this review are in fact the SU-V7L rack itself, and, of course, the CDP-101 compact disc player. Both these items are optional, and the 77 system can be bought instead with just a simple shelf-top housing (also suitable for the Compact 33 system) at reduced cost. Once again, all these 'Compact' components are just 355mm wide.

I can imagine most that purchasers will take up the option to buy the full floor-standing rack, which is unique in that it can be assembled in two different ways – either as a vertical unit akin to the conventional format, or as a low enclosed 'horizontal' housing. The unit can be dismantled and reassembled at will, and in its vertical form, can be arranged with either a wood or a glass top. In either shape, the rack will accommodate the CD player if required, and in the horizontal arrangement there are two drawers in place of record storage. The build quality and finish of this item is exemplary for a vinyl-covered design and assembly not too difficult.

Full remote control is a feature of the Compact 77, using a handset uniform with the CD player's remote control (the two can be linked together, if required). All the normal operations including initiation of recordings and power on/off (standby) can be controlled via this infra-red unit, and it worked well.

Sony have made a fair attempt at rationalising the wiring to ease installation headaches. Ribbon connectors link the components to distribute the remote control commands, which are received by the tuner, and there are paired plugs for the signal connections. Mains wiring has been similarly simplified.

Turntable: PS-FL77

A drawer-loading turntable, the PS-FL77 is a high-technology player with a 'Biotracer' arm of the parallel-tracking type. The 'Biotracer' system is a feedback-operated device which controls arm movement in both vertical and horizontal planes by means of servo motors and hence suppresses or controls the arm/cartridge resonance (this was measured at 8dB, 11Hz in both planes, several dB lower than usual). Resonance control can be accomplished by other means and there are theoretical drawbacks to Sony's scheme, but the system appears to have paid off at least to the extent that the player is unusually undisturbed by mechanical shocks and feedback.

The arm can be positioned over a specific track with the drawer open – a good point as it's often difficult on players of this type to see the stylus with the draw closed. The player has a direct-drive motor and record size recognition. As is often the case, the drawer doesn't open far enough to make loading easy, and the opening and closing operations are tediously slow and noisy.

The player has good standards of wow and flutter, though slow-rate speed variations were

only average. The cartridge's measured frequency response was found much smoother than normal, but note the 'jitter' in the trace, which I believe to be caused by the Biotracer system. Other cartridge parameters measured well.

Cassette deck: TC-V7

This deck is almost as distinctive a product as the turntable. The tape loads from above into a slide-out tray, which works quickly and smoothly. The tape is invisible with the drawer retracted, but the drawer can be left open, and in any case tape progress can be followed accurately by using the tape counter which is scaled, usefully, in minutes and seconds. Track location, auto-repeat and counter memory facilities are provided. The deck is equipped with Dolby B and C type noise reduction systems. The auto-reverse feature is for playback only.

Transport controls which use well designed membrane switches has full logic operation (you can switch transport modes at will, without going through 'stop') and work very smoothly indeed. Noise (hiss) levels with Dolby B were higher than usual, as was wow and flutter, but the Type II (chrome position) tape record/replay frequency response was extremely accurate, though not very extended in the treble.

Tuner: ST-V7L

Apart from a very mild background whistle, this synthesiser tuner has low background noise levels, and high sensitivity on FM. Both MW and LW bands are provided, and eight station pre-sets can be allocated to any combination of frequencies on any band – a simple and logical arrangement which saves having to select the waveband separately. Each preset can be individually labelled with the neat station names supplied, back-lit when in place. So the pre-sets are very easy to use, although the provision of only eight stations may be a little limiting to some. The three-LED signal strength meter is in practice nearly useless as on test it saturated with less than 100μV of signal – this is barely enough for quiet mono reception. The AM circuitry gave low interference levels and a clear and positive, if tonally forward sound balance.

Amplifier: TA-V7

This amplifier makes full use of flat membrane switches and offers an unusual arrangement of tone and high- and low-pass (subsonic and treble) filters. The tone controls are set in steps and there is a graphic display corresponding to the chosen tonal correction. Two sets of tone control and filter settings can be memorised, and recalled. The TA-V7 is an extremely powerful amplifier, and on test it gave no less than 85watts/channel over most of the frequency range. With the speakers supplied, it gave a maximum usable volume of 100dBA in the listening room.

Loudspeakers: APM-700

Sony, like a number of other Japanese

GENERAL DATA

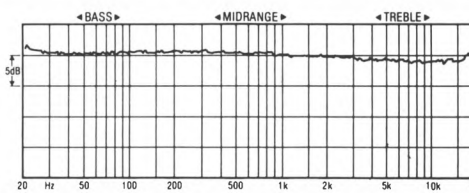
Amplifier: TA-V7
Power output, per channel, at 1kHz ..... 85 watts

Record deck: PS-FL77
Speed variations (wow and flutter) 0.07%
Speed drift ..... average
Speed accuracy ..... 0.3% fast
Arm/cartridge resonant frequency ..... 11Hz, acceptable
Cartridge channel balance ..... within 0.4dB
Cartridge channel separation (crosstalk) ..... – 30dB
Cartridge tracking ability at 1.25g downforce 80μm

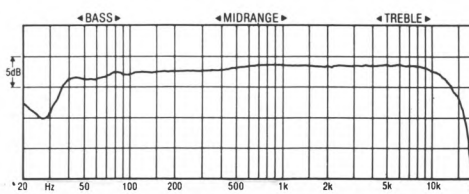
Cassette deck: TC-V7
Tape used for tests .... Sony UCXS (maker's recommendation)
Frequency response ('chrome' or 'II' position) .. 40Hz – 13kHz
Speed variations (wow and flutter) 0.23%
Speed drift ..... good
Signal-to-noise ratio, with Dolby B 61dB
Distortion at OVU, with Dolby B 1.6%

Tuner: ST-V7L
Sensitivity ..... good
Signal-to-noise ..... good

General
Maximum volume level in room (typical, with APM-700 speakers supplied) 100dBA
Rack dimensions (w x d x h) ..... 79 x 40.5 x 46.5cm (horizontal)
Speaker dimensions (w x d x h) ..... 22.5 x21 x 39cm
Price ..... £800 (inc speakers, £1000)



Disc: frequency response with cartridge supplied



Cassette: record/replay frequency response

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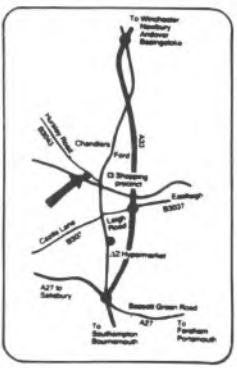

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manufacturers, use drive-units with flat diaphragms instead of cones in their more expensive speaker designs. The flat diaphragms are backed by a thick but light honeycomb structure which has the advantage of greater stiffness. Experience shows that units of this type can suffer from undesirable resonant behaviour that can be excited by music programme, depending of course on the way the speaker has been designed. The APM-700 is lavishly built, the cabinet being heavy and moderately well damped, and the crossover between the two drivers is complex and engineered to a high standard. A variable treble control is wired into the tweeter circuit to alter the frequency balance as required.

Compact Disc player: CDP-101

In stark contrast to the frequently fussy styling and poor ergonomics of much up-market Japanese hi-fi, the drawer-loading CDP-101 is a model of visual simplicity and sophistication, with controls grouped logically and given distinctive sizes and positions according to function. A visual display gives track number, elapsed time from the start of the track and other information and the player incorporates a cue/review feature to allow rapid scanning through a disc, with a semblance of the music coming through the speakers. Search speeds are exceptionally fast and the deck unusually quiet and unfussy in action. The remote control gives comprehensive access to the transport facilities. In purely functional terms this model is a classic – one of the finest pieces of industrial design to come out of Japan.

In use . . .

Aside from the elegant CD player, the Compact 77's control arrangements are perhaps rather more complex than they need to be and the system proved a little fiddly to operate at times, except via the remote control – a necessarily simplified version of the controls on the equipment fascias. There were no operational problems though apart from the slow record-player drawer mechanism.

With some minor reservations about the loudspeakers in particular, the system sounds every bit as good as its appearance suggests. The speakers have some strong abilities, but are undoubtedly ruthlessly analytical in the sense that if a record has surface noise or distortion problems, the speakers will expose this. Their whole balance is bright and razor-sharp when used set to 'normal', and with their treble controls turned down the sound becames rather coloured and thick without actually curing the problem. My listening notes describe the APM-700 as having a 'metallic' treble, a slightly coloured upper midband and a very dry bass – though the bass does not benefit from being used close to a wall as is sometimes the case. In musical terms, and when used with the rest of the Sony system, the speakers in my view sounded very 'sharply etched' with a clean but excessively light bass – almost like listening to a pair of large headphones! Stereo imagery was well defined laterally, but there was little feeling of depth or spaciousness.

The remainder of the system worked well. The amplifier was particularly successful, with a very positive, well shaped and expressive way of reproducing music, and a fullness and weightiness even at high volumes that many amplifiers just can't manage. Record reproduction was very successful too. There was a marginal shortfall in warmth and depth in absolute terms, but the sound was stable and even, with a particularly well controlled if slightly insubstantial bass. FM sound quality was also good, though not of the best. There was a loss of airiness and a slightly 'squashed' feel to the reproduction.

Compact Disc had the effect of characterising the problems of the system, without really exploiting its good points – the Compact 77 really needs something a little 'softer' and more 'forgiving' to provide the music. But this is no reflection on the CDP-101, which in its current production trim has vastly improved error-correction over earlier samples, and gives a more definite and relaxed sound, with much less in the way of the harshness and lack of stereo depth information noted on early production of this player. In my view the sense of ease and naturalness provided by the Philips/Marantz players (see Marantz MX250 review) still keeps them convincingly ahead in sound quality terms, but the gap is much narrower than it was.

Conclusion

The system complete with speakers is worth considering on the grounds of immaculate build quality, a superb rack housing, some useful operational features (not least the remote control), and generally adequate if unexciting sound quality. The price is undoubtedly high for the sound quality on offer, but value for money improves if you buy the system without loudspeakers, in which case it is recommended.

Technics 315 Type 10

National Panasonic (UK) Ltd, 300-318 Bath Road, Slough, Berks
Tel (0753) 34522

Here is a neat little system that comprises just three basic elements – a turntable, a casseiver (cassette, tuner and amplifier in one box) and loudspeakers. The turntable and casseiver are both very narrow, measuring just 315mm wide, as implied in the system designation. The units can be stacked with the turntable on top if required, but there is a useful improvement in sound quality if the turntable is placed alongside the casseiver directly on a solid surface. The loudspeakers are of compact design too, and are included in the system price – they're not optional.

Turntable: SL-3

Technics were the originators of the 'LP-jacket-size' turntable with the SL-10 some years ago. This is one of the less lavishly-built models of the type, but it's as slick to handle and as attractively designed as any. The parallel-tracking arm with its readily interchangeable 'P' mount cartridge is located within the lid, which leaves plenty of room for placing the records on the mat.

The SL-3 proved fairly susceptible to knocks and bumps, though acoustic feedback never became too obvious. The cartridge has a fairly flat measured frequency response, good tracking ability, acceptable separation and crosstalk. The player itself has excellent measured wow and flutter and good long-term speed stability.

Casseiver: SA-K6

As a cassette deck, the SA-K6 is easy and simple to operate. Tape-type switching is manual, but the switch is right next to the cassette tray when the door is open – it's difficult to miss. Noise reduction is by Dolby B (not C) and the recording level control is automatic, somewhat more gentle than some in operation; auto-level controls can often be heard manipulating the sound in a fairly obvious way, but not here.

Nevertheless, as always there are penalties to balance the benefits of simplicity; noise levels are generally higher than normal during quiet passages, and especially in this case when using metal tape, which appeared to reproduce with a rather sharp 'edge' due to being slightly underbiased. Type II (chrome position) tapes suited this deck best. Record/playback frequency response linearity was good, but measured low-frequency response was affected by the auto-level and should be ignored.

The tuner section of the SA-K6 is an analogue (scale-and-pointer) type; with its short, vertical scale it requires considerable care to tune stations in accurately. FM, MW and LW bands are covered, but the waveband switching arrangement seems something of an afterthought. There is no signal strength meter though there is a 'tuned' light. FM background

noise levels were on the high side, and sensitivity slightly lower than average.

Built into the SA-K6 is an amplifier giving a moderate power output on test of 28watts/channel. Surprisingly, there are no tone controls as such, but there are switches to give boost at high and/or low frequencies, and also a cut at high frequencies only.

Some of the minor switching on this casseiver is somewhat muddled, but the unit is otherwise a pleasure to operate. It is also beautifully finished and has a solid, expensive feel – very desirable!

Loudspeakers: SB-F5

Also beautifully finished, the SB-F5 is a compact and simple two-way ported loudspeaker. The frequency response is fairly uneven in the treble – hardly a surprise with the design of tweeter used, but the midrange is essentially smooth. There appears to be little output below 100Hz. In the listening room, maximum usable volume was 98dBA.

In use . . .

This neat little system was almost as attractive on the ear as it was on the eye. The loudspeakers are the obvious weakness; subjectively, they have a somewhat recessed and hollow, boxy sound, with very little bass apart from a rather papery 'thud' to represent drums, for example. The treble was a little sharp and the speaker as a whole displayed serious losses of musical information. Despite all these faults though, the SB-F5 remained relatively uncoloured and unobtrusive. Its sins were of omission – the speaker failed to exploit the dynamics, colour and sheer variety of the music it was fed, but it still managed not to sound unpleasant.

Record reproduction was also pleasant. The bass end was rather loose, but not boomy, and there was a splashiness at high frequencies attributable to the cartridge which sounded ill at ease on complex musical programme. The liveliness won through in the end, though, most records sounding likeable enough. The cassette deck had much the same kind of sound as the turntable, though with a more obviously limited dynamic range. As previously noted, it worked best with Type II tapes. The amplifier, finally, proved an excellent, if modest performer. It scaled no heights, and seemed rather 'out of breath' if asked to drive the speakers hard. Within its limitations, it sounded clean and tidy with a slightly 'raw' midrange that made it sound superficially more detailed than it actually was.

Conclusion

A neat, unobtrusive system, the electronics come close to meeting the essential requirements of high fidelity for a limited power system. Cassette performance was slightly compromised due to the auto-level control, and it didn't like metal tapes. Overall it's a pity the system cannot be bought without speakers – the SB-F5 model supplied is not unpleasant, but it remains a limiting factor.

GENERAL DATA

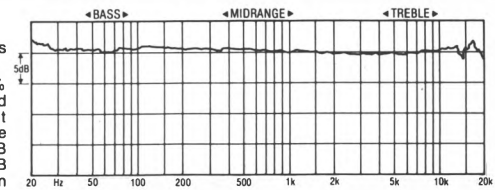
Amplifier: part of casseiver, SA-K6
Power output, per channel, at 1kHz ..... 28 watts

Record deck: SL-3
Speed variations (wow and flutter) 0.06%
Speed drift ..... good
Speed accuracy ..... 0.3% fast
Arm/cartridge resonant frequency ..... 12Hz, acceptable
Cartridge channel balance ..... within 0.3dB
Cartridge channel separation (crosstalk) ..... – 28dB
Cartridge tracking ability at pre-set downforce 73μm

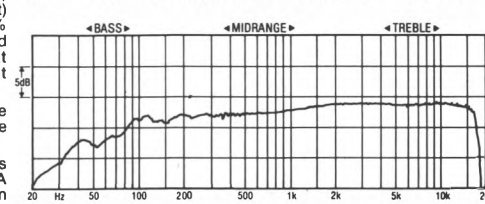
Cassette deck: part of casseiver SA-K6
Tape used for tests ..... TDK SA (maker's recommendation)
Frequency response ('II' position) .... 85Hz – 16kHz (see text)
Speed variations (wow and flutter) 0.14%
Speed drift ..... good
Signal-to-noise ratio, with Dolby B ..... see text
Distortion at OVU, with Dolby B ..... see text

Tuner: part of casseiver SA-K6
Sensitivity ..... below average
Signal-to-noise ..... below average

General
Maximum volume level in room (typical, with SB-F5 speakers supplied) 98dBA
Rack dimensions (w x d x h) ..... 31 x 35 x 19.5cm
Speaker dimensions (w x d x h) ..... 20 x 20 x 32cm
Price ..... inc speakers, £339



Disc: frequency response with cartridge supplied



Cassette: record/replay frequency response

Technics Z75

National Panasonic (UK) Ltd, 300-318 Bath Road, Slough, Berks
Tel (0753) 34522

Although well-known for the '315' shelf-mounting or 'midi' systems, Technics also offer 'full-size' systems like the Z-75 reviewed here. The components are finished in a very dark chocolate brown with bright metal switches, and full use is made of attractive LED displays to lighten the appearance. The external appearance, finish and operational quality is first-class – the system looks though it's worth every penny of its price.

Turning to the more function aspects of the system, the Z-75 has quite a few points of interest, including the addition of dbx noise reduction to the cassette deck – which covers every option by having the usual Dolby B and C noise reduction as well.

I should say here that the dbx system is not widely used on domestic equipment, though Technics are a long-term advocate. The advantage is very effective tape hiss reduction – about 35dB by Technics figures. The disadvantage, arguably, is a certain trade-off in sound quality (see later) and a lack of pre-recorded dbx cassettes.

The rack housing is a very smart affair, finished in keeping with the equipment and with glass side cheeks as an unusual styling feature.

The Z-75 system is supplied only with the loudspeakers tested below.

Turntable: SL-Q210

Misleadingly perhaps, this record player is marked 'automatic' on its front edge; in fact it is semi-automatic in that the arm returns to its rest when play is finished. To start play, the arm has to be manually cued over the record the arm being lowered from that point by the usual lift/lower device. The arm has a straight arm tube and bearings fairly free of slack; it is fitted with an offset fixed headshell made from plastic and an interchangeable T4P ('P-mount') cartridge. Tracking force and bias are factory set and cannot be changed – a standard feature of the 'P' mount system, which makes setting-up this player a doddle.

The player is not heavily built, following the normal conventions for a middle price direct-drive Japanese player. It is moderately

microphonic in practice, especially when used in the rack housing, so care over rack placement should be taken, and ideally the rack should be fastened to the wall behind. On test the Technics gave very low wow and flutter and just average long-term speed (pitch) stability. The cartridge was found to have a very smooth, gently declining frequency response. The arm/cartridge resonance was rather low in frequency, which will not have helped the microphony problem, but tracking ability and crosstalk were both fine.

Cassette deck: M233X

Aside from the addition of dbx, discussed earlier, the M233X is a fairly straightforward Dolby-B-and-C equipped deck. The transport is controlled by power-assisted mechanically-latching controls which work smoothly and which offer auto-replay following rewind if required, and a cue/review feature. Superb fluorescent bar graph meters have a 29dB operating range, with 2dB resolution over the middle part and a 'peak hold' facility that retains peak levels for a short while to ease record level setting. Tape type selection is manual and a single input level control with a separate balance control complete the picture. Unusually, no track search or memory feature is provided.

The deck is simply and functionally laid out, with few traps for the unwary. The review sample produced a low-level continuous drone when the deck was on, presumably from the pinch wheel/capstan assembly, but the deck operated smoothly in every other respect. The record/replay frequency response showed some underbiasing for Type II (chrome position) tape, resulting in a bright tonal balance. A similar plot taken with dbx switched in (not reproduced) shows a rather flatter response. The review sample appeared to suffer a slight tape-to-head contact problem with this deck; both measurements and listening showed obvious and fairly sustained dropout on a wide variety of tapes. Aside from this, there were no problems, the Dolby signal-to-noise ratio being respectable, while dbx took the figure well beyond the limit of the test equipment, which was – 80dB.

Tuner: ST-Z55L

This slim-line tuner covers FM, MW and LW and has eight channel presets for FM, plus a further eight for the two AM bands. The tuner uses the quartz-synthesiser tuning principle and has the usual digital read-out of tuned frequency.

As is so often the case, the three-LED signal strength meter proved near useless in practice, as all three LEDs lit with only 10μV aerial signal. Sensitivity was found only average on FM, background noise being spoilt by noticeable synthesiser whistles. AM interference levels were low, and sound quality fine.

Amplifier: SU-Z55

The pretty if rather senseless graphic display of tonal correction and balance control

GENERAL DATA

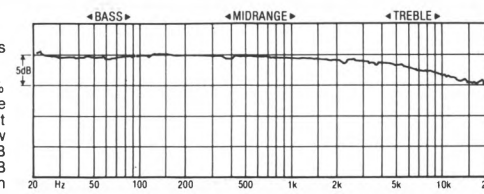
Amplifier: SU-Z55
Power output, per channel, at 1kHz ..... 48 watts

Record deck: SL-Q210
Speed variations (wow and flutter) 0.06%
Speed drift ..... average
Speed accuracy ..... speed correct
Arm/cartridge resonant frequency ..... 10Hz, too low
Cartridge channel balance ..... within 0.8dB
Cartridge channel separation (crosstalk) ..... – 28dB
Cartridge tracking ability at 1.25g downforce 80μm

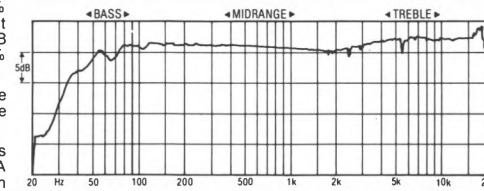
Cassette deck: M233X
Tape used for tests ..... TDK SA (maker's recommendation)
Frequency response ('chrome' or 'II' position) .. 45Hz – 19kHz
Speed variations (wow and flutter) 0.08%
Speed drift ..... excellent
Signal-to-noise ratio, with Dolby B 61dB
Distortion at OVU, with Dolby B 0.8%

Tuner: ST-Z55L
Sensitivity ..... below average
Signal-to-noise ..... below average

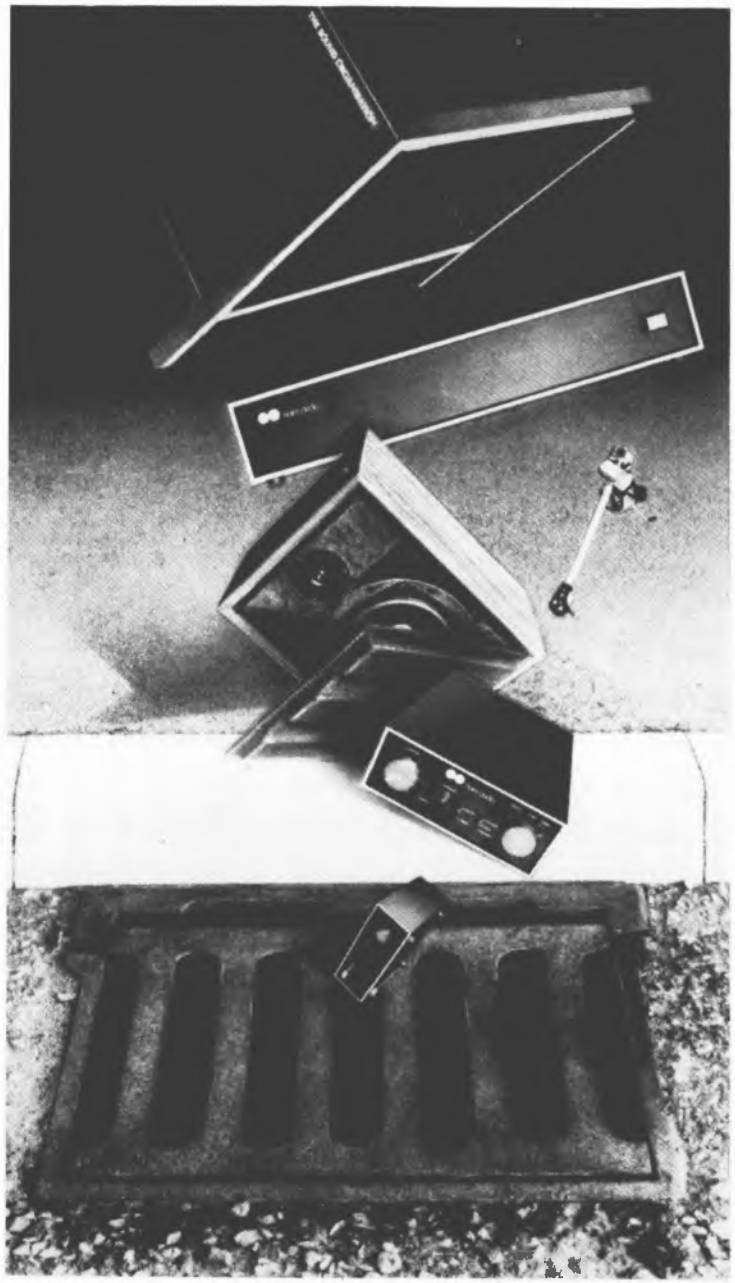
General
Maximum volume level in room (typical, with SB-3150 speakers supplied) 99dBA
Rack dimensions (w x d x h) ..... 47.5 x 47 x 87cm
Speaker dimensions (w x d x h) ..... 29.5 x 22.5 x 55.5cm
Price ..... inc speakers, £599



Disc: frequency response with cartridge supplied



Cassette: record/replay frequency response



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settings makes this amplifier look more fully equipped than it in fact is – but nothing important is missing. Apart from a record deck, tuner and cassette deck; a second cassette or tape deck and one other item such as a CD player can be connected, as can two pairs of loudspeakers for use either independently or together. Power output measured on test was 48 watts per channel. In the listening-room maximum volume test, 98dBA was reached with the supplied loudspeakers.

Loudspeakers: SB-3150

Impressively finished, the SB-3150 loudspeakers complete the system with style. Three drive units are used within a large enclosure; a 23cm paper cone bass unit, a 5.5cm cone midrange and a 1.4cm dome tweeter, the latter being crossed over (according to Technics) at the extraordinarily high frequency of 10kHz. This strictly makes it a 'super tweeter' which should have little effect on the perceived sound. The cabinet is lightly built, and has minimal internal damping and no bracing, as a result of which the enclosure is rather 'live', and it did sound obviously boxy on audition. The 3150 still shows a declining response in the treble, though the nature of the curve is smooth enough.

In use . . .

The story of the Z-75 parallels that of the other Technics system reviewed in this publication, despite the quite different nature of the hardware involved. In the main, the electronics proved satisfactory enough, the tuner and turntable being the weakest elements; but the loudspeakers were a mixture of good and not so good. Again, it's a pity this system cannot be bought without these loudspeakers.

At moderate volume levels, the amplifier has an 'unstoppable' feeling: it sounds unconstrained and relaxed, giving slightly 'darker' tonal colours than normal via its phono input especially. Drive it hard though and the sound changes, becoming rather over-vigorous and obviously unable to cope. There was plenty of volume level for most circumstances with the supplied loudspeakers.

Music off records had an undistinguished, slightly insubstantial sound, though in the player's favour the bass end was fairly lean and well controlled, despite some expectations to the contrary based on the initial physical examination! The sound was essentially positive and clean, with a quite articulate sense of stereo perspectives, but there was no great weight or depth to the sound, and loud, vigorous passages sounded a bit weak.

The tuner was thought only just satisfactory for a system of this price level. The sound here was rather diffused and unfocused, in that stereo images tended to spread rather amorphously outwards, and centrally placed images were vague. Bass reproduction was decidedly loose and lacking in impact, and this may have been the dominating factor in the other observations. There was also some noticeable, if slight, edginess at high frequencies.

Finally, the cassette deck; both Type II (chrome position) and Type IV (metal) tapes worked well, the latter giving a very slight improvement in perceived dynamic range and overall clarity. There was a very slight softening effect with Dolby C in circuit, but this effect wasn't great.

What was obvious to me was the degradation in reproduced sound caused when the dbx noise reduction system was switched in. It did what was claimed of it; background hiss attributable to tape noise was almost totally eliminated, and contrary to experience with very early dbx hardware, noise pumping is now well suppressed, and I found it certainly no worse than Dolby B for most of the time – better sometimes in fact. Recordings made from Compact Disc retained their low noise floor without noticeable degradation. The problem was, I felt, in the nature of the sound that was left after processing. It sounded exactly that: 'processed'. There was an 'uncomfortable' feeling on audition, as though the sound was somehow being understated because transients (leading edges of notes and the like) just were not happening properly. The effect was to actually reduce the perceived dynamic range, leaving the sound somehow emasculated and compressed.

Finally, the stereo image became very blurred and unstable with dbx in circuit. But whilst the dbx circuit was not liked, the deck worked more than adequately via the Dolby circuits. You could therefore regard the dbx system as a bonus that you don't have to use.

Conclusion

A mixed bag, this one, with the high system price ruling out an automatic recommendation. Technics should consider the viability of selling this system without loudspeakers, when a recommendation would be in order, though as a first step I feel that the performance of the tuner needs tightening up.

Tensai Compo 10

John A. Walker Ltd, 1st Floor, 55 North Street, Thame, Oxfordshire OX9 3BH
Tel (084421) 6929

When Amstrad (and others) broke the Japanese stranglehold on the audio market with their under-£200 integrated rack or 'tower' systems, the Japanese manufacturers were left high and dry — unable to compete in price terms with the UK-made (or assembled) opposition. Needless to say, the Japanese acted fairly quickly to change this situation, and here is one of the results — a Japanese-made system that sells for well under £200 complete. The speakers though are made in the UK.

This is the only sub-£200 rack system we tested whose rack is not supplied preassembled, but building it up caused no problems and the result is a simple, attractive and well finished product, with door corners lined up with the side walls of the cabinet to avoid sharp corners. The electronics comes in a single package and is well finished, simply styled and of good operational feel. Note that there were the usual problems interfacing the test equipment with this class of audio unit, so the measurement programme is not as complete as with the component systems.

Turntable section

This is a very basic sprung-chassis player, idler-driven and using a crude ceramic cartridge, rather than the magnetic type used in more expensive players. A damped cueing platform is provided for starting play; arm return is automatic at end of side. The response of the cartridge (as measured via the auxiliary output) shows the characteristic high frequency losses associated with ceramic cartridges as a breed, plus the equally characteristic light bass. Nevertheless the overall response shape looks better-engineered than from most such cartridges. Wow and flutter (pitch fluctuations) measured fairly poorly at 0.18%, and longer-term speed (pitch) stability generally was also poor.

Cassette deck section

In a different league from most cassette efforts in the sub-£200 category, the Tensai offers soft-touch logic transport controls, Dolby B noise reduction and full metal tape record/playback capability. Using Type II (chrome position) tape, the record/playback frequency response was even and flat up to 2kHz, but fell away rapidly thereafter. Speed stability was acceptable, and signal-to-noise and distortion results good.

Tuner section

This is an analogue tuner with a travelling LED acting as cursor. FM, MW and LW are provided. There were some RF problems on the lab FM generator test with images of the generator transmission being receivable at various places on the dial, but there were no problems off-air and in no case was there interference to a wanted transmission from an unwanted one. FM background hiss levels were higher than average, but sensitivity was good. AM, which required an external aerial, suffered fairly high interference levels, mostly in the form of high pitch spurious whistles, but basic sound quality was clear and extended.

Amplifier section

This part of the system has simple tone controls and an auxiliary DIN socket is fitted at the rear which provides input and output facilities at normal line level. Power output checked out at 15watts per channel at 1kHz which is well above average for this class of equipment. Maximum usable volume in the listening room, with the supplied speakers was 95dBA.

Loudspeakers: TS910

In common with the other inexpensive types in

this project, these loudspeakers had sealed cabinets which could not be examined internally without damaging them. Two drive units are fitted, both cone units and both mounted from behind the baffle, a practice that eases assembly but causes problems for the tweeter especially. Tweeters don't like firing through tunnels, even short ones! On test in the listening room, the frequency sweep signal excited a severe box resonance around 500Hz, the severity of this peak in the response depending on the input signal level. Despite this measured shortcoming, the frequency response otherwise looked very respectable (again for a system of this price) apart from noticeable peaking of treble output at the tweeter resonance around 14kHz.

In use . . .

The loudspeakers proved quite a surprise on audition. Despite some high frequency brashness and a slight nasal effect in the midrange, the musical merit of these speakers was rather better than the colourations and 'brashness' comment might imply. Indeed compared to other similar systems the Tensai proved easy and informative to listen to, though long term listening could prove rather wearing. The sound remained substantially coherent and solid though — a welcome change at the price.

Happily this was backed up by an electronics package which was very adequate in comparison to its peers. The turntable was, predictably, the weakest item. Rumble was always noticeable, and the player invested music with the usual shallow, undynamic, unrefined and dull qualities, typcial of a low-cost ceramic cartridge.

Some background hiss apart, the tuner provided excellent stereo FM and a clean, neutral sound. The cassette deck was not much worse either, although with one of our sample there were occasional losses of output on one channel due to poor tape/head contact. On the whole though, cassette reproduction across all tape types and including pre-recorded cassettes was reassuringly even and smooth, if slightly noisy on ferric tape replay. About the worst that can be said otherwise is that metal tapes failed to show any real advantage over cheaper Type II formulations such as the TDK SA tape used for the measured response tests.

Conclusion

It's worth reiterating that compared to most systems at the price, the Tensai is incomparably better built and more pleasant to use. It lacks nothing of musical substance apart from those qualities that can only be had at a higher price. I still feel it is worth spending more — such features as ceramic cartridges in crude idler drive turntables like the one used here really have no useful place in high quality sound reproduction. But if the budget is limited to £180, a recommendation is clearly in order.

GENERAL DATA

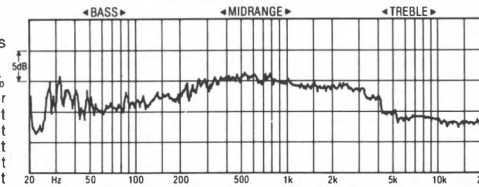
Amplifier: part of main unit
Power output, per channel, at 1kHz . . . . . 15 watts

Record deck: part of main unit
Speed variations (wow and flutter) 0.18%
Speed drift . . . . . poor
Speed accuracy . . . . . see text
Arm/cartridge resonant frequency . . . . . see text
Cartridge channel balance . . . . . see text
Cartridge channel separation (cross talk) . . . . . see text
Cartridge tracking ability . . . . . see text

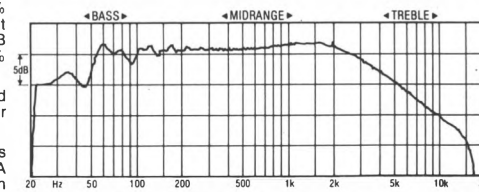
Cassette deck: part of main unit
Tape used for tests . . . . TDK SA (no maker's recommendation)
Frequency response ('chrome' or 'II' position) . . 50Hz – 3.4kHz
Speed variations (wow and flutter) 0.11%
Speed drift . . . . . excellent
Signal-to-noise ratio, with Dolby B 63dB
Distortion at OVU, with Dolby B 1.8%

Tuner: part of main unit
Sensitivity . . . . . good
Signal-to-noise . . . . . poor

General
Maximum volume level in room (typical, with TS-910 speakers supplied) 95dBA
System dimensions (w x d x h) . . . . . 43.5 x 39.5 x 70cm
Speaker dimensions (w x d x h) . . . . . 26.5 x 20 x 41cm
Price . . . . . inc speakers, £180



Disc: frequency response with cartridge supplied



Cassette: record/replay frequency response

Tensai System 3000

John A. Walker Ltd, 1st Floor, 55 North Street, Thame, Oxfordshire OX9 3BH
Tel (084421) 6929

A 'full size' system supplied with a floor-standing rack housing, the 3000 comes with two large three-way loudspeakers; it is not available without speakers. The equipment that bears labels of origin is made in Korea. System 3000 is an essentially straightforward and purposeful package, bereft of superfluous gadgets. Styling is unusual, the electronics making extensive use of black perspex and bright contrasting aluminium sections. The quality of build and finish is about average, though some of the switches are not mounted in place very neatly and the quality of 'feel' of the controls is little below average.

The rack housing itself is attractive and generally well built and finished. There was a minor problem in that the front edge of the lid doesn't quite clear the front door when the latter is opened. A pair of self-adhesive rubber stops on the top front section of the woodwork will easily cure the problem.

Turntable: TD-540D

The distinguishing feature of this player design is not necessarily obvious at first sight; it is the subchassis arrangement that supports the platter and arm. This assembly is partially decoupled from the rest of the plinth, and whilst the effect of this arrangement is nothing like as beneficial as a true sprung subchassis (which in any case is a complexity virtually unknown in the rack system arena), the Tensai is rather less microphonic than average.

A direct-drive motor is used, speed being adjustable using a pitch control and internally-illuminated stroboscope. The platter itself is better-made and heavier than usual at this (system) price level. The arm bearings though have some noticeable friction and the detachable headshell is a flexible, resonant plastic moulding. The cartridge too is detachable. Wow and flutter measured well, but longer-term speed (pitch) stability was less good; some occasional roughness being noticeable on audition. Stereo separation of the cartridge measured 18dB in one direction, and 30dB (or more) in the other, this being attributable to the fact that on our sample the headshell was canted sideways, due to sloppy assembly in the manufacturing stage. Finally, the cartridge has a falling high frequency response, though it's not out of order compared to the similarly priced competition.

Cassette deck: TFL-3000

The TFL-3000 is a simple, no-frills Dolby B equipped cassette deck. The fairly stiff transport controls are of the mechanical but power assisted type, and allow free interchange between fast wind and play, and vice versa. The deck is tolerably quiet, but the Type II (chrome position) record/playback frequency response is slightly 'bright' — that is, lifted at high frequencies. The review sample also suffered poor tape-to-head contact, resulting in considerable dropout.

Tuner: TT-3000

Although this is an analogue tuner using a long scale-and-pointer, seven pre-sets are available on FM, plus three on MW and four on LW (actually, one is currently sufficient for LW in the UK). A separate, smaller tuning scale meter gives a rough indication of tuned frequency when using the pre-sets; this also doubles as a signal strength meter, reaching maximum reading at about 1mV, a sensible calibration. Sensitivity on FM was average, but background hiss levels were very high. AM performance was satisfactory on all counts.

Amplifier: TA-3000

Capable, on test, of 30watts per channel the

TA-3000 could drive the supplied loudspeakers to a maximum sound level of 100dBA. Facilities are entirely conventional; there are inputs for turntable, cassette deck, tuner, and one extra 'auxiliary' item. Two pairs of loudspeakers can be attached for use together or separately. Finally, there are buttons for 'loudness' and a 'low' (high-pass) filter.

Loudspeakers: TS-9155

Although the external finish of this large, three-way loudspeaker is adequate, its acoustic engineering quality is far less so. The three simple cone drive units are staggered laterally on the front baffle, while the cabinet itself is light, unbraced and undamped other than by a thin unsecured sheet of sound-absorbent material. Two miniscule capacitors are all there is for a crossover. The box itself is resonant and hollow sounding when knocked and the air seal is nearly non-existent. In its favour, the frequency response appeared quite well-adjusted.

In use . . .

Despite rather noisy internal electronics, the cassette deck is the strongest item of equipment in this system. It has a rather 'untidy' sound-quality character, tending towards instability, probably because of the poor tape-to-head contact already noted. Nevertheless it sounded reasonably neutral and innocuous on the whole, though it sounded more at ease using Type II (chrome type) tapes than with Type IV (metal).

The tuner was thought unacceptable on audition, not because of its sound quality, which was in fact quite clear and well controlled, but because of the high background hiss levels which could be heard almost all of the time. The turntable had its problems too, not least a very heavy, 'slow' and 'flabby' sounding bass. There was also noticeable midrange colouration, the overall presentation showing considerable losses of musical information.

The amplifier was fairly distinctive too, though not in an unpleasant way. The sound here was light in the bass (no bad thing) and rather forward in balance, giving the unit a slightly unnatural open quality on audition via the phono input especially. There was also some high-pitched buzzing on this input, probably attributable to inadequate earthing arrangements. The loudspeakers were surprisingly even tempered in the midband, voices for example sounding quite articulate. At higher frequencies, though, the speaker was characterised by a thin, nasal quality; there was obvious 'phasiness' here too.

Conclusion

Built quite solidly in some ways, this system combines unusual styling and an attractive rack with some fairly 'old-fashioned' technical features — though this in itself is not necessarily a bad thing! Unfortunately, there were too many problems on audition throughout this system to warrant recommendation here.

GENERAL DATA

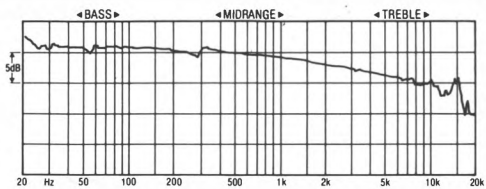
Amplifier: TA-3000
Power output, per channel, at 1kHz ..... 30 watts

Record deck: TD-540D
Speed variations (wow and flutter) 0.08%
Speed drift ..... poor
Speed accuracy ..... user-adjustable
Arm/cartridge resonant frequency ..... 14Hz, acceptable
Cartridge channel balance ..... within 1.0dB
Cartridge channel separation ..... – 18dB, – 30dB (see text)
Cartridge tracking ability at 2g downforce 61μm

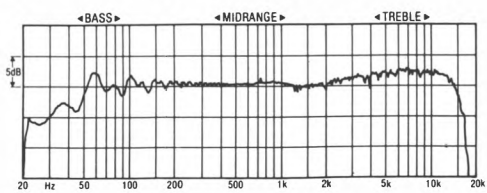
Cassette deck: TFL-3000
Tape used for tests ..... TDK SA (maker's recommendation)
Frequency response ('chrome' or 'II' position) .. 47Hz – 14kHz
Speed variations (wow and flutter) 0.17%
Speed drift ..... good
Signal-to-noise ratio, with Dolby B 60.5dB
Distortion at OVU, with Dolby B 0.6%

Tuner: TT-3000
Sensitivity ..... average
Signal-to-noise ..... poor

General
Maximum volume level in room (typical, with TS-9155 speakers supplied) 100dBA
Rack dimensions (w x d x h) ..... 29 x 25.5 x 56cm
Speaker dimensions (w x d x h) ..... 47.5 x 44.5 x 95cm
Price ..... inc speakers, £399



Disc: frequency response with cartridge supplied



Cassette: record/replay frequency response

Toshiba System 20

Toshiba (UK) Ltd, Toshiba House, Frimley Road, Camberley, Surrey GU16 5JJ
Tel (0276) 62222

At the bottom end of the Toshiba rack range, System 20 comes complete with non-optional loudspeakers. The rack itself is not very solid when built, and has relatively poor finish, though the packing is good, and instructions comprehensive. The door on the review sample would not close properly due to poor hinge fitting, and the door corners (the top one capped by a handle) are rather exposed.

Turntable: SR-B20

Labelled on the front as an automatic player, the SR-B20 is in fact a conventional auto-return model with speed change and arm return controls at the front of the plinth, and arm cueing near the arm pivot. The player is belt driven.

The turntable ran quietly and gave excellent wow and flutter readings (implying no audible pitch instability), though the absolute speed was slightly fast (+0.6%). The cartridge displayed a significantly falling response at high frequencies (−3dB at 10kHz) before recovering slightly to its tip mass resonance near 20kHz.

Cassette deck: PC-G10

This is a simple Dolby B-equipped deck with well laid out meters, record level controls and tape type switching for the three main tape types. The power-assisted transport controls on the other hand suffer from a rather messy layout. The deck offers cue-and-review facilities in addition to the usual functions, but the transport was mechanically noisy and fast wind could not be selected direct from fast rewind or vice versa.

The deck had a well extended and relatively flat record/replay frequency response on Type II tape (TDK SA used on test), but dropouts (momentary losses of output) were more obvious with this deck than usual, possibly an indication of tape tension problems. Wow and flutter was moderately high, but the deck measured well otherwise.

Tuner: ST-U20L

Toshiba's ST-U20L is a neat, analogue 'scale-and-pointer' type tuner. Although the long, well-calibrated tuning scale is not itself illuminated, the cursor or pointer takes the form of a red LED which changes to green when a transmission is properly tuned. This tuning aid is supplemented by a five-LED signal strength meter. The only operational criticisms of this three-band (FM, MW and LW) tuner concern the illogical waveband switching and the rather crude feel of the tuning control. On test the Toshiba produced slight background hum on strong signals only, but noise levels were generaly lower than usual. Sensitivity, on the other hand, was slightly poorer than average, well over 1mV being needed on test for good, noise-free stereo. AM interference levels were moderate, but the sound had little treble extension, sounding dim and at times less intelligible than usual.

Amplifier: SB-M20

A neat, uncluttered layout characterises the SB-M20 amplifier. Input socketry copes with the other system components plus one additional item via auxiliary sockets. Two pairs of speakers can be connected for use separately or together; the amplifier drives the speakers in series when two pairs are used together. This imposes a loss of power from the amplifier in the interests of maintaining safety margins. Power output into 8ohms measured

more than 38watts, and maximum usable volume in the listening room from the loudspeakers supplied was 100dBA.

Loudspeakers: SS-20

By the usual standards of rack system loudspeakers, the SS-20s are relatively well engineered, notwithstanding the use of three drive units where, I suggest, two might have done the job better (*In marketing terms, three-way speakers look like 'more for your money' but all too often sound worse — Ed*). The wood-effect vinyl-wrap cabinetwork looks acceptable on the sides, but a little rough on the baffle when the cover is removed. Measured frequency response in the listening room was elevated in the 500Hz region, even taking the room boundary effects into account, but above this the speaker behaves fairly smoothly with a gentle loss of output with increasing frequency.

In use . . .

Records were reproduced with a bass-light, rather shallow sound, but with reasonable clarity and cohesiveness for a system of this price. Although the deck is very susceptible to shock, its low weight seems to have reduced any tendency to 'overhang' in the bass. FM reception was found better than average, despite a slightly 'indeterminate' and 'thin' quality heard on some programme material.

The cassette deck exhibited much the same 'thin' quality as the tuner, perhaps a tonal-balance effect. A degree of speed (pitch) instability was also noticeable at times, but again the basic performance on music was quite good, especially using metal tapes which sounded crisper and more vivid than chrome-bias types. The latter gave a rather bland, though unexceptionable overall performance.

In isolation, and even more so in system context, the amplifier was well up to its task. In the better, reference system the amp could be heard to 'shut down' slightly in the bass, reducing impact and weight in this region. The sound also went obviously 'hard' when the amp was driven very hard, but the high efficiency of the supplied loudspeakers will prevent such problems arising in normal use; the bass dryness of the amp probably helped by masking other inadequacies in this region, especially when playing records.

Finally, the speakers were a considerable improvement on typical rack system models. On the debit side, they had a 'wooden' bass feel, and sounded generally slightly inarticulate and unable to generate stereo 'depth' images; but for the most part they are fairly smooth and inoffensive.

Conclusions

It must be said that the System 20 is visually uninspiring, but on audition each component managed a degree of basic competence and compatibility missing from many similar packages. Supplied with better-than-average loudspeakers, this system warrants recommendation.

GENERAL DATA

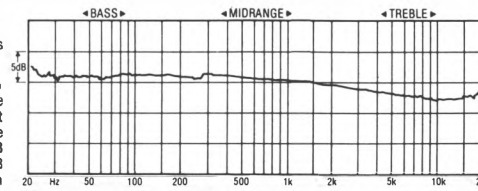
Amplifier: SB-M20
Power output, per channel, at 1kHz . . . . . 45 watts

Record deck: SR-B20
Speed variations (wow and flutter) 0.07%
Speed drift . . . . . average
Speed accuracy . . . . . 0.6% fast
Arm/cartridge resonant frequency . . . . . 13Hz, acceptable
Cartridge channel balance . . . . . within 0.6dB
Cartridge channel separation (crosstalk) . . . . . – 24dB
Cartridge tracking ability at 2g downforce 75μm

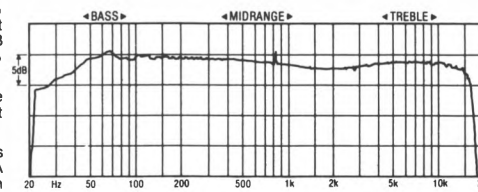
Cassette deck: PC-G10
Tape used for tests . . . . . TDK SA (maker's recommendation)
Frequency response ('chrome' or 'II' position) . . 29Hz – 15kHz
Speed variations (wow and flutter) 0.14%
Speed drift . . . . . excellent
Signal-to-noise ratio, with Dolby B 63dB
Distortion at OVU, with Dolby B 1.6%

Tuner: ST-U20L
Sensitivity . . . . . below average
Signal-to-noise . . . . . excellent

General
Maximum volume level in room (typical, with SS-20 speakers supplied) 100dBA
Rack dimensions (w x d x h) . . . . . 46.5 x 44.5 x 91cm
Speaker dimensions (w x d x h) . . . . . 26 x 21.5 x 46.5cm
Price . . . . . inc speakers, £330



Disc: frequency response with cartridge supplied



Cassette: record/replay frequency response

Toshiba System 30

Toshiba (UK) Ltd, Toshiba House, Frimley Road, Camberley, Surrey GU16 5JJ
Tel (0276) 62222

System 30 from Toshiba is the 'grown up' version of the less expensive System 20, with a more sophisticated electronics line-up, a larger pair of loudspeakers and a much more elaborately-built rack housing. This has excellent standards of fit and finish, a very easy assembly procedure (supported by excellent instructions), and an optional additional shelf. The rack is unusually tall, and even more unusual comes with centre opening double doors, themselves well protected by the construction of the rack sides, base and top.

Turntable: SR-B30F

A fully-automatic derivative of the turntable used in the 20 system, this model has a slightly better-made platter and various chassis modifications which result in a smarter and more expensive-looking design. The important differences though are in the use of a DC servo-controlled motor (though there is no pitch control, often found on Japanese decks of this type), and a different (though related) cartridge. Weighted wow and flutter was actually found slightly higher than the SR-B20's, though still good at 0.09%; but the advantages of the servo control showed up clearly in the improved result for pure wow (speed variations with a slower rate of change), now very good. There is a trade-off though in that this deck hums quite loudly when under power both mechanically and (to a smaller degree) through the system's loudspeakers. It also is more susceptible to externally-applied shocks. The cartridge has a declining response at high frequencies but measures smoothly.

Cassette deck: PC-G30

The cassette deck, we found, produced some horrendous noises when transport modes were engaged — indeed it gave a continuous whine when switched on, presumably from the capstan/pinch-wheel assembly.

These points apart, the cassette deck works well, and is well equipped. Noise reduction is by Dolby B and C, and the transport controls, which are clearly laid out, have an attractive light-touch action. The deck has a separate reel motor giving faster wind and allowing more stable tape-to-head contact than in System 20's single-motor deck. It measured acceptably on all counts and is well set-up for the Type II (chrome position) tape we used, TDK SA.

Tuner: ST-S30

System 30's quartz synthesiser tuner has some attractive features, not the least of which is a back-lit LCD display of tuned frequency, which doubles-up as a clock if required, or when the tuner is switched to standby. I'm less happy about the omission of long-wave from this product though.

Ten station frequencies can be stored using the pre-set buttons, these also doubling as 'direct entry' keys so that frequencies can be 'called-up' — rather like dialling on a press-button telephone. Background noise levels and sensitivity both rated as good on FM, but the tuner was found slightly susceptible to background whistles. AM performed well, giving relatively low interference levels and a clean, incisive sound.

Amplifier: SB-M30

Light-acting microswitches replace mechanical push-buttons for source selection on this amplifier, which otherwise looks very like the amp supplied with System 20. There are a few additional facilities though; two pairs of speakers can be used, together (in series connection) or singly, and a second tape input has been added, increasing versatility considerably. A mono/stereo switch (increasingly rare

these days) has also been provided and Toshiba have also fitted a subsonic (high-pass) filter which proved useful in 'cleaning up' the bass end of the sound from the rather excitable record deck supplied. Power measured more than 65watts, whilst maximum usable volume in the listening room was a high 100dBA.

Loudspeakers: SS-30

Although these loudspeakers look like nothing more than enlarged SS-20s, as used in the smaller system, they certainly don't behave that way. A similar array of three drive units is used, the large bass driver being heavily doped. Cabinet construction is light, and the rudiementary crossover (just series capacitors for the smaller drivers) and the small quantity of internal damping used demonstrate an unfortunate degree of penny-pinching. The speakers are quite well finished though, and surprisingly large. As usual, they worked best away from walls and on stands. The frequency response, measured in the listening room, was erratic, to put it mildly. Note the response peaks on the plot at around 700Hz and 5.5kHz.

In use . . .

The loudspeakers sounded as ragged as the in-room response suggests, and this component therefore dominates the performance of the system. With a shallow bass, and a hard, gritty and 'raspy' treble clearly associated (at least in part) with the 5.5kHz peak, the speakers sounded so obtrusive it was difficult to hear what the rest of the equipment was doing. More significantly, it became very difficult in my view to make any judgements on the music being played! A pity, this, as the rest of the sustem worked at least adequately, and in certain respects very well.

Using the Kef loudspeakers, it was always clear that the system didn't aspire to being as neutral and transparent as the best; there was a trace of 'transistor-type' hardness associated with the amplifier, for example, and the turntable sounded somewhat unrefined and 'heavy' in the bass, this ameliorated to an extent by the subsonic filter. Tuner and cassette deck, though, were excellent. The cassette deck was obviously well set up for both Type II and IV tapes, and produced clean, stable recordings with Dolby B and C. And the tuner too gave crisp, open sound quality and positive, unambiguous stereo.

Conclusion

I understand from the importer that it may be possible for dealers to place a special order for this system without the SS-30 loudspeakers. If System 30 fits your bill, this would clearly be an excellent idea. As it stands, these speakers do let the system down badly, and Toshiba should consider a replacement design. Though the turntable was a little disappointing, and audibly worse than the model supplied in Toshiba's own cheaper system reviewed earlier, the other components — cassette deck and tuner especially — work well.

GENERAL DATA

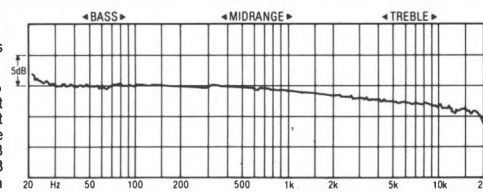
Amplifier: SB-M30
Power output, per channel, at 1kHz . . . . . 70 watts

Record deck:
Speed variations (wow and flutter) 0.09%
Speed drift . . . . . excellent
Speed accuracy . . . . . 0.6% fast
Arm/cartridge resonant frequency . . . . . 12Hz, acceptable
Cartridge channel balance . . . . . within 1.8dB
Cartridge channel separation (crosstalk) . . . . . – 30dB
Cartridge tracking ability at 2g downforce 80μm

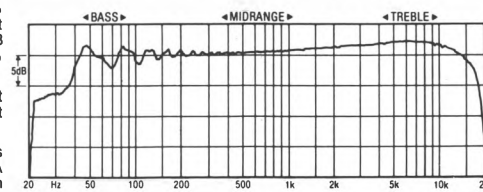
Cassette deck: PC-G30
Tape used for tests . . . . . TDK SA (maker's recommendation)
Frequency response ('chrome' or 'II' position) . . 40Hz – 16kHz
Speed variations (wow and flutter) 0.09%
Speed drift . . . . . excellent
Signal-to-noise ratio, with Dolby B 60dB
Distortion at OVU, with Dolby B 1.0%

Tuner: ST-S30
Sensitivity . . . . . excellent
Signal-to-noise . . . . . excellent

General
Maximum volume level in room (typical, with SS-30 speakers supplied) 100dBA
Rack dimensions (w x d x h) . . . . . 50.5 x 45 x 101.5cm
Speaker dimensions (w x d x h) . . . . . 32 x 24 x 56cm
Price . . . . . inc speakers, £500



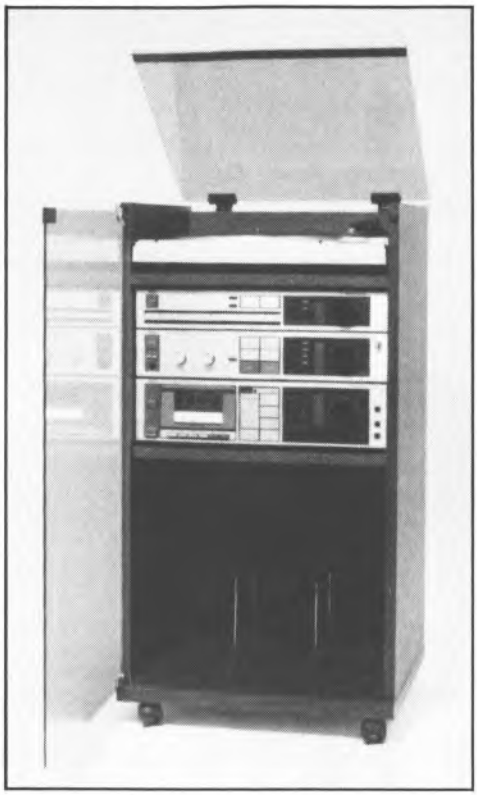
Disc: frequency response with cartridge supplied



Cassette: record/replay frequency response

Trio V31 System

Harman (Audio) UK Ltd, Mill Street, Slough, Berks SL2 5DD
Tel (0753) 76911



Trio is a Japanese company whose roots are firmly in high fidelity. Their racks, along with their other audio components, are marketed in this country through a relatively small number of specialist outlets — by and large you won't find them in the big high street stores or discount houses.

The V31 system is based on a range of newly-designed electronics which present a cleanly laid-out and attractive face to the world. Ergonomics have clearly been a high priority, and so has the presentation of the system in its well-finished rack with its smoked glass door and lid. The task of screwing the rack together was no more onerous than usual, and the final result was flaw-free, if a trifle less steady than the best.

Trio's UK distributors, Harman UK, should be able to supply the Harman T2000 loudspeakers to match the V31 system, though these were not available at the time of the review. Instead, the V31 was tested with the Kef Coda speakers.

Turntable: KD-21R

This turntable is a 'semi-auto' type; it starts automatically when the arm is moved towards the platter, and the arm returns automatically at the end of the record. A hydraulic lift/lower device is fitted, but care needs to be taken to avoid jogging the stylus when this is used. Drive is by belt from a synchronous motor, and springy feet are used in an attempt (largely unsuccessful, I'm afraid) at environmental isolation. The straight arm tube has an integrated cartridge/headshell which can be replaced by an accessory headshell with universal mounting if you fancy a change of cartridge. The arm bearings have considerable free play though, and this is likely to prove a limiting factor in trying to squeeze higher sound quality from this turntable. Measurements show the Trio to run fast by 0.9% (noticeable on audition), but to be competent in other areas. The cartridge supplied shows a slowly declining response with increasing frequency until the tip-mass resonance peak near 15kHz.

Cassette deck: KX-31

A Dolby B (but not C) equipped deck, the KX31 has slightly 'clanky' power assisted switching and otherwise neat and simple controls. Few unnecessary 'extras' are provided; however the deck is suitable for unattended timer-controlled recording if you have a suitable timer. There are small failings; while the record level meters are too bright, the dark, recessed cassette well is unlit, making it hard to see how much tape is left to run. Furthermore, the review sample emitted a constant low-level hum when switched on. On test, the deck gave a smooth, even frequency response, but wow and flutter measured on the high side of average at 0.12%. Signal-to-noise was satisfactory, taking into account the low distortion at 0VU — you can afford to over-record on the meters a little.

Tuner: KT31L

Although the KT31L is a three-waveband model (FM, MW and LW), the addition of LW has clearly detracted from the integrity of the control layout and waveband indicators. The conventional tuning scale is well marked but is not illuminated — instead, the cursor incorporates an LED that changes colour to show when a station is properly tuned. Signal-strength metering is also included, but again

this uses lights that are too brightly lit for me. The tuner is both sensitive and quiet on FM, whilst AM gives quite good sound, but with a fair amount of whistles and other forms of interference.

Amplifier: KA-31

The amplifier has a neat source switching pad with clear illumination of the source selected, whilst the other controls are equally well thought out. Tone defeat switching is incorporated, and is worth using — I found that the sound became a little heavy and sluggish with the tone controls in circuit, and airier and more ambient with them switched out. There is a very slight problem, perhaps with the earthing arrangement of this amplifier. With the volume cranked up high, a faint 'spitty' noise can be heard through the speakers when a hand is placed near the cartridge — and a smaller amount with the arm left to its own devices.

The power yield of the Trio is a clean 35watts, and the maximum usable volume output with the Kef Codas a medium 98dBA.

In use . . .

Apart from running noticeably fast, the turntable gave a somewhat disappointing 'tizz and boom' effect on much musical material, with an obviously bright and harsh high frequency reproduction and a wooden, 'slow-sounding' bass — the midrange being overshadowed by these characteristics. Nevertheless, there were signs of some real musical ability below these surface effects: speech, for example, sounded fine, with consonants and vowel sounds well articulated on speech, and a crisp, detailed presentation on music — albeit with a rather fierce emphasis of record surface noise.

The amplifier sounded a little bass-shy, other than on records, and had a slightly mechanical, relentless feel at high volumes especially. Again though, there was real musical ability for all this: the overall presentation being dry, but both detailed and dynamic.

The tuner, in line with Trio's reputation, was the strongest element, with a crisp, clean and open sound quality on FM. There were some slight background whistles at times, but stereo information was well presented in an ambient, open soundstage. The cassette deck gave good recordings, with a small loss of airiness and stereo stability. It worked well on all tape types, but metal tape did not bring much practical benefit on this deck. Pre-recorded cassette replay was also good. The V31 system will suit most good loudspeakers under, say, £100 or so.

Conclusion

Bright and positive maybe, but the overall musical performance of this system was rather brash at times, and perhaps unnecessarily revealing of inadequate records and tapes. Not a firm overall recommendation then, but the good-looking V31 could still prove a good buy for those primarily interested in radio and tape.

GENERAL DATA

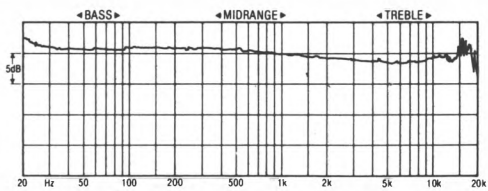
Amplifier: KA31
Power output, per channel, at 1kHz ..... 35 watts

Record deck: KD21R
Speed variations (wow and flutter) 0.09%
Speed drift ..... average
Speed accuracy ..... 0.9% fast
Arm/cartridge resonant frequency ..... 10Hz, acceptable
Cartridge channel balance ..... within 0.4dB
Cartridge channel separation (crosstalk) ..... – 24dB
Cartridge tracking ability at 2g downforce 80μm

Cassette deck: KX31
Tape used for tests ..... TDK SA (maker's recommendation)
Frequency response ('chrome' or 'II' position) ..30Hz – 16kHz
Speed variations (wow and flutter) 0.12%
Speed drift ..... excellent
Signal-to-noise ratio, with Dolby B 60dB
Distortion at OVU, with Dolby B 0.60%

Tuner: KT31L
Sensitivity ..... good
Signal-to-noise ..... good

General
Maximum volume level in room (typical, with Kef Coda speakers) 98dBA
Rack dimensions (w x d x h) ..... 48.5 x 44.5 x 91cm
Speaker dimensions (w x d x h) ..... 26 x 22 x 45cm
Price ..... £389 (inc speakers, £429)



Disc: frequency response with cartridge supplied

Cassette: record/replay frequency response

Trio V71 System

Harman (Audio) UK Ltd, Mill Street, Slough, Berks SL2 5DD
Tel (0753) 76911

This system can be bought either with speakers, manufactured in the UK under the Harman brand (Harman UK being the Trio importer and distributor for this country), or without; the difference in cost is around £70 at typical shop prices.

Comprehensively equipped, the V71 system features a powerful (80watt) amplifier; a synthesiser tuner with 12 pre-sets over the three wavebands, an auto-reverse cassette deck and a direct-drive turntable. The speakers classify as 'large bookshelf' models, though they are best used on open stands, and have three drive units each. As with the V31 system, ergonomics are a strong point with most of the components, though the complexity of the cassette decks operating options inevitably takes its toll. For this review, the system was used both with its own loudspeakers and with the Kef Codas.

Turntable: KD-51F

A direct-drive model, the KD-51F has full automation for initiating play, as well as returning the arm and cutting the motor at the end of side. Records can still be cued manually if desired. It works at the two usual speeds, and a switch at the front of the turntable informs the auto-mechanism of the size of the records — brush-up your metric though, as it is not marked in inches! The arm has a straight arm tube with a detachable integrated arm/cartridge assembly, but an accessory headshell can be obtained if you want to change the cartridge. The unit sits on soft rubber feet, there being no other isolation from the environment.

The turntable automation was maladjusted on the review sample, the arm descending short of the edge of the record. Adjustment appears to be an internal job, best left to the supplying dealer if required. The machine otherwise operated correctly, if somewhat tediously in the manner of most automatic turntables. The V71 had an earthing (?) problem similar to the V31 — with a hand on the headshell and the volume raised, there was a marked increase in high frequency noise through the system. With the treble raised, the system could reach the point of parasitic oscillation. Harman should investigate this.

As with the majority of quartz controlled direct-drive motor units, the KD-51F ran at the correct (average) speed; but both wow and flutter and slow-rate speed drift were much poorer than usual, indicating a relatively crude servo system. The arm bearings were also poor, with a great deal of free play. Cartridge performance, though, was fine, according to our measurements.

Cassette deck: KX-71R

Trio have clearly gone to considerable lengths to keep the number of operating buttons and switches to a minimum, in the interests of visual simplicity. Consequently, what appears to be a very straightforward machine to operate – and it is if you keep to the traditional functions – conceals a complex maze of extra facilities that operate in slightly obscure fashion that will require some acclimatisation.

A major feature is auto-reverse, using a rotating head system and triggered by a photo cell at the end of a side – so that on continuous recordings using both sides of the tape there is literally just a momentary gap in the recording. The deck also incorporates a

host of auto and repeat functions based on finding the gaps between recordings, including 'index scan' capable of playing the first few seconds of each of a sequence of tracks. Two noise reduction systems are provided, Dolby B and C.

With the recommended Type II tape, TDK SA, the KX-71 showed a rising frequency response on test (exaggerated a little by making the measurement with Dolby B switched in), but other parameters checked out fine – indeed giving a usefully better working dynamic range than the cheaper KX-31.

Tuner: KT-51L

In contrast to the tuner used in the V31 system, Long Wave is clearly *not* an afterthought here; the tuner has six pre-sets on FM and six on AM, the tuner switching freely between MW and LW on the AM setting according to the frequencies stored with each pre-set button. Curiously, there is no signal strength indicator, though there is a 'tuned' light, but this can be justified by looking at the product as a 'set-up and forget' type tuner, designed for the general user rather than for those concerned with DX (long distance) reception using rotating aerials and so on. Like all digitally tuned models, the KT-51L makes an awkward package to use as in manual mode. The synthesiser tuning method only really comes into its own when you use the pre-sets, when it gives great convenience.

This is a quiet model given a reasonable FM signal to work on, but on test there were some low-level spurious background tones on test, perhaps injected into the signal path from the synthesiser circuitry. Sensitivity is only fair. AM sound quality was rather poor, and overly subject to interference.

Amplifier: KA-71

Inputs are available for disc, tuner and two tape recorders (or one recorder and one other 'auxiliary' item. As well as the usual bass and treble tone controls, Trio have fitted a tone defeat switch, which we found well worth using, and a stereo/mono switch. The KA-71 accepts two pairs of loudspeakers, and adopts the unusual practice of having a rear panel switch to set the impedance of the speakers in use. The usual setting (which applies with the supplied speakers and most others) is the 8ohm one; but if 4-6ohm speakers are used, or two pairs of 8ohm ones, the switch should be set to 4ohms.

Power output on test was a healthy 80watts, and with the Harman speakers hooked up, the available volume was no less than 102dBA – which is loud!

Loudspeakers: Harman T4000

Harman have played the 'more drive units are better' game here, and have got away with it! For a box this size, three drive units could normally be regarded as a 'selling' feature rather than one designed seriously to improve sound, and certainly build compromises have been made. The front baffle looks suitably

GENERAL DATA

Amplifier: KA-71
Power output, per channel, at 1kHz ..... 80 watts

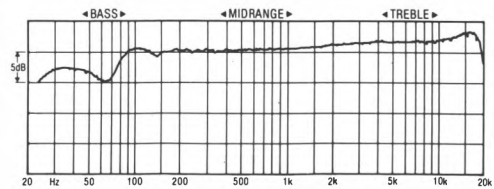
Record deck: KD-51F
Speed variations (wow and flutter) 0.11%
Speed drift ..... poor
Speed accuracy ..... speed correct
Arm/cartridge resonant frequency ..... 10Hz, acceptable
Cartridge channel balance ..... within 0.2dB
Cartridge channel separation (crosstalk) ..... – 23dB
Cartridge tracking ability at 2g downforce 80μm

Cassette deck: KX-71R
Tape used for tests ..... TDK SA (maker's recommendation)
Frequency response ('chrome' or 'II' position) ..63Hz – 16kHz
Speed variations (wow and flutter) 0.09%
Speed drift ..... excellent
Signal-to-noise ratio, with Dolby B 60dB
Distortion at OVU, with Dolby B 0.5%

Tuner: KT-51L
Sensitivity ..... fair
Signal-to-noise ..... good

General
Maximum volume level in room (typical, with Harman T4000 speakers supplied) 102dBA
Rack dimensions (w x d x h) ..... 48.5 x 44.5 x 91cm
Speaker dimensions (w x d x h) ..... 27 x 23.5 x 56cm
Price ..... £629 (inc speakers, £699)

Disc: frequency response with cartridge supplied



Cassette: record/replay frequency response

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busy when the cover is removed, with its complement of bass and midrange cones, plus the small semi-horn-loaded tweeter – not forgetting no less than two ports. The cabinet is made of good-quality chipboard, although inside it is undamped and all but unlined. There is no real crossover network, just a capacitor in line with each of the smaller units to protect them from overload. Finish is adequate, in vinyl woodgrain material, whilst the front baffle is black.

It was no surprise to find that the speaker was very efficient – that is, it goes loud without needing too many watts from the amplifier. It was also no surprise (given the thick wooden grille frame used) to find that the speakers sounded a great deal better with the grilles removed. Whether you like the looks without said grilles in place is a matter of personal taste.

In use . . .

Comparisons with the cheaper Trio V31 system proved instructive, if not entirely in the more expensive model's favour. The turntable with the V71 setup is rather heavier built, and incorporates a different motor system: but despite the advantage of price, record reproduction with the V71 was thought decidely inferior. Surface noise was certainly less fierce, though some sharpness remained at high frequencies, but the sound overall had a heavy, 'leaden' feel. There was plenty of volume available from this system, but subjectively a curious absence of energy or tautness to the sound, whilst music with a strong rhythmic element lost incisiveness and pace. Overall there was a significant loss of detail, of information off records.

The tape deck too was not without problems, though these are almost certainly curable by a properly equipped dealer. Results using TDK SA tape were very good, in fact, using both Dolby B and C noise reduction. The sound went haywire using TDK's MA-R metal tape with Dolby C, though, strings sounding very wispy and thin. With Dolby B the sound was better, but still no match for the cheaper Type II formulation, and it was clear that the Dolby circuitry was not 'tracking' properly between record and replay. This quite common problem can be cured quite easily by any dealer equipped with fairly basic instrumentation, and in any case is not a problem inherent to the design of the deck itself. It *is* an indication that quality control wasn't fully up to scratch here.

The tuner is a happier story, and it worked well. With low voltage signal inputs – as would be had using a poor aerial, or when trying to receive a weak station (below about 100μV) the sound acquired a rather 'gritty' character. But at more normal levels the basic sound quality was crisp, clean and open. Dynamics and the stereo soundstage were well defined. It must be said that the simpler analogue tuner from the V31 system gave marginally better sound quality still, but the extra cost does buy a tuner with the not inconsiderable virtue of pre-set operation, making mistuning a thing of the past.

In this system at least, the amplifier was not the limiting factor. In the external test system it impressed as producing an authoritative and dynamic sound, with better bass extension and control than the V31 – or quite a few other amplifiers we tested. Very complex, close-miked recordings could 'trip it up' and make the sound a little 'messy', and there was a trace of a 'quacky' colouration. But these shortcomings were not at all serious, and the KA-71 in isolation is clearly quite good value. Note however that the reference in the instructions to its compatibility with moving-coil cartridges should be taken to include only those of the high output type (greater than about 0.5mV/cm/sec).

Finally, the loudspeakers proved to be something of a surprise. Notwithstanding a rather hollow, boxy 'one-note' bass – more apparent on orchestral recordings than on rock, strangely enough – the performance through the midrange and treble was thought essentially clear and well defined, with well articulated speech reproduction. A good off-axis response makes it possible to sit right round to the side of the speakers without losing much. There is a proviso though; as noted earlier, for best results the speakers must be used with their grilles removed – they become very 'shrieky', and even boxier, unless this is done. Finally, they need to be used on tall, open stands well away (say 20in in or so) from walls, to control the otherwise loose and coloured bass. Given their £70-ish price tag, the Harman loudspeakers are definitely quite acceptable.

Conclusion

High power output, a fair loudspeaker performance and good radio and tape reproduction mark this system out. Judged by the stiffer standards appropriate to a system of this price level, though, an unqualified recommendation cannot be given here.

Yamaha System A-05

Natural Sound Systems, 7 Graycaine Road, Watford, Herts WD2 4SB
Tel (0923) 36470

Yamaha is a Japanese manufacturer of both hi-fi equipment and musical instruments. The 05 system is a straightforward and cleanly styled package with an excellent, solidly constructed rack that was easy, if tedious, to assemble. Finish, in a light wood-effect vinyl, is excellent, and the completed product has an unusual heavy wooden hinged top in place of the usual glass lid. Both top and bottom sections project proud of the glass door which makes the latter more difficult to catch against with clothing – a useful safety benefit. The system is sold without speakers.

Turntable: P-200

The two running speeds of this belt-drive turntable are controlled by its servo-locked DC motor. The deck, which is physically quite large, is a little more solidly built than usual, though the top plate is the usual plastic moulding. The platter itself though is heavier-than-average for a deck at this price, and the mat too is quite heavy and well-designed. The straight arm has some slack in the bearings, and the detachable headshell too is rather less than ideally rigid. The deck offers manual start, using a damped cueing platform, whilst arm return is automatic at end of side.

Measured frequency response of the cartridge supplied showed a rather more pronounced upper-midrange/treble dip than usual, even for a budget cartridge. This dip reaches – 3.5dB between 4 and 6kHz before recovering to what appears to be a very early tip-mass resonance near 12kHz. Not a promising start. Additionally, both crosstalk and (to a degree) tracking ability were below par on our measurements. The basic elements of turntable performance on the other hand were fine, wow and flutter (steadiness of pitch) being especially good.

Tuner: T-05

This neat analogue tuner employs scale-and-pointer indication of frequency, and although the scale is a little cramped in length, it is clearly marked and easy to read. The rest of the controls are strictly functional, with three press-buttons for the three wavebands, FM, MW and LW; one for FM interstation muting, combined with the stereo/mono switch as usual; plus the on/off and tuning controls. Tuning aids take the form of a three-LED signal strength meter, but no centre-tune indicator.

The T-05 is both sensitive and quiet on FM, the background noise being clean in character and with no noticeable hum or other spurii. AM sound quality is exceptionally good. It sounds unusually sweet and clear, with a clearly extended high frequency response and fairly low levels of interference.

Cassette deck: K-300

This deck is in character with the tuner, having fairly basic facilities which have been properly thought out to offer rather better-than-average ease of use. With two drive motors (one for the capstan/pinch wheel assembly and the other for the reels) the K-300 has Dolby B and C noise reduction systems fitted.

The control panel features a large flat 'rocker' pad which is pressed on different edges to give the required commands to the logic controlled transport. Recording can be initiated with one finger to set 'record pause', a subsequent push on the 'play' key starting the tape. The deck automatically detects the type of tape inserted, be it metal, chrome (or chrome bias) or ferric. Good quality metering is employed, but other facilities are sparce. Timer-controlled recordings are provided for (using your own external timer) but there are no counter memory or programme search facilities.

Unfortunately, the deck was found to suffer the common problem of not being properly aligned electrically. No specific tape brands

are suggested, but Yamaha have been associated with Maxell in the past, and this brand gave the nearest to flat response of those measured; but even this tape appeared to be significantly underbiased using the Type II position, producing the elevated high frequency response shown in the plot. The other parameters checked though were fine, wow and flutter being notably good.

Amplifier: A-05

The A-05 has inputs for the other system components, plus an auxiliary input which could be used for a CD player or other device. Two pairs of loudspeakers can be connected. Facilities include the normal tone controls plus a variable loudness one that progressively reduces midrange output, but not bass or treble, as it is rotated counter-clockwise from the 'flat' position. As usual, loudness merely duplicates what is already available via the tone controls, and this applies to Yamahas variable control no less than the usual fixed-contour loudness switch. The amplifier is ergonomically sound and attractively laid out. Power output measured 33watts per channel at 1kHz. Maximum undistorted output volume using the standard test was 99dBA – loud!

In use . . .

The amplifier was a real surprise. It had a vivid, open and dynamic quality that set it apart from many of its peers. With excellent stereo and a sense that instruments were well separated so that musical strands could be easily followed, even the slight splashiness at high frequencies and lack of real impact at low ones couldn't stop this being one of the most communicative and revealing, and therefore unfatiguing, amplifiers tested. The tuner was almost equally good, though there was a sense of a loss of 'space' around instruments that occasionally manifested itself as a dryness of reproduced ambience.

The turntable and cassette deck were less satisfactory. The cassette deck in particular suffered from the uneven frequency response already mentioned, it also sounded rather coarse and generally unrefined. The turntable's sound quality too was on the 'crude' side of neutral. It had a rough and ready kind of presentation, with little sense of 'flow' to the music, and a treble quality that was at times wispy, and at times hard and gritty. Most of those shortcomings though were traced to the cartridge which was much cruder in sonic performance than many competitors. With a better cartridge (I tried a Nagaoka MP11) performance was improved to the point where the Yamaha turntable was at least of average performance.

Conclusion

A good system this, let down only by the readily-correctable problems of the cassette deck and cartridge as supplied. The system will work with most loudspeakers very well indeed (on radio especially), and it's an easy system to use. It must be recommended.

GENERAL DATA

Amplifier: A-05
Power output, per channel, at 1kHz . . . . . 33 watts

Record deck: P-200
Speed variations (wow and flutter) 0.06%
Speed drift . . . . . good
Speed accuracy . . . . . 0.3% fast
Arm/cartridge resonant frequency . . . . . 12Hz, acceptable
Cartridge channel balance . . . . . within 0.4dB
Cartridge channel separation (crosstalk) . . . . . – 20dB
Cartridge tracking ability at 2g downforce 80μm

Cassette deck: K-300
Tape used for tests . Maxell UDXLII (maker's recommendation)
Frequency response ('chrome' or 'II' position) . . 35Hz – 17kHz
Speed variations (wow and flutter) 0.07%
Speed drift . . . . . very good
Signal-to-noise ratio, with Dolby B 61dB
Distortion at OVU, with Dolby B 1.2%

Tuner: T-05
Sensitivity . . . . . good
Signal-to-noise . . . . . good

General
Maximum volume level in room (typical, with Kef Coda speakers supplied) 99dBA
Rack dimensions (w x d x h) . . . . . 48.5 x 45 x 88cm
Speaker dimensions (w x d x h) . . . . . —
Price £440

Disc: frequency response with cartridge supplied

Cassette: record/replay frequency response

CONCLUSIONS

General conclusions at the completion of the test programme include some surprising findings on cost-versus-performance and the value of some much-vaunted 'extra' features.

The really startling thing that emerged from having gathered 50 systems in one place at one time – was how similar most of them looked, but how different they sounded!

There was some correlation between price and musical merit, but nothing like as much as the buyer has a right to expect. Some of the more expensive systems were well thought out, and offered real benefits in line with the price tag, but in a number of cases, the designer's imagination has clearly not gone beyond supplying elaborate packaging and expensively executed gadgets and gimmicks. We found a number of instances of manufacturers producing high cost systems which offered no real benefit compared to cheaper systems from the same stable. Not that it was necessary to pay a lot to find over-complicated, gadget-ridden equipment where something simpler could have better sound for the same price.

Undoubtedly these things merely reflect the marketing priorities of the companies concerned, but a less charitable explanation would point to a degree of contempt for the tastes and requirements of buying public. The other, positive, side of this particular coin is the fact that the best of the systems reviewed are competitive with similarly-priced, well chosen systems of separate, with all the packaging and convenience benefits offered by the rack format.

Turntables

On the whole, the turntables were a disappointing lot. Most of them merely confirmed a trend that has been evident for quite a while now; the mechanical engineering content has been systematically weeded-out of the product, and electronics substituted in its place. Thus where heavy, well-engineered platters and main bearings used to be coupled with carefully-designed drive systems to give accurate, stable platter rotation, the tendency now is to make these items very cheaply, and to use an electronic servo-speed control system to correct an inherently poor basic performance.

Whilst the end results may well be equivalent in some terms, there are less desirable side effects because that well-engineered platter, bearing and so on did more than just ensure good rotational performance. They also helped record reproduction generally by providing a reasonably inert, stable and non-resonant platform to play records on. The overwhelming evidence from a number of sources, and it's certainly confirmed by the results from the 50 turntables in this project, is that despite the window-dressing of high technology (direct drive motors, quartz control servo systems etc) most players employ very crude engineering and that music reproduction suffers as a result.

Specifically, there was very little evidence that most manufacturers have paid much heed to isolating their turntables from shocks, knocks and feedback. Flimsy plastic shells now stood in for solid plinths, poor springy feet replaced suspension systems, and bearings, both on the platter and the arm, tended to be loose to give low friction while keeping assembly cheap.

Having said all this, there were encouraging signs with some of the more expensive units. As a breed, the parallel tracking turntables were rather more solidly and carefully made than the majority of the pivoted-arm models, and perhaps as a result they tended to give a more solid, believable and tight musical performance. There were certainly less excitable and less prone to feedback than average.

But the best performance of all came from those models that embraced traditional enginering qualitites in their design. Undoubtedly, the best were the record players from Rotel which use lots of weight and high quality components and bearings, and the very clever Dual CS-505 which is one of the very few to use a full, floating suspension in its design. The two B&O turntables and the NAD were in their way even cleverer, the former being fitted with excellent cartridges and the latter leaving the choice to the purchaser (like the Rotels). All of these models are recommendable in their way, though the NAD unit is a little awkward to handle, and a pig (I am sorry to say) to set up in the first instance.

The worst-sounding models tested wre those supplied as part of the Amstrad, Binatone, Sentra and Tensai Compo 10 systems. These units offered extremely crude engineering, practically no perceived dynamic range on audition and a generally congealed, rough sound. The ceramic cartridges fitted met none of the criteria of high-quality music reproduction. Absurdity knows no bounds, we

thought, when faced with a belt-driven, parallel tracking turntable using a ceramic cartridge! Note that ceramic cartridges can be made to work tolerably well – such designs as the old Decca Deram spring to mind here – but even with a good ceramic cartridge, correct electrical termination (usually 1Mohm) is required to make them 'sing'. The ones used in the models named above all too clearly didn't sing at all, though the Tensai Compo 10 installation was slightly more successful.

Finally in this section, it's worth reiterating that the rack housings themselves were a limitation on turntable sound quality because when sat on a typical carpeted, suspended floor, as during the tests reported on here, they were far from being sufficiently solid. Used on a structurally sound surface, the shelf-top systems were generally at an advantage here, and free-standing rack system buyers should consider what measures can be taken to support the players better. The most obvious route would be to replace the castors with solid wooden props – or even to screw through the backs of the units to the wall behind.

Cassette decks

The cassette decks tended to be more evenly-grouped as a whole than the turntables, but there was one inexcusable problem that arose time and time again. This concerned the incorrect setting-up for Type II tapes, as revealed all too clearly in some of the measurements. A large percentage of models suffered from this, which from auditioning results clearly extended to both ferric (Type I) and to a slightly lesser degree metal (Type IV) tapes too. The effect was an unbalanced frequency response, with too much treble giving a 'bright' sound, though midrange aberrations were by no means absent. Dolby noise reduction circuits rely on a flat frequency response for correct 'tracking' – so an unbalanced response leads to other audible anomalies such as confusion of the stereo image and 'comings and goings' of quieter instruments as the overall volume level changes. These effects were noted frequently during the tests.

On a related topic, it was disappointing to find that so few manufacturers gave clear, unequivocal recommendations concerning which tape should be used for each tape setting. Sometimes whole lists of tapes are recommended, which strictly speaking is another absurdity because the tapes are usually quite different in measured performance from each other. If one tape is 'correct', the others are guaranteed not to be!

There is now a widespread adoption of the 'programme search' facility, but this by its nature is incapable of dealing with speech and many types of music that contains prolonged quiet passages. I can see the value of programme search as an additional feature where some sort of memory search facility is already provided.

'Programme search' generally proved unreliable in practice, not always stopping during clear programme gaps that were too short, but being triggered on other occasions in the middle of musical passges. I also noted with some sadness the almost universal eclipse of the 'cue' and 'review' feature where a speeded up 'Chipmunks' version of the programme can be heard over the loudspeakers – a useful means of identifying wanted places on a tape. Intriguingly, the Rotel deck actually has this feature, but the maker forgot to mention the fact, either in the literature or on the front panel of the recorder itself!

On the other hand, some long-term gripes about cassette decks in general are now being put right. Many of the decks had automatic tape-type sensing, so you don't need to remember to make this setting each time a tape is changed for one of a different type. Record-level meters too were generally informative, well adjusted and clear, and setting levels should cause few headaches in most cases.

Also very welcome is the switch to powered or logic transport controls which make for pleasant and foolproof operation. During the entire project, only one tape was actually written off as a result of cassette deck misbehaviour, and on the mechanical side, the majority of models appear well engineered and probably likely to last. With a few exceptions, the decks gave reasonable basic sound quality, but without exception they sounded a bit 'vague' in the stereo sense and lacking in both low- and high-frequency definition compared to the best of the turntables.

Again, the unhappiest story was told by those decks fitted to the very inexpensive systems. Operationally they gave no reason for confidence in their engineering quality, and they were generally extremely uneven, noisy and unstable in their performance. Some of the decks pretended to offer facilities they didn't in fact possess. Thus Amstrad's 'metal tape

facility' is a sham inasmuch as the unit cannot give the correct bias for recording on Type IV metal tape. At least Binatone prudently add the crucial word 'play' (in very tiny lettering!) to their metal-capable claim. No deck can be compatible with Type IV metal tape for recording purposes if 'metal' shares the chrome (Type II) tape-select switch setting.

Even more misleading is the 'noise reduction' label for what in fact is a simple filter. Buyers' seeing this claim might reasonably expect to find a genuine noise reduction system such as Dolby B fitted, and a filter can by no stretch of the imagination be regarded as a noise reduction system.

Other points; the twin cassette decks which offered high speed dubbing gave universally poor performance in this mode – not unexpectedly given the technical difficulties of high-speed dubbing generally. The automatic record-level feature of a number of models is worth having if ease of use is of paramount importance, but there is some loss of sound quality which cannot be avoided. You'll probably get better results by simply setting the record-level controls of a manually set deck to their mid position, and leave it at that.

Tuners

Compared to the standards prevailing with the turntables and cassette decks, the tuners finished the tests smelling of roses – on the whole. Some of the very inexpensive models – again those in the sub-£200 systems – had severe RF problems; they frequently managed to tune in more than one transmission at a time which the sort of bonus we can do without! Nevertheless, there were very few cases of outright poor FM sound quality, and most tuners gave acceptable, if far-from-optimum AM sound quality too.

As a breed, the synthesiser tuners offered more user benefits in the form of (reasonably) assured tuning accuracy and the advantage of pre-set operation. They generally sounded clearly worse than their analogue (scale and pointer) brethren though, and tended also to suffer from spurious background whistles and other related noises. That this needn't be the case was proved by the excellent and inexpensive Fisher FM77.

A number of synthesiser tuners now offer the ability to mix presets from different wavebands at random, which means the user can design his own pre-set tuning plan according to his own logical needs. Other synthesiser tuners were slightly erratic in that they would persistently mistune themselves when in 'scan' mode, but this fault wasn't common. More common was the omission from some analogue tuners of good, unambiguous signal strength meters and centre tuning aids.

Amplifiers

I was pleasantly surprised to find that the majority of amplifiers had reasonably purposeful and un-gimmicky facilities, and were all the easier to get to grips with as a result. Still, 'loudness' controls which merely duplicate tone-control settings, and poorly thought-out tone controls themselves were in ample supply. Tone-control 'defeat' switches, where fitted, gave worthwhile sound quality improvements, but the graphic equalisers fitted to a number of amplifiers were poorly designed in that each control tended to have an influence over far too wide a band of frequencies. They universally failed to deliver better sound even where there were obvious tonal anomalies to correct.

In performance terms, the ground covered was wide. The best designs – and models like the crisp-sounding Rotels, the warm, relaxed NAD 3020 and the powerful and effective Dual CV1260 come top of the list – gave a solid, believable and embracing quality that made the systems they were supplied with more open and involving to listen to. The poorer designs generally sounded non-transparent and more 'artificial'. Subtle, easy-to-destroy qualities like coherent stereo imagery and the feeling of authority and control that is so essential to good music making were absent. But most amplifiers were powerful enough to provide ample volume levels under most conditions of use, and there were few obvious failings in use apart from a general sense of under-achievement in the phono input stages of a large number of designs.

Loudspeakers

The overwhelming number of recommendations given to systems without loudspeakers tells its own story here. The phrase 'under-achievement' used in the last section applies with a vengeance here, and the majority of the loudspeakers submitted were far from meeting any objectively realistic idea of what a loudspeaker should do. Questions of personal taste do not arise here; with far too many cheap and expensive systems alike, the designs were inadequate at best, incompetent

at worst.

There were exceptions of course, but in the majority of cases the manufacturers involved simply hadn't made a serious effort. Apart from obvious failings like flimsy, hollow sounding boxes, grille covers tended to be acoustically obstructive, internal cavities went undamped and unlined, and crossovers stood no chance of doing a proper job. A large number of the loudspeakers had large cone tweeters which were incapable of handling the frequencies assigned to them. The reason for this particular peculiarity appears to lie with the fact that high-performance tweeters tend to be inherently fragile, and are likely to self-destruct if low frequencies are fed into them. In other words, they need a properly designed crossover, and proper crossovers cost proper money!

That very simple loudspeaker designs can be made to work adequately, apparently despite the odds, was proved by odd examples like the Fisher ST-77 which incorporates most of the cost-cutting design tricks outlined above but which still conspires to give a reasonably musical and believable result. Only a few manufacturers had really gone out of their way to design thoroughly engineered models, and pre-eminent here are the two Rotal designs and the LD-20 from Marantz.

It is interesting to note in passing that more than a few manufacturers I talked to were surprisingly candid about the quality of the speakers they supplied with their systems, though they were usually ready to defend the merits of the electronics part of the package against any attack. Some suggestions for separately available loudspeakers are listed in the 'Alternatives' section.

Rack housings

I had anticipated a number of the shortcomings discussed earlier in this section before the tests began. What I had not expected was to find that so many of the systems didn't even rate as acceptable pieces of furniture. Not one single rack system housing offered a real wood veneer, and a large number of the imitations wouldn't stand up to even cursory examination. Poor hinges and door catches were common, while glass corners were often unprotected and potentially hazardous, especially with children around.

The most imaginative design, and one of the best finished, was in our view the excellent Sony one featured in the Compact 77 review, and also available with the Compact 33 and other models in their range. The worst examples came from Fisher, but it would be unfair to single this company out too strongly for condemnation when it was so obvious that so many of these pieces of furniture clearly failed even in their own terms.

Compact Disc players

Only three manufacturers (Sony, Marantz and Fisher) submitted CD players for review. The most obvious point that must be made is that as the majority of manufacturers represented here do make and sell CD players on this market, and as the current CD hardware scene is in such a state of flux, there are few grounds for altering the rankings of any of the systems because of the presence or absence of a CD player in these pages. Full coverage of CD players will be found in the appropriate *Hi-Fi Choice* editions of course.

Drawing on experience from working on this project and from outside, it is clear that Compact Disc players in general have some way to go before they reach their promised potential, and that the 'perfect sound, forever' claim (to quote Philips' advertising slogan) certainly cannot be justified on present showing. I have examined early samples of Philips/Marantz (they're identical in all but name and finish) and Sony hardware, and found real, positive improvements in the samples of these machines reviewed here.

In a curious way, Compact Disc bought out both the best and the worst in the rack systems as a whole. Whilst there was some variability between systems, CD tended to sound a lot crisper, cleaner and more positive than any of the other sources used, and this comment is especially true in the case of the turntables and cassette decks. At the same time, CD tended to drive most of the systems 'over the edge', making them sound harsh and brittle at worst, 'congealed' and uncommunicative at best. From evidence gleaned outside this project, it is clear that CD players from the major sources are improving almost on a batch by batch basis.

Similarly, CD software standards are extremely variable, with the rarer Japanese-European made counterparts a clean (sonic) pair of heels at the time of writing. With prices of both hard- and software presently high, and likely to drop in the medium term future, the best overall advice for this embryonic technology must be to wait and see.

BEST BUYS AND RECOMMENDATIONS

Considerable thought went into deciding which systems we should recommend, and into determining the criteria for recommendation in the first place. Here are our findings.

For a system to warrant a 'Recommended' flag, it had to offer a degree of balance in the way it was built, and in the sound quality it offered. None of the recommended systems are shoddily screwed together, and as far as can be judged from the experience gained through the project, they're fairly likely to last well under normal domestic conditions of use.

One of the most potent arguments in favour of the complete 'one make' system is its greater domestic acceptibility compared with a 'mixed bag' of separates from different sources. But in many cases, though the components of a system may share uniform styling, the end result is not all that attractive in a home situation. Fortunately, a number of manufacturers have started to produce systems which really do deserve praise for their visual appeal. Our comments give credit where it seems due!

It was not considered necessary that a recommended system be able to perform on equal terms with the best available similarly priced hi-fi component systems where there is no restriction on the choice of components. If you don't mind choosing a turntable from one company, an amplifier from another and so on, you can end up with a system that outperforms almost any of the recommended systems, if you've done your homework.

On the other hand, you could choose your separates badly and end up worse off! In short, yes, you can get better performance if you turn your back on the rack system concept altogether, but you'll not end up with an aesthetically matched rack system where just one manufacturer takes full responsibility for the complete package if anything goes wrong. With rack systems, you're buying what in effect is a different product, and one with a different appeal.

To earn 'Best Buy' status, through, the system certainly did have to compete on functional grounds with good, separately-available high-fidelity components. The measure of the success rack system manufacturers have in achieving this desirable goal can be seen in the number of Best Buys in this project.

As already noted in the *Conclusions*, the weakest part of a great many rack systems is the loudspeakers provided as part of the package. Accordingly, where loudspeakers are optional, we have in many cases recommended the system without speakers, and suggest that the purchaser choose his own speakers — a separate chapter gives help here.

Note that some systems are recommended both with and without speakers; here we take the best buys and recommendations without speakers first.

BEST BUYS: WITHOUT LOUDSPEAKERS

The following systems are lised in price order; the cost of suitable speakers must be added.

Sansui IS 330 (£295)
Clean, attractive styling, simple operating controls, and a comfortable, easy-on-the-ear kind of performance characterises this system. Automatic record level setting on the cassete deck is a minus factor, but this operated almost imperceptibly in practice, and at its modest price the system clearly outperformed all comers.

Although the Sansui is essentially well balanced between sources, the record deck was slightly less satisfactory than the cassette or tuner, but its sins on audition were mostly of omission rather than commission – it rarely sounded less than pleasant, and it is certainly well above average at this end of the market.

Rotel '820 system' (£395 without cartridge)
As a record playing system, the Rotal was superb, and sounded crisp, clear and articulate. The cassette deck and tuner offer only moderate levels of engineering and are modestly specified compared to some of their more glamorous competitors, but they were both surprisingly effective on audition. Both the turntable and the amplifier were real gems, and not that far behind the more expensive versions also found in the Rotel range. On value-for-money grounds, this system wins hands down. It has all the individual qualities needed for excellent performance, especially off records, and the individual components were well suited to each other.

Dual System 3 (£499)
This system offers most of the qualities of the cheaper Rotel system, but adds superb cassette and tuner performance, and an amplifier with considerable 'poke', making it suitable for

high quality, low efficiency loudspeakers and/or large rooms. Sound quality is authoritive yet extremely 'musical', there is little of the masking of detail or dynamics which is found in so many systems, and the Dual is essentially 'transparent' – an open window on the source material being reproduced.

BEST BUYS: WITH LOUDSPEAKERS

Rotel 820 system (£475 without cartridge)
Rather than supply the usual low cost, under-engineered loudspeakers that are fairly usual with rack systems, Rotel have gone the whole hog and produced, in the RL870, a loudspeaker which is fully competitive with the best UK-built designs of similar cost. Indeed, the loudspeaker is being sold successfully as a separate component. Accordingly, the Rotel system fully maintains its Best Buy status with speakers included.

RECOMMENDATIONS: WITHOUT LOUDSPEAKERS
Again, listed in price order; note that the cost of suitable speakers must be added.

Sony Compact 33 (£320)
Although supplied with a table-top housing, the Compact 33 (and Compact 77 — see later) can be bought with a well finished rack housing which can be assembled in horizontal or vertical format — the former incorporating drawers.

Considerable thought has clearly gone into making this system easy and pleasant to live with. The weakness lies in the turntable and (to a lesser extent) the amplifier, but the system remained capable of respectable performance on the whole, and one well in line with the moderate price.

Aiwa V-600 (£350)
Not strictly a hi-fi performer in all areas, the Aiwa V-600 will appeal to those who want a very compact, integrated system for shelf-top use. We could not recommend the matching 'loudspeakers, but the system can be bought without. It offered a surprisingly good performance from its high technology turntable, had a very acceptable tuner but a bright sound off-tape and audible 'pumping' from its Dolby C circuit, presumably because of the bright frequency response. This is a low power system, but there are a number of fine loudspeakers that will suit this superbly finished combination admirably.

B&O 2200 (£365)
Uniquely in this project, the B&O 2200 is unashamedly a music centre, but very much in this company's idiom. Idiosyncratic to the last, the 2200 offers many of the qualities of the Aiwa V-600 system, though it couldn't look more different. It is a little short on flexibility, as it is not easy to interface with external equipment, and even lacks a tape counter. But recommendation is in order because of its absolutely immaculate build quality, its strong but smooth styling and its better-than-average sound quality, especially from records. The amplifier has a slightly 'transistory' sort of 'glare' noticeable on all inputs, but there are few other problems – the 2200 is fairly evenly competent in most areas.

Dual System 1 (£379)
Among the systems we have recommended, the Dual System 1 is one of the cheaper combinations that actually looks like a rack system, though the tuner is powered from the amplifier – it's not a conventional stand-alone product. We felt that there was nothing special about the electronics; in fact, they were even tempered and clean sounding, but it would be stretching a point to call them more than just OK. What lifts the system as a whole from the majority of its peers is the excellent CS514 turntable. It's clearly second best to the 505 in the more expensive Dual system, but it's still head and shoulders above most rack system turntables, and the system therefore gave very acceptable sound quality from records in particular.

Trio V-31 (£390)
This system was only tested without loudspeakers, as the model the distributer supplies was being revised whilst this project was in progress. Unlike some of the preceding systems, the Trio will probably suit best the person interested mostly in radio and cassette — the turntable being rather average (and hence disappointing). The V-31 could sound rather brash and edgy, but the sound was fair on the whole whilst styling and ergonomics were highly satisfactory. A well turned-out system of fair ability in most respects.

Marantz MS300 (£410)
High levels of mechanical noise from the cassette deck marred an otherwise good per-

formance from this Dolby B-only unit, but the system was otherwise pleasant to use and evenly competent on the whole. Record reproduction was reasonable, though far from meeting the standards set by the Dual System 1, for example. The tuner though was excellent on FM, and the amplifier proved to be quite acceptable, though from memory it seemed little better than the older model it replaced. Rack housing finish was poor with this system, but current production is said to have been improved.

Onkyo System 22 (£416)
Like some of the systems described earlier, the Onkyo System 22 is better designed to play cassettes and FM radio with high quality results than it is records. There is nothing distinguished or outstanding here, but most of the components are honestly conceived — they're straightforward in execution and work well. The turntable though is frankly just another of the multitude of rather nondescript Japanese turntables of no special engineering quality or merit. The amplifier, on the other hand, is quite impressive — and it goes impressively loud for those who need it.

JVC GX-222 (£425)
The story here is much like that of the Trio; the JVC has fairly neat, simple styling (but not without some annoyances of a minor nature like the signal strength meter that worked by changing colour), and it gives an acceptable performance in most areas, but not from records. In fact the turntable was merely ordinary in that it failed to conjure up solid stereo images, and it lacked low frequency control. The tuner and cassette deck were good and the amplifier was decently powerful and effective. The system as a whole won't give its competitors too many sleepless nights, but it nevertheless gave some surprisingly attractive sounds at times.

Yamaha 05 System (£440)
A poor cartridge and incorrect alignment of the cassette deck let this system down. Both these are easily correctable given a willing dealer to re-align the cassette deck and supply a more suitable cartridge, though the latter will put the price up by £15 or so. Both these items were of otherwise fair performance. The amplifier and tuner though are excellent. The tuner gives unusually good AM sound quality and fine FM stereo too, whilst the amplifier is a little special. It doesn't go all that loud, but in qualitative terms everything was as it should be. It gave a refined, articulate and detailed performance from all its inputs, and a degree of subtlety and purposefulness missing from too many of it peers.

Marantz MX250 (£470)
Ergonomically a bit of a mess, MX250 does offer the attractions of very neat neat styling and packaging that allows it to fit unobtrusively on a shelf. The electronics are unremarkable enough, but the turntable turns in a reasonable sound. There were odd niggles with tuner and cassette performance, and the former is really only suitable for strong-signal (local) reception. But there is nothing vital to detract from a recommendation if the packaging is to your taste.

Rotel '820B system' (£465 without cartridge)
Only the considerably higher price compared to the other Rotel system stops this being a 'Best Buy'. But though it misses that accolade by a whisker, it remains one of the best sounding and most musically capable systems in the project, and is very strongly recommended. Both turntable and amplifier offer a tauter, crisper and more alive feel than their cheaper counterparts.

NAD system (£515)
This system misses being a 'Best Buy' in our judgement by a narrow margin, and it is not sound quality that lets it down. The main negative factor is our view that the turntable is not an obvious rack system product. It's unquestionably awkward to set up and to use, and is really best classified as a true enthusiast's product. The amplifier and tuner though are first-class, with an authoritive, clean and entirely musical quality on audition. The cassette deck is beginning to look on the elderly side by now, but matching alternatives are available from the same stable if required. Indeed the system can be bought without the turntable, and another substituted in its place. Anyone contemplating buying in this price range should not overlook the NAD.

Onkyo Radian (£525)
The slightly high price for the performance on offer with the Onkyo Radian is accounted for by the small, shelf-top dimensions. It's a system whose looks attracted considerable praise from visitors during the tests, and it's

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fairly easy to use. It also delivers what it promises, despite misalignment of the cassette deck frequency response; and sound quality is fairly informative and realistic. The turntable was quite impressive in its way, though access for records is a little limited.

Sony Compact 77 (£800, CD player extra)
Sony's 77 system has the same flexibility in its housing arrangements as the Compact 33 (see earlier in this section). The system earns its recommendation the hard way — performance is good though not much better than some systems costing considerably less. What tilts the balance in the Sony's direction is the sophistication of the equipment's operating facilities, and the excellent remote control system. Build quality is first class, but the ergonomics are a little messy in my judgement. The CPD-101 compact disc player can be bought with this system and is reviewed alongside the system.

B&O 5000 (£1000)
The B&O 5000 defies normal categorisation. In simple sound quality per pound spent, it stakes no realistic claim on value for money. A good £500 system can match it in most respects. But it offers a range of unique features including a very sophisticated and highly effective interactive remote control system which you may not want to live without, having once tasted its delights. The package also offers first-class build and finish quality. Again, a system that cannot be overlooked if you like the idea of total armchair control extending to programming off-air recordings with just a few button pushes. It's a highly individualistic package, almost imposing its own lifestyle on the user! A thorough demonstration is essential before jumping in.

RECOMMENDATIONS: WITH LOUDSPEAKERS

Tensai Compo 10 (£180)
Of all the sub-£200 systems, apart from the well-made Sanyo GXT-200, this was the only one tested that offered an acceptable build or sound quality — indeed on the whole it is rather better made than the considerably more expensive Tensai System 3000. The 10 is honestly conceived and executed and in all departments bar the turntable (where the Sanyo proved superior) it really sounds quite pleasant. The turntable itself is a relatively poor component (though most of its competition was worse still!) and it was further hamstrung by a poor ceramic cartridge.

Toshiba System 20 (£330)
The Toshiba represents a straightforward and purposeful approach to rack system design. The manufacturer hasn't tried to load the system with superfluous paraphernalia but what is supplied is decently engineered on the whole, and works quite effectively. The turntable is a little disappointing but not unpleasant sounding.

B&O 2200 (£400)
The loudspeakers B&O supply are smallish three-way designs, well-built and of surprisingly good performance. The system is offered at a concessionary price with the loudspeakers included — you only pay about £34 extra!

Sony Compact 33 (£400)
The SS-X180 speakers available for this system are balanced on the bright side of neutral, but perform much better than the majority of rack system speakers. The Compact 33 retains its recommended status with speakers included.

Marantz MX-250 (£550)
In many ways the loudspeakers help make this system. Without being super-analytical, the LD-20 is pleasantly musical — it makes the most of the accompanying electronics without highlighting the shortcomings. In absolute terms, they sound a little hollow and lacking in transparency, but they neatly straddle the dividing line between most rack system loudspeakers and separate high fidelity designs — indeed they lean in the direction of the latter.

Rotel '820B system' (£600 without cartridge)
The loudspeakers supplied here are the RL-870, a successful model in their own right. On balance, they're not as 'seamless' and as well-integrated in sound as the cheaper loudspeakers of this marque, but they are extremely well built for the price and are fitted with an excellent tweeter from Scanspeak that gives a rather better defined treble than the larger unit is able to offer in the midband. Despite this and occasional hints of colouration, the 870 is fully recommendable and is musically more revealing than the RL-850 reviewed with Rotel's cheaper '820 system'

OVERALL COMPARISON CHART

	TURNTABLE				CASSETTE DECK						TUNER					
	Auto-start	*Auto-return*	*Auto-repeat*	*Disc size/speed sensing*	*Dolby C noise reduction*	*Timer-record capability*	*Auto record level control (ALC)*	*Auto tape-type selection*	*Microphone input*	*Programme search*	*Medium wave*	*Long wave*	*FM presets*	*AM presets*	*Digital readout*	*Signal-strength meter*
Aiwa V300	●	●			●	●		●			●	●	6	6	●	●
Aiwa V600	●	●	●	●	●	●	●	●	●	●	●	●	6	6	●	●
Aiwa V700	●	●	●	●	●	●	●	●		●	●	●	6	6	●	●
Akai Pro E310	●	●	●		●	●		●	●		●	●	16		●	
Amstrad TS81/TS80 Mk II									●		●	●				
Bang & Olufsen Beosystem 2200	●	●	●	●	●	●		●	●	●	●	●	4	‡	●	
Bang & Olufsen 5000 System	●	●	●	●	●	§		●	●	●	●	●	9	‡	●	
Binatone Studio 5									●		●	●				●
Binatone Music Tower 2									●		●	●				
Dual System 1		●				●		●	●		●	●	7			
Dual System 3		●			●	●		●	●	●	●	●	15	‡	●	●
Ferguson Stereomaster 3A04	●	●									●	●				●
Fisher System 55		●			●	●			●		●	●				●
Fisher System 77		●			●	●		●		●	●	●	8	8		
Hitachi S2SMR	●	●	●	●	●	●		●		●	●	●				●
Hitachi System S4M	●	●	●	●	●	●				●	●	●	12	‡	●	●
JVC GX-111		●							●		●	●				●
JVC GX-222		●			●				●		●	●	7	7	●	●
JVC 2001FS	●	●	●	●	●	●				●	●	●	6	6	●	●
Marantz MS300	●					●			●		●	●				●
Marantz MX250	●	●	●	●	●	●			●	●	●	●	8	8		●
Mitsubishi System 43	●	●	●	●	●	●		●		●	●	●	7	7	●	●
NAD System									●		●					
Onkyo System 22	●				●	●			●		●	●				●
Onkyo Radian System	●	●	●	●		●				●	●		6	6	●	●
Philips 134 System	●	●				●			●		●	●	8	4	●	
Philips 235 System	●	●			●	●			●		●	●	19	28	●	●
Pioneer XA3 System		●							●		●	●			●	
Rotel '820 System'									●		●	●				●
Rotel '820B System'									●		●	●				●
Sansui IS-330		●				●	●	●	●		●		6	6	●	
Sansui M-55	●	●	●	●		●	●			●	●	●				●
Sanyo GXT-200		●						●		●	●					
Sanyo 2220		●							●		●	●				●
Sanyo 3230W		●				●			●	●	●	●				●
Sentra 840		●					●		●		●	●				●
Sentra 850	●	●					●		●		●	●	6	6	●	●
Sharp 103	●	●	●	●					●	●	●	●	6			●
Sony FH-9	●	●			●		●	●		●	●	●	5	0	●	
Sony SR-1		●						●	●		●	●	8	‡	●	
Sony Compact 33		●			●	●		●		●	●	●	5	10	●	
Sony Compact 77	●	●	●	●	●	●		●		●	●	●	8	‡	●	●
Technics 315 Type 10	●	●	●	●		●	●			●	●	●				
Technics Z-75 System		●			●	●			●		●	●	8	‡	●	●
Tensai Compo 10		●							●		●	●				●
Tensai System 3000		●							●		●	●	7	7		●
Toshiba System 20		●				●			●		●	●				●
Toshiba System 30	●	●	●		●	●			●	●		10	‡		●	
Trio V31 System		●				●			●		●	●				●
Trio V71 System	●	●			●	●			●	●	●	●	6	6	●	
Yamaha System A-05		●			●	●		●	●		●	●				●

OVERALL COMPARISON CHART

AMPLIFIER												PRICE		
Moving-coil input	*Aux input*	*Second tape input*	*Second tape output*	*Second speaker outlets*	*'Low' filter*	*'High' filter*	*Microphone mixing*	*Graphic equaliser*	*Auto source select*	*Remote control*	*Without loudspeakers*	*Including loudspeakers*	
	●						●	●			£350	£400	**Aiwa V300**
	●						●				£350	£400	**Aiwa V600**
	●						●				£430	£500	**Aiwa V700**
	●	●	●	●	●						—	£590	**Akai Pro E310**
					●			●		●	—	£180	**Amstrad TS81/TS80 Mk II**
	●	●	●	●						●	£365	£400	**Bang & Olufsen Beosystem 2200**
	●	●	●	●							£1000	£1150	**Bang & Olufsen 5000 System**
					●	●	●				—	£180	**Binatone Studio 5**
					●	●		●		●	—	£200	**Binatone Music Tower 2**
		●	●								£380	—	**Dual System 1**
		●	●	●	●						£500	—	**Dual System 3**
	●		●				●				—	£230	**Ferguson Stereomaster 3A04**
	●			●				●			£315	£360	**Fisher System 55**
	●			●		●	●	●			£360	£400	**Fisher System 77**
	●			●			●				—	£460	**Hitachi S2SMR**
	●	●	●								—	£600	**Hitachi System S4M**
	●										—	£369	**JVC GX-111**
	●			●							£425	£495	**JVC GX-222**
	●	●	●				●				—	£889	**JVC 2001FS**
		●		●							—	£410	**Marantz MS300**
	●	●	●				●		●		£470	£549	**Marantz MX250**
	●			●			●		●		—	£529	**Mitsubishi System 43**
●	●										£515	£634	**NAD System**
		●	●	●							£416	—	**Onkyo System 22**
	●	●	●								£525	£611	**Onkyo Radian System**
	●										—	£429	**Philips 134 System**
	●	●	●	●	●						£550	£690	**Philips 235 System**
											—	£299	**Pioneer XA3 System**
	●			●							£395*	£475*	**Rotel '820 System'**
	●										£459*	£599*	**Rotel '820B System'**
		●	●	●							£295	£350	**Sansui IS-330**
	●	●					●		●		£320	£400	**Sansui M-55**
											—	£180	**Sanyo GXT-200**
	●										—	£280	**Sanyo 2220**
	●			●		●		●			—	£400	**Sanyo 3230W**
	●		●	●	●	●					—	£200	**Sentra 840**
	●		●	●	●	●					—	£270	**Sentra 850**
	●										—	£390	**Sharp 103**
	●							●			£470	—	**Sony FH-9**
	●			●							£350	£400	**Sony SR-1**
	●										£320	£400	**Sony Compact 33**
	●	●		●	●	●				●	£800	£1000	**Sony Compact 77**
	●		●			●	●				—	£339	**Technics 315 Type 10**
	●	●	●	●							—	£599	**Technics Z-75 System**
	●										—	£180	**Tensai Compo 10**
	●			●	●						—	£399	**Tensai System 3000**
	●			●							—	£330	**Toshiba System 20**
	●	●	●	●	●						—	£500	**Toshiba System 30**
		●	●	●							£389	£429	**Trio V31 System**
		●	●	●	●						£629	£699	**Trio V71 System**
	●			●							£440	—	**Yamaha System A-05**

* *Supplied without cartridge*
‡ *FM presets can be allocated to AM stations as desired*
§ *Timer built in*

ALTERNATIVES AND ADDITIONS: LOUDSPEAKERS

Many rack systems are supplied without speakers, and more often than not it is a good idea to buy speakers produced by another manufacturer. There are plenty of good models available, mainly from the ranks of the UK specialist speaker firms.

It is striking that of the 50-odd systems we tested for this issue, very few indeed met our criteria for recommendation with their own speakers included. On the other hand, where speakers are optional, we have frequently recommended that you choose your own speakers to go with the system.

The only complete answer to choosing a loudspeaker is by listening, but there are some guidelines that can shorten the process.

First, a number of the systems tested are of a relatively low power, and will therefore work best with relatively efficient loudspeakers – those that give more volume output for a given amount of amplifier power. This is of less importance if listening is to be predominantly at low volumes, or if the system is used in a small room which will tend to make the most of relatively low volumes. But the systems which come without loudspeakers, or where an option of buying without is available, are on the whole the larger, more potent systems where power and loudspeaker efficiency problems really don't arise. The majority of loudspeakers that cost below £150 are electrically suitable for most of the systems reviewed here; but in any case this section gives our selection as a guide.

Perhaps a more crucial part of the equation is that concerned with bass response. In principle of course the more bass the better, but in practice almost the opposite is in fact the most appropriate and safest advice. Deep bass can be 'suggested' quite effectively by quite small loudspeakers, and even bookshelf models will usually not sound immediately lacking in bass. But where real low bass extensions really exists in a loudspeaker, the system driving this speaker must be able to impose effective control over the speaker or the result will be boomy, flabby and coloured – in every way worse than not having deep bass at all, in fact. I'm not speaking from an ivory tower on this topic. As I write this, I am preparing to audition a batch of £2,500-plus amplifiers using loudspeakers no larger than the Kef Coda IIIs used throughout this project. As a loose analogy, a sports car would never be thought of as truly capable merely because it had a big engine that packed a lot of muscle. You also need the roadholding to go with it *Then* you have a fast car!

Most of the systems reviewed here will have their weaknesses exposed unduly by using large, bassy loudspeakers – unless you really enjoy luxuriating in the audio equivalent of treacle. A large number of the systesm tested fell down in the speaker area because the manufacturer apparently felt the customer wouldn't be satisfied if he didn't get lots of 'wellie' for his money. The result is loose, boomy bass which is far from realistic. In any case, trying to extract really accurate, solid, tight bass from a loudspeaker, even when the rest of the system is good, can be more difficult and more rarely accomplished than you might think.

In general, it is a mistake to think that a large, impressive multiway loudspeaker with ABR diaphrams and/or ports and level controls will necessarily sound better than a simple, sealed and much smaller two-way one at the same price. Usually the opposite is the case.

The current *Hi-Fi Choice: Loudspeakers* (No 31) illustrates these points well. The majority of the recommendations in all price ranges are of apparently straightforward two-way loudspeakers. Often a great deal of craft and subtlety has gone into their design and construction, but most are conceptually simple and often quite compact – even in the case of the expensive models.

Recommended models

The loudspeaker used for system test purposes was, of course, the **Kef Coda III.** This model was specifically chosen for its suitability with as wide a range of systems as possible because it has a very clean, easy-to-listen-to characteristic. Music reproduces (via a suitable system) with a useful mixture of transparency and solidity whilst having good aural 'cosmetics' – it is smooth and uncoloured. It is also relatively efficient. It can be recommended for the majority of systems and rooms with confidence, providing you're willing to use them on tall stands well away from walls or any other obstacles. The Kef Coda III costs about £99 a pair, and measures 37cm high.

Mordaunt-Short make a loudspeaker with similar overall capabilities, albeit in a slightly larger cabinet (it's 42cm high), better finished (with a real wood top plate and fabric covering

all vertical surfaces) and more expensive – the **Carnival III** costs £140 a pair. Positioning advice is as for the Kef, and the sound is very sweet and clear, but slightly brighter than the Kef, which will suit some systems better than others. Mordaunt-Short also produce a similar and less expensive model with a less distinctive vinyl wrap cabinet. It's the £98 **MS-20** which has many of the qualities of the Carnival in a more economical form.

If you prefer loudspeakers which are less domestically obtrusive, probably the best advice would be to consider a model that can be used in proximity to a wall. The wall reinforcement effect often means a smaller cabinet can be quite potent at low frequencies, but this only works effectively if the speaker has been designed from the outset with wall proximity use in mind.

There are a number of models at reasonable prices that meet these requirements. Since it was reviewed in *HFC*, the **Acoustic Research AR18LS** has had a minor but useful facelift, and it now performs extremely well. It is rather more coloured than average, and is rather more dependent on the quality of the driving equipment than usual, but it can repay the investment by sounding surprisingly 'solid' and three-dimensional. The AR costs £99 a pair. Another model with many of the trademarks of the AR, but with a rather sweeter, less coloured and altogether more even midband characteristic is the excellent **Mission 70** (a Best Buy in *HFC* No 31), at £99.

Another 'Best Buy' in this competitive price category is the £105 **Castle Clyde**, which in many ways offers the best of all worlds by producing a superbly clean, crisp and tidy sound quality from its tiny real-wood-veneered cabinet, and having high efficiency. Whilst it can be described as 'sharp' in the sense of having strong musical resolution, it rarely sounds nasty even on the end of an inadequate system. Kef have also produced a small loudspeaker, the **Chorale III** at £80, said to be suitable for wall proximity use, and also worthy of mention is the very small but effective **Keesonic Kub** at £89.

This far from exhausts the list of possibilities. **Celestion** make at least two models that are entirely suitable for use with the majority of rack systems in the **Ditton 100** (£80) and the larger **110** (£100). These are designed for open stand use, and the 110 especially is a very tidy and competent-sounding loudspeaker. The same comment applies to the now much-improved **Wharfedale** Laser range, and especially the **Laser 90** (£90) which, with a fairly recent update to the design, has been transformed into a very capable and potent package that will help even the least 'musical' of systems along.

There are still quite a number of fine models not so far discussed, but there isn't space here for a full survey. Suffice it to say that with few exceptions, all these loudspeakers need to be used on tall, open stands to work properly and give a satisfying stereo image and bass performance. Stands will cost from about £20-£60 a pair, and as with other equipment, you tend to get what you may for. Follow the positioning advice with the loudspeakers carefully, and be sure to wire them with good quality loudspeaker cable from QED, Supra or one of the other specialist loudspeaker cable suppliers. The price of these accessories mounts up, of course, but as a proportion of the value of most systems, the real cost is small, and the benefits to sound quality, particularly in terms of clean bass reproduction, should be disproportionate to the investment made.

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JVC GR-22 MARANTZ MS300
MARANTZ MX250
SONY COMPACT 33
SONY COMPACT 77
TRIO V31 SYSTEM
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ALTERNATIVES AND ADDITIONS: CARTRIDGES

Nearly all 'complete' systems include a ready-fitted pick-up cartridge, but in some cases it is well worth spending a little extra time and money to upgrade this vital component.

Only three of the systems tested left the choice of cartridge to the purchaser – the NAD and the two Rotal systems. NAD dealers can supply the NAD cartridge, in our view an excellent device and fairly well suited to the turntable, though I suspect many purchasers may want something a little 'brighter' in tonal balance. At the time of writing, Rotel do not offer a cartridge to suit their turntables, but plan to do so in the future.

Some advice on suitable cartridges may not come amiss for buyers of many other systems too. In the majority of cases, the cartridge supplied is readily interchangeable, and a small investment in a new cartridge may well be a good idea if the model supplied is holding record reproduction back. A small investment in this context can be taken to mean under £20, and in practice a significant number of systems tested will benefit – see individual reviews. In a few cases the cartridge is not interchangeable at all, and this is pointed out in the reviews.

Usually, the cartridge is attached to the pick-up arm by two bolts, and the arm will thus accept any cartridge with standard ½in mounting centres. But many players now have the simple plug-in 'P-mount' fitting, which allows you to change the cartridge very easily without having to bother with screws or fiddly connecting leads. 'P-mount' cartridges have standardised weight and tracking force, so no adjustments have to be made to the arm either.

Suggested models

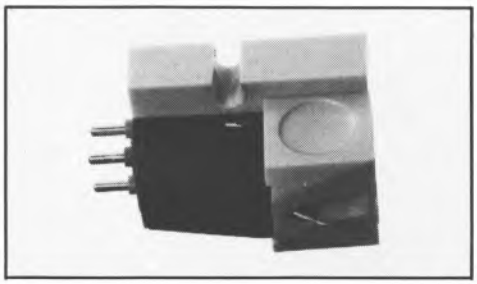
There are fewer good and inexpensive cartridges than there are good loudspeakers at moderate prices, but there remain sufficient for most dealers to stock at least one of the suggestions below.

A long standing low price favourite is the excellent little **Nagaoka MP11.** Like many inexpensive cartridges, the MP11 is a little variable from sample to sample I've found, but in general the sound it produces can best be described as quite 'fruity' – it's a little rich and tonally dull, but very sweet and refined. It usually conspires to sound rather more expensive than its £18 price tag, but the **MP15** which costs £28 offers the best of both worlds – the positive virtues of the 11, with added tonal neutrality and predictability. In both cases low-mass arms are the ones best suited as compliance tends to be fairly high; virtually all straight arms will be compatible.

The **ADC** 'Phase' range has almost parallel qualities to the Nagaokas, the **Phase II** being an especially good buy, and a very pleasant-sounding cartridge for just £25. The **A&R C77,** at a modest £17, also fits in the same category, and it's mechanically well suited to most of the system turntables tested here. It is available from a smaller number of dealers but shouldn't prove difficult to find.

A great number of the cartridges that come with complete systems are supplied to the system manufacturers by Audio-Technica. Apart from these 'OEM' models, Audio-Technica offer a wide range of cartridges under their own brand name, and one recent budget model that will suit many rack systems is the AT-110E. Priced at £12, this gives a crisp, 'alive' if slightly 'rough' sound and is also available in 'P-mount' form.

Last but by no means least, we should mention the **Ortofon** 'OM' range; of these models, the **OM10** is the obvious choice to work with most of the systems tested. The OM series are of unusual construction and extremely light weight, and having quite high compliances, they are designed for medium- or low-mass arms. More massy arm structures will be better suited to the A&R or the Audio Technica discussed earlier. The Ortofons have a very refined, detailed and open sound quality and despite a touch of brightness, they don't over-emphasise record surface noise and similar ills. The OM10 costs around £15, while a version with a better stylus is the **OM20** which costs about £30. Both cartridges are also available as 'P-mount' designs, with model numbers **OMP-10** and **OMP-20.**



Nagaoka MP-11 – an old favourite!

ALTERNATIVES AND ADDITIONS: 'SPECIALIST' SYSTEMS

If you feel tempted to try selecting your own combination of separates, or perhaps want to save money by not buying the complete system all at once, this section looks at how to do it.

There appear to be two basic reasons for buying integrated rack systems instead of separate components. The first would appear to be price. With some 42% of purchases of systems being under £300 (according to AGB Home Audit year ending June 1982 – more recent figures are not yet available), alternative separates systems that fit into this price range are thin on the ground, though far from non-existent.

The second undoubtedly is compatibility – in both the aesthetic and the technical senses of the word. Many people fear buying separates in case they will not knit together into a properly working system – that they will not 'match' in other words. Even where this is not important, the fact that rack system components are neatly organised and have uniform styling (or non-styling!) is clearly appreciated, and, on a related topic, Sony had great success a year or two ago selling the idea of 'no spaghetti' hi-fi to the public at large.

In the light of these facts, and the results of the tests reported upon in this book, what do high fidelity separates have to offer?

Ironically, the first thing to note is that the rack systems were not generally very well matched in the technical sense of the word – in some cases you could almost do better by choosing components the only way I know to pick horse race winners – with a pin! Time and time again, the rack systems showed the same evidence of poor matching. They tended to fall down by being fitted with poor loudspeakers and poor turntables especially. The tuner was almost invariably the best-sounding source and the record player the worst, whilst loudspeakers ranged from only just acceptable to diabolical – with just a few honourable exceptions.

So technical compatibility isn't really a good reason for buying a rack system, especially where the alternative exists of buying from a specialist hi-fi dealer who can recommend and demonstrate matched systems of separates.

The other argument – that of aesthetic matching – also holds rather less water than may be immediately apparent. The reason for this is the fact that many systems make such poor pieces of furniture in the first place. All the components share uniform styling it is true, but in most cases very little imagination, effort or expense has been spent to give a truly attractive and well finished system, however impressive they may look at first sight in the dealer's showroom.

On the other hand, you're not necessarily buying different standards by buying separates rather than rack systems or vice versa. The majority of manufacturers represented in this publication sell separate components as well as complete systems and very often the items concerned are the same. Meanwhile the smaller, specialist companies who make high fidelity separates have by and large ignored the rack system market, and have made no attempt to cater for it at all. However, this situation may change.

Buying British

At the time of writing, only one UK 'specialist' manufacturer has produced a record-playing system comprising uniformly-styled components, designed to meet the best standards of sound quality available at the price – around £500. The Mission System excluded from our test programme because it plays record only. A tuner is presently in prototype form, but the cassette deck is still a year or two away. For disc replay, the Mission does offer excellent sound quality basically on a par with the best of the rack systems reviewed in this publication. Its styling, though unusual, is very 'chic' and attractive, and controls are simple and easy to operate.

There is one other such system on the horizon, though to date only one item is actually available. This is QED's system which, in their words, is intended 'to provide a viable British alternative to the ubiquitous Japanese £500-£600 "rack" system .... The QED system will be presented as a neat "stacking" system with an attractive and uncluttered appearance'. This is for the future, of course, but the single item currently in the shops – the **QED A230** amplifier at £99 – is a very fine performer indeed (*This model appeared just too late for Hi-Fi Choice: 'Amplifiers and Tuners – Ed).* Availability of the complete system with cassette deck, tuner turntable and so on is scheduled for phased release ending before the middle of 1985.

'All-in-one'?

Rack and compact systems by their nature always include all three main sources of music

– a record deck, cassette deck and tuner. However, you may decide that you do not immediately want or need this 'all-in-one' package in its entirety. You may want to use a cassette deck for making recordings from microphones, or perhaps making tapes for use in the car or Walkman. But if you are going to use it for playback only, the cassette deck in a sense duplicates the function of the turntable. Now whilst the *worst* rack system turntables are undoubtedly poorer than most cassette decks for sound quality, most turntables will easily outperform cassette decks, especially where the deck is being used for playing pre-recorded cassettes which still on average offer low sound quality compared to the 12in vinyl competition.

It may make sense therefore to consider buying a simpler system – usually one without cassette so that the available resources don't have to be spread to thinly; both tuner and cassette deck can easily be added to any record-only playing system at a later date.

With these basic starting points, the separates market has some very viable alternatives to the rack system on offer. Several of the better systems in this project are in fact available on a piece-by-piece basis. The **Dual CS-505** seen in the Dual System 3, for example, enjoys a fine reputation in its own right (it is 'Recommended' in *Hi-Fi Choice* No 30, *Turntables and Tonearms*). The excellent **Rotel** turntables are also sold individually (they appeared too late for inclusion in HFC No 30). Any of these models would form an excellent basis for a low to medium priced record playing system – say one that costs £250-£450, depending in part on which turntable is chosen. There are other, equally viable alternatives at under £150 including such models as the **Thorens TD166** (Recommended), the **Rega Planar 2** and **Planar 3** (Recommended) and, of the more recent introductions, the **Acoustic Research** turntable – though this costs closer to £200 with arm, as does the Rega 3 when fitted with the new Rega **RB-300** arm.

There is now no shortage of good, inexpensive amplifiers either, contrasting with the situation a year or two back there were few recommendable products that didn't cost a lot of money. The **NAD** and **Rotel** amplifiers included in this book were among those highly rated as separate components when tested in*Hi-Fi Choice: Amplifiers and Tuners* (No 33). Other possibilities include models from **Onkyo, Yamaha, Creek, A&R** and others, and as noted earlier the **QED A230** which I would place near the top of the £100 amplifier category.

From the list above, it is possible to put together quite a variety of turntable/amplifier combinations of very high performance for £200 or so, without fear of a mismatch. Add loudspeakers and a cartridge and you have a basic record playing system which will cost £300 or over which in sound quality terms will outperform the majority of rack systems irrespective of price. It will not offer the versatility of a course, or the compactness of a 'midi' system. The choice is yours.

'Separate' Yamaha A-300 is essentially similar to the silver 'system' model A-05

PRODUCT INDEX

Components making up each system are listed here in italics in the following order: Turntable; cassette deck; tuner; amplifier; loudspeaker, if supplied; CD player if supplied. Note that amplifier and tuner may be combined as a receiver, or with the cassette deck as well.

Acoustic breakthrough or feedback: In turntables, effect of vibration from the loudspeakers or other sources picked up microphonically by the cartridge. Symptoms range from subtle distortions to 'howl-round'.

Azimuth: In cassette decks, refers to accuracy of alignment of the head. The head gap should be at exactly 90° to the direction of tape travel. Maladjustment causes loss of treble on pre-recorded cassettes.

Bias: In tape decks, a high-frequency alternating current applied to the head during recording. For best performance bias must be adjusted to suit the tape being used.

Bias compensation: On turntables, an adjustable outward force acting on the arm to counteract the inward pull of the groove due to arm geometry. Also known as 'anti-skating'.

Cantilever: In a cartridge, the tiny tube or arm on which the stylus diamond is mounted.

Clipping: Heard as severe treble distortion, clipping is the truncation of the output waveform due to overloading an amplifier. Can occur when an under-powered amplifier is turned up full with large speakers.

Colouration: General term for audible effects of distortions, particularly in loudspeakers and record players, and usually those caused by frequency response irregularities and/or resonances.

Compliance: In cartridges, the springiness of the cantilever/stylus assembly in its movement relative to the cartridge body.

Decibel (dB): A unit of relative loudness, or relative strength of electrical signals. In general use for specifying sound pressure level (SPL), the figure given will be relative to the threshold of hearing. Thus 0dB is the threshold of hearing, 120dB the threshold of pain. In equipment tests for noise, hum and rumble, separation etc. the wanted signal is at a level defined as 0dB and the unwanted signal (noise) is quoted as a minus figure, i.e. so many dB below. In these measurements the larger the figure, the better. See also 'weighting'.

Distortion: Usually refers to 'total harmonic distortion' which is the percentage of uneanted frequency components (harmonics) present in a wanted signal. Strictly, distortion can mean any unwanted change in the signal, introduced by the equipment.

Dolby: Usually refers to Dolby B noise reduction, fitted to most cassette decks. The Dolby circuit boosts low-level treble signals on record and cuts them again on replay, so that tape hiss is effectively reduced by 8 to 10dB. Dolby **C** is a further development giving even greater noise reduction.

Dynamic range: The range between the quietest and loudest sounds which a system or component is capable of reproducing.

Equalisation: Deliberate modification of frequency response. In disc and tape recording, equalisation is applied in a standardised way prior to recording (pre-emphasis) and this is compensated by inverse equalisation (de-emphasis) on replay.

Flutter: Rapid fluctuations of pitch, caused by cyclical changes in speed in tape deck or turntable.

Frequency response: Range of frequencies which a system can reproduce evenly, that is, without emphasising some notes or tones at the expense of others. Usually specified ± 1dB, as in our tests.

Hertz (Hz): Unit of frequency – 1Hz equals one cycle per second, 1kHz one thousand cycles per second.

Impedance: In loudspeakers, the electrical load presented to the amplifier. Though nominally specified as a single figure such as 8ohms, the actual load the amplifier has to drive varies with frequency.

Integration: Term to express the success with which drive units in a speaker are combined to give a smooth output through the crossover region.

Mistracking: Failure of the stylus to exactly follow the modulations in the record groove. Audible effects are mainly in the treble, producing harshness, rasping sounds or blurring of notes.

MPX filter: Filter which cuts out the 19kHz pilot tone used as part of the multiplex system in stereo broadcasts.

Presence: The upper-midband/lower treble part of the frequency spectrum, emphasised by frequency response characteristics, makes human voice sound more forward – hence the term 'presence band'. Conversely, a dip in frequency response in this area makes the sound appear more distant, irrespective of actual overall volume.

Resonance: In loudspeakers, turntables and arms, mechanical resonances occur when passive parts of the system are excited by certain frequencies in the musical signal. The result is unwanted cancellation or emphasis of some frequencies.

Rumble: Unwanted noise (low frequency) from the turntable drive system, transmitted through the cartridge microphonically and heard on the speakers.

Sensitivity: The amount of signal required to generate a specified output. In the case of speakers, the term 'efficiency' is often used instead.

Separation: Independence of one stereo channel from the other, quoted in minus numbers of dB..

Tracking ability or trackability: Ability of the stylus to follow the record groove modulations even when these are cut at very high levels.

Tracking force or **tracking weight:** Downward pressure on the stylus, usually between 1 and 3 grams. Tracking force is usually adjusted by means of a counter-balance weight on the back end of the arm and is not to be confused with actual mass of the arm itself.

Vertical tracking angle (VTA): The angle at which the plane of motion of the stylus is set with respect to the vertical when viewed from a side elevation of the cartridge. Should match the 20° cutter standard.

Weighting: Bias applied to test measurements to take into account the ear's varying sensitivity to different frequencies, for example 'DIN A weighted, noise figures. These will appear better than unweighted figures.

Wow: medium-term pitch variations. Usually measured in combination with flutter to give total speed variations.

ADVERTISERS' INDEX

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THE BOOK OF LINN

IN the beginning is the performer.
2 And as he singeth or stroketh his instrument, so shall ye hear his song and know that it is good.
3 And all who hear his song may attest to the wonder of his music.
4 But in the days before the coming of high fidelity, though they that would hear the performer came in multitudes, even so his song could not carry beyond the ears of the anointed.
5 Therefore did the prophet Edison come forth from the Land of Ohio and create a disc which would transcribe the performer's song and multiply it a thousandfold. And in this manner did the performer make his song known even unto the ends of the earth.
6 Now in the time of Edison the disc was but a pale reflection of the performer's song. But it came to pass, in the generations after him, that the art of the transcriber was increased greatly.
7 Yet all who would listen were not blessed with a joyful sound for there dwelt in the land false prophets who would distort the song and confound its progress from the record to the ear.
8 And there came then a manufacturer who looked upon this sore affliction and saith, Behold, there is a chain of reproduction and unless this chain be rendered faithfully, it shall not profit ye to listen. And though each link save the first be of the finest metal, nevertheless shall the result be without honour.
9 Thus was the law given by the manufacturer who was called Linn.