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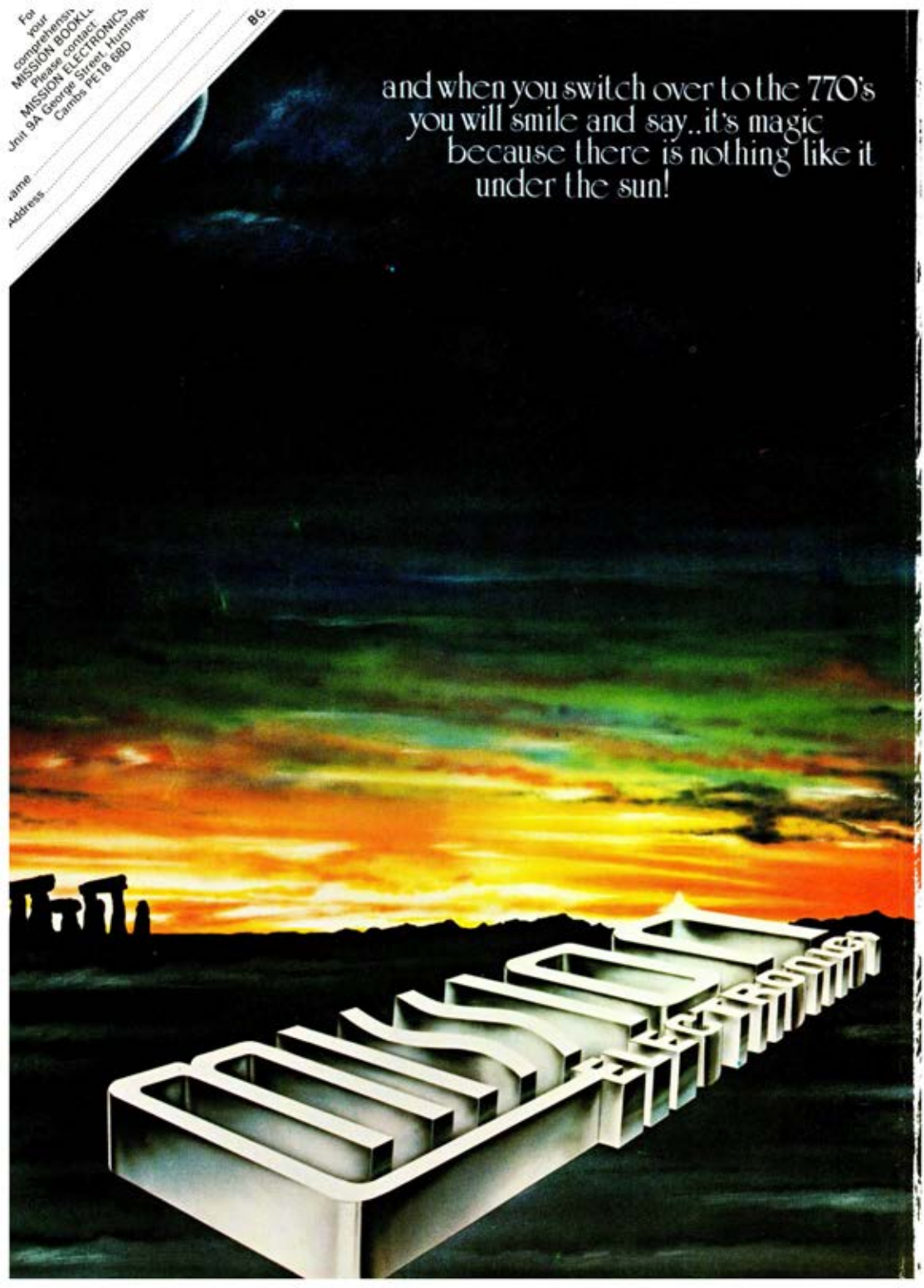
hi-fi buyer's guide

TURNTABLES PICKUP ARMS & CARTRIDGES

TEST REPORTS ON 35 TURNTABLES, 6 ARMS & 60 CARTRIDGES BY CLEMENT BROWN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HI FI FOR PLEASURE

by CLEMENT BROWN

CONTENTS

Turntables remain one of the complex facets of the hi-fi compatibility game. This part of the system relies heavily upon mechanics, rather than electronics, and all components must balance accurately if good sonic performance and stability are to be achieved. Mechanical matching is not aided by the fact that in many better systems, the three components (turntable, arm and cartridge) usually come from three different manufacturers, and commonly are purchased separately. Guidance towards selecting optimum combinations, and checking out whether manufacturers offering integrated systems have done their homework carefully, is Clement Brown's goal in this booklet. We hope sincerely that, in your eyes, it has been achieved.

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Spotlight Publications Ltd,
40 Long Acre, London WC2E 9JT
Tel: 01-836 1522. Telex: 299485
Typeset by Meadway Graphics Ltd.
Printed by Pensord Press, Gwent

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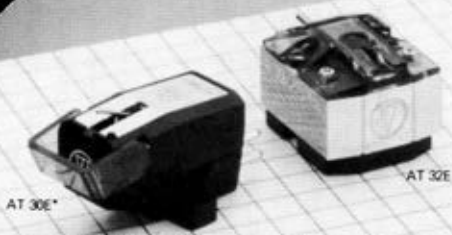

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OFF THE RECORD

Most first-time buyers of hi-fi equipment give pride of place to the disc record despite the attractions of other programme media. They do so because they recognise a familiar format. It is easy to find one's way around on a disc: everyone knows how to use it. Most importantly, the recorded repertoire is vast, the price-range is wide, and competition leads to advantages for the consumer.

In the interests of accuracy I shall use the word 'disc' simply because a record could be made in other formats (a recorded tape is a record — by definition). So far as this Guide is concerned I am focussing attention on high-quality replay. Not so much pop singles, though, for they are mostly recorded at 45 (sometimes at 33) and are of less interest, for the technical standards of production are, with a few exceptions, indifferent. Many are quite appallingly bad. But there are some creditable efforts combining the 12-inch format with the 45 speed.

After more than a century of development of the gramophone we are clearly approaching the time when an alternative disc format, offering technical and practical advantages, is to become available. But we can expect only a gradual transition, and the well-established vinyl plastics LP has a considerable life ahead of it. In hi-fi circles it attracts fresh interest because of the application of digital techniques and the well maintained production of direct-cut discs as well as renewed efforts by some producers to raise quality standards.

So mechanical groove-tracing, with a diamond stylus following the impressed modulations, takes on a new lease of life; and at its brilliant best the disc is a precise and generous store of information for domestic use which is not easily surpassed — bearing cost and convenience in mind. Even today, only a minority of audio equipment users retrieve with high accuracy and refinement the wealth of detail stored in the grooves. However, the means are there: it is largely a matter of wise choice of replay equipment, but such factors as correct installation and adjustment are also very important, as we shall see.

In this Guide we explore the characteristics of an extensive variety of components. Probably more diverse than any selection brought together before for evaluation in one comparable publication, these embrace both simple and more advanced products. The mid-price area is strongly represented, but also included are low-budget items as well as a few examples of hi-fi esoterica.

The coverage of pickup cartridges is extensive, reflecting the wide selection now available, ranging from inexpensive mass-produced examples to more advanced products. Typical magnetic types in a wide price-span are included and a cross-section of moving-coil cartridges indicates the growing interest in such devices. A group of pickup arms is chosen to demonstrate the properties of specialised components, while the broad spectrum of turntables is well sampled — integrated and separate models, both direct-drive and belt-driven.

Inevitably the serious enquirer, faced with a considerable array of products, will wonder which is best. In the Guide we try to help the potential buyer in his choice by offering clear guidelines in a brief form without risking superficial advice. However, what is best for one buyer is not necessarily relevant to the needs of another. Much depends on personal ambitions and the conditions of use. Value for money is another consideration.

As in earlier Digests, gradings of technical merit and value receive some emphasis but should be read in association with the detailed reports. Brief verdicts on each product will interest those who wish to gain a quick impression before deciding whether to examine the test findings in more detail. Explanations of the product gradings are set out immediately before the first group of product tests.

Finally, I strongly recommend the newcomer to read the articles brought together in these introductory pages, as they are intended to set the scene. Although the would-be enthusiast may not wish to grapple with a wealth of technical detail as a preliminary to a purchase, a little background knowledge can be very useful. So these articles are concerned mostly with basics but are augmented by some information on modern practice to interest those who like to probe beneath the surface.

ABOUT HI-FI

Since this Guide is a critique rather than a mere commentary, we may as well dwell on the basics of our subject before looking at details. Difficult though it is to put forward a hi-fi 'standard' of the Go and No-go sort to cover all aspects of performance (not in a concise form, anyway), the professional attitude is to take a critical stance based on experience.

The convenient but often misused 'hi-fi' tag stands for high fidelity, and this implies an advanced standard of sonic realism and refinement, for the technology has been pushed forward rapidly in recent years. Clearly, the only true hi-fi is the best that the technology can provide at any particular stage in its development. Not every user can aspire to such excellence but that cannot be allowed to influence too strongly our critical attitude when a lot of products are to be assessed.

So it is necessary to judge hi-fi equipment in strict fashion without failing to recognise that some of the cheaper or simpler items may have specific merits, as well as limitations, when regarded in relation to price. It is unnecessary, however, to confuse the issue with references to hi-fi where unworthy products are concerned. Such careless references by those who should know better, including some in the trade, do not help anyone especially when, as is nowadays the case, the public is attracted by quite cheap 'music centre' outfits and even little portable machines which cannot possibly earn a hi-fi label whatever their other merits.

It is relevant to point out also that the word 'audio' has its uses, partly because it can get the doubtfuls off the hook. We use this term in a general way to refer to sound systems without necessarily adding any hi-fi overtones, and it is at least a reminder that high fidelity claims a special place in the hierarchy. After all, a telephone handset is an audio device, and so is an intercom or a public-address installation at a railway station.

HI-FI SYSTEMS

In its practical, everyday form hi-fi nearly always consists of a number of components or units which go together to make a working system. This traditional presentation makes good sense for technical and economic reasons. Each unit is purpose-built and has a specific function, and having started with a basic or limited system, probably on economic grounds, you can widen its scope to some extent. On the other hand you can plan for every possible facility at the outset if you wish. The principles were covered in the earlier Systems Digest (Digest No. 1) and are constantly under review in Hi Fi for Pleasure magazine.

The sources of programmes determine the size and extent of a hi-fi system. VHF radio, with stereo as a special attraction, is an important source of music and information. Very many listeners have small radios around their homes but relatively few enjoy the noise-free clarity of VHF/FM via a good sound system. No doubt more would do so if only they could be convinced of its excellence.

Then there is tape. To most people this means the cassette, for reasons that have more to do with size, convenience and cost than with any intrinsic technical merit. However, rapid progress has been made with this medium and users who merely play a few commercial music tapes can have little idea of the possibilities. Tape is for recording, and there is interesting potential for those who will devote a little time and patience to acquiring the simple skills that ensure best results.

Discs remain the popular choice for those who want a wide variety of music and entertainment in an easily used format. There is every sign that this will remain true. Some study of requirements for accurate replay will always bring practical rewards. Attention to correct use and good hi-fi housekeeping is just as important; in fact it should be obvious when one realises that the value of a record collection amounting to a couple of hundred discs may, at typical shop prices, rival the value of the equipment used.

At its best the LP offers feaures which are well in tune with hi-fi aims. For example, it has a very wide frequency range, corresponding to the range of hearing. This means that the groove is impressed with modulations of wavelengths which, at one extreme, are so small that a stylus tip can only just trace them and, at the other, are quite big and raise a few mechanical problems. Again, despite grumbles about noisy results, the disc is essentially a low-noise medium, though much depends on details of manufacture and use.

Then there is the control of distortion. Good headway has been made in recent times so far as professional aspects (mastering and processing) are concerned. So we see renewed emphasis on replay accuracy, lest the possible gains are lost through lack of precision. Distortion arising as the stylus traces the groove can be particularly objectionable — more hostile to hi-fi than anything else caused in the system.

Another feature is the astonishing dynamic range now conveyed by many recordings. Convincing representation of such a range is bound to bring some practical hazards, bearing in mind that unfettered reproduction may imply a very high peak demand of audio power, not within everyone's ability to embrace. We may have effectively to truncate the range of dynamics because of domestic conditions. The fact remains that widening the contrasts between the quietest and loudest sounds is a professional preoccupation with a direct bearing on realism.

TURNTABLES FOR HI-FI

On the face of it a turntable's role is a simple one. What we require is quiet and consistent rotation of discs. Shorn of its trimmings the ideal turntable is a silent servant, always self-effacing but always there when needed. Experience shows that a unit of the finest quality will be so unobtrusive that one may forget to switch it off after use — understandable though not to be recommended!

So active 'performance' is not a strong feature, and the basic requirements have not really changed over the years despite the elaborations of design that have appeared. This may be difficult to believe when faced with the modern product of high technology, replete with controls and winking lights, but many users, both professionals and enthusiastic amateurs, must reach the same conclusion after a little thought about their real needs.

However, the beginner may know little about details of hi-fi practice but will wish to be informed about the forms taken by turntables and the approaches to design that are of interest, especially in the popular price area. To begin with, the vast majority of turntables are in integrated form, with a pickup arm mounted and ready for use. A cartridge may be included, and in nearly all cases the unit is a complete package including the plinth or base, leads and a dust cover. Obviously this means that the buyer must accept the manufacturer's views on the union of the components. The arm and turntable are inseparable, so it is necessary to seek assurance that jointly they provide what is needed.

There is an alternative for those who are prepared to go to a little more trouble. Nowadays there is an interesting choice of separate turntables, mostly in the medium and high price region. Usually the turntable is installed in a plinth and provision made for fitting the pickup, though just a few such units are available in chassis form. At one time this approach was of interest exclusively to the skilled enthusiast who was willing to make a mounting for the pickup and check the installation details.

Now, however, the job of assembling chosen components is made simpler, as many turntables will accept any one of a selection of arms and the turntable manufacturer can advise on the possibilities. In some instances the buyer can assemble and adjust the pickup and turntable in about half an hour. Why go to even this amount of trouble? In short, the turntable can be chosen on its own merits — and so can the pickup. A particular advantage is the choice of an arm which caters for cartridges of the most advanced type. Another is the versatility demanded by the experimenter who may use several cartridges of differing characteristics.

Turntables for hi-fi divide quite neatly into two types where working principles are concerned. There are belt-driven and direct-drive machines and both have their protagonists. That, at any rate, is broadly true since the demise of the rim-driven turntable in which a rubber-tyred idler wheel was the link in transmission between the driving motor and the inside of the platter rim.

In the belt-driven unit a loop of neoprene rubber, silicone elastomer or other material is the medium of transmission between a pulley on the motor and some part of the platter. This drive may be applied to a central hub or to the rim. In this way the belt plays a part in isolating the motor from the other parts.

In complete contrast direct-drive involves a symmetrical arrangement in which the motor is mounted centrally and an extension of its spindle supports the platter and provides the centre-pin on which the disc is located. The drive is 'direct' because the motor and platter are coupled together.

A notable difference will soon be seen if you examine the mechanisms in relation to their plinth housings. With direct-drive the often large and heavy motor is normally bolted firmly to a central portion of the plinth or to a cast metal chassis. Then the pickup is fixed equally firmly elsewhere on the plinth surface. This conception is by no means new, by the way, and a direct-drive turntable for 78s was marketed more than 30 years ago.

In contrast, the belt-driven mechanism is often suspended on some kind of spring arrangement in the plinth. This may be somewhat primitive in the least expensive models but is applied with care in the most advanced units as a result of close study of noise control and resistance to mechanical

shock and vibration. It will also be seen that there is a rigid coupling between the platter support and the pickup. Relative motion of pickup and platter is not to be permitted, for the only motion required is that of the stylus in relation to the disc groove. Other decoupling is likely to pick a quarrel with the basic requirements of reproduction.

WHICH TO CHOOSE?

Newcomers may well ask — which is the best type? Well . . . it is open to debate. A good direct-drive unit has an appealing logic about it and a well engineered specimen can take high honours. At its best this type is usually pretty massive and mounted in a monolithic plinth, so the implication is that it will be fairly expensive.

Belt-driven units are available in a wide price-range, but again the most desirable examples are usually the most massive. They appeal to buyers who prefer a down-to-basics product in which a high proportion of cost is allocated to essential engineering features (bearings, suspension system, transmission) which have a strong influence on results. By way of contrast the typical direct-drive unit reveals its new technology through its speed-control aids and other elaborations.

For many users the question of automation in disc-replay will be nearly as interesting as other factors. Of course, entirely manual control and cueing of the pickup may be preferred, so that this component is positioned over the disc by hand, a lift/lower control being used to ensure safe descent of the stylus to the groove. Such manual operation is the norm where the turntable and pickup have been chosen as separate components.

A high proportion of integrated players have fully or partly automatic facilities. For example, the mechanism may position the pickup according to disc size and then return it to its rest after play, meanwhile switching off the motor. Or the function may be semi-auto, so that the pickup is positioned manually but is subject to auto return at end of play. In a few cases the pickup simply lifts above the run-off groove at end of play.

Then there are more advanced systems by means of which particular tracks on a disc can be selected, and in a few instances a sensor associated with the pickup detects the presence or absence of a disc on the platter. Also, remote control by hand-held infra-red transmitter is coming into vogue, although so far it is not as popular for hi-fi as it is for television.

EVERYTHING UNDER CONTROL?

Controls on turntables can range from a single on/off switch to a group of controls for speed adjustment and pickup movements. Facilities concerned with automatic or semi-auto operation are by their nature essential, and it can be assumed that the buyer who is not attracted by automation will turn to something simpler as a matter of taste and preference.

It is hardly surprising that controversy has arisen over the elaboration of controls on a hi-fi component that is apparently supposed to be simple, with an easily understood job to do. Much of this controversy concerns the adjustment of nominal speeds (33, 45 and very occasionally 78 revolutions per minute) and it applies to both belt-driven and direct-drive turntables, the latter being most generously endowed with switches and controls of all kinds — or gimmicks, if you remain a doubter.

At its simplest a belt-driven turntable employs a synchronous motor, a type chosen for its desirable speed characteristics. Changing of platter speed is by a simple mechanical device which shifts the belt on to one part or the other of a pulley on the motor spindle. In some instances it is necessary to shift the belt by hand, though this may seem a bit spartan! There are also one-speed units, the assumption being made that hifi users will be interested in 33 rather than 45. Since some interesting 45s of audiophile calibre are in circulation, the assumption is not really justified.

So much for simplicity. But the complications have been mounting and with the readier availability of miniature electronic devices we have seen the steady development of speed-governing and 'servo' systems in which speed fluctuations are continuously monitored so that corrections can automatically be applied. Too often, such refinements have drawn attention away from the more vital requirement of minimal noise levels, summed up in the S/N ratio.

Very many turntables incorporating electronic systems are equipped with controls for fine adjustment of speed, the range being a few per cent each side of the nominal disc speed, which is checked with reference to an illuminated strobe device. The practical need for adjustment is open to question, and such a system often merely offers a visual sign of a small error which the user would not find worthy of notice unless his attention was drawn to it. Further, very few users require an adjustment for any purpose other than to correct an error which, strictly, should not exist in the first place. It is certainly true that small long-term errors of speed (and musical pitch, therefore) are noticed by few listeners, although the user's tolerance in this respect is not to be taken as an excuse for overlooking poor speed regulation.

So we have the spectacle of users drawn repeatedly to the correction of small errors. There is another, technical objection that the strobe devices used for adjustment reference have been supplied from the mains while the whole point of the control system has been isolation from the mains, the drive motor being a low-voltage type fed from electronic circuits. However, this curious state of affairs is corrected in the best of new designs employing quartz control.

The accuracy of the quartz crystal as a frequency reference is exploited here (as it is in wrist-watches and radio-communication), and if all aspects of turntable design are equally well handled, rock-steady supervision of speed can result. Unless there is some special reason for fine adjustment of each nominal speed, there is really no point in visual aids beyond, say, a beacon to confirm that the platter has run up to speed and is held here.

So the increased popularity of simple designs occasions no surprise. If the platter speed remains firmly on nominal — or with only a hairsbreadth error — we have what many users require. That is true, at least, if the unit is well engineered in all important respects. A turntable that is both massive and precisely made is likely to be the most satisfactory, judging by current developments.

A word about platter-mats. A 'technical' approach may seem unduly specialised and exclusive but it makes more sense than is at first apparent. The reason is that many mats are unsatisfactory, added without regard for even commonsense requirements. A badly designed mat can take the edge off the results from an otherwise acceptable turntable, while substitution of a better purpose-made mat can in some instances make audible improvements. In short, a mat is not a major key to hi-fi but it plays its part, too often ignored. We return to the subject elsewhere in these pages and can leave it for the moment with the thought that what is often wilfully made wrong can often be put right.

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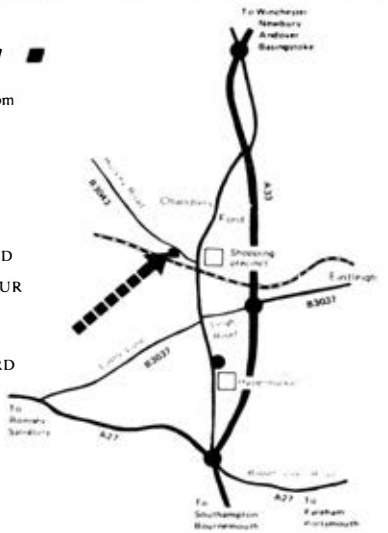

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Some of our readers may find that test procedures are fairly obvious and they may even feel that more detail would be welcome. But many others will prefer concise reports from which they can easily gain impressions of merits and possible disadvantages. In fact the coverage is primarily intended to inform the beginner and first-time buyer, so the aim has been to present a generous cross-section of typical products in such a way that the Guide is manageable and readable. Lengthy comments are avoided.

Technical commentary is augmented by brief notes on audition. The procedures will be evident and the results self-explanatory in many instances but a summary should be helpful to newcomers who are not familiar with the subject's intricacies. So the technical round-up of the next few pages (made as straightforward as possible) is recommended reading for those who wish to make the best of the reports and extend their appreciation beyond the scope of superficial impressions.

What matters at the end of it all is the sound of the pickup and turntable combination, so all the products have been auditioned. But no attempt is made to convey conclusions in elaborate language. The greater the elaboration, the greater seems the chance of misunderstanding. It is for the prospective buyer to hear and criticise whatever claims his interest.

In any event, the Guide's comments on sound quality represent a personal view and depend on the use of familiar auxiliary equipment and a wide variety of programme material representing the current state of the art. The listening-panel approach was rejected. It is fairly easy and certainly tempting to form a small panel which will convey the 'expert' opinion of those in the know, so that the result comes complete with its special insight and notions about users' needs. A properly constituted panel, on the other hand, is large and necessarily representative of interested consumers (that is, expertise is at a premium while percipience is strong). In the circumstances the simplification of reporting to a more personal basis is hardly surprising!

CARTRIDGES

There is no point whatever in measuring the technical performance of a cartridge — still less its characteristic sound — until it is known to be tracking properly. First it must be precisely set up in the test arm so that its attitude to the disc is correct, and then optimum tracking pressure must be determined in conjunction with bias correction. This setting will cover the requirements of the main tests but does not rule out small experimental adjustments at a later stage in the investigations.

For the sake of simplicity, the frequency response trend is depicted but channel differences are excluded. Midrange channel balance is reported, as are output figures relating to the generally accepted standard of 5cm/sec recorded velocity. This is a nominal level enabling cartridges to be compared, although on music discs the recorded levels rise dramatically and the pickup output is often surprisingly high.

Magnetic cartridges (moving-magnet types and others) usually require a termination of 47-50kohms, which is catered for in the tests. Comments on load capacitances are offered and the advice may not always be in accord with manufacturers' figures. Generally the test method has been to try for the best response and therefore the most realistic HF trend.

With some high-impedance cartridges the load may be critical and the user, in case of doubt, should seek expert advice in case he accidentally fails to secure the response the device is capable of. Bear in mind that the capacitance introduced in the circuit includes the complete run of the pickup leads plus whatever the amplifier imposes at its input. A few manufacturers of cartridges and arms give specific advice on tailoring the capacitance (and the HF response) to suit the circumstances. Apart from that it is useful to remember that adjustment of lead length is the obvious and cheapest way to alter capacitance.

Low impedance cartridges such as most moving-coils are much less fussy about loading and lead length. However, they are not treated very well by much of the equipment to which they are connected, and a good MC deserves more consideration

than it often gets. (A separate note is included in these introductory pages.) In general the MC is not very load-conscious and all the fuss about special conductors and gold-plated terminals is not as justified as some suppliers would have us believe. But above all a moving-coil, typically employing coils with a few turns of wire (only a few ohms resistance), should be free to work as a voltage generator and not be loaded down with boosting devices of relatively low impedance.

Midband channel separation is reported and some comment is offered on separation trends where this is of interest, plus any further observation on symmetry of operation. It cannot be said that such points always relate well to listening experience, and the interpretation of square-wave tests also poses some problems. But the more the tester examines the results the more he learns, so all observations are taken into account in the search for a verdict.

Compliance figures quoted by manufacturers may or may not be realistic and helpful. Sometimes no figure is quoted and no guidance given on arm matching! In any event it was necessary to estimate compliance by dynamic means, reaching a conclusion via study of the pickup's subsonic resonant behaviour. The relevance to practical affairs is brought out in the following pages.

As for mistracking the less we hear of it the better, but no pickup will track everything with consistent flair. For the beginner it is as well to emphasise that symptoms of mistracking, as described in the reports, are noted occasionally — they are not constant and not always audibly serious. It should not be supposed that dire warnings about loss of groove/stylus contact mean that hi-fi life is an unremitting nightmare of blurred detail and edgy, spluttery noises! The reports refer to the cartridges' behaviour in the face of severe challenges and even a reportedly poor tracker may sound secure enough on a variety of mild programmes.

A cartridge, like a loudspeaker, is a transducer translating energy from one form into another. In general such transducers have far more impact on sound quality, and therefore on the listener's impression of hi-fi, than do the electronic items such as amplifiers. It is possible to play the same version of a familiar test-piece with two contrasting cartridges and almost be prepared to believe one is hearing two different recordings.

Contrasts may indeed be marked with two magnetic cartridges which ostensibly are supposed to do the same job. Sometimes the contrasts are much more subtle. The novice is unlikely to appreciate the significance of all this unless he has above average opportunities to audition a variety of products. However, reported findings are offered in the hope that the potential buyer will follow up the reports, using whatever facilities for listening are available to him.

Although there are some sharp differences of opinion regarding the merits of modern super-discs it is up to the tester to take the latest developments into account. Many users of hi-fi systems are interested in digitally mastered discs and direct-cuts, so selected examples were included in auditions. Representing a cross-section of the repertoire, discs were drawn from the best of Chalfont, Decca, EMI, Classics for Pleasure, Sheffield Labs, Ultrafi, Japanese RCA, Telarc, Varese and others. Selection of differing recorded balances, with attention to the ambience content (very useful in audition), was regarded as important.

Notes at the end of each report summarise the most important results. The figures resulting from statutory tracking checks are listed together with output, channel balance at 1kHz and midrange separation. Additional data are as follows. Stylus condition is noted as **Good, Fair** or **Poor** following inspection of the stylus tip mounting, alignment and finish. It is augmented by any necessary comments in the text of the report.

Stylus replacement is noted:

U The stylus is replaceable by the user.

W Works replacement. The user must return the cartridge to the supplier or distributor.

Pickup arm compatibility guidelines:

L, M or **H** (low, medium, high) indicates the area in which arm effective mass should fall if satisfactory matching is to be achieved.

Sound quality rating in brief:

Hi, Av or **Ba** (high, average, below average) judged with regard to the place of the product in the market and the manufacturer's pretensions to quality.

PICKUP ARMS

The pickup arm's task is to carry the cartridge safely and precisely on its difficult journey across the disc. With this component any positive contribution to the sound is likely to be a disadvantage, betraying an error in design or manufacture. We want to hear the programme not the hardware, so neutrality is really the objective. However, it is possible for the arm to detract from a good cartridge's honest attempts to retrieve the information impressed in the disc groove.

That is why such findings as pivot frictions, bias (sidethrust) correction and provision for adjustment are featured in these reports. They apply with equal importance to integrated pickup/turntable units and separate, specialised arms, though the latter's strong appeal is to be found in the range of adjustment provided, as appropriate to the use of top-quality cartridges.

Effective mass has been explained and the subject is given some emphasis in the product reports because of its relevance to the matching of cartridges. The aim is to avoid serious incompatibility. Since it is not practicable to take the arm apart to analyse it, noting the distribution of mass along its length, a way round the measurement problem has to be found. The simplest way is to vibrate the arm with a suitable test cartridge fitted, sweeping down the subsonic range (from about 20Hz for practical purposes) and studying the resonant behaviour from which mass can be derived. Alternatively the arm can be oscillated in a suspended jig and the inertia arrived at by a rather tedious mathematical method.

Approximate effective masses are given in the reports and further reference is made to the subject in cartridge reports in order to shed some light on basic matters of mechnical matching. Remember that the mass felt by the stylus is the result of the arm plus cartridge. So when you see that the reported figure is for a pickup arm alone, add the deadweight of the cartridge in which you are interested so as to arrive at the total effective mass. As an example, an arm in the medium range of effective mass might have a reported figure of 9g to which has to be added a cartridge mass of (say) 6g, making a total of 15g.

If the stylus compliance is too high for a particular arm mass, then instability is likely to result and problems will arise in tracking disc warps. This could be the situation if a high-compliance cartridge partnered a too-massive arm. Unacceptable motion of the stylus would be another outcome. Further, the effective tracking pressure varies as the stylus rides up and down the disc undulations, although the actual extent to which this proves troublesome depends on arm design. However, the potential hazard with a massive pickup can be

HOW TO ACHIEVE THE RIGHT RESONANCE

Resonant frequency Hz	Stylus compliance in cu (μm/mN) 40	35	30	25	20	15	10
18	2·0	2·5	2·5	3·0	4·0	5·0	7·5
17	2·0	2·5	3·0	3·5	4·5	6·0	9·0
16	2·5	3·0	3·5	4·0	5·0	6·5	10·0
15	3·0	3·5	4·0	4·5	5·5	7·5	11·5
14	3·0	4·0	4·5	5·0	6·5	8·5	13·0
13	4·0	4·5	5·0	6·0	7·5	10·0	15·0
12	4·5	5·0	6·0	7·0	9·0	12·0	17·5
11	5·0	6·0	7·0	8·5	10·5	14·0	21·0
10	6·5	7·0	8·5	10·5	12·5	17·0	25·0
9	8·0	9·0	10·5	12·5	15·5	21·0	31·0
8	10·0	11·5	13·0	16·0	20·0	26·5	40·0
7	13·0	15·0	17·0	21·0	26·0	34·0	52·0
6	17·5	20·0	23·0	28·0	35·0	47·0	70·0
5	25·5	29·0	34·0	40·5	50·5	67·0	101·0

Effective mass in grams

visualised — especially if there is a mismatch as well.

At the other extreme, a low-compliance stylus and a very light arm can result in the bass resonance being pitched too high in the audio range. In a serious case there would be a marked effect on the bass reproduction, especially with some modern discs which provide a lot of usable information at low frequencies.

The pros and cons could be argued at much greater length, but that is hardly warranted in a beginner's guide and the aim here is to warn against going to extremes. Since in any case a pickup is bound to display resonant behaviour in the subsonic region the idea is to place this resonance sensibly in a middling area, centred on 10-12Hz and clear of the trouble spots.

Accompanying these notes is a table which will guide you on matching arms and cartridges. If you find that your sights are set on a couple of desirable components that appear to be totally incompatible, then you can thank this Guide for leading you out of danger. If may also lead you to conclude that some commercial pickup combinations are badly adrift (which is only too true), but a little study will put you on a safe course.

The table relates stylus compliance to the effective arm mass for a range of resonant frequencies. To use it, check the reported compliance and arm-mass figures and then see where the resonance will fall. Or focus on the resonance and read off the relevant figures. The table could be extended but the area covered is of special importance. If the transition from one set of figures to another seems to lack regularity, that is only because the effective mass figures have been adjusted to the nearest half-gram.

Compliance relates a displacement to a force and has formerly been quoted in 10^{-6}cm/dyne. The modern way is to relate microns to a force in Newtons; hence the abbreviation μm/mN. Taking it on trust that we are talking about the right quantities, we can boil it down to compliance units and use 'cu' for compliance. Mass is in grams and the abbreviation is g.

TURNTABLES

A selection of results is shown in the form of bar-chart displays. Although such displays are less precise than rows of figures, they are largely self-explanatory and do at least have the advantage that findings for different products can be compared without the encumbrance of a lot of additional explanation.

Some comment on constructional details (such as bearings, platter, mat) is included as it is relevant to performance and value. The signal-noise result is given as an unweighted figure, representing an overall noise level compared with a reference signal and any interesting points about rumble or other noise are added. Speed stability in dynamic conditions is studied and with this the motor torque is observed for confirmation that it is adequate for the conditions of use. Such details as start-up time and long-term speed error are reported.

Recently the following note was seen in an instruction manual: 'The turntable should be located where it will not be affected by vibration and by sound pressure due to the speakers.' This seemingly obvious warning is rarely offered in practice, but in the knowledge that turntables vary in their susceptibility to such influences it is worth repeating here that a little experiment is the way to cope with particular idiosyncracies. Mainly to highlight the variations that exist, the reports include an estimate of isolation from mechanical disturance, each unit being vibrated at low frequencies; and the impact of acoustic interference is also noted, the results depending on comparisons of performance in the audition room with that in a shielded location.

TEST BENCH

A laboratory-built equalised preamplifier with provision for adjustment of load capacitance was used for cartridge measurements and the test discs were by CBS, EMI, JVC and Nippon Columbia. The HFS81 disc was used for initial tracking tests, output and balance. Two Denon turntables were the basis of test-beds for pickups, and the test arms were Mission and SME III, with an ADC ALT1

available for further checks. A rumble-coupler device permitted examination of turntable noise via a test pickup without the intervention of a disc. This applied to all units using conventional arms but not to radial-trackers on which the device could not be fitted and which required the use of test discs.

The QED MCA1 preamplifier was used for audition of low-output cartridges (most MC types and a few others) and a Pickering P20 was also to hand. A Tandberg 3002/3 amplifier and control unit combination aided audition of all products, and this equipment also offered the advantage of a well designed MC input to augment the separate test preamp facility. Loudspeakers were Reference Standard Professional Monitors by IMF Electronics.

MERIT & VALUE

All reports are headed by star ratings on a scale of five to highlight merit and value for money. To some extent these ratings are linked. A judgment of merit, largely a technical matter but also depending on assessment of sound quality, has to be made against a background of appreciation of the current state of the art.

Clearly a cheap product can have special merit within limitations (that is, it may be better than other cheap products) and it may represent attractive value without rivalling more advanced designs.

As an example: Merit ★★★
Value ★★★★

Again, an expensive product may rank highly on technical grounds but by any sensible evaluation be difficult to assess for value. Indeed, it is always possible to find a few examples falling outside the bounds of any normal value judgment, and probably well-endowed buyers who take an interest in such equipment would not wish for more detailed qualification. Because of this, some of the value ratings are made with caution.

As an example: Merit ★★★★
Value ★★

Inevitably some products will appeal as middling value and merit, and this does not imply that they lack qualities to inspire enthusiasm. In fact there are worthy mid-priced examples that call for no extremes in assessment.

Finally, with any large-scale review it is to be expected that the reader will soon turn to the conclusions to check the status of an item that appears to be of interest. Is there anything outstanding about it? What, in a nutshell, is the critical view?

Such quick scanning has been made as simple as possible. Look first at the brief Verdicts, viewing these in association with the ratings and prices to see whether the subjects are relevant to individual needs. Of course, close study of all reports is recommended to the serious student of hi-fi who wishes to gain an impression of the market irrespective of an impending purchase.

PRICES

Wherever possible the prices quoted are the approximate recommended or suggested prices advised by manufacturers and distributors. Where exact information was lacking, typical prices in the market-place have been derived from trade sources.

As some hi-fi enthusiasts have commented, prices are not really prices anymore, and it is for the buyer to look around and see what is on offer. The author and publishers of the Guide can only, in good faith, pass on the information they are able to glean. However, VAT is omnipresent and is therefore included in all prices at the rate of 15 per cent.

Luxman write a new chapter in turntables with vacuum stabilisation

1. What is it?

A new method devised by Lux of creating a vacuum between disc and turntable surface, which has the effect of firmly bonding the two together so that in effect the disc becomes part of the turntable.

2. What does it do?

It eliminates colouration caused by vibration and resonance giving a measurably cleaner signal than any which can be obtained from ordinary turntables.

3. Can this effect be demonstrated?

Yes, simply place a record on any turntable then rest the arm and cartridge on the record without rotating the turntable. Turn up the relevant amplifier volume control to around half way and give the record a sharp tap — you will hear a fairly loud boom through the speakers. Try the same demonstration on the PD300 and you will note the boom has been almost entirely eliminated. However with the vacuum released the same boom can be heard.

4. Will the vacuum pump make a noise during playing?

No — The vacuum is created prior to the commencement of playing by the flick of a bellows switch, and the vacuum can be released when the record has finished.

5. Vacuum Stabiliser apart — is this just an ordinary turntable?

Like most units from Lux, the turntable is far from ordinary. We'll send you a leaflet on request showing just how extraordinary they are and giving full specifications — space precludes further details here.

6. Where can I hear the turntable?

Nowhere! The turntable is practically noiseless in respect of both rumble and the addition of unwelcome signal modulations, but we will send you a list of the Lux dealers who will be pleased to demonstrate the unique Lux Vacuum Disc Stabiliser.

LUXMAN

To: Howland-West Ltd., 3-5 Eden Grove, London N7 8EQ. Tel: 01-609 0293.

Please send full details and list of Lux dealers.

Name.....

Address.....

.....

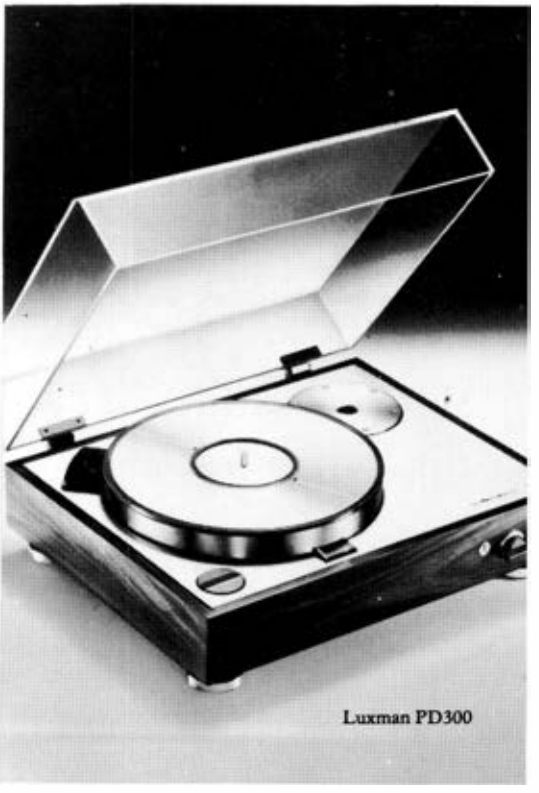
BG 1

7. What do the reviewers say?

***HI-FI NEWS* — "The Luxman PD300 Deck is exceptional by any standards and offers the most significant improvement in the quality of disc reproduction that has been seen for a long time."**

***HI-FI FOR PLEASURE* — "The Luxman PD300 shines as a well-engineered turntable with genuinely fresh appeal — a valid innovation. It promotes a high standard of disc reproduction and stands very favourably against other units in the upper price range."**

***HI-FI CHOICE* — "Recommended".**



Luxman PD300

KEY ADJUSTMENTS

Test disc special offer:
see page 200

If you buy your new hi-fi from a specialist supplier who is responsible for installation, checking all details, you will have little use for what follows. You may however be one of the many who take a practical interest, at least to the extent of fitting a new cartridge or making occasional checks of arm settings and other vital points. Some of the requirement emerge elsewhere in this Guide but a summary will serve to emphasise the most important matters.

Whether the pickup arm is part of a turntable unit (the popular choice) or purchased separately and installed by the user, a few essentials have to be highlighted. A commonsense requirement is that the cartridge should be fixed squarely in the headshell or on the mounting platform, the stylus being perpendicular to the disc when the cartridge is viewed from the front. Note that the stylus tip will not appear perpendicular when seen from the side, as it enters the groove at a slight angle of rake, tilting back a little.

Then the arm height is set to make the arm-tube parallel to the disc when the stylus is resting in the groove and the tracking pressure has been set to the anticipated working figure, as shown in the specification. Great care is necessary during this latter adjustment to ensure that the stylus does not come to harm. Avoid touching the stylus with fingers or any other object. By the way, it is convenient to make a gauge by drawing a few truly parallel lines on a postcard. Hold the card on the turntable behind the arm; then sight across the arm and check for parallel setting.

Most pickups have adequate arm-height adjustment. A turntable unit without such adjustment (which should be incorporated in the bearing pillar) is clearly deficient in

one important aspect. The most serious limitation would arise if the arm was seen to be slanting 'uphill' toward the cartridge when in the playing position. On the other hand a down-sloping pickup, though still a nuisance, could be corrected to some extent by fixing a spacer between headshell and cartridge.

Viewing the pickup from above, the evident need is to adjust the cartridge in the fore-and-aft direction, this being limited to the headshell adjustment in most examples of popular integrated players. It is best to obtain a simple alignment protractor and follow the associated instructions to secure the optimum position. Then one of the last jobs is to fix the cartridge very firmly.

Provision for downward tracking pressure settings may take several forms, but by far the most common depends on the rear counterweight. With the cartridge in place the counterweight is first adjusted so that the pickup balances and swings freely with the arm horizontal. Then a calibrated ring is set as instructed and the counterweight moved forward to give a specific downforce at the stylus. Alternatively a separate rider weight may be provided to give the same result.

In the absence of any further aid, the bias correction device can be set as instructed. However, this may come perilously close to guesswork in many cases and best accuracy is achieved with a suitable test disc which is designed to provide audible clues to secure tracking (or lack of it) while adjustments are made. The procedure is to start with the tracking pressure at a sensible figure, such as the expected working pressure, and then make very small incremental adjustments of bias and pressure until the best combination is found.

Often such settings do not correspond to those apparently advocated by the manufacturer of either cartridge or arm, but that does not mean that anything has gone wrong. Settings found under dynamic conditions are sure to take precedence over those arrived at by other means. In any event the aim is to find the optimum, not to apply pressure in hit-and-miss fashion in the hope of avoiding mistracking. Every pickup has some limitation on tracking, even if it is very subtle in its audible manifestation.

These setting-up procedures apply in a general way to separate pickup arms, although the range of adjustment on the best examples is particularly good and makes for high precision. If faced with the task of installing an arm designed for single-hole fixing, slightly elongate the hole in the mounting board (in a direction toward the turntable centre) as this will facilitate final adjustment. There is a specific cut-out pattern if the arm is equipped with a sliding base for adjustment and, because of the superiority of this arrangement, many turntables are equipped with prepared mounting inserts or other devices to smooth the way to quick and accurate installation. Use an alignment protractor for final adjustment.

A high proportion of turntable units are sold as complete 'packages' including leads. In many cases choice of cartridge is left to the purchaser, and that is better than being left with a cartridge that one does not like. So the setting-up points already outlined will apply. In addition it is wise to check published reports on the chosen cartridge or seek guidance among the specification data, as this will offer clues about specific load capacitance requirements. If in doubt consult the cartridge distributor or supplier. All this is relevant, of course, if you are replacing a cartridge with a new type rather than putting one in for the first time.

If you are using a turntable with a floating sprung sub-chassis, pay particular attention to instructions concerning adjustment of the springs. This is likely to be fairly critical in achieving optimum performance, and the adjustment does, of course, take into account the mass of the pickup chosen to partner the turntable. Other types of turntable, such as the typical direct-drive unit, do not have such adjustments because the motor and pickup are both anchored to the top of the plinth and the whole player is one rigid assembly — the heavier the better.

Siting of a turntable unit may appear straightforward enough and it is tempting to choose a position solely on grounds of convenience. However, there is no reason why convenience should be lost when the safest and best location is selected more objectively. An insecure footing must be avoided. Small tables and lightly constructed items of small furniture are rarely satisfactory, and supports undermined by

We'll be the first to admit — you can buy a finer cartridge

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But for those of us without unlimited funds we've produced a very special cartridge indeed, the new Grado Gemini Gold.

Tailored exclusively for British tastes, the Gemini Gold features a highly refined version of our unique flux bridger circuit. It is an efficient transducer designed to surpass all criteria for total system compatibility.

Compatibility plus. The **Plus** is a quality of sound already described* as both 'ethereal' and packing 'a fine punch'.

The **Plus** is a new 'tru-ellipsoidal', diamond stylus for impeccable tracking and resolution of the very shortest wavelength groove modulations.

The **Plus** is new elastomeric material which keeps the Gemini Gold sounding smooth while lesser cartridges 'harden up' when the temperature drops.

The **Plus** is an exclusive UK Warranty that covers both cartridge **and** stylus for a full twelve months.

The Gemini Gold is a new cartridge designed specifically for British ears and British weather.

Whether you buy it depends on your need to have the best — that will cost you an extra £500 and we'll be happy to provide it.

But first, hear the Gemini Gold. At branches of Lasky's, Hi-Fi Markets and good dealers everywhere.

COMPATIBILITY *Plus*

*PRACTICAL HI-FI September 1981

GRADO

Gemini Gold BY Grado

TRANSONIC IMPORTS, BROOKS COURT, STAMFORD, LINCS.

loose or springy floorboards are even worse.

Any pickup and turntable will to some extent be susceptible to both sound-pressure waves in the room and any mechanical vibrations transmitted through the support on which it rests. The acoustical problem could be circumvented by placing the player and amplifier in one room and the speakers in another, some distance away, but that is hardly practicable in most homes. In practice we have the player and speakers fairly close together and can only hope to put as much distance between them as conditions permit.

In the most severe case the sound energy reaches the pickup and turntable to cause acoustic feedback, heard as a howling and ringing effect. The more the volume is advanced the worse the effect. In less severe instances the sound can still cause colouration, masking the performance of which the equipment is capable. That is why attempts are made to assess the player's vulnerability to such interference.

Although everyone has to seek a compromise, taking room layout into account, the general rule is to install the turntable (and the associated amplifier) so that it is remote from the speakers. Since there are mechanically generated vibrations to anticipate as well as acoustic interference, do not allow the turntable to share a shelf with the speakers, even in cramped quarters. If space is really tight, mount the speakers on wall brackets.

Experiment with equipment positions to the extent that space permits. If a rack system is used the turntable can stand on top provided the whole assembly is resting on a firm foundation. Likewise an existing piece of furniture or a purpose-made cabinet is usually acceptable if it provides a firm support. Where other methods fail it is best (and certainly cheap) to fix stout brackets to a wall and screw the turntable plinth to them from underneath. Choose the location so that the amplifier can be positioned nearby.

A set of isolating feet is fitted under most turntable plinths. These vary in efficacy, but in general solidity of support will turn out to be more important than devices which can by their nature only have restricted use. By the way, a way of introducing mass into a support system is to use a block of concrete, suitably camouflaged.

Disc equipment requires little maintenance. It is of course wise to keep a tally of use, so that the stylus can be inspected or replaced at the appropriate time. Stylus-tip life depends on conditions of use, including the presence of dirt and the characteristics of the pickup, and in the absence of specific instructions given with the product it is advisable to consult the cartridge distributor or manufacturer. Estimates of diamond tip life range from around 400 playing hours (about 900 sides of LPs) to a substantially higher figure, but it is better to be safe than sorry and seek firm recommendations about replacement. Many users do of course prefer a change of cartridge when the time comes for stylus replacement, possibly because they want a more advanced model or because the associated equipment is to be changed.

Some other points, such as stylus-cleaning and minor checks, are covered in a separate round-up of accessories. It is, of course, necessary to keep the turntable and associated parts free from dust. Where appropriate wash the mat under running water (not very hot) and dry it well. On no account apply any lubricant to pickup arm pivots, as this will attract dirt and alter performance characteristics. Pickups are designed in such a way that they need protection rather than maintenance, so keep the player's dust cover closed.

Attention to turntables is confined to very simple and infrequent jobs. Check the instruction manual to see whether the main bearing requires the occasional drop of oil. Not all units require such attention, so do not probe about with an oil-can unless directed. In any event a special grade of lubricant will be needed if such maintenance is specified. For belt-driven turntables a possible requirement is the occasional application of talc to the belt. But check carefully because there are certain belt materials which only need an infrequent wash with soapy water.

Finally, check signal and mains connections from time to time. Remove signal plugs and reinsert them a couple of times to ensure clean connection. In fact a quick check throughout the hi-fi system is advisable, especially where leads may have been subjected to pinching, stretching or any disturbance.

RECORD CARE

The main requirement is to keep dust and other foreign matter away from discs. Air-borne hazards vary from home to home and include abrasive particles, substances in aerosol form, cooking vapours and tobacco smoke. Since the record owner is unlikely to stop cooking or smoking just because he has purchased a hi-fi system, all that can be done is to counsel reasonable care.

A plethora of devices and substances for cleaning discs exists but will not be intemised here in detail. The plain truth is that many products are unnecessary and some are harmful. Too many are introduced on the assumption that frequent and enthusiastic assaults on the vulnerable disc are necessary in order to make it playable, whereas in fact only the most simple and gentle routines are needed. It is unfortunate that 'record care' is such a misapplied expression.

In a hi-fi context all will agree that the purchaser who buys new discs will wish to preserve mint condition as far as possible. This means avoidance of treatments which are either abrasive or introduce substances into grooves. The latter includes the use of moisture (water or any other wet application) in such a way that trapped particles increase the noise level and wear when the moisture dries out. If in doubt, avoid cleaning, as that way the disc will last longer than if ill-advised treatments are used.

A disc may be slightly noisy when new if particles have been trapped in the grooves during manufacture or packing. If gentle dust-removal does not cope with this, try playing the disc through without listening to it. If that is obviously not the solution, the disc is probably a reject and, like any disc which is unplayable due to blemishes or other faults, should be smartly returned whence it came.

Pre-play collection of debris is good practice if the tool used exerts only a gentle action. The Watts Preener is probably the cheapest tool and is certainly one of the best. Alternatives include brushes with carbon-fibre filaments (Decca, Goldring, Metrocare and others). Pads and the like requiring appreciable pressure or use of moisture are of questionable value, to say the least.

There is little more to be said so far as the needs of many disc users are concerned. However, there may be a case for extending the gentle dust-removal to collection while the disc is being played. This is where tracking devices come in useful, for they can collect particles which otherwise would tend to gather around the pickup stylus. Bib, Nagaoka and Ross are among prominent suppliers.

The merit of this method will be realised if dust causes mistracking or distortion. It is found that with some cartridges even a couple of whiskers of stiff debris can provoke audible distortion or several dB of channel imbalance!

However, there is a possible snag if the turntable employs a sprung sub-chassis, for in such a case the device will bridge the gap

between fixed and suspended parts. Further, a tracking gadget cannot be used if its drag is enough to slow the turntable, as could happen with a few low-torque units.

Devices using a simple tufted brush are not usually very effective. The same applies to the curious little brushes that trail on the ends of some cartridges. All such gadgets offer a reminder of the lazy servant who spent a long time in the parlour shifting dust from one place to another but never actually picking it up.

An interesting device of some merit is the tacky-surfaced roller (Nagaoka, Metrocare, Pixall) which picks up particles and other foreign matter when passed across the disc. Any large and possibly gritty bits should be gently blown away before the roller treatment, as there is a risk that they will be returned to the disc as rolling proceeds.

Comments so far have concerned the care of discs which are purchased new and then protected from contamination. However, we can take a different view of already-contaminated discs which are virtually useless. Bad examples should not be played with hi-fi pickups.

If the disc is badly fouled, washing may be the answer. Very thorough washing in tepid water, including scrubbing around the grooves with a fine-haired brush or pad, should be followed by rinsing and careful drying. The treatment is somewhat drastic, of course, and best regarded as a last resort where a disc has been regarded as unplayable. Better still, look for a record or hi-fi shop running a cleaning service based on the KMAL professional cleaning machine.

Again with severely contaminated discs firmly in mind there are wet treatments of the kind provided by the Sound Guard Cleaner kit and the Knowin kit, both very effective. An alternative is offered by Metrocare and Nagaoka in the form of a viscous solution which is spread over the disc's recorded area and left to dry. Then the resulting film is stripped off, bringing with it the dust and any sticky deposits.

Complaints about noisy reproduction, leading to energetic and damaging attempts to 'clean' discs, may all too often be traced to audio system deficiencies such as incompatibilities and mismatches that emphasise random and impulsive noise. The new enthusiast who has just spent a substantial sum on equipment may not care for the suggestion that his planning is at fault; but the fact is that a nominally clean disc may sound smooth, with a good signal-noise performance, on one system, yet sound gritty and noisy on another.

To many disc-users the presence of static electricity is inextricably bound up with noise problems, and that is because substantial static charges (up to 15kV or more) are known to attract dust to an extent depending on local conditions. This attraction is beyond dispute, of course, but in practice we find that some hi-fi users blame all the ills of faulty sound reproduction on it while others seem almost unaware of it.

The contrast is in part a reflection of differences between equipment characteristics. However, temporary relaxation of static can be achieved by use of an anti-static 'gun' device of the sort pioneered by Zerostat. Others include the Watts, Bib and Nagaoka instruments, and some models are of the battery-powered type which operate as long as the control button is depressed. They all offer two advantages — treatment can be repeated as often as necessary, and the disc is not touched by the instrument. Permanency is claimed for alternative treatment involving fluids, examples being the Permostat, Bib and Metrocare kits.

Record storage housings are readily available and provide for storage and proper support of vertical groups of discs. The best but inevitably expensive furniture units have doors to exclude dust. Because of the high cost of storing a growing collection, many owners resort to simple shelf arrangements, but special provision should be made for support of discs. In any case large collections are very heavy, so many a keen music-lover must be looking forward to the day when LPs become miniaturised.

Special inner bags are available and may interest those who are dissatisfied with the inners supplied with their LPs. The best ones are made of a non-stick smooth film, and Nagaoka and Zerostat are among the suppliers. Similar bags are a standard feature of some audiophile discs (such as direct-cuts) but for economic reasons few of the big record companies use them.

ACCESSORIES

It would be an unusual hi-fi enthusiast who did not accumulate a drawerful of odds and ends, some intended for regular use and possibly a lot of others whose relevance has been forgotten with the passage of time. In fact only a few minor items can be regarded as really essential to good hi-fi housekeeping, but many others appeal as luxuries or novelties.

With modern pickups the emphasis is on tracking ability and therefore on precise adjustment. Often the pickup's calibration of down-pressure is accurate enough to instil confidence, but in cases of doubt it is advisable to use a separate gauge or balance. Experimenters who use several cartridges will in any case prefer to double-check their adjustments. Suitable gadgets include those by Bib, Musonic and Shure. More along the lines of a laboratory tool is the Transcriptors balance, which is an adjustable beam on a unipivot enabling tracking pressures to be compared with a series of weights ranging down to 0·1g.

While on the subject of adjustments, spare a thought for the initial setting-up of a new cartridge. Manufacturers of cartridges are inclined to leave any instructions to the pickup arm designers, but they in turn have some curious ideas based on the principle of adjusting the cartridge to give a specific stylus overhang. It is an awkward method, inviting inaccuracy, and the best solution is to use an alignment protractor. A few manufacturers pack one with their products; otherwise this simple item is obtainable as an accessory. Some appear over-complicated, but not so the example supplied to the trade by Howland-West.

There is something of a boom in spare

headshells, most usefully in the form of flat mounting platforms which offer the advantage of secure fixing of cartridges which are far from uniform in dimensions. Shells for the familiar plug-in union are usually in aluminium or magnesium alloys, and emphasis is on rigidity rather than extreme reduction of weight. Standard patterns are offered by ADC, Audio-Technica, Howland-West, Nagaoka and others. ADC also list the miniature variety suited to their own arms.

Among other useful sundries are small magnifiers and pocket microscopes of the kind marketed by Osawa, Discwasher and Goldring. There are also miniature inspection mirrors for looking into awkward corners (check your children's teeth while you are about it). Goldring, Nion and Bib offer such items either separately or as part of kits.

It must not be thought that a low-power viewer is of any use in detecting stylus wear, for something along the lines of a high-grade student's microscope would be a minimum requirement. Only the most devoted enthusiasts would wish to face up to the cost. However, a small magnifier is quite good enough to see gross damage of the stylus or any accumulations of dirt around tip and cantilever.

This raises the question of stylus cleaning, essential but often neglected. The diamond tip should be cleaned with due respect and delicacy — but often. Use a miniature brush (a nylon tuft is suitable) and work very gently in the direction of groove travel — that is, from rear to front of the tip. This removes any fluff clinging to the tip and cantilever. Watts make a small plush-headed tool as an alternative to a brush, and Discwasher have yet another version.

Many suppliers provide a suitable brush plus a bottle of cleaning fluid to form a kit. Audio-Technica, Bib, Metrocare and Ross are only a few of the firms listing such aids, intended for removing contamination which reaches the stylus via the disc grooves. A stubborn encrustation of dirt on a diamond tip, possibly the result of neglect, is however likely to resist all but patient work with pure alcohol.

A selection of small tools may seem an obvious requirement, almost mundane — but do you keep all the right items in one place? Some of the tools will of course be useful for various jobs around the home. Surprisingly few accessory firms supply a hi-fi selection, apparently preferring to mix tools with other items in a maintenance kit.

A basic tool-kit would include small screwdrivers of the 'instrument' type (three sizes, as they cost very little), long-nose pliers, tweezers, side-cutters, a selection of screws and nuts, and some insulated wire and sticky tape. To extend this kit, add a cross-head screwdriver or two, a small cleaning brush and a cloth or tissues. A cleaning fluid of the anti-static variety is useful for restoring control panels, turntable parts and plastics items. By the way, side-cutting pliers can both cut wires and strip off insulation, but purpose-made stripping tools are available (Bib list them).

All the fuses needed for household electrical appliances might conveniently be kept with the tool-kit. Do remember that the 3-pin mains plug for each appliance, whether it is hi-fi or a vacuum cleaner, should carry a fuse with a current rating to suit the circumstances. Although most homes have a 13-amp system, this does not mean that every plug should contain a 13A fuse!

Soldering wires to small terminals such as those in DIN plugs or pickup headshells is fiddly and best avoided by the impatient. However, handymen will face up to the task, remembering that the tool should match the work. A miniature soldering tool suits hi-fi jobs, and the best examples have interchangeable bits so that optimum transfer of heat can always be secured. Keep the bit clean and tinned; then clean and tin the work (such as wire ends or terminals) using a spot of solder. Bring the bit to the work and apply the solder. Do not make a puddle of solder on the bit and expect that to flow where you want it. Resin-cored wire solder, such as Multicore, is available in small dispensers.

For those who do not relish the job of adapting signal leads there are plenty of prepared connectors by specialists such as Audiopacks, Audio-Technica and Ross. Every eventuality and permutation seems to have been thought of. You can find DIN-to-DIN connections, DIN-to-phono conversions, long leads and short ones (for lower capacitance), interconnections of every description.

Tests discs are in demand for hi-fi pickup and system checks, and the various examples (Shure, Denon, CBS and so on) cater for most investigations including channel identification, phasing, rumble, tracking and subsonic resonance tests. The HFS81 disc used for tracking and other tests involved in compiling this guide is distributed by Howland-West Ltd.

MATS

Platter-mats have by now been elevated to the status of major accessories, attracting a great deal of attention in audiophile circles — but not so much elsewhere, it must be said. It is hardly surprising to find some interest in the subject when one considers the inept design of mats on so many popular turntables. In many cases the mat seems to have been added as a cheap afterthought, while in others the emphasis is on a nice appearance, so that the surface is covered with ribs, studs, pads or even strobe patterns.

It is reasonable to expect that manufacturers of top-flight turntables will have given some thought to the type of mat which best suits the product (but even then there are some exceptions, alas). Dissatisfaction over mats arises most often with the less costly turntables, as some of the reports in this Guide will show.

On the other hand, low-cost players often introduce so much colouration, in the sense of departures from neutral sound, that one cannot expect a 'better' mat to make a major contribution to improved performance. It may make a small improvement, though, and a good mat is likely to provide a better supporting surface for the discs.

Indeed, aside from the more subtle aspects, obvious and simple requirements are that the mat should impose some damping and present a suitable contour to a nominally flat LP. Thus a label recess will be a feature. It can be seen that too many of the 'afterthoughts' are totally and hopelessly wrong, for they have voids moulded in the underside as well as top surfaces with unhelpful bumps and rings. A fair substitute in such cases, at least where no special complication is warranted, would be a properly contoured rubber mat at lowest possible cost. It would be even cheaper to buy or make a felt mat, although felt does not have magic properties and does not provide ideal support. In any event a rubber mat is appealing because it can be washed under the tap.

Since there is much to be said for a hard supporting surface, it would be satisfactory to place the disc directly on the contoured top of a suitably inert platter (as has been done a few times in the history of turntables). It does pose some manufacturing problems, however, so we are still using mats! By way of contrast a few turntables have point supports for the disc and no mat at all, and this is evidently done more for production expediency than because the arrangement has any intrinsic merit. It leaves all too much scope for the disc to vibrate — the situation we are supposed to avoid. A nice embellishment here would be a glass mat, assuming that the turntable could physically accept it.

Suppliers of speciality mats do of course make various claims on behalf of hard rubber, polymeric materials of several kinds, glass, felt and so forth. You are well catered for if you have a taste for experiment, but bear in mind that the ideal mat depends on the turntable design, so that it is not acceptable to make sweeping statements about the 'best' one to buy.

Hard, contoured mats are widely applicable, and sensible examples among many contenders are those by Avon, Ariston and Osawa. The Audioref is of different composition and more absorptive, while the Platter-Matter is an interesting tacky-surfaced mat. GA Audio and Nagaoka are among producers of glass mats with central label recesses. If you are thinking of using a thick mat, first check that the turntable's centre spindle will be long enough to accept it. Also remember to adjust the pickup height.

Intimate contact with the disc is desirable. Some enthusiasts promote such contact by the use of weights or clamps. Audio-Technica, KMAL, Nagaoka, Monitor Audio and others market such devices. Disc warps pose problems, and 'dished' discs are especially difficult. Clamping is all right on one side but causes edge-lifting on the reverse side. Then the only solution would be to clamp the edge — as Trio have demonstrated.

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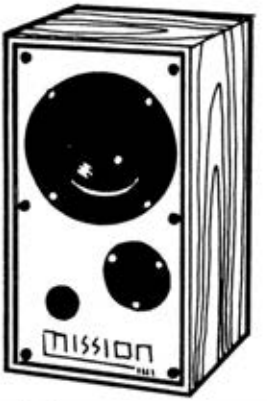

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SUPERDISCS

The shape of things to come — Sony's prototype Compact Disc player

Most hi-fi users are interested in what is 'on' a disc in the technical sense. This interest is directed at such matters as recorded levels, frequency range, distortion, noise and the way in which fine details are captured. Expertise in cutting the master disc prior to the manufacture of pressings is a particularly critical factor in success, and one receiving close attention in the making of 'super-discs' worthy of the hi-fi accolade.

No doubt many buyers will be inclined to believe that a disc free from blemishes and extra-musical noise — the result of careful quality control — is 'super' from any reasonable viewpoint. Perhaps they will not expect more than that, and fortunately suppliers, including a number of the smaller independent producers, are responding with an enthusiasm which, if belated, is very welcome.

However, disc recording is moving forward with new technology. A large and growing array of discs appeal as audiophile products, in that sales are primarily to buyers who are musically aware and critical users of sound systems. Direct-cuts claim a high standing among hi-fi enthusiasts, and now there is the more influential development of digital recording.

Often a marked advance in quality is only offered at a premium. For example, many direct-cuts sell at twice the price of standard new releases from the large record companies. On the other hand some of the latter's best products can appeal as audiophile discs, although no price differential is involved.

DIRECT-CUT DISCS

The alternative expression 'direct-to-disc' recording affords the clue to the technique. Magnetic tape is not used at any stage, so the

possible hazards it could introduce (unwanted noise, distortion or other limitations) are avoided.

With this method the master disc is cut as the musical performance takes place. Then in principle the production method is the time-honoured one involving a chain of processes starting with electroplating of the master and finishing with the manufacture of pressings. The elimination of the tape stage is held to be the major factor in the technical and audible improvement achieved, and at the same time special care is taken over disc-cutting in order to make the best of the method's potential.

Some of the implications are readily visualised. Each disc side is a complete 'take' and this may make for spontaneity in musical performance. In some cases the side consists of a complete musical work and in others a complete recital or concert of some kind. However, a disc cannot be edited (the big feature of tape), so the producer's choice lies between acceptance and rejection of errors in the course of recording. Serious errors mean that the performance has to be repeated and the side cut again.

This somewhat daunting regime has led in some quarters to the exclusive choice of performers who were prepared to accept the peculiar conditions, which in fact are the same as those imposed in the earliest days of sound recording. This has tended to limit the repertoire, in which instrumental performance has been dominant. However, there have recently been some impressive examples of large-scale performances by internationally celebrated orchestras.

Innovations in digital recording tend to divert attention from the direct-to-disc method, and in any case the cost of many direct-cuts limits their sales. However, the best examples are admirable with their attack, clarity and general sparkle. Wide dynamic range, coupled with low noise and distortion, can yield a realism that is worth sampling by everyone who follows the fortunes of sound recording. Prominent labels known to UK enthusiasts include Crystal Clear, Sheffield Labs, Ultrafi and Japanese RCA.

Hi-fi enthusiasts, and indeed many others who are less aware of advances in audio, await the digital revolution — the next phase which, we are promised, will take us forward to a spectacular increase in realism. The fact that many disc sleeves already sport a 'digital' legend reminds us that we have started the run-up to something which will change the pattern of recorded sound and its reproduction.

Today's so-called digital recording is a hybrid, and good though it may be it can provide only a clue to what is likely to happen. Currently such discs are the results of digital mastering on tape in the studio but there is conversion to non-digital form (analogue, as it is known) prior to disc manufacture in the familiar shape of vinyl LP pressings.

Digital recording has its origins in data processing and, therefore, in computer technology, the mainstay of which is the conversion of information into numbers or digits. The newcomer to hi-fi will probably not find it very edifying to learn that music, in its passage through a record/replay system, can be represented by a stark code and put together again at some appropriate stage. It works well, though, as the BBC found when it decided to use such a system for VHF broadcasting. Whatever complaints the Corporation may have to suffer, very few are directed at the encoding of the studio's output.

In recording the audio signal is sampled in such a way that an accurate reconstruction of the original can be made at the decoding stage. While the information is in digital form it remains relatively invulnerable to the deficiencies that can arise in magnetic recording, and there are important gains in such areas as distortion, noise and linearity of frequency response. The hybrid nature of the product bears on convenience and practicality, since the buyer can play it without any fundamental change to his hi-fi system.

CBS, Decca, EMI, Philips, Hyperion and Unicorn are a few of the names on the digital scene, while there are imported discs from Chalfont, Telarc, Varese and others.

WHAT NEXT?

At present the digital technique is applied only as far as the master tape and digital copies of it. If full advantage is to be gained from this innovation it is necessary to apply it

at all stages, right through to replay in the home. This means that the digital data will be converted into usable (analogue) form as the disc is played, and this result will be passed to the audio system for amplification in the usual way.

Several new systems, fully digital and mostly based on discs of one size or another, have been developed. The Philips compact digital audio disc (or DAD) appears to be furthest along the road to commercial availability. Licensees are already numerous, Sony and CBS being particularly prominent.

In brief, the compact DAD is only 12cm (4·7in) diameter and therefore requires only about one-sixth the storage space demanded by conventional LPs. The coded information, in the form of microscopic pits and flats on the metallised disc, is covered by a transparent plastics coating and thereby protected from scratches and dust. The disc is traced by a laser pickup, so that no part of the playing mechanism makes contact with the recorded area.

One side of the disc can offer one hour of stereo, and a larger number of channels could be accommodated at the expense of playing time. The disc rotates anti-clockwise and is played from the centre outwards, while the speed is variable and controlled by information encoded on the disc itself. The replay machine incorporates cueing facilities for selection of items within a programme, and there are many programming possibilities such as the recording of titles, item lengths or texts for display on a monitor.

Recent demonstrations of the discs and the replay machine have shown that a very high standard of sound quality is possible. Particular claims made include a signal-to-noise ratio of 90dB, implying a similarly wide dynamic range; linearity of response in the 20–20,000Hz range; channel separation of at least 90dB; and absence of rumble and pitch fluctuation effects.

Obviously this mini-disc and its player differ in every way from what is now in general use, but the hi-fi user will realise that the replay unit can be regarded as a new input for a hi-fi system, which in itself will not change. In any event there is no question of a sudden disappearance of the vinyl LP: the new and the established will have to co-exist for a considerable time. Further, since other digital systems have been developed, the potential user will want to see whether they are likely to succeed or fail. Digital recording on cassetes is feasible.

SURROUND SOUND

Recording and replay systems designed to surround the listener with a sound-field attract a lot of attention in the UK, the USA and elsewhere. British activity in this area takes practical form in the Ambisonics technology, and the BBC and several recording organisations are taking a close interest.

As users of good hi-fi equipment are aware, stereo can convey certain features of music and entertainment, bringing out generous detail and some 'atmosphere' while working in favour of a wide dynamic range. However, directional distortion is involved in a directional illusion which is provided only over a frontal sound-stage. Mixtures of directly perceived and reflected sounds, a natural feature of listening to a live performance or event, are presented from one direction — in front of the listener.

With surround sound the aim is to bring about a sharp reduction of directional distortion using two or more channels of recording or transmission. In this way it is possible to create an illusion of the sound-field as it was recorded. This can be true whatever the listener's position within most of the listening area.

The disc recordings are encoded with surround information and played with a normal pickup. The signals are passed through a decoder and then to four amplifier channels (instead of the two needed for stereo). A basic layout would employ four loudspeakers in a rectangular figure enclosing the listening area, although it is possible to use more speakers to good effect. In any case the number of channels of the recording or broadcasting system do not determine the numbers of speakers that may be used.

Since surround-sound technology is not at odds with the digital innovation, it should prove compatible with new and emerging audio developments. Current hybrid digital LPs with encoded surround information and offering good stereo compatibility are exemplified by Unicorn-Kanchana releases.

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Linn Isobarik loudspeakers
Naim NAP 250 power amplifier
Naim NAC32 pre amplifier
Linn Ittok pickup arm
Koetsu moving coil cartridge

352-4 LOWER ADDISCOMBE ROAD,

Systemdek

Our suggested system with the Systemdek turntable

Lentek S5 loudspeakers
Lentek stereo integrated amplifier
Mission 774 pickup arm
Denon DL301 moving coil cartridge

CROYDON SURREY.

Ariston

Our suggested system with the Ariston RD80 turntable

Mission 727 loudspeakers
A&R (Cambridge) A60 integrated stereo amplifier
Linn LV V Basik tone arm including cartridge
or Goldring 910 IGC

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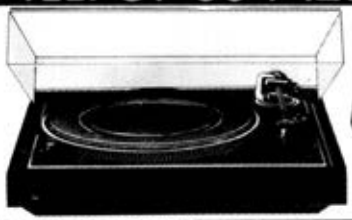

Dual

Our suggested system with the Dual 505 turntable (including tonearm)

Mission 700 loudspeakers
NAD 3020 Integrated Stereo Amplifier
A&R C77 cartridge

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Oracle

Audiostatic loudspeakers
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ADC B3001

ADC is of course BSR's hi-fi line, and the series includes a celebrated range of cartridges a well as pickup arms and minor items. Seemingly it was almost inevitable that the compan would eventually come up with a separate turntable, suited to arms such as ADC's own, and i fact the suggestion was made to them some time ago

The result is the 3001, made in the USA for British-owned ADC. This is a simple two-spee unit of the direct-drive type, almost stark in appearance but at least unobtrusive. The soli plinth has a black finish, easily cleaned, and the material used is high-density Synergite Simple knob controls are provided for fine-speed adjustment with reference to a platter-edg strobe.

THE FINDINGS

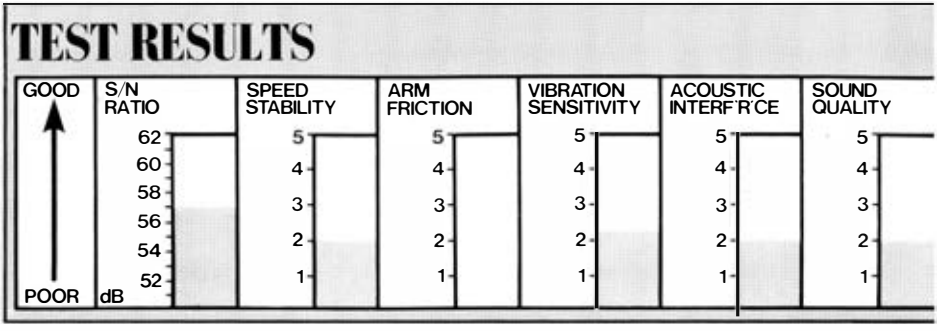
A well engineered platter and bearing made a good impression but the mat, with its radial ridges, could only be dismissed as a bad mistake for it was faulty in respect of disc support and damping. The turntable arrived with the SME-pattern cutout, suited to ADC arms, and both ALT-1 and SME III arms were tried. Fitting was simple and the routing of leads to the rear of the plinth was effected without problems.

Start-up time to 33 was 4 secs, which was twice the claimed figure but not in itself a serious point. Speed correction involved a small overshoot and the marginal torque remained a matter of concern, for the design balance of motor and platter is open to question. Dynamic stability under typical programme conditions was distinctly poor. Overall S/N was a fair 57dB.

This unit depends on a servo system, the emphasis being on adjustment rather than close maintenance of nominal speeds. Drift was 0·15 per cent in an hour. Most likely the 3001 would have been better as a quartz-referenced unit, without the control emphasis, but it looks as though stability would have been a problem with the components used. Vibration-resistance was only fair, while sensitivity to acoustic interference was likewise a bit of a disappointment — not really up to expected standards at this price level.

Audition revealed some lack of bass extension and, through the midrange, heavily scored material did not emerge as crisply as desired. Speed stability was a worry under workin conditions, and its effect was intrusive with variety of modern programmes. It was inclined t make good stereo superficial, lacking prope detail and perspective. A revision of desig should focus on certain electro-mechanic factors, for there is scope to improve audibl performance.

TEST RESULTS



£139 MERIT ★★ VALUE ★★

THE VERDICT

Although this turntable has the virtue of simplicity, which undoubtedly has a lot of appeal, the design has in some basic respects been poorly gauged for the application. It consorts very uneasily with this company's existing range of products.

Type	Direct-drive, servo, with speed adjustment
Speeds	33 and 45
Platter	Cast aluminium, 1·6kg approx.
Standard of construction	Fairly good
Pickup	Not supplied. Mounting insert provided

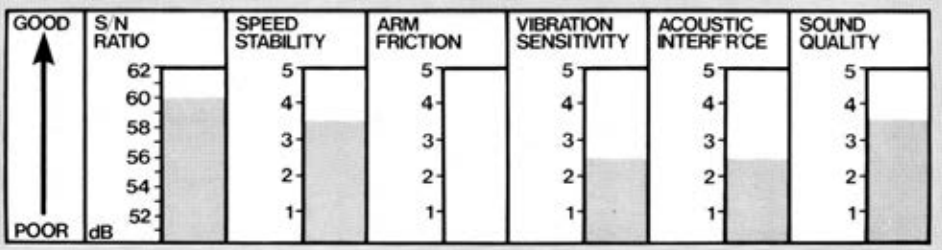
ARGOMOUNT ATHENA I

Often one hears the enthusiast bewailing the elaboration of much modern hi-fi equipment, suspecting that apparent gimmickry adds to the cost. Are all the 'features' necessary? The straight answer is that many refinements are purely cosmetic, having scant bearing on audible results. You are not denied a choice, however, for there are some more basic products about, and at their best they place the emphasis on essentials.

Argomount evidently go for simplicity, and their new turntable is one of the least cluttered units to be found. In fact there is not one control on the deck, for the speed selection is consigned to a remote box providing 33/45 switching and an 'off' position. This item incorporates a transformer and electronic parts, the idea being to keep these away from susceptible areas around the pickup.

The Athena I is a direct-drive turntable with quartz lock, dispensing with fine adjustment of speed. The most noticeable feature is a float-glass platter, 12mm thick and ground concentric to the centre spindle. A felt mat is supplied. No pickup arm is fitted or specified but there is a blank aluminium insert for arm mounting. Few users would want to cope with cutting this substantial chunk of metal, so it is just as well that Argomount intend to make prepared inserts available. A sample SME-pattern insert was provided for test.

TEST RESULTS



THE FINDINGS

Simplicity tends toward a stark aspect in this instance but this does not imply any criticism of finish or workmanship. The plinth is a monolithic affair fabricated from dense particle board, surfaced with a good teak veneer and fitted with rubber feet. The thick metal mount for pickups could hardly be bettered at this price level, although a hardwood insert is a possible alternative.

Use of a glass platter could pose some problems of fitting to the centre spindle but Argomount have circumvented these in suitably simple fashion. A small aluminium hub is first placed on the spindle taper (a very good fit) and then the glass platter is placed on the hub. A hard rubber seal holds the two parts. If there is any mild criticism of the arrangement, it is that an even stronger union and better concentricity could be achieved with a slightly more complex seal. There should be no disadvantage in that, for the platter would not normally be removed for a considerable time.

As for other details, the choice of mat is called into question. A felt mat is on the face of it an adequate addition to a glass platter, yet it has a poor appearance and does not offer ideal disc support. In this instance a properly contoured mat (Ariston, Avon and the like) is an alternative worth considering. The dust cover was decidedly flimsy and had some slight influence on acoustic interference results, so the best thing to do is remove it during play and then put it back afterwards for purposes of protection.

Data of interest include the platter mass of nearly 2kg and a start-up time to 33 of 2 secs. Motor torque was adequate though not generous, while long-term stability was fair, and there was a positive drift of 0·1 per cent in an hour. Using a SME test arm the overall signal-noise result was 60dB, and some relatively high components were present while the low rumble result was very good.

Auditions centred on the SME arm revealed that a firm bass could be achieved, though this lacked the extension and sheer authority sometimes achieved with more massive constructions. Through the range the sound was well defined and sometimes a bit hard, while some subtle details were considered to be slightly veiled. Results generally confirmed that a contoured hard mat showed more promise than a felt one.

Vibration-resistance findings were just about average and acoustic breakthrough fair. Careful siting and support will be essential — inevitably the result of experiment. In all it was concluded that performance was quite well in tune with the modest price.

THE VERDICT

This product goes some way to proving the virtues of the simple approach, despite one or two minor reservations. Many buyers, favouring a 'commonsense' turntable, will find that the Athena does what they require if a middling budget places a curb on ambitions.

Type:	Direct drive servo with quartz lock.
Speeds:	33 and 45.
Platter:	Glass with aluminium hub, 1·8kg.
Standard of construction:	Good.
Pickup:	Not supplied. Special arm mount fitted.

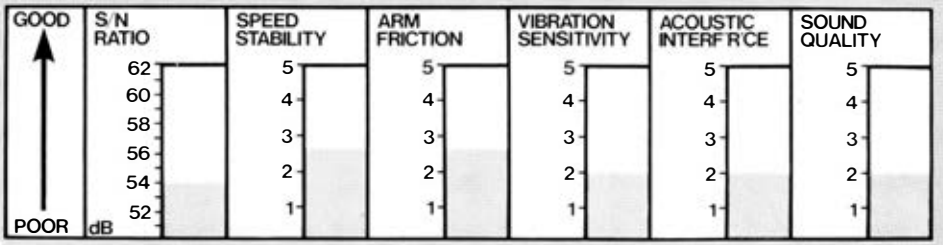
AKAI AP-Q55C

Placed in the lower medium range of price, the two-speed AP-Q55C is a direct-drive unit with quartz control. It is a semi-auto player with the usual trip and end-of-side return of the pickup, while cueing is visual and aided by a damped lift/lower control. A reject button is included and, ranged along the front of the plinth, all facilities can be used with the dust cover closed.

Speed monitoring with a sensor on the motor produces a signal for comparison with the quartz reference, leading to correction applied via the motor's drive circuits. The user's check of speed is a single-row strobe but this is primarily for use when speed-lock is off to permit fine adjustment via the 'pitch' control. As ever with such systems it is difficult to see why the system is not limited to quartz supervision without option, as this is all that most users would require. The same could be said of many other turntables with elaborate control schemes.

The plinth, provided with a hinged dust cover of reasonable quality, is largely of plastics and fairly light in construction, with a silver-grey finish. It provides what is virtually a statutory style in Japanese units, and it becomes difficult to tell one from another. The pickup arm, of conventional design, is S-shaped with a plug-in headshell, and a cheap cartridge is fitted to finish off the package.

TEST RESULTS



£99 MERIT ★★ VALUE ★★★

THE FINDINGS

High technology is all very well but there is often the penalty of meagre torque in low-cost designs, and the balance with platter inertia is too often in question. In the present case the torque is marginal, with some effect on stability under dynamic conditions, influencing the overall result in respect of definition of detail.

The main bearing and the motor mounting made a favourable impression. The cast platter weighed nearly 1·2kg including the mat. All too many platter-mats on popular turntables leave a lot to be desired, and the oddity supplied by Akai is no exception. It provides quite good disc support but has a series of voids underneath, all unnecessary and giving the mat a curiously irregular property. A plain mat could be substituted but the platter-edge lip might necessitate trimming.

Intended for cartridges in the approximate range 4 to 11 grams, the arm was of fairly good quality and of the more massive variety with an effective mass of 12g (plus cartridge) when set up for the 5·5g cartridge supplied. The latter was a V-magnet example, evidently made by Audio-Technica and designed for 2g tracking. It had a conical shank-mounted tip. Since the compliance was 22cu the matching to the arm was a little less than ideal.

The coarse sound quality, short of detail and often edgy, did not make a good impression. A substitute with better characteristics as regards matching and tracking pressure might with care yield smoother results, limited by the potential of the player as a whole. Lateral pivot friction was 40mg and the vertical figure 15mg, so there are possibilities for experiment if ultra-light trackers are excluded. Bias results backed this, as the correction trend was acceptable only for the higher settings.

This player could probably benefit from another look at cartridge choice, though nothing particularly exotic could be justified. In any event that is for Akai to look at, for they do not seem to have paid much attention to it. As for other aspects the unit was touchy over vibration and break-though results were barely average for the class. Care in location and mounting can make the best of it. In any situation audible colourations were fairly strong and the loss of detail on average material was disappointing.

Start-up to 33 was in 2 secs. Pickup cue descent was faster than some at 2 secs. Overall signal-noise result was 54dB with some significant low rumble. All controls were effective and simple but the final impression was that neither basic sound quality nor dynamic stability instilled much confidence.

THE VERDICT

There is an obvious restriction to outfits of limited medium-fi capability, mostly of the economy class. Sound quality was indifferent. Some attention to a few details are warranted, but more generally it can fairly be asked whether costs have been apportioned to best effect in a unit which is so elaborate in the speed-control department. It is not an exclusive Akai foible, of course.

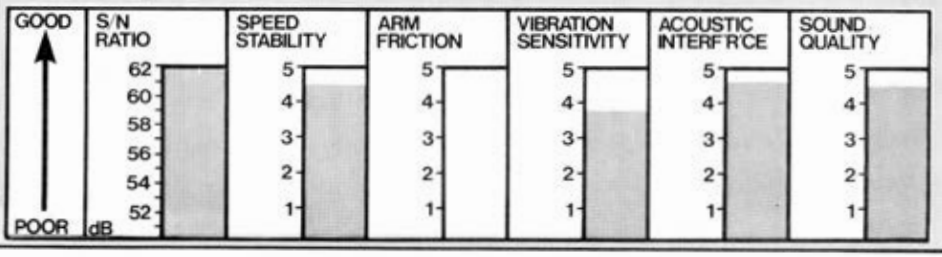
Type	Direct-drive, DC servo, quartz control.
Speeds	33 and 45.
Platter	Diecast alloy, 1·2kg approx.
Functions	Auto-return, reject. Quartz lock and switched speed adj. with strobe.
Standard of construction	Good.
Pickup	S-shaped arm, plug-in headshell, MM cartridge. Dial bias corr.

ARISTON RD80 SL

Starting with the relatively expensive RD11S, which has more than a little in common with the Linn LP12, Ariston have gone on to produce alternative and somewhat simpler models. Least costly is the RD80 SL, reasonably seen as a competitor to Thorens' TD160-S. A version with electronic speed control and the questionable luxury of fine-speed adjustment is available (around £60 extra) but this innovation was not taken into account for these tests.

Drive is from a 24-pole synchronous motor via a flat belt to a hub which is the centre of the substantial two-part platter. Other features are a steel sub-chassis with three-point suspension and a circular arm mounting insert — prepared with SME cutout on the test model. The unit is made for 33 and 45 in that a suitable pulley is supplied, but speed-change depends on shifting the belt by hand.

TEST RESULTS



THE FINDINGS

This turntable lacks the limited-slip clutch device used on the RD11, and drive take-up depends on the belt settling correctly on the pulley contour. It means that start-up is a bit sluggish (3·3secs to 33) and high accuracy in setting-up is necessary. This 'tuning' is not particularly tricky and in any case is inseparable from sub-chassis systems of this sort. It is simply that some are more tedious than others, and it is easy to see why some would-be buyers decide to avoid them.

Motor torque and speed stability under dynamic conditions were very satisfactory, although an absolute error of nearly 0·3 per cent positive was considered excessive. With the test arm the overall S/N result was 62dB. The main bearing (long, finely polished spindle on a steel ball) was approved, as were platter and chassis details. Ariston's own sensibly contoured mat, also available as an accessory, was supplied.

An SME III test arm suited this unit well and the Mission is likewise a contender. Nicely balanced and integrated performance was achieved, and in all the results were much like those with the Thorens TD160-S, although there were moments when the latter seemed to promote a little more midrange brightness. The Ariston bass was very good indeed, quite firm though not as remarkable as from more massive constructions. Acoustic interference result was above the norm for this price level; vibration resistance was also to a good standard.

THE VERDICT

A sensible design, suited to hi-fi systems of refinement, though not for those who shun setting-up checks. Arm choice poses no problem. Good value.

Type:	Belt drive, synchronous motor. Fixed speeds.
Speeds:	33 and 45.
Platter:	Two-part cast alloy, 2·4kg approx.
Standard of Construction:	Very good
Pickup:	Not supplied. Mounting insert fitted. Plain or cut insert optional.

AUREX SR-D45

Some enthusiasts will associate Toshiba's Aurex brandname with diminutive 'micro' hi-fi units. The D45 is conventional enough, however, and is the sort of player one would find surmounting rack systems in the medium price range. It is a fully automatic player of the direct-drive variety and comes as a complete package including fitted magnetic cartridge model C60M.

The plinth is of loaded plastics with a few metal parts, rigid and less flimsy than some, and soft rubber feet are fitted as an attempt (not very effective) at isolation. As usual with this sort of player, the cover is directly linked to the structure carrying the pickup.

Of the DC servo type (an alternative model has quartz-lock as well) this unit has all controls arranged at the front, operable with the cover closed. Quite large compared with the light-touch buttons often used nowadays, the controls are for speed selection, disc size, start/stop and cueing. A milled wheel provides speed adjustment, checked with reference to a strobe which is based on pips ranged under the platter and reflected in a window.

THE FINDINGS

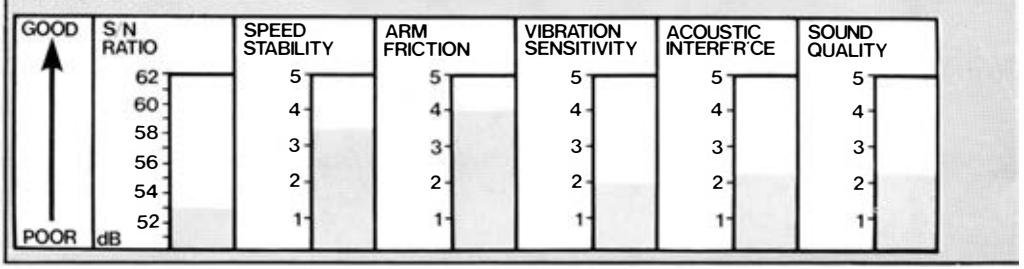
Although the motor gave a good impression, and despite attempts evidently made to achieve adequate rigidity, the central area of the assembly was still a bit doubtful to judge by the tendency of the bearing to flex in its mounting. However, all mechanical parts worked well and the 1kg platter was well made and finished. The mat was another of those complicated curiosities, and a plainer design would give better damping.

The system was free from pronounced hunting and instability but the torque was only just adequate for practical conditions and performance barely responded to demands made by all modern material, assuming use of the pickup as set-up (the cartridge is a low-compliance 2·2g tracker). Start-up time to 33 was a long 3 secs. S/N result was an indifferent 53dB, with some low rumble, and not too well in line with hi-fi requirements.

Long-term speed drift was high at 0·5 per cent in an hour, so we have yet another instance of one's attention constantly being drawn to a display of error for purposes of manual correction. Acoustic interference result was not good in relation to price class, nor was sensitivity to vibration and shock.

The arm is another example of a straight component with small plug union and thumbscrew for clamping, an alloy cartridge platform being supplied. The fit of the plug was vague and with the screw secured the head was canted by a degree or so. Effective mass was about 11g plus cartridge and lateral friction was 25mg (negligible vertically). Bias was roughly linear in effect but only acceptable in the range of setting for the supplied cartridge. Pickup cue descent was 2·5 secs. While the cartridge was a fair match to the arm, its sound quality was coarse with poor revelation of detail. Indeed, overall results from the player lacked refinement, although the basics of operation were likeable enough.

TEST RESULTS



£100 MERIT ★★ VALUE ★★

THE VERDICT

This player could probably benefit from attention to a detail or two, including the cartridge, but it fails to inspire in relation to price. More notable for automatic control than for sonic refinement.

Type	Direct-drive, DC servo, automatic
Speeds	33 and 45
Platter	Alloy, 1kg approx
Functions	Speed and disc size selection, cue, repeat, start/stop, speed adj. with strobe
Standard of construction	Fairly good
Pickup	Straight arm, detachable offset head, fitted MM cartridge. Dial bias corr.

B&O BEOGRAM 1700

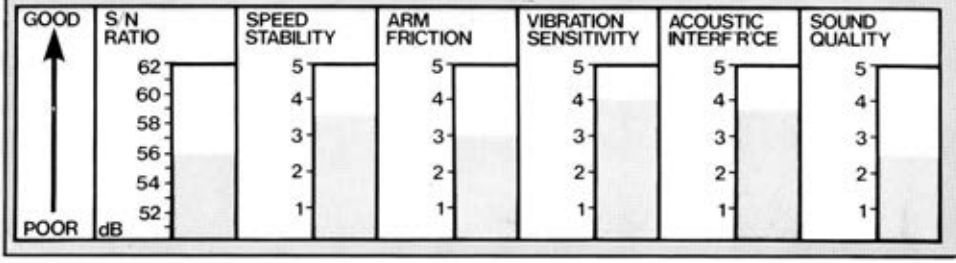
Smart Danish styling and cleverly executed designs gain for Bang & Olufsen a lot of admiration and significant sales in the UK. You can always depend on B&O to come up with a novel approach — one that works — but don't expect designs in accord with the mainstream.

Above all, B&O are systems-minded and inclined to promote matching arrays of units. However, you can select individual items if you don't mind fretting over a few details such as the use of DIN signal connectors and mains leads fitted with Continental plugs. The Beogram 1700, one of the least expensive players offered, is an example with a fair share of merit, though it is not really very 'hi-fi' (and is not claimed to be).

This unit is in typical B&O slimline style with a well-made plinth (metallic and teak finishes), the cover hinges being arranged so that extra rear clearance is not needed when operation is on a shelf close to a wall. It is an automatic, belt-driven turntable incorporating a floating sub-chassis. The pickup is integrated, in that the union of B&O head and arm is exclusive and other makes of cartridge cannot be used. The head actually fitted is a MMC-20S, which comes complete with some calibration data.

The 1700 looks very uncluttered and is operated by just four soft-touch buttons. Pickup lift/lower is included in the auto functions and adjustments on the arm are reduced to just one — for tracking pressure.

TEST RESULTS



THE FINDINGS

In common with other Beograms the 1700 has a very light platter of pressed aluminium alloy resting on a cast hub to which the belt drive is applied. There is no platter-mat and the disc rests on raised, painted portions of the platter, so that small areas of support alternate with voids. (One can say the same about a lot of rubber mats, of course.) Careless handling can cause the disc to skid a little, as grip is minimal. However, the support here is better than with the radial ribs used on some more costly Beograms.

Operation has its novel features. Touching the appropriate speed button starts the motor and brings the pickup to the disc start, whence the stylus descends to the groove in 1·3 secs. There is pickup lift and return at end of play. A pause control lifts the pickup at any point, and play is subsequently resumed by touching the speed button again.

Use of the pause is in any case needed if particular tracks are to be selected once play has been commenced. A fourth button gives platter rotation for a short time without moving the pickup, and this is intended to aid the use of dust-collecting tools (Preener and the like) prior to playing. Platter start-up time to 33 was 1·3 secs.

There is no cueing arc above the deck, and the arm-rest stays beneath the arm during traverse of the disc. This part, like everything else about the pickup, appears flimsy. The pivots virtually slop about, both laterally and on the vertical knife-edge bearing, but there is nothing specially surprising about it, for this maker's pivoted arms are often made that way, security and centring being dependent on gravity.

Distant though all this may seem from generally accepted practice, the component worked well in that operation was consistently accurate. As expected, low effective mass was a feature, the total for the integrated pickup being only 6·5g. Built-in bias for the MMC head (a 1·5g tracker) was acceptable. Pivot frictions were on the high side at 40mg lateral and 20mg vertical but not out of keeping with the particular design.

Real merit attaches to the design in respect of vibration to resistance, reflecting well on the sub-chassis arrangement, and the acoustic break-through was somewhat better than average for a unit in this price class, perhaps surprisingly so in view of misgivings about constructional features. Although the rumble result was fairly good, with an overall 56dB S/N, and long-term speed drift was negligible, stability under load was only fair.

The platter design was not liked at all. There is scope for use of a thin, hard mat, and brief experiment suggested that greater stability of stereo performance could result. However, the generally bland, if fairly smooth, character of the sound, with shortage of detail and depth, plus limited dynamic range, could not be entirely attributed to the pickup head and many other factors must have been contributing.

THE VERDICT

Personal liking for the styling and other details could sway the decision. This neat player has enough going for it to attract a middling commendation. Some attention to details could probably raise it above the basic audio standard to which it is restricted but the hi-fi accolade would still have to be withheld.

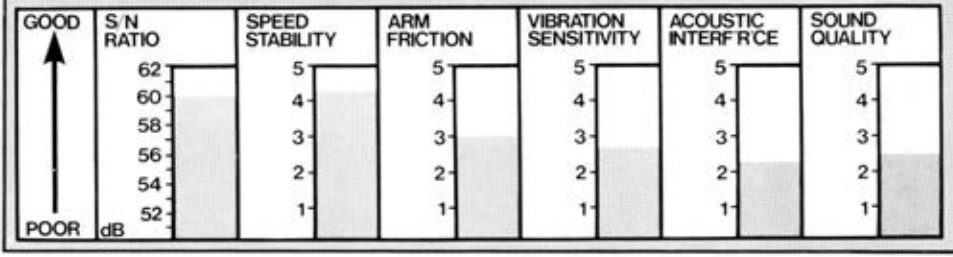
Type	Belt-driven, fixed speeds, automatic
Speeds	33 and 45
Platter	Pressed alloy, 0·45kg (top platter only)
Standard of construction	Fairly good
Pickup	Low-mass integrated pickup with detachable MMC-20S head. Built-in bias corr. No adjustment

DENON DP30L

Although Denon are not noted for the skimpier type of low-cost product, and still less for designs focussing on gimmick-appeal rather than audio advantages, the DP30L clearly represents an attempt to come 'down-market' while offering some familiar features. The direct-drive system is in effect a whittled-down version of more massive Denons, and there is the usual attention to plinth construction, in this instance based on a dense compound and given a bright modern finish.

Soft-touch controls are arranged at the front of the player so that they can be used with the dust cover closed. However, the latter item is of light plastics and, being directly linked to the structure carrying the pickup, does not bode well for sensitivity to acoustic interference. There is a degree of automation, in that pickup lift/lower is powered and there is end-of-side sensing with a velocity-sensitive trip to actuate pickup lift and motor switching

TEST RESULTS



£130 MERIT ★★★ VALUE ★★★

The proven Denon motor is an AC type with a speed monitoring system employing a magnetically encoded strip which is formed inside the platter rim and scanned by a magnetic head. This frequency-detection system is augumented by fine adjustment of speed and a strobe device.

Experience of Denon pickup design has not led to any great expectations. In this instance the arm design is competent but unexciting, of fairly high mass. The sample came complete with a moving-magnet cartridge, ostensibly a match but unfortunately a rather cheap choice — a 2g tracker with a 16μm conical tip. Not a very imaginative selection for a budget-stereo player from a good maker, though in truth no worse than some others, as some reports on Japanese units in this Guide will show.

THE FINDINGS

Results did not place this unit in quite the same league as the DP55K and that would hardly be expected, but in relation to price this version of the Denon motor and platter was impressive. Torque was well in accord with requirements of the system and dynamic behaviour was very good indeed. Servo operation was good, overshoot not in evidence, and long-term drift did not exceed 0·25 per cent in an hour. Rumble result was good, with an overall S/N of 60dB, which surpassed many at comparable cost. Start-up time to 33 was 1·6secs. The platter-mat offered good disc support but was afflicted with dust-collecting ridges.

It is disappointing to have to report that the pickup was not to the same standard as the motor system. It is a high-mass arm (about 17g effective) and this would not rule out use of a few cartridges of quality, mostly in the 8–12cu range of compliance. The supplied MM cartridge was, however, too poor to qualify with its coarse sound, short of real detail. It was an indifferent tracker with a dislike for a lot of modern programme material.

The arm exhibited fair characteristics so far as pivot frictions and bias were concerned. Lateral friction was 40mg, the vertical result being about half that figure, while bias was somewhat overdone but amenable to compensation by the user. It did not appear to be a very rigid arm. This combined with the cartridge quality yielded a poor result, not in keeping with the standard evidently being attempted.

Resistance to vibration was fair — about average for a player of this type. Acoustic breakthrough was marked, probably accounting for muddle in replay of high-energy material where the lower range proved disappointing. Bass was somewhat lumpy and short of real extension. In all, the tonal balance was lacking in life and sparkle.

Such a deficiency can hardly be attributed to the turntable design. In fact brief experiment with better cartridges showed promise within the limitations imposed by the Denon arm. The DP30L does seem a bit unbalanced and it is not difficult to point to areas for improvement. Siting in the room may pose a problem.

THE VERDICT

Real promise shown by the turntable is not balanced by pickup design, even disregarding the indifferent cartridge supplied. Some revision could make this unit more interesting for low-budget systems. Middling value, then, and susceptible to improvement.

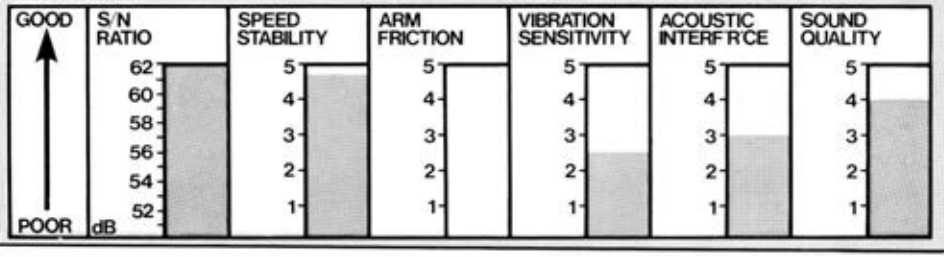
Type:	Direct-drive, AC motor, servo, speed adj.
Speeds:	33 and 45.
Platter:	Cast alloy, 1·6kg approx.
Standard of construction:	Good.
Pickup:	Alloy arm, detachable headshell, MM cartridge, dial bias corr. End-of-side trip and lift

DENON DP55K

Latest and most advanced of the Denon (Nippon Columbia) turntables, this model comes in two versions. The DP-55K is the basic direct-drive turntable mounted in a plinth, but a version known as the DP-60L (similarly a manually operated unit) is supplied with a pickup arm. However, inclusion of a 'standard' arm would completely change the basis of evaluation, and the comments offered here refer solely to the unit as described, specifically with the use of test arms as mentioned.

This unit incorporates the familiar Denon AC motor — a large and excellent example — with electronic control and quartz referencing for stability. Error detection is by a magnetic system, a series of magnetic pulses being recorded on a strip around the inside of the platter rim and scanned by a head. A single-row strobe with internally generated supply is fitted, and electrical braking is a nice refinement taking effect at switch-off and when changing down from 45 to 33.

TEST RESULTS



THE FINDINGS

The strong and bulky plinth has an easy-clean shiny finish in a dark colour and a hinged dust cover of reasonably good quality is included. A removable flush-fitting board provides for pickup mounting. On a point of detail, Denon continue to use a tapered centre-spindle which will not suit those who favour record clamps. That is because the full spindle diameter is provided for little more than the thickness of a disc, with the taper starting immediately above. Even a record-weight is inclined to locate in a rather vague fashion on such a spindle.

As usual with turntables from this maker, platter and bearings were to a superior standard. The cast platter was found to weigh about 1·7kg including a well-contoured mat of synthetic rubber (a distinct improvement on earlier and unsatisfactory Denon mats). The very positive tab controls, needing only light pressure, were well liked, as was the braking system for the motor. Start-up time to 33 was 1·1 secs. Speed stability was exemplary, long-term drift was slight enough to be disregarded, hum rejection was very good, and motor torque, as expected, was ample for the application.

Tests were primarily with Mission and SME III arms, both being typical of the more advanced components that could qualify. Using a few top-grade magnetic cartridges (Denon, Goldring, Technics) it was possible to achieve clean and well balanced results, with an encouraging approach to the neutrality sought from the best equipment.

As it happens, a spare mounting insert had been used to make this unit a test-bed for other trials at an earlier stage, when it was found that the Ultracraft AC-30 was an attractive partner — a finding of some interest since the AC-30 (see separate report) is less costly than several other contenders.

Under test conditions with the SME the rumble result was very good, the overall S/N figure being 62dB. Acoustic breakthrough result was fair, possibly a shade above average, and shock-resistance not particularly promising. The DP-55K does not specially impress in this area. Close attention to support and siting is necessary, for carelessness could undermine performance.

THE VERDICT

A smooth, quiet machine and a fine example of direct-drive design. The absence of fussy speed-adjusting gimmicks will be welcomed by those who see them as redundant. Middling on value, but in practice a convenient unit offering a high standard given careful choice of pickup and equal care over location and solid support.

Type:	Direct drive, AC motor, quartz reference without speed adjustment
Speeds:	33 and 45
Platter:	Cast aluminium 1·7kg approx.
Standard of construction:	Excellent
Pickup:	Not supplied. Mounting board fitted

DUAL CS-505

A price-rise was applied to Dual turntables at the time this report was prepared, but the CS-505 still falls in the low-budget area. This particular model is supplied without a cartridge, but an alternative version is equipped with a low-mass integration to suit the arm. The CS-505 is a Model-T Ford among players, arriving in severe black finish, though detail improvements centred on the motor and suspension have been made in recent production.

All parts are mounted on a deck-plate which is spring-mounted within the plastics plinth. A notable feature is the low-mass arm with a clip-in cartridge carrier. Belt-driven, the player has fine-speed adjustment and a strobe pattern around the platter rim, but this is not illuminated. Unusually, the CS-505 is not really a semi-auto unit, for the run-off trip merely actuates an arm lift and the pickup does not return to rest.

THE FINDINGS

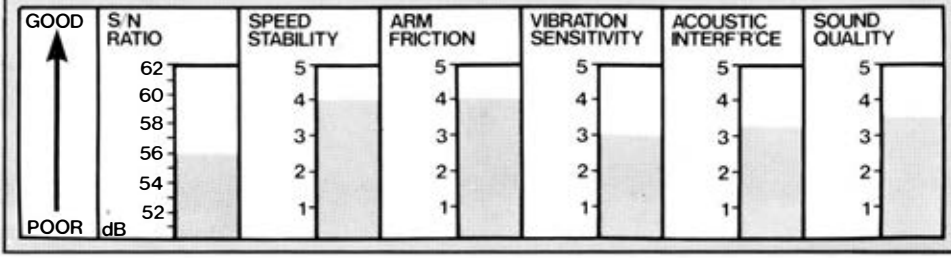
Examination provided some clues to the recent popularity of this model. Speed stability was somewhat above average for a low-cost unit and torque adequate, behaviour under load being good with long-term error not exceeding about 0·25 per cent. Start-up time to 33 was 1·5 secs. Overall S/N result was a fair 56dB.

The 1kg platter was well made but the mat, with a couple of raised portions, was good for neither damping nor support. It is stuck down but can be removed and an alternative fitted with a little trimming. Experiment indicated that an audible upgrade could be gained with a heavier and more solid mat, properly contoured. Control functions were approved. Dual's novel hinge/clamp arrangement was provided for the cover.

Dual are way ahead with their low-mass arm (7·5g effective), for it is unusually good for the price level and suited to stylus compliances centred on 20cu. Careful choice is warranted and there are good examples in the Osawa, Pickering, B&O and Goldring ranges, among others. Pivot frictions were only 25mg lateral and 15mg vertical, and cue descent time was a brisk 1·2 secs. The benefit of the complex damped counterweight was not apparent but this is not a serious matter.

Sensitivity to vibration and acoustic interference could be classed as average and certainly above reproach for a unit of this class. Sound quality with selected test cartridges was clean and reasonably open, though rendition of subtle detail in stereo was sometimes poor (and one can hardly expect a lot in the circumstances). Bass was a bit lumpy, but in all it was not difficult to secure an agreeable overall balance. It's a pity about the platter-mat, but most features are right.

TEST RESULTS



£79

MERIT ★★★★
VALUE ★★★★

THE VERDICT

Merits are more notable than demerits and the CS-505 stands out as a simple but effective unit for low-cost systems of limited potential. Certainly a high-value product.

Type	Belt drive, manual control with pickup trip
Speeds	33 and 45
Platter	Cast alloy, 1kg approx
Standard of construction	Good
Pickup	Straight arm with offset head and cartridge carrier. No cartridge supplied. Dial bias corr.

DUAL CS-627Q

Although we may still associate Dual with spring-mounted decks, some of the company's models are now based on moulded plastics plinths, suggesting an attempt to beat the Japanese at their own game. The luxury-style silver presentation is as Oriental as any one will see among the new season's turntables. However, a lot of care has evidently been devoted to the moulded plinth in the cause of rigidity, and this part is more substantial than the average. The dust cover too is of fairly good quality and, due to the clever hinge system, needs no extra rear clearance when opened.

This is an automatic player with all controls ranged on the front of the plinth, and starting is initiated either by pushing the appropriate button or by moving the pickup from its rest as a prelude to manual cueing with the aid of a button-operated lift/lower device. It is centred on a direct-drive motor with electronic regulation and quartz reference.

As is sometimes found in the more elaborate designs, the quartz supervision can be switched off to enable a pitch control to be used, reference being made to a platter-edge strobe, illuminated from an internally generated supply. This feature is as questionable as ever, and would be seen as redundant by anyone who is only interested in an assurance that nominal speed is being maintained.

Dual's well known low-mass pickup arm with 'gimbal' pivots is fitted, and with this comes a version of the Ortofon lightweight cartridge designated TKS-55E, intended for 1·5g tracking and with stylus characteristics ensuring good arm compatibility. The arm depends on static balancing, the tracking pressure being dialled at the side of the pivots.

THE FINDINGS

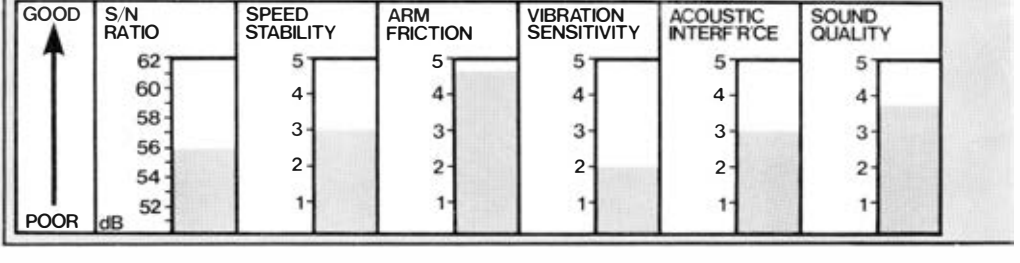
The motor torque was rather low, and a less meagre quota was expected in a design of this ostensible quality. Speed stability in practical conditions was always marginal, while long-term drift without quartz control was about 0·2 per cent positive, serving to confirm that pitch-control arrangements mainly draw the user's attention to small errors, whereas quartz control can largely remove the worry. Start-up time to 33 was 3 secs.

A mass of 1·3kg for the cast platter includes the unsatisfactory Dual mat, similar to that on the CS-505. In this instance the mat is loose and therefore very easily replaced by one of better contour and substance. Signal-noise result was 56dB. The player's behaviour in respect of mechanical disturbance was rather poor but the acoustic interference result was at least average. Here again we have an example of a unit requiring special care in siting and support.

All auto operations were performed smoothly and precisely. The highlight of this model, however, is undoubtedly the pickup. This slender component has an effective mass of only 7·5g in total, including the low-mass Ortofon cartridge, which is a properly compatible choice. It is of highish compliance, fitted with an elliptical tip (7µm scanning radius) and displaying good alignment and finish. The fine pivots offered a low 20mg lateral friction and entirely negligible friction in the other plane. Bias correction worked on the high side but acceptable results can be obtained with experiment.

Audition gave quite good results and, although the bass was a bit light, the overall balance was agreeable enough on most material. Stereo detailing was not to the standard achieved with some speciality components, but in all the performance was a shade better than average for players of the type and price. A replacement mat is worth the extra cost.

TEST RESULTS



£164 MERIT ★★★ VALUE ★★★

THE VERDICT

Its vices are not too noticeable but the pickup is better than the motor department. Not the best balanced of designs, so a middling rating seems appropriate. Possibly Dual could save on the fancy pitch control next time round — and divert the effort to the motor.

Type	Direct-drive, quartz reference plus pitch control. Auto operation with manual cue option
Speeds	33 and 45
Platter	Cast, 1·3kg
Standard of construction	Good
Pickup	Straight arm, offset head with fitted Ortofon low-mass cartridge. Dial bias corr.

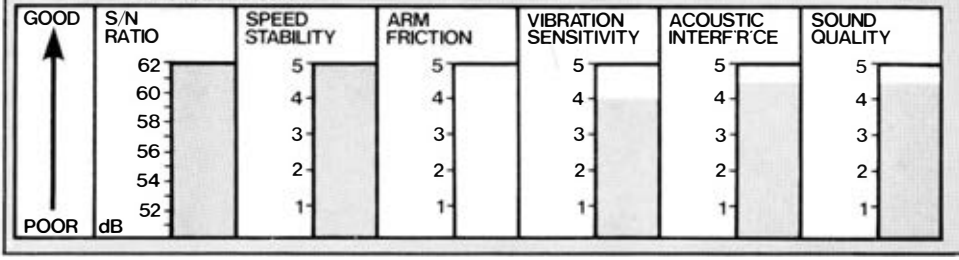
DUNLOP SYSTEMDEK

Since its introduction this finely made speciality turntable has undergone improvement — in detail but not in principle. Must of the attention has to do with initial adjustments, which is now more quickly accomplished. Improved isolating feet have been devised and the platter now sports a terminating ring in the form of a tight-fitting rubber insert around the rim.

The dreadnought platter, one of the heaviest in the business, rests on a central hub which is belt-driven. Turntable and pickup support are on a rigid sub-chassis, suspended within a substantial plinth formed from composition board and steel parts, good provision being made for routing the pickup leads to their exit. A board suitable for the SME-pattern arm base is provided and in fact the Mission arm (similarly equipped at the base) was used for tests. A blank board can also be supplied.

A felt mat is lightly bonded to the platter but it would be possible to remove this to permit experiment with other mats, not overlooking the fact that there is already a platter-top recess for disc labels. The sample Systemdek was finished in dark grey Nextel, a 'suede' surface the merit of which seems questionable with areas that are handled a lot.

TEST RESULTS



THE FINDINGS

Much admired were the slightly revised suspension (chassis resonance at about 4Hz vertically), the beautifully made platter and the generally solid construction of the product. The centre-spindle has a spiral oil-distributing groove, as in earlier versions. Speed change is strictly manual, involving a shift of the belt on the motor pulley.

There is a little chassis-wobble on start-up and careful pickup handling is necessary with such a 'soft' suspension, which has some nuisance-value as well obvious merit. A starting time of 4 secs to 33 was hardly surprising in view of the platter mass, but stability was very good indeed and the speed always within a hairsbreadth of nominal. In the test regime acoustic breakthrough results and resistance to mechanical disturbance were among the best yet encountered, while S/N was a superior 63dB.

Audition with the test arm and a few top-flight MC and MM cartridges (Denon, Sony, Technics) yielded impressive results, with well extended and solid bass (an occasionally emphatic quality was suspected) and finely detailed stereo with a high degree of analysis. The open character and generally convincing balance were always admired.

THE VERDICT

A very well engineered unit catering for a simple arm fitting and capable of a high standard, not readily surpassed. Massive construction is complemented by a basic simplicity which has wide appeal.

Type	Belt drive, manual speed change
Speeds	33 and 45
Platter	4·5kg approx.
Standard of construction	Good
Pickup	None fitted. Pre-cut mounting board supplied

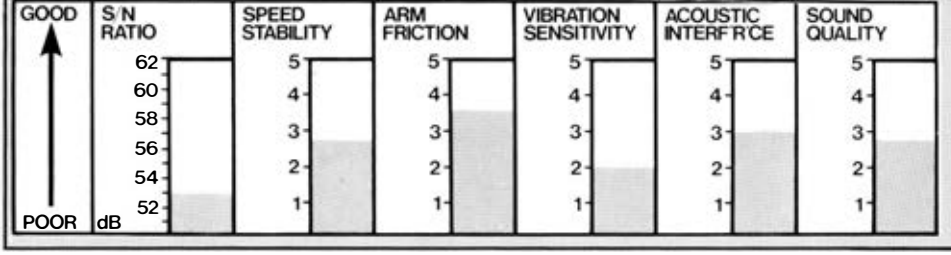
HITACHI HT-20S

Another very lightly built unit intended for 'budget' outfits, small rack systems and the like. The HT-20S is unusual among units of this class in that it incorporates a DC motor/servo system but is otherwise very simple, with belt drive to a light platter. There is no speed adjuster, but the product is none the worse for that omission.

Semi-auto operation gives end-of-side trip and pickup return, while the motor is started by moving the arm from its rest. A stop/reject button is included, and the cue control for the pickup is operated from the frontal control array, all being usable with the cover closed.

Light plastics construction is inevitable, of course, but the silver/grey finish is neat enough. The hinged, removable dust cover is on the flimsy side. The straight pickup arm with its 'non-standard' plug-in shell fitting is a pattern which is becoming much more common on Japanese players, many of them in the low-cost range. A cartridge is supplied. As is often the case, the plinth is fitted with sprung feet, included more as a token than to give any useful effect.

TEST RESULTS



£58 **MERIT ★★**
VALUE ★★★

THE FINDINGS

Fashions change. We have seen a rash of S-shaped pickups on Japanese players, and now the straight arm is in vogue. Some reduction of mass has been achieved, as in this case, but the offset plug-in cartridge platform sometimes leaves something to be desired. Here, the plug union is a vague fit until clamped by its set-screw and the platform is too flexible. Effective mass was about 10g, or a total of 15g with cartridge. Bias force was overdone but amenable to compensation after a little experiment.

Arm pivot assembly was notably better than average for this class of player, leaving no slack in the lateral bearing, but the lateral friction was on the high side at 40mg, though negligible. The cartridge was a good match for the arm and indeed was a little better in characteristics than the average for an inexpensive application, though lumpy bass and poor differentiation of detail through the midrange remained a disappointment.

Controls worked satisfactorily and speed error was very slight, while dynamic stability was above the norm for cheap systems — evidence that belt drive can be a better proposition than direct drive at this level of ambition. Start-up time to 33 was just over a second. Pickup cue descent took about 3 secs, considered excessive.

Behaviour in respect of acoustic breakthrough and feedback was better than the unit's construction seemed to promise, though touchiness over vibration was evident — a barely average result. On sound quality the HT-20S is marginally better than some at comparable price, but that does not amount to a special commendation. It would be possible to do better with a cartridge change (medium-compliance stylus). Another detail due for improvement is the platter-mat, for the one supplied is an absurdity.

THE VERDICT

Not a bad little player outside the true hi-fi area, showing promise for compact audio outfits of the simplest kind, though a few details are certainly not beyond criticism.

Type	Belt-driven, DC servo. Fixed speeds
Speeds	33 and 45
Platter	Light alloy, 0·6kg approx
Standard of construction	Good
Pickup	Straight alloy arm; plug-in offset shell. Magnetic cartridge fitted, 2g tracking.

JVC LA-31

Model LA-31 is a semi-auto player with the usual trip and end-of-side return of the pickup to its rest. The turntable is started by moving the pickup from rest and cueing is visual, aided by a damped lift/lower device linked to the control array at the front of the plinth. This unit seems to exemplify the Japanese maker's determination to bring the presumed advantages of direct-drive to units in the low-cost area.

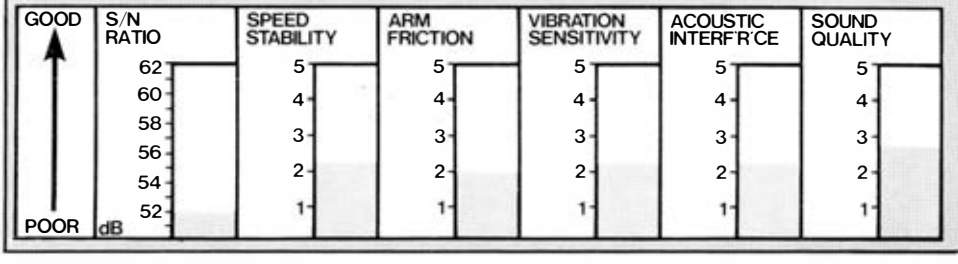
A stop control cancels play at any time during operation, returning the pickup, and there is fine-speed adjustment on 33 and 45. This is unusual, but certainly not unique, in that 33 is checked against the platter-edge strobe while 45 adjustment depends on the use of a card strobe disc which is supplied.

Construction is light, as may be expected at this modest level of cost. The plinth is largely of plastics and supplied with a hinged, removable dust cover of adequate quality. Finish is smart: colour is silver with black. Controls can be used with the cover closed.

The arm is of medium effective mass, a straight tube with offset headshell, the latter employing a miniature plug-in fitting of the kind made familiar by ADC arms and others. The arm was marred by what may be a sample fault of a minor sort — a pivot friction deficiency.

Cartridge mounting is on a flat, rigid alloy platform. The omission of a cartridge may be counted an advantage, considering the inadequate examples so often included in such packages, and it is arguable that the buyer is better off when left to make his own choice.

TEST RESULTS



THE FINDINGS

The LA-31 seems representative of what has been accomplished down-market with application of the direct-drive principle, but at this level it is inevitable that snags arise in respect of light construction and marginal motor torque, affecting stability under dynamic conditions. Whatever the cartridge used the sound quality is influenced, with loss of definition. It cannot be assumed that belt drive would be preferable at this same level, as so much depends on details of individual designs.

This turntable worked well and the controls proved effective and easy to use, with the exception of the fine-speed adjuster (about 3 per cent variation) which was small and awkward, and therefore somewhat inconvenient. The merit of such adjustment is in any case open to question.

The cast platter was found to weigh about 0·9kg including a very poorly designed mat, afflicted by grooves and voids. It should not be difficult to effect an improvement. Some users may be tempted to do so, although it is really for the manufacturer to produce something more sensible.

Light construction showed its limitations in the flexing of the main bearing in the plinth mounting and this is probably a factor in the unit's vulnerability to external influences. Acoustic breakthrough results were not at all good, nor was isolation from vibration and shock. Care in siting and mounting may to some extent control audible colourations, especially lumpiness and poor definition in the lower energy regions which are all too likely to occur

The pickup arm, a simple component of fairly good quality, balances cartridges in the approximate range 4 to 9 grams and is itself in the medium area of effective mass — about 9g plus cartridge Lateral pivot friction was much too high at nearly 100mg, although vertical friction was acceptably slight. Unless very heavy tracking is contemplated, the pivot deficiency would impose a limitation on performance. Inspection of the design suggests a better result should be possible with more care in assembly and control

In the anticipated range of use the bias correction was overdone but some experiment can compensate for this. Start-up time to 33 was 1·2secs and overall S/N was a poor 52dB with significant low rumble. Checks with compatible cartridges of modest cost and middling compliance (ADC and Shure) pointed up problems of bass definition and midrange colouration, often strong on highly modulated material.

THE VERDICT

With dynamic range restrictions inseparable from its use, this smart little unit might find its place in low-budget outfits of very limited capability — those of 'music centre' quality. In its field it is not bad value, but attention to a few specific points could improve it.

Type	Direct-drive, DC servo
Speeds	33 and 45.
Platter	Diecast alloy, 0·9kg approx.
Functions	Auto-return and stop. Speed adj. with strobe
Arm	Alloy straight tube; offset headshell, detachable. Dial bias corr.
Standard of construction	Fair
Cartridge	Not supplied

JVC QL-A51

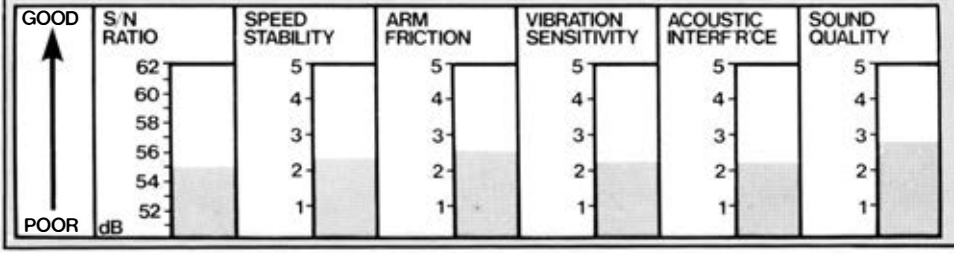
This smarly presented player, in the slimline style, could be said to typify units which combine direct drive and quartz referencing of speed in the popular price area. It is a semi-auto turntable with the expected functions: the motor is started by moving the pickup from its rest and cueing is visual, the damped lift/lower device being actuated from the front of the plinth, where all controls are usable with the dust cover closed.

There is the option of overriding speed-lock and a fine-speed adjustment which can be set with reference to the single-row strobe, displayed at the front of the turntable. A stop control cancels play at any time during operation, returning the pickup to rest.

Plinth construction is largely of plastics with a few metal parts, and rigidity appears to have been the objective. Finish is silver with black. The hinged, removable dust cover is adequate, though lacking the substance that might be expected at this price level.

The pickup arm, for all practical purposes the same as that on the LA-31, is of medium effective mass and takes the form of a straight tubular component with offset headshell on a miniature plug-in union. This latter item is a flat mounting platform, one of the smallest and lightest encountered. The QL-A51 is supplied without a cartridge.

TEST RESULTS



THE FINDINGS

Everything worked well and the controls were liked, although (as with the LA31) the speed adjuster knob was small and awkward in use. Presumably most users would ignore it and leave the quartz reference to do its job. Fine speed adjustment seems to be included as a token on units of this kind, but in fact the cost of it could be applied elsewhere to good effect.

Speed monitoring and correction, rather than maintenance of stability through mechanical precicion, is the centre of design in such units, and in fact the QL-A51 hardly excelled in respect of motor torque and stability under load. An overshoot tendency was evident in speed regulation and there was a slight inclination toward hunting, although in the long term the drift was negligible.

The cast platter was lightish but nicely made and finished. As is too often the case, the mat was a poor specimen, and an improvement is imperative. Start-up time to 33 was 2·2 secs and the overall S/N result with compatible cartridges was 55dB. Noise components were distributed in the low range with subsonic rumble dominant.

Fewer limitations than usual due to light construction were manifested and the motor mounting and associated parts were approved. All the same, the unit's behaviour in the face of external disturbances was no better than average. In view of the vulnerability to breakthrough the player should be sited with care, since results with loud and energetic material in the lower spectrum can be influenced. The unit's sensitivity to mechanical vibration was marked.

The JVC pickup arm is a basically good design and might be counted an asset if more care could be taken over details. In particular the pivot frictions should be reduced, for in this sample the figures were 90mg lateral and 30mg vertical. It appeared that adjustment was a bit better than with the arm on the LA-31 but there was still scope for improvement. Light-tracking cartridges are ruled out, but fortunately there are possibilities among medium-compliance types of fairly good quality.

However, problems of midrange colouration and lack of ideal stereo detail are likely to be encountered here, while tests indicated that indifferent bass definition and extension also marred the overall balance. It does seem that more attention to detail could give the product some uplift, although there are basic limitations.

THE VERDICT

This player worked quite well but displayed some weak points, for instance in stability in working conditions and the pickup area. In a hi-fi context the application is in systems of restricted capability.

Type	Direct-drive, DC servo, quartz reference
Speeds	33 and 45. Speed adj
Platter	Cast alloy, 0·85kg approx
Functions	Auto-return and stop. Speed adj. with strobe
Pickup	Alloy straight tube, detachable offset headshell. Dial bias corr.
Standard of construction	Good
Cartridge	Not supplied

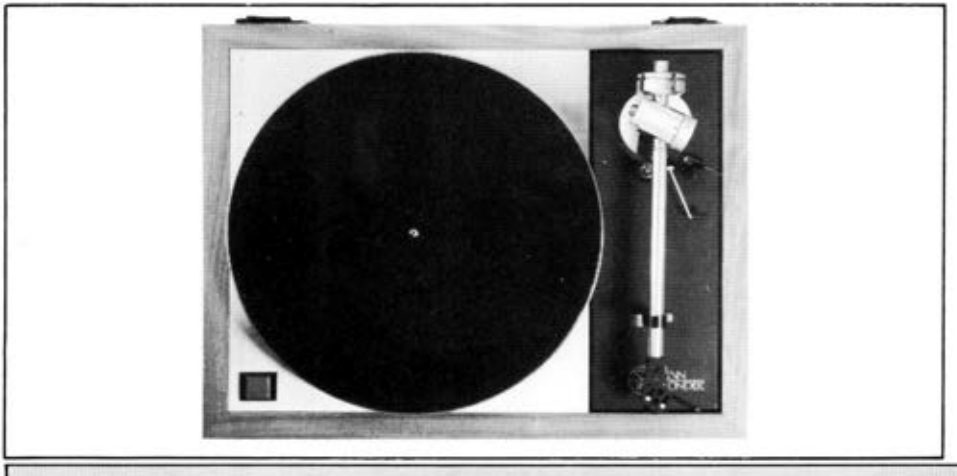
LINN SONDEK LP12

A nice example of hi-fi esoterica and a happy union of British-made and Japanese components, this combination has a certain reputation in audiophile circles. Those who feel they belong in that rarefied atmosphere will hardly require a description of the product, but others may welcome a summary.

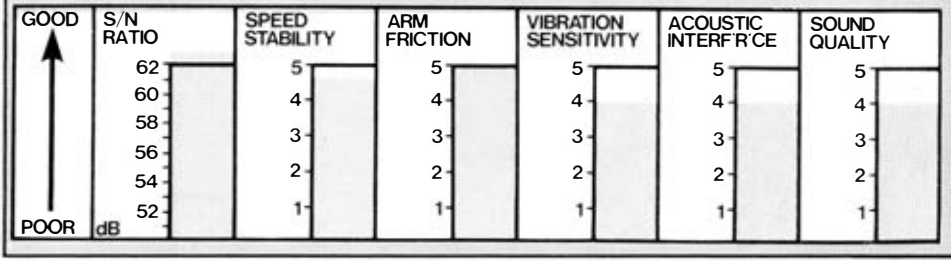
Central in this unit's appeal is the emphasis placed on desirable engineering features, or more pertinently the allocation of effort in directions where it has the most impact on performance (noise content and speed stability in particular). Essentially this is a down-to-basics design in which 'cosmetics' play little part, and in fact the turntable is of plain and unobtrusive aspect, somewhat like certain Thorens models on account of the operating principle involved.

The turntable incorporates a sprung sub-chassis with three adjustable coil springs, a finely made bearing and a massive cast platter which is belt-driven at the single 33 speed. The platter is in two parts, the transmission being to a central hub portion. Careful adjustment of the chassis is needed to ensure optimum performance. The entire assembly is housed in a robust hardwood plinth.

Made in Japan to Linn requirements, the Ittok arm is often specified for use with the LP12 because it is clearly a compatible partner. However, it is of relatively high mass and limited application. Other arms can qualify. The Asak moving-coil cartridge is a natural choice for the Ittok and was incorporated in the tests, but a separate report is included in the cartridge section of this guide.



TEST RESULTS



THE FINDINGS

In using a belt-drive system an important objective is to avoid transfer of unwanted energy through the transmission, the belt being seen as an isolating component — a sort of buffer — as well as the one that drives the platter. This does in fact call up all manner of details to do with choice of belt and the mounting of the motor in its support — all well studied by Linn, as evidenced by superior rumble results. The dynamic behaviour of the chassis has equally received attention to enhance stability while keeping resonance distanced from that of a well-matched combination of arm and cartridge.

Apart from that, the massive 'flywheel' platter and its excellent bearing are the prime features. The platter is topped by a simple felt mat and it can be argued that this is adequate in view of the platter design. On the other hand the support given to discs is not of the very best. Anyone who feels like exploring subtleties by substituting a contoured hard mat should note that the platter has a lip around its edge, likely to make mat fitting difficult.

Linn's uncompromising 33-only design may seem a bit daunting to some, although it does of course side-step the possible nuisance value of a mechanism for changing speeds. There are some good 45s about, such as remastered 12-inch extended-players and some audiophile direct-cuts. An alternative motor pulley, while obviously changing the drive ratio, would not be much of a solution for those who seek only occasional use of 45.

By current standards the Ittok LV II is in the medium range of mass at 14g effective, the addition of an Asak cartridge bringing the total to 20g. The arm is indeed suitable for low-compliance cartridges, typically a selection of MC types in the 8 to 15cu range, where some exotic specimens are to be found.

You will find this acceptable if your preferences tend in that direction, but otherwise the arm will probably not qualify. A high-mass arm cannot be turned into a low-mass component for experiment with cartridges of high compliance. On the other hand a low-mass arm can be loaded to some extent to increase its range of cartridge acceptance.

Rigidity is the big attribute of this arm and the engineering is very fine in all aspects from the cast headshell (a flat platform) to the excellent pivots and the provision for locking the bearing pillar. The robust alloy tube extension carries a decoupled counterweight. Pivot frictions were too slight for dependable measurements, bias was effective for the anticipated range of use, and adjustability overall was good. Cue descent was a reasonably quick 1·8 secs.

Turntable start-up time was 3·5 secs. Speed stability was particularly good, as might be expected from this design, and long-term error was negligible. With the pickup as specified the overall S/N result was 63dB, performance in respect of acoustic breakthrough well above average, and isolation from shock and vibration very good.

The Ittok/Asak partnered the LP12 very well indeed, though there are other possibilities with potential. Results were smooth and quite well balanced, bass was solid and well defined and the stereo imaging conveyed plenty of detail, with nice transparency in a broad spectrum, though on some material there was a lingering impression of over-keen and forward presentation.

Although uncommonly expensive, this model maintains a place among up-market specialities. Setting-up is somewhat demanding and most buyers would depend on specialist suppliers' services to prepare the unit for use. One aspect is cartridge fitting, which has to be completed with the arm removed from the LP12 to avoid any risk of damage to the pivots. Some may feel that lack of the 45 speed is a demerit, while others will not consider it important.

THE VERDICT

A settling of audio mystique, cloudy with controversy, seems to have affected comment on this combination of products over a period during which detail refinements have been applied. Quality of the turntable and arm is first-class but the price is difficult to justify, most particularly if the Asak is added. The special, limited appeal of the arm must be evident to those who observe developments away from the mainstream.

Type:	Belt drive, synchronous motor
Speed:	33 only
Platter:	Cast two-part assembly, 4·2kg
Standard of construction:	Excellent
Pickup:	Ittok with Asak cartridge. Dual bias and tracking adj. Cast cartridge platform. Negligible pivot frictions; full adjustment. Low-capacitance leads.

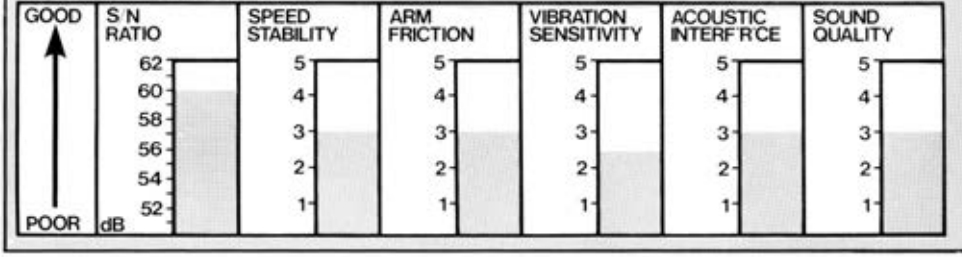
LUX PD284

New to the Lux range when these reports were compiled, the PD284 is a fairly simple two-speed player displaying the clean lines and good finish expected of this manufacturer. A Lux slotless DC motor is used in a servo system which also provides for fine adjustment of speed, reference being made to a strobe formed as pips under the platter, viewed in a mirror image.

A familiar objection can be made in that a speed monitoring aid serves mainly to call attention to small discrepancies that would go unnoticed by most users. More importantly, the servo application tends to confirm the merit of quartz-lock, which is spreading down the price-spectrum but is not included in this particular Lux unit.

Slim in design, the plinth is of veneered board with a bright trim for surfacing, and a substantial hinged dust cover is provided. The pickup arm, of lowish mass, has a manual lift/lower control but is also under the supervision of an optical device to initiate electrical arm lift at end of side plus motor shut-off. This is the one concession to auto operation, and there is a concealed switch to cancel the facility if desired.

TEST RESULTS



THE FINDINGS

Weight of the cast platter was approximately 1·6kg including a well contoured mat of hard rubber, the latter being typical of an improved design now used by Lux. A curious feature is a series of wells around the casting, reducing mass near the rim — just where one would expect to increase it if inertia had been the objective. However, the platter was to the expected high standard and the motor bearings were fine too.

Start-up time to 33 was 3·5secs, which is slow for a unit of this type. Torque was decidedly meagre and called into question the design balance, at least in respect of inertia and motor choice. It seems to indicate some conflict between hi-fi pretensions and the economic problems of going down-market where Lux have not often ventured so far. On the other hand the long-term speed error was not too bad, with a 0·03 per cent drift in an hour. Dynamic stability remained a point of concern with some of the more deeply modulated programme material. Overall S/N result was 60dB.

The pickup arm is a nicely made, simple component that appears well in keeping with the type of integrated unit being attempted here. It has a fixed headshell in the form of a rigid and flat mounting platform, clamped to the straight arm-tube but provided with screw adjustment to aid final setting-up. With a simple decoupled counterweight the arm caters for an approximate range of 4 to 10g cartridge weight, and with adjustment for a 5g example the effective mass was 6·5g. This suits the arm to popular magnetic cartridges of fairly high compliance, but medium-compliance types can be used, possibly with a small loading to the headshell.

Effective length (stylus to pivot) is 227mm and tracking pressures up to 3g are specified. Arm pivot frictions were 35mg lateral and 20mg vertical, and some unwelcome movement was evident in the lateral bearing. Bias correction was acceptable for tracking settings above 1g. The pickup lift-off device worked well and, although it can be cancelled by a switch, it is likely that many users would like its quiet action and therefore would leave it engaged.

Checks with compatible cartridges of up to about 30cu compliance (magnetics by B&O, Goldring and Technics) yielded evidence of some colouration in the midrange, with loss of ideally precise stereo imaging, especially on the more energetic material characteristic of the most advanced modern discs. Attack and transient performance were then in question, although less challenging inputs were quite smoothly treated. Bass was acceptably firm but not as well extended as might be wished. Isolation from vibration was indifferent; acoustic breakthrough result was fair. Due thought has to be given to the siting and support of this player.

THE VERDICT

Although value is not too bad, the unit would appeal more strongly on that score if a few technical points were revised, not necessarily at any great expense. Basically the PD284 has its attractions and the arm looks promising. But is is to be hoped that Lux can soon apply quartz referencing at this price level.

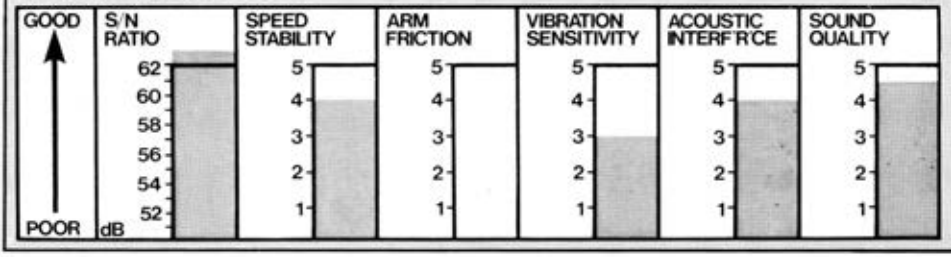
Type:	Direct drive, DC motor and servo. Speed adjustment; pickup lift-off.
Speeds:	33 and 45.
Platter:	Cast aluminium, 1·6kg approx.
Standard of construction:	Good.
Pickup:	Straight arm, offset cartridge platform. Lift/lower control. Dial bias corr.

LUX PD300

A lot of attention is devoted to ensuring intimate contact between the disc and the surface supporting it. Hence there is much interest in platter-mats. That at least is true of the better audiophile products, though the least ambitious examples often seem virtually hopeless cases. As their solution to an evident problem, Lux first introduced the PD555, a turntable with a vacuum hold-down system to secure the disc, preventing movement and resonance.

Remarkable though that model may be, it is also priced beyond the reach of most people. It has been followed by a simpler, less costly version, the PD300. Whereas the larger unit has a separate suction pump, the PD300 has a manual bellows-type pump built into its plinth and operated by a lever at the front. It effectively integrates the disc with the platter, avoiding the use of a mat which is normally regarded as a necessary evil.

TEST RESULTS



THE FINDINGS

The disc is held down by atmospheric pressure against a couple of neoprene seals while the below-deck vacuum is operative, and the degree of suction is sufficient to cope with mild undulations in the vinyl to which nearly all LPs are subject. If the warp is very pronounced it becomes more difficult to maintain a vacuum. One might accomplish this by a great deal of pushing and prodding but that would mean handling the disc too much. Because of this Lux provide the DP1 'pressing pad', an acrylic disc with a handle and a hole to fit over the turntable spindle.

One uses the pad to push the disc down onto the seals before operating the vacuum pump. This worked with mild warps but the odd exception was bound to arise — mainly discs which would hardly be worth bothering about anyway. It is obvious that there must be limits to attempts to play discs that are really rejects.

Since it is not easy to visualise how a vacuum can be created between a disc and the platter, it should be explained that the air route is via the main bearing to channels in the platter, formed between the seals on which the disc rests. Intimacy of contact between seal and disc is imperative, so careful handling is necessary, particularly at the edge where the outer seal is exposed to fingers when the LP is pushed or lifted. In fact the unit was a bit temperamental at first, but the vacuum was established consistently after a short settling-down period during which the sealing action improved rapidly.

Massive constructions are firmly associated with the Lux series of turntables in the higher price-range, and in this instance the standard of engineering excellence extends to the platter (it weighs 3·5kg) as well as the heavy plinth and the decoupling system for the sub-chassis carrying the main bearing and pickup mounting.

The platter is driven at its rim by a DC motor in a servo system augmented by fine-speed adjustment of 33 and 45, control being referenced to an illuminated single-row strobe fed from an internal supply. It is surprising that Lux did not settle for a fixed, locked control system, which would surely be more appropriate to a unit of this calibre. However, it is a good system of its kind and motor torque was ample while stability was acceptable. Long-term speed drift, amounting to about 0·2 per cent on the plus side in one hour, was more than expected, but dynamic behaviour was excellent. Start-up time was 3 secs. to 33.

Finish and attention to detail were exemplary and a substantial hinged dust cover of superior quality was supplied. Provision is made for the fitting of alternative metal mounting plates for various pickup arms, the test item being a rigid and heavy mount to suit SME mounting bases. SME III and Mission arms were in fact used in experiments together with recent examples of top-grade magnetic cartridges plus the Mission moving-coil.

Splendidly smooth and quiet in use, the PD300 yielded an overall S/N result of 63dB, showing itself to be in the highest class in that respect. Performance on acoustic breakthrough was above average, while shock-resistance was less impressive, but it can be expected that anyone interested in a unit of this calibre would pay a lot of attention to siting and support. In view of its sheer mass, a purpose-built shelf or cabinet top would be the likely solution.

Solid and extended bass was impressive and tended to prove the authority that massive units offer at that end of the range. Otherwise the sound was characterised by crisp clarity and analysis with a nice approach to neutrality that is rarely equalled even in the top price area. The disc hold-down system and the unit's good stability under working conditions were clearly important factors.

As may be visualised from the nature of the platter and the intimate disc contact, strict cleanliness is essential, lest any abrasive particles are forced into the disc surface. Routine dust-collection on discs and meticulous moist cleaning of the platter, with careful drying, should form an acceptable regime.

THE VERDICT

A valid and welcome innovation, combining a high standard of engineering with superior sound quality. It is not easy to assess this one for value, but you may well rate it very highly if planning a no-compromise system on a generous budget.

Type:	Belt drive, DC motor with servo and fine speed adjustment.
Speeds:	33 and 45.
Platter:	Cast aluminium, 3·5kg.
Standard of construction:	Excellent.
Pickup:	Not supplied. Special arm mount fitted.

MARANTZ TT1200

This is one of the cheapest turntable units available from any source. It is also one of the simplest, and too much should not be expected of it. Model TT1200 really boasts no hi-fi pretensions at all, yet in its simplicity it has some appeal to those assembling a very modest audio set-up such as might be used as a 'second' system, for the entertainment of young persons or for a guests' room (assuming that you do not expect very hi-fi minded guests).

A basic two-speed unit, driven by a belt from a synchronous motor, it is lightly constructed—flimsy, in truth — with the usual plastics plinth. Hard feet are fitted and there is no attempt to cope with isolation from disturbances. The pickup arm is in all essentials the same as that on the TT2200 and even at this low price an Excel magnetic cartridge is provided.

THE FINDINGS

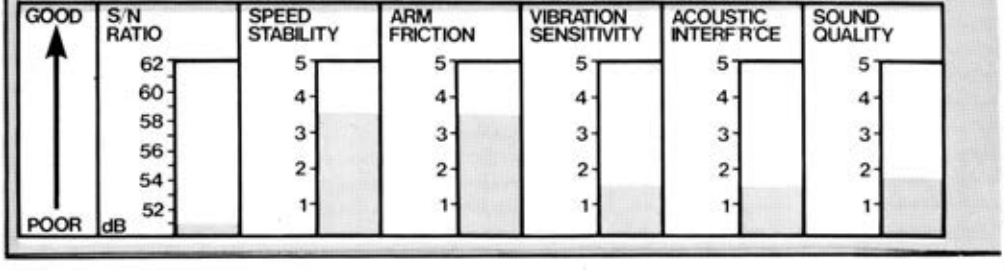
It is hardly surprising to find that speed control and strobe are omitted. There is just a mechanical speed-change whereby the belt is shifted on the motor pulley, and the unit is started by moving the pickup away from its rest. Auto pickup return is provided, as is a stop/reject control. Like the other controls, that for pickup cueing is operated from outside the dust cover (which is as flimsy as the one on TT2200).

It all worked very well. Motor torque was ample and dynamic stability was better than with the 2200. Start-up of the 0·75kg platter was within 1 second, so one cannot complain of delay. The platter-mat was a flimsy thing, but it is of little account in the circumstances. Vulnerability in respect of vibration and shock was quite evident and the unit was below average on acoustic interference. Bearing noise showed up as a component of a S/N result which was reasonable for a product in this category, but the motor was encouragingly quiet. Speed error was only 0·2 per cent fast.

Subjects of criticism are the rocking behaviour of the platter, pickup bearing imprecision and a too-flexible headshell. Bias correction was acceptable in the middle range where the supplied cartridge tracked. Pivot frictions were low at 25mg lateral and 15mg vertical. In view of tendencies to feedback and breakthrough associated with the light and sensitive design, special care will be needed with siting and support if the best is to be made of the unit's limited capability.

Lack of good definition was a feature of the sound quality through much of the range, the upper range being limited and coloured while midrange stereo information was vague. A cartridge substitution might give the result a lift but only a very limited improvement could be expected.

TEST RESULTS



£49 MERIT ★★ VALUE ★★★

THE FINDINGS

No doubt it will surprise some that a player of any merit at all can be provided at this price! This example has only the loosest connection with what goes on in hi-fi but, taking into account its obvious limitations, it is fair value.

Type:	Belt-drive, synchronous motor, fixed speeds.
Speeds:	33 and 45.
Platter:	Aluminium, 0·75kg approx.
Standard of construction:	Fair.
Pickup:	Straight arm, offset detchable headshell, MM cartridge supplied. Dial bias corr.

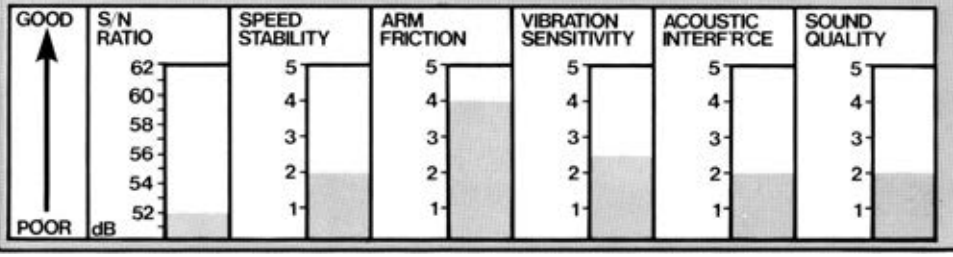
MARANTZ TT2200

Marantz are among the companies attempting to offer a lot of 'features' at very competitive prices, placing much emphasis on economy-class package systems. The 2200 turntable is very typical of units put forward for such outfits and indeed representative of Japanese flair in this area.

Smart presentation of the almost mandatory semi-auto functions receives most attention; engineering for enthusiasts' needs hardly comes into the equation, nor would it be expected at such modest cost. One of two low-cost units, this version is of the direct-drive type with the usual fine adjustment of speed and servo regulation. A platter-edge strobe is included.

The plinth is a plastics moulding with a hardboard base. Light construction with more than a hint of flimsiness is the penalty, and this unit is not fundamentally different from many others in that respect. A slim-looking pickup arm is fitted, as it was on certain earlier Marantz turntables, and this is 'non-standard' in the limited sense that the miniature plug-in head fitting contrasts with some others used on Oriental players.

TEST RESULTS



THE FINDINGS

Although attention to detail was good, light plinth construction resulted in some flexing of the motor mounting. The dust cover too lacked substance, so the unit was pretty lively under working conditions. As ever, isolating feet were fitted, but resonant behaviour cut across that of the pickup. The cast platter and the bearing were of good quality but the platter-mat was a flimsy item offering neither good damping nor disc support.

The unit offers pickup trip and return, the motor being started by moving the arm away from its rest, and this is augmented by a reject button. Lift/lower is actuated from the front of the plinth. It was interesting and perhaps unexpected to find that a data sheet mentioned pickup effective mass, quoting a 20g figure. This evidently referred to the pickup with the cartridge supplied, and the figure was clearly over-estimated (17g was nearer the mark). In fact the magnetic cartridge is labelled Excel and tracks at about 2g with its conical stylus, which was poorly finished. It was marginally better than some of the cheap afterthoughts supplied in package units; but that does not imply much of a standard and the sound was somewhat coarse and poorly detailed.

An unduly flexible headshell did not help matters, although the union with the arm was rigid. Bias correction was of little use at its lowest settings but acceptable in the range relevant to the supplied cartridge. The arm pivots exhibited only slight friction (about 20mg in either direction) but there was marked bearing play. Much more attention is warranted in that department. Pickup cue descent took 2·2 secs.

Motor torque was meagre and dynamic wow effects were evident while stability with the intended pickup load was rather poor. Start-up time to 33 was about 3 secs. Long-term drift was none too impressive at rather more than 0·3 per cent in an hour. Apart from misgivings about speed stability it was considered that the unit could have been made a little less touchy in respect of acoustic interference and vibration, given greater solidity of construction. Breakthrough and feedback effects showed a barely average result. Rumble included motor-generated noise.

Sound quality was limited by the fitted cartridge, and a marked lower midrange colouration plus a coarse upper range were noted. A change to a superior but still compatible cartridge did not show much promise, as the bass remained lacking in definition while colourations intruded with energetic material. Several constructional deficiencies evidently account for the result, and lack of care in pickup bearing assembly is hardly helpful in the circumstances.

It remains as true as ever that in disc replay, as elsewhere, you get what you pay for (give or take a bargain or two), but in this instance it seems likely that closer attention to a few basic points could yield some improvement without great impact on costs.

THE VERDICT

This model might have notched up a slightly better value rating given a little more diligence over mechanical matters, but it would remain a lightweight suited to audio outfits of modest pretensions.

Type:	Direct-drive, DC servo, with speed adj. and strobe
Speeds:	33 and 45
Platter:	Cast aluminium, 1kg approx.
Standard of construction:	Fair
Pickup:	Straight arm, offset headshell, detachable and fitted with MM cartridge. Dial bias corr.

MITSUBISHI LT-20

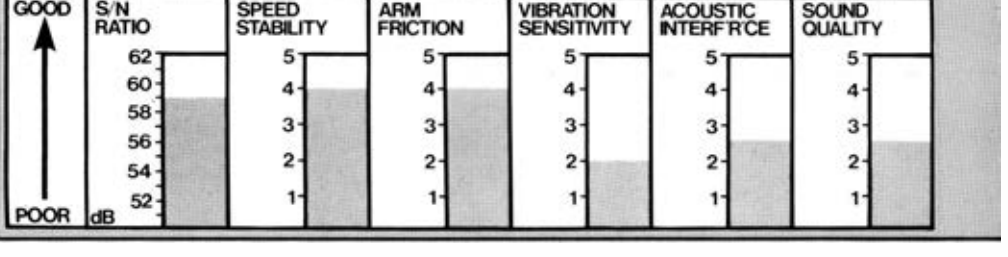
Not so long ago Mitsubishi attracted attention with their LT-5V, a radial-tracker which was designed for vertical use. That model seemed to gain a mixed critical response, and even a brief examination of the LT-20 suggests that the same might well be true. Again, it incorporates a radial-tracking pickup, but here the styling and construction dictate use in a normal horizontal position. Thus the controls are at the front and a full dust cover is provided.

This is a direct-drive player with quartz lock, lacking fine-speed adjustment but given the benefit of a beacon to show when the motor has run up to nominal speed. The unit is based on a robust plinth with simulated wood finish and the standard of construction causes no qualms.

The pickup arm runs on a track at the rear of the plinth and is therefore relatively long. Mitsubishi have chosen to partner this fairly massive arm with an Audio-Technica AT12E, which is a well known moving-magnet model with elliptical tip — a compatible choice, though still a fairly cheap one. The pickup does of course depend on a motorised drive for cueing and correct operation, and this is all subject to 'logic' supervision, as is disc sensing via an optical system. This latter arrangement involves an above-deck light source and below-platter sensors together with apertures in the mat and platter.

Consequently the system will not react correctly to the presence of transparent or coloured discs — any other than black — and the solution is to place blanking sheets between disc and mat so that play can proceed and positioning can be done with the electrically actuated cue device. Controls along the front edge of the plinth cover speed change, cueing, repeat, start and stop.

TEST RESULTS



THE FINDINGS

It was evident from the start that the LT-20 was over-lively in the face of mechanical disturbances, and behaviour in respect of acoustic interference was barely average. Many aspects of design appeared to contribute, although pickup matching could not be singled out. Indeed, the AT12E was a reasonable and compatible choice.

On this latter point the arm had an effective mass of approximately 15g (plus cartridge) and was set up by static balancing followed by setting of pressure on a rider weight. It seems surprising that, with the opportunity presented by a radial-tracking system, the designers did not try to get away from a virtually dreadnought component. However, the mechanism worked well, with just a little directly radiated noise, and friction in the track device was negligible.

A novelty was the mains switch actuated by the lock on the arm-rest, arranged so that unlocking the pickup for use switched the whole player on. All controls worked satisfactorily but cueing across the disc was considered to be irritatingly slow. Manual cueing with a pivoted pickup is usually very much quicker. Cue descent time was about 3·2 secs, which again was rather slow.

The motor was well braced in the plinth, with a nicely solid feel, and start-up time to 33 was about 3 secs. Speed stability was good and torque ample, while long-term drift was very small indeed. The total platter mass was about 1·6kg and the mat, inseparable from the platter because of apertures for the sensors, was fortunately endowed with a sensible contour. Rumble results were reasonable, the overall signal-noise figure being 59dB.

Although certain aspects of performance appeared so promising the touchiness of the unit was a disappointment. Great care in location and support is essential. The choice of AT12E cartridge did not in any case promise much more than an average audition, but it can be said that the stylus was well set and finished (10 by 18μm elliptical tip) and that the midrange result was tolerable, if lacking real stereo detail. The bass was none too well defined, while the extreme top was hardish, without true sparkle. The arm could probably do with a more ambitious partner, though mechanical matching would require careful consideration.

THE VERDICT

An interesting player which fails to sound as good as some of the test results seem to promise. Middling on merit — and there is quite a lot for the money. Not a major contribution to hi-fi, though.

Type	Direct drive with quartz lock, automatic, fixed speeds. Radial-tracking system and manual cueing facility.
Speeds	33 and 45
Platter	1·6kg approx
Standard of construction	Good
Pickup	AT12E moving-magnet cartridge on radial-tracking arm

PIONEER PL-7

For a unit within the medium-price category this automatic player is fairly ambitious, exemplifying the competitive spirit for which Pioneer has become specially noted in recent times. Although it is of lightish construction with a plastics plinth, the player reflects an attempt to offer quality features.

Some emphasis is placed on the pickup department, the arm being inscribed 'polymer graphite' and 'low mass', and some kind of carbon-loaded material has evidently been used. Particularly novel is the inclusion of a 3MC moving-coil cartridge, a high-output type which, to judge by the Vee-coil system in a user-replaceable stylus block, has been made by Audio-Technica. It is probably a cheaper version of a standard AT model.

The PL-7 is a direct-drive unit of the Hall effect type familiar in Pioneer models. Fixed speeds are quartz-referenced, and beacons on the plinth and the pickup mounting confirm that nominal speed has been attained. The pickup lift/lower control is associated with the arm mounting but other controls are ranged on the plinth front and usable with the cover closed. Disc-size selection is linked with pickup set-down position and there is also a repeat button. Pickup return at end of play works in the normal fashion.

THE FINDINGS

Construction was fairly good, although the motor flexed readily in its light support and the dust cover lacked ideal rigidity. No criticism could be directed at motor torque, and speed stability under working conditions was better than average for the class of unit, with negligible drift. Start-up time was 2 secs to 33 and the platter weighed nearly 1kg including a mat which, if not very substantial, could be accepted as adequate.

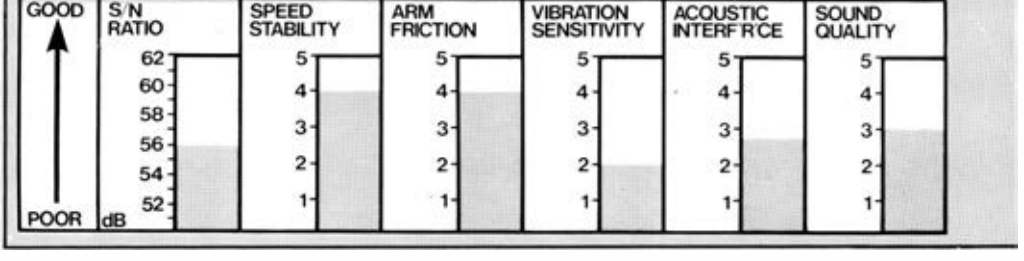
The package as supplied was not very well behaved in respect of sensitivity to vibration but acoustic interference was about average. Rumble result was nothing special at 56dB. All controls worked smoothly and dependably. The somewhat lively nature of the unit, with light parts in critical areas, was always evident. Pickup cue descent was an acceptable 2 secs and the bias characteristic, poor at low settings, could be accepted in the anticipated range of setting.

When Pioneer used the label 'low mass' they should have added 'relatively', for by current standards we have here a medium-mass arm and the low-compliance cartridge is only a fair match for it. But the error is not great and it is unusual to see a moving-coil partnership in a player of this kind. Arm effective mass was about 9g and the cartridge, with a conical shank-mounted tip, proved a little better than the commonplace to be found at this level, despite a tendency to generate distortion in the high range. Tip finish was only fair.

The arm exhibited low pivot frictions, the results being 30mg lateral and about half that figure vertically, and rigidity was good. Evidently care had been taken over assembly. Internally the plug-in head union was like that on many Japanese units but the fitting was longer than usual and equipped with a set-screw to give a solid and rigid result.

Sound quality had a high-end harshness tending to mask real detail and the bass performance betrayed lack of substance in the construction. Stereo imaging was fairly good in much of the range. But the impression remained that the arm would warrant a better partner, to some degree limited by the standard of the PL-7 as a whole.

TEST RESULTS



£139 MERIT ★★★ VALUE ★★★

THE VERDICT

A brave attempt has been made to offer a high-value product and this deserves recognition in the rating. Mixed feelings persist about some features of performance, and the sound quality is not what it could be.

Type	Direct-drive, fixed speeds with quartz reference
Speeds	33 and 45
Platter	1kg approx.
Standard of construction	Fairly good
Pickup	Straight arm, detachable headshell. MC cartridge fitted. Dial bias corr.

PIONEER PL-320

Model PL-320 is yet another example of the down-market application of direct drive. This is a semi-auto player with the usual end-of-side trip and pickup return, the motor being started by moving the pickup to the desired position over the disc. A damped cue device is provided. With its silver-grey finish and light plastics construction, this unit has a certain amount in common with the PL-7, at least superficially.

It has some parts which are similar to those in the more expensive model, the dust cover and top deck layout being much the same. In particular the pickup arm is substantially the same and again is a medium-mass component labelled 'polymer graphite'. The unit lacks quartz referencing of speed and instead has fine adjustment, made with reference to a mains-fed strobe. The strobe marks are under the platter and reflected in an illuminated display. A PC-220 magnetic cartridge is fitted.

THE FINDINGS

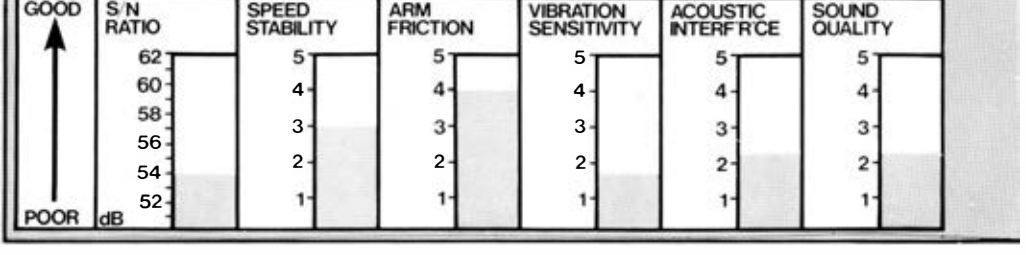
Flexing of the motor support was a feature of the light construction and torque was barely adequate for the application. Stability was rated about average for a near-budget player but long-term control was not at all bad, for drift did not exceed 0·2 per cent in an hour. Rumble result was 54dB overall. In all it was felt that a bit more could with advantage have been spent on the motor and its support instead of on a pointless strobe and adjustment system. However, Pioneer do not specially attract such a criticism!

Start-up time to 33 was 2·3 secs and the platter weighed about 0·9kg including the mat, which was the same item as adorned the PL-7. The unit was about as poor as they come in respect of touchiness over mechanical disturbance, though acoustic breakthrough was better. Bias on the pickup was the same as for the PL-7 and all controls worked well.

Well adjusted pivots were again a good feature of the pickup arm, as for the more expensive player, and the same rigid plug-in head arrangement was used — very commendable. Oddly, the magnetic cartridge was a better match for the arm, so far as purely mechanical considerations take us. However, its shank-mounted conical tip was messily set and the finish was indifferent. Once again, low pivot frictions were noted.

Sound quality was disappointingly coarse, and the cartridge (a 2g tracker, optimistically) yielded ill-defined results on a variety of material. Without doubt, the arm could take a better cartridge of medium-compliance characteristic, subject to the inevitable restriction imposed by the unit's overall performance.

TEST RESULTS



£84

MERIT ★★
VALUE ★★★

THE VERDICT

Middling value in its class. Pickup quality does not seem to have been given enough attention. The belt-drive principle applied in a neat little player like this would probably have produced superior results.

Type	Direct-drive, semi-auto, with strobe and speed adj.
Speeds	33 and 45
Platter	Cast alloy, 0·9kg approx.
Standard of construction	Fairly good
Pickup	Straight arm, detachable headshell. Magnetic cartridge fitted. Dial bias corr.

REVOX B795

This particularly neat example of a radial-tracking player is the second of two models introduced by Revox some time ago. The first, the B790, had fine-speed adjustment and a digital display of speed, whereas the B795 lacks such extras and instead offers straightforward fixed speeds with quartz reference. It is all that many users would require.

A prime difference between this model and some other radial-trackers is to be found in its tracking carriage arrangement. In several examples the cartridge or head is fitted to an arm which is carried bodily along a track at the rear of the plinth. In contrast the cartridge in the Revox is attached to a short holder — not really an arm at all — tracking within a housing which swivels over the disc to take up its radial position. The cartridge has been adopted by Revox from the AKG range. Alternatives could with care be fitted and Revox can advise on this possibility.

The B795 is a direct-drive turntable in which all the main parts are assembled on a damped, sprung deck, the controls being on the front, unsprung portion of the plinth and the dust cover being hinged on a similarly rigid part at the rear. This layout is in fact unusual on direct-drive units, for most often the cover is directly coupled to the deck and, therefore, to the structure carrying the pickup.

THE FINDINGS

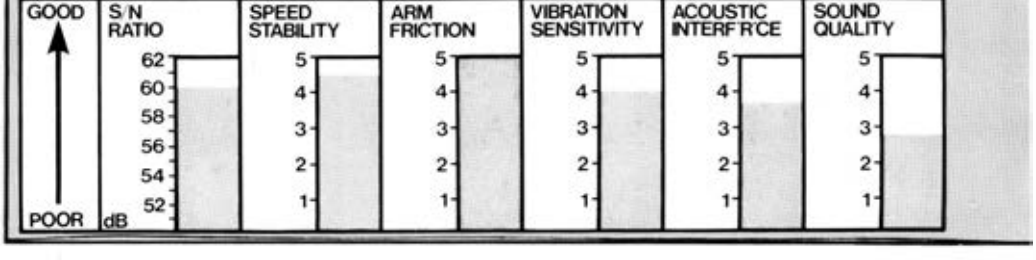
Containing all the pickup 'works', the swivelling housing has been well thought out and the arrangement is such that any disturbance causes the cartridge to lift clear of the disc, thereby avoiding any hazard to disc or stylus. Visual cueing is intended, the pickup being shuttled to and fro by use of the frontal controls, but the procedure may be found a little tricky by some, especially as the illumination provided in the housing is not exactly generous.

Mixed impressions of performance were gained. Rumble results were quite good, with an overall 60dB S/N figure, and the acoustic breakthrough and vibration isolation were certainly better than average for complex assemblies of this kind. Speed stability was excellent and the mechanical balance displayed by the drive system reflected well on choice of components.

On the other hand the pickup performance did not impress, for the stereo displayed some vagueness, detailing was less than the best, and the overall tonal balance revealed some lack of definition and extension in the bass which was not truly in accord with the level of cost.

All controls worked smoothly, although it was thought that they took a little getting used to. Start-up time to 33 was 1·2 secs. and long-term drift was negligible. Pickup descent depends on the auto control, of course, and was achieved in 1·4 secs. The 'stub' pickup support had an effective mass of approximately 3g, so that the total for the pickup was unusually low at 7·5g.

TEST RESULTS



£339 MERIT ★★★ VALUE ★★

THE VERDICT

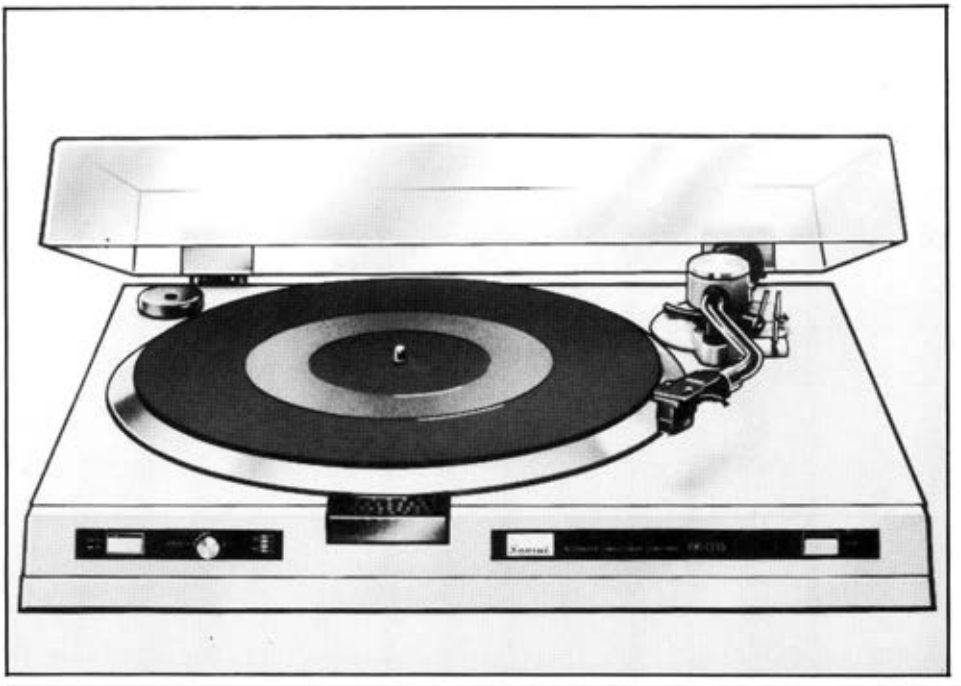
Much is attractive about this cleverly designed unit, for the drive system is a good one and the radial-tracking device is well executed. Reservations are, however, held about sound quality, which is not as good as expected. It should be possible to secure better at this price.

Type:	Direct-drive, quartz-lock, radial-tracking pickup
Speeds:	33 and 45
Platter:	Cast alloy, 2·5kg approx.
Standard of construction:	Good
Pickup:	Revox/AKG cartridge with elliptical stylus; short stub arm. Bias correction not applicable

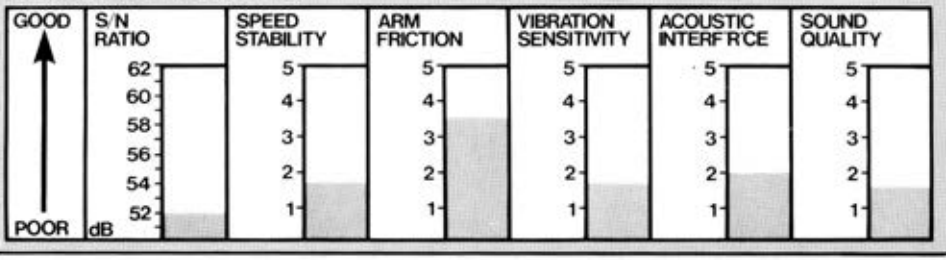
SANSUI FR-D35

Not so long ago Sansui dropped from their range the SR222 Mk2, a simple belt-driven turntable which was highly regarded by hi-fi enthusiasts because it offered what was needed for economy-class outfits and was cheap. If recent information is anything to go by, Sansui do not intend to re-introduce that model or anything similar. This, alas, may mean that they know their market only too well. However that may be, there is no player in the current series that can repeat the earlier triumph.

In fact there are two low-cost units of which the FR-D35 is one. It is a lightweight semi-auto turntable with a direct-drive motor, pitch control and platter-edge strobe. The usual pickup return function is offered, and the S-shaped arm comes complete with a magnetic cartridge in its plug-in headshell. The plastics plinth is surmounted by a rather flimsy hinged dust cover.



TEST RESULTS



£85 MERIT ★ VALUE ★

THE FINDINGS

Motor torque was meagre and despite an evident attempt to maintain balance with the platter (a 0·8kg casting) the dynamic stability was quite poor, regulation was not very effective and the unit was not adequate for the working loads it had to face. Long-term drift was about 0·25 per cent positive in an hour, while start-up time to 33 was 2·5 secs. The platter-mat, with its series of voids in the underside, was neither better nor worse than many on low-cost players.

The pickup arm proved to be the best feature. With pivot frictions of about 30mg in each direction, the arm had an effective mass of 16·5g (plus cartridge). Bias correction was too forceful, but assuming a 2g setting it would be possible to compensate experimentally. The particular cheap cartridge supplied (by now almost notorious for its coarse sound quality) did nothing for impressions of overall performance, although a compatible substitution could probably make the FR-D35 a little more interesting. The sample fitted had a conical stylus tip and tracked uneasily at just over 2g, The lift/lower control was fine and gave a 1·7 secs descent.

Overall S/N result was 52dB and a relatively high rumble component was audible under practical conditions. The unit did rather poorly in investigations of acoustic interference, and vibration resistance anywhere in the low-frequency region was even worse. Siting of this player may pose some problems, and these will not be helped by the ineffective plinth feet which bring resonant behaviour too high in the sub-sonic range.

Bass sound quality was plummy, lacking definition, midrange stereo was imprecise, and overall the coarse and hard performance was disliked. Pretty though it is, this player is not much of a contribution to economy-class audio. By past evidence Sansui have the means to produce much better at comparable cost.

THE VERDICT

Come back SR222, all is forgiven! Even with a substitute cartridge this unit has little to offer, for scant regard has been paid to essentials.

Type	Direct drive, DC motor servo, semi-auto
Speeds	33 and 45
Platter	Cast aluminium, 0·8kg approx.
Standard of construction	Fair
Pickup	S-shaped arm, plug-in headshell, magnetic cartridge. Weighted lever bias corr.

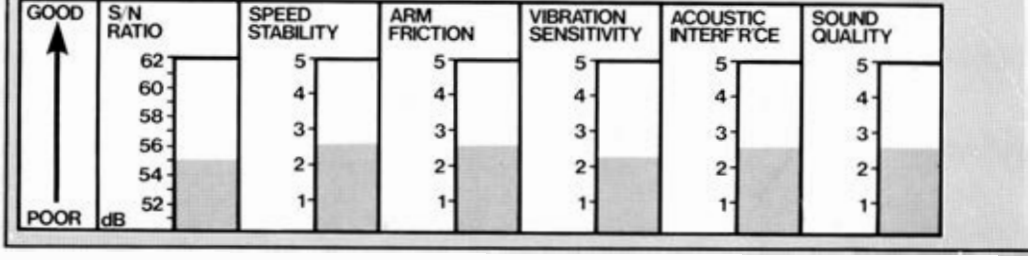
SANSUI FR-D55

Sansui, like some other companies, currently place much emphasis on complete rack systems — the curiously named Super Compo outfits — and three recently introduced turntables fit in with such schemes, although they can of course be used in shelf systems or indeed any other layout.

We find in the publicity much reference to 'computer' technology and features which bear on user-convenience, while a mix-and-match approach is directed at the simplification of systems planning within prescribed budget limits. Smart presentation is paramount, and the FR-D55 certainly looks very good, but the appeal to audio devotees is minimal.

Automatic operation is an expected feature, and this top model of a series offers the greatest elaboration with its microprocessor for track sequence selection as well as the usual switch off at end of side, with pickup return. An optical sensor on the pickup is the key to the auto programming. It is all very clever and actuated by light-touch buttons at the front of the plinth, providing for play of up to seven tracks in any order. There are also a repeat facility and the usual lift/lower control, electrically operated. The unit is a direct-drive type with a DC motor in a servo system complete with fine-speed adjustment.

TEST RESULTS



£180 MERIT ★★ VALUE ★★

THE FINDINGS

Although quite decently made of plastics with a few steel parts, the plinth was not as well designed as one might expect at this price level, and more mass would not come amiss. The cast platter was well made, weighing about 1kg including a reasonably well contoured mat. This latter item has a number of ridges and voids in its underside — all quite pointless.

Track-selection depends on optical sensing via an infra-red device carried on the pickup in front of the cartridge. This gadget is adjusted to a sensitivity threshold such that banding grooves between tracks are seen to lack modulation, and thereby the microprocessor section sets the mechanism in motion to bring the stylus to a selected position. Since seven track selections are the limit, one can have an amusing time finding discs that defeat the system (during tests no fewer than nine were found in a ten-minute search).

Semi-auto operation, using the lift/lower control, was necessary for any discs which were not black. It was possible for the track sensing to go very wrong in the face of big changes in groove-pitch, as encountered on some modern speciality discs. In an extreme case the stylus might land in a passage that had been opened out to accommodate a hefty bass sound; but that is not a strong objection since the system is meant for normal track sequencing rather than experiment.

The pickup has a straight alloy tube, a decoupled counterweight assembly and an offset cartridge platform with provision for axial adjustment on the tube. Although the arm appeared to offer fair potential as a medium-mass component (13g effective), the sample displayed excessive lateral friction at about 80mg and it was thought that some contribution could have been made by routing of extra wires involved in the auto system. Vertical friction was acceptable. Some lateral bearing play was noted. Inaccurate bias could be compensated experimentally.

As is so often true (though it is not an exclusive Sansui failing) the fitted cartridge proved a disappointment. Labelled SV202 it was evidently a bought-in Audio Technica, as the familiar V-magnet design indicated. While the best AT models are justly renowned, there was little to admire about the coarse sound quality obtained from this indifferent tracker. It just could not be taken seriously in relation to the price of the player or the general standard that Sansui seem to be attempting.

Speed control worked well and all the controls seemed foolproof. Long-term speed drift was perhaps a little great at 0·3 per cent positive in an hour, while dynamic stability with typical disc loads was only fair, though not out of line with performance of units of 'popular' (rather than audiophile) type. Start-up time to 33 was about 2secs. Rumble results were somewhat below average and the overall S/N of 55dB failed to impress.

Isolation from shock and vibration was somewhat below average and acoustic interference of about the same standard. The pickup quality was clearly a limitation, but in any event the sound was quite coloured and poorly balanced, often lumpy and certainly lacking good clarity. Sansui can do much better than this, and it is to be hoped that they will quickly respond to the real need.

THE VERDICT

In a nutshell, the auto facilities are clever and interesting but are not supplemented by adequate attention to basics of sound quality. Those who like lots of controls may be inclined to place this unit higher for value, but no better rating can be given in a hi-fi context.

Type	Direct drive, DC motor and servo. Automatic with microprocessor and track selection.
Speeds	33 and 45, plus fine adjustment.
Platter	Cast aluminium, 1kg approx.
Standard of construction	Fair
Pickup	Straight arm, offset head with fitted magnetic cartridge. Lift/lower control. Bias corr. by weight lever

STD 305-S

Strathclyde's standard model with the 'M' suffix has been established for several years and has earned the approval of many quality-conscious audio enthusiasts. It is just one of many good things that stem from North of the Border. More recently the company has added the 'S', a somewhat cheaper version which lacks a few trimmings found on the original, an obvious change being the use of a robust moulded plinth with a rather sombre appearance (matt black). A hinged acrylic cover of above average quality is included.

This is of course a sub-chassis model with an adjustable four-point spring suspension. The springs include some foam damping and the chassis is 'undersealed' with a damping material. The platter is a flat machined alloy disc resting on a central hub which accepts the belt drive from a 16-pole synchronous motor. Speed-change is manual and one has to shift the belt on to the appropriate section of the motor pulley.

An uncut pickup mounting board (a rigid high-density material) was provided but it is possible to obtain pre-cut boards for popular arms such as SME III. A board to suit the Mission arm was fitted for test purposes. Provision for routing the outgoing leads is good, and with care there should be no problem of interference with the sub-chassis suspension

THE FINDINGS

The belt is intended to have a dusting of talc to ensure smooth take-up of drive (there is no limited-slip clutch) and in practice the start was smooth, with absence of the chassis wobble which afflicts some units. Time was about 2·5 secs to 33, longer than claimed but of no practical consequence. The platter weighed nearly 2kg including its hub.

One aspect of simplification is the provision of hard rubber feet under the plinth, without any attempt at isolating device, and the underside is simply a piece of hardboard. Removal gives access to the suspension adjustments, which again are very simple. It all proves to be very basic but satisfactory, and the chassis resonance showed up at 6Hz vertically.

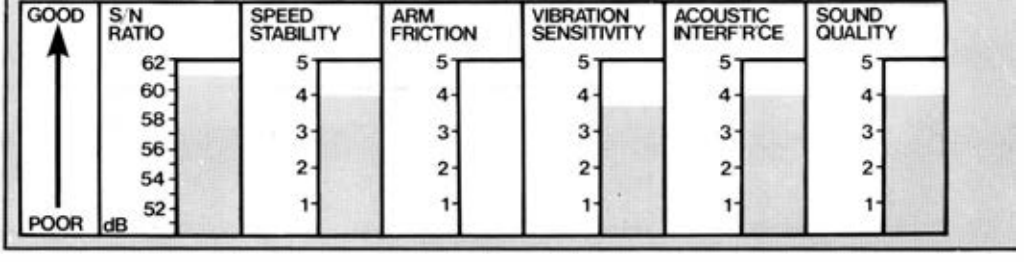
Two platter-mats were included, one of felt and the other a contoured composition mat with a 'suede' surface. Over a range of trials the second of these was preferred, and good results were also achieved with Limpet and Avon mats.

Torque was adequate and speed stability good under working conditions. Characteristics were as expected of a synchronous motor drive and an error of about 0·15 per cent fast was considered to be moderate. Overall S/N figure was good and the result spoke well of the bearing and associated parts.

In the test regime with the Mission arm the sound was first-rate and characterised by open, clear quality with the anticipated analysis of fine detail. It could not be faulted on precision of stereo presentation through most of the range. There was not the extension and sheer solidity of low bass achieved with the best of the more massive constructions, but the result was well in accord with cost and the sacrifice due to cheapening was clearly not very serious.

Results in respect of vibration-resistance and acoustic interference were very satisfactory, the latter being above average. In all, the findings vindicated the sub-chassis approach. Simple as it is, this unit instils confidence and should prove to be what a lot of budget-conscious enthusiastics require

TEST RESULTS



£170 MERIT ★★★★ VALUE ★★★★★

THE VERDICT

A down-to-basics unit without serious vices. Not the most elegant of styles, but unobtrusive. It deserves a good pickup, a careful owner and regular dressing of the drive belt. Top marks for value.

Type	Belt drive with synchronous motor. Fixed speeds, manual change
Speeds	33 and 45
Platter	Alloy disc, 1·9kg approx
Standard of construction	Good
Pickup	None fitted. Mounting insert supplied, blank or pre-cut.

SONY PS-LX5

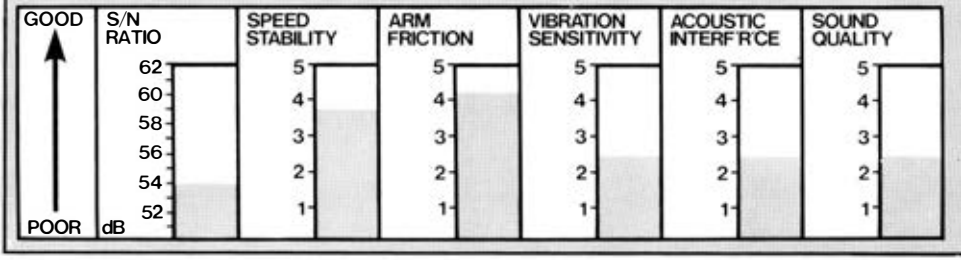
In some ways novel and certainly quite complex, this recently introduced Sony is a two-speed fully automatic unit based on the direct-drive principle and featuring quartz-lock speed regulation. Disc size is automatically sensed by an optical system involving a light source on the deck and a pair of sensors beneath the platter, with detection of diameter dependent on small apertures in the mat and platter.

The system initiates pickup control for 12-inch and 7-inch discs but can be overriden by a cue control. In fact recourse to manual control is straightforward if the disc is non-standard in size or colour (rare exceptions, preventing auto control). There are facilities for repeat and interrupt of play.

If no disc is placed on the turntable the pickup remains in the rest position. Muting is applied during operation. Provision can be made for remote control via an infra-red transmitter, as would be possible with a complete Sony system in use, and synchronisation with cassette decks can also be arranged. In relation to its price the unit is well endowed with facilities which have more to do with user-convenience than with sound quality.

The moulded plastics plinth, light but quite rigid, is in the ubiquitous silver-grey finish and equipped with a rather flimsy hinged dust cover. Speed control is by means of an electronic system with quartz reference, and speed-sensing involves a magnetic head which scans a magnetic strip coated around the inside of the platter rim.

TEST RESULTS



THE FINDINGS

Quiet and smooth in operation, the direct-drive system made a favourable impression with good speed stability and adequate torque, although the auto mechanism was rather noisy during the time it was in cycle for pickup positioning. Mass of the cast platter was 1·1kg including the mat, and start-up time to 33 was 0·6sec. The mat was reasonably well contoured for disc support, and that is just as well since the auto system precludes its replacement.

All control functions were approved and the speed regulation was a notch or so above the ordinary. What it amounts to is that Sony have concentrated on auto facilities and simply included quartz referencing without adding separate speed adjustment. There is not even a strobe, but a beacon lights to indicate that nominal speed has been reached. The LX5 is none the worse for such omissions, and its appeal is based firmly on the presumed convenience of pickup automation.

Of fairly low mass the pickup features a non-standard union of arm and plug-in head. The magnetic cartridge is integrated with the head and the component as a whole is more interesting than the average pickup at this price level. Designated XL-200 the head is a moving-magnet type tracking at 1·5g, and the compliance of about 22cu is fairly well in accord with a total effective mass of 11g. So in some respects the design is more sensible than one often finds on integrated players.

However, the head is not otherwise a specially advanced example, and a rather messily shank-mounted conical tip was not thought to be in line with the unit's apparent pretensions. Pivot frictions were negligible (only 15mg lateral and even less vertical) but bias correction was acceptable only from 1·5g upwards. Pickup cue descent was commendably rapid at 1·2secs.

Results in respect of sensitivity to vibration and acoustic interference were no more than fair, but some influence on colouration can be achieved by removal of the dust cover, confining its use to protection when the unit is not in use. Overall S/N was 54dB. Sound quality was inevitably limited by the pickup, evident characteristics being a hardish and poorly detailed upper range and some lumpiness in the lower regions on energetic material.

The sound was explicit rather than subtle, and impressions of depth or real perspective were almost entirely absent. Tracking was not of the best on the more difficult modern discs. A feeling of disappointment remained, and it was thought that an alternative head integration and an elliptical stylus could yield a better result. Unfortunately there is no change the user can make, and the possible upgrading is for Sony to consider.

THE VERDICT

An interesting design with some technical merit and an obvious emphasis on user-convenience, Light construction is a disadvantage but seemingly inevitable at this level of cost. Middling value, but reservations are held on pickup design, despite the promise shown.

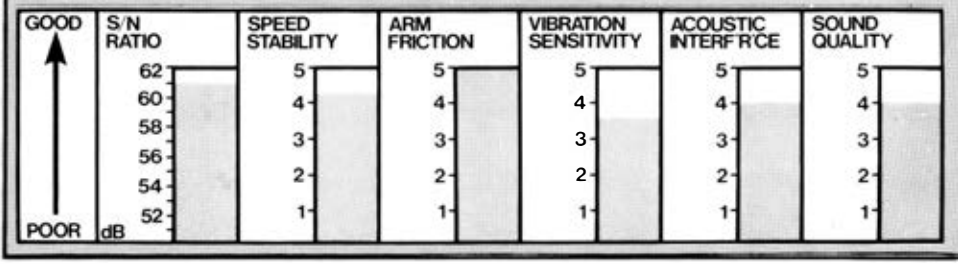
Type	Direct-drive, magnetic servo, quartz control
Speeds	33 and 45
Platter	Cast aluminium, 1·1kg approx.
Functions	Pickup cue, return, repeat, disc size selection.
Standard of construction	Good
Pickup	Straight arm, offset plug-in head with integrated MM cartridge. Dial bias corr.

TECHNICS SL7

Model SL7 is a slightly simplified, cheaper version of the SL10 and has become so well known that it is no longer necessary to offer a long-winded description. Compact design is the obvious attraction, for both models mentioned have a top surface about the size of an LP sleeve. Design is based on an automatic direct-drive unit with radial-tracking pickup.

Auto control covers visual cueing and pickup lift/lower, all operable with the lid closed. Since the pickup, driven by a micro-motor, is in the lid, any attempt to open the player results in stopping of play, the fail-safe arrangment being suitably efficient. An optical system with sensors beneath the platter is responsible for disc-size selection and cue start, but manual use is possible and there is also a repeat control. A notable feature is the solid plinth construction; another is the excellent Technics cartridge with nude stylus.

TEST RESULTS



THE FINDINGS

The motor with its servo system and quartz reference displayed superior characteristics with extremely slight drift or error of any kind. Start-up to 33 took only 1·2 sec and stability under dynamic conditions was above average. Overall S/N result was a good 61dB. Indeed, everything pointed to a well contrived balance between the excellent motor and the system as a whole with its 1·3kg platter, which is surmounted by a fixed mat of satisfactory contour.

Tracking at 1·2g the cartridge is carried by a stub arm which itself has an effective mass of about 3g. Of fairly high compliance, the cartridge tracked well, being embarrassed only by isolated examples of modern high-level cuts. Stylus condition was good. Stereo separation was outstanding. Pickup cue descent took only a fraction over 1 sec.

Although operation of a unit with a tightly closed lid brings its own advantages, the cueing takes a little getting used to. Practice makes perfect. We hope it is not patronising to say that the SL7 works better than its neat little shape and deceptive simplicity seem to promise! It even works at odd angles and in all sorts of awkward corners, though it is best to find for it a solid support like any high-grade player.

One promise suggested by the closed-up, substantial construction is a good result on acoustic breakthrough, and this is borne out in practice. Resistance to mechanical disturbance is also above average. Characterising sound quality poses no great problem, for the overall balance was very good and departures from neutrality quite small and inoffensive.

If there was any serious reservation it concerned a slightly over-explicit quality in the midrange. Otherwise the sound was well detailed, with fine stereo imaging and a realistic rendition of a wide variety of programmes. Bass lacked the solid extension gained with some high-class separates.

THE VERDICT

If an auto radial-tracker appeals, then this compact example must be seen as outstanding among a few contenders. In its class it really cannot be seriously faulted. You could do better with separate, specialised components — but not on a £200 limit.

Type	Direct-drive, servo with quarts lock. Auto
Speeds	33 and 45
Platter	1·3kg approx
Standard of construction	Very good
Pickup	Radial-tracking system with magnetic cartridge

TECHNICS SL-B202

This example from the low end of Technics' range is a semi-auto player of light construction incorporating a servo system and fine-speed adjustment, user control being made with reference to a platter-edge strobe with mains-fed illumination. Facilities are standard for this sort of unit, with end-of-side trip and pickup return, plus a cue button set at the front of the plastics plinth where all the controls are ranged and usable with the cover closed.

An S-shaped pickup arm with high-mass characteristics is fitted and the plug-in headshell carries a magnetic cartridge. A hinged dust cover of good quality is provided and the unit is finished in silver-grey.

THE FINDINGS

Although this player worked well enough in basic ways, some aspects of construction and performance gave rise to misgivings. The flimsy construction was responsible for marked flexing of the centre-spindle assembly, and there was also unacceptable movement in the arm's bearing support.

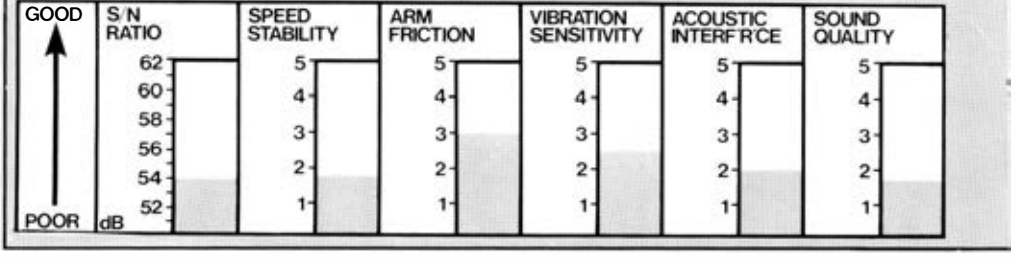
Dynamic stability of the drive system was poor and in particular there was a tendency to speed-hunting which recurred throughout the tests. The platter weighed only 0·8kg but the torque was barely adequate for the practical exigencies of use. Start-up time was 2 secs to 33. Signal-noise result was a poor 54dB and rumble was evident. The less said about the platter-mat the better.

Apart from the criticism of the arm pivot, the pickup had some small merit as a fairly massive and well-made component. It displayed better rigidity than some of the whittled-down medium mass arms now used on low-cost units. However, the effective mass of about 15g was not well in accord with the cartridge (itself adding about 5g), for the stylus compliance was higher than specified. The shank-mounted diamond tip showed a fair finish, and the contour was hemispherical.

In fact the cartridge was considered to be a bit above the average for low-cost players (so many are a sad disappointment), but still not much can be said for it in view of the severe limitations imposed by the unit as a whole.

Replay generally was lacking in dynamic contrasts and detailing was indifferent, while the amorphous quality of the bass did not bode well even for a system of very restricted capability. Speed stability on severely scored material was a worry. Results in respect of vibration resistance were about average for the class of player and acoustic breakthrough barely average.

TEST RESULTS



£69 MERIT ★ VALUE ★

THE VERDICT

If you are obliged to settle for a lowly standard you should be able to get it for a lower price than Technics are asking. The company has a number of triumphs to its credit, but the SL-B202 is not one of them.

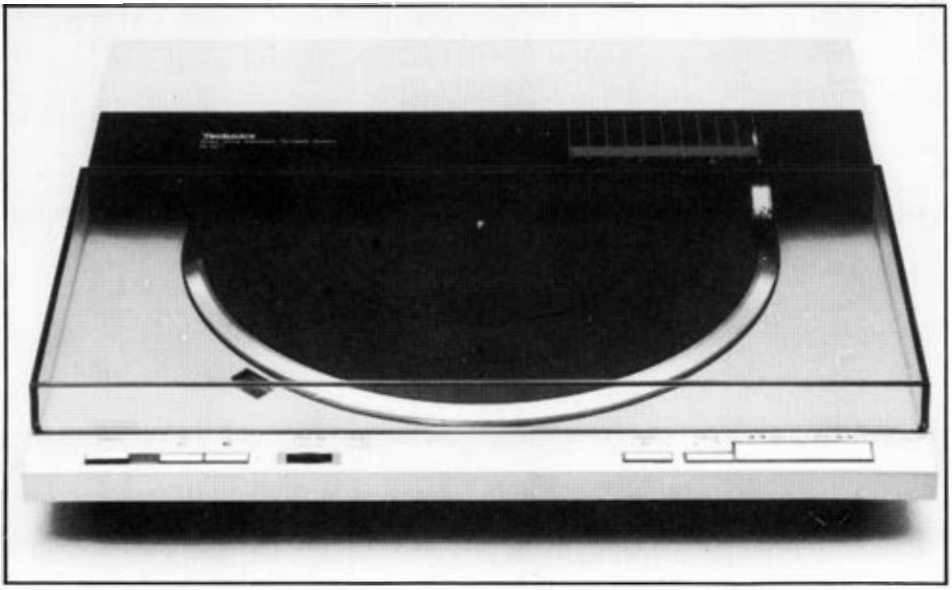
Type	DC servo, belt drive, semi-auto with speed adj.
Speeds	33 and 45
Platter	Cast alloy, 0·8kg approx
Standard of construction	Fair
Pickup	S-shaped arm, detachable headshell. moving-magnet cartridge fitted. Dial bias corr.

TECHNICS SL-DL1

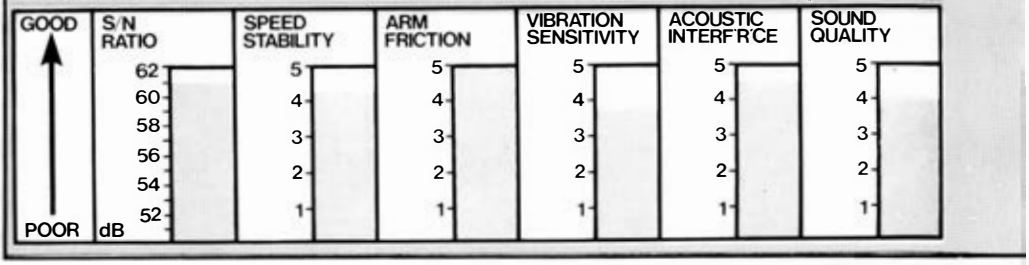
While the SL7 automatic radial-tracking player has achieved a measure of well deserved fame, the SL-DL1, as a relatively recent addition, is less familiar. It is in fact very much like the SL7 in principle but is different in execution, for it is bigger and therefore more in keeping with conventional rack systems and other layouts in which space-saving is not the prime aim.

The SL-DL1 carries the pickup and its tracking device in the lid, all in a fail-safe arrangement so that the pickup lifts safely from the disc if the player is opened while it is active. Although there are various plastics parts, due attention is paid to mass and rigidity. The base employs both loaded plastics and metal parts.

Model SL-DL1 has a pitch control but does not boast quartz reference for speed regulation. There is an alternative version offering this refinement at extra cost. Disc-size sensing is by means of an optical system involving the detection of lights through small apertures in the platter and mat. Repeat play is catered for, and it is possible to reset the speed in order to play a 12-inch disc mastered at 45rpm. Other features include a magnetic cartridge, platter strobe and a button-operated cueing device.



TEST RESULTS



THE FINDINGS

Precise and predictable in operation, this unit exemplified the marked contrast between the traditional, with its emphasis on setting-up and adjustment (anything from bias to chassis springs) and the fairly automated approach. With a radial tracker there is (for example) no pickup bias; nor is the owner encouraged to pry into matters which have been taken into account at the works. Just close the lid and press the button.

The DL1 was surprisingly noisy during motorised pickup cueing, but that can hardly be put forward as a major objection in view of the high standard achieved when the stylus met the groove. Mechanical excellence in relation to cost was not disputed and the well contrived drive system (ample motor torque) was approved. Regulation and speed stability generally were better than average. Long-term drift was too slight to be of account, while initial start-up to 33 took only 1·5 secs.

Superior in respect of acoustic interference and isolation from vibration for a unit of the type, the DL1 returned a S/N figure of 61dB, derived from an unmodulated-groove test in this instance (as is the case for other radial-trackers also). Platter-mat design is of course linked to the auto facility, but fortunately this item has an acceptable surface contour and makes its fair contribution to damping. It is stuck to the platter, so in-situ cleaning must be done with care. Platter mass was about 1·4kg including the mat.

The pickup has a short stub of an arm — merely a cartridge carrier — with an effective mass of 3g. To this is fitted a magnetic cartridge of fairly good characteristics, showing proper compatibility (resonance was at 11Hz). Frequency response was sensibly linear though with a slight treble rise, while separation was 27dB in the midband, held to a good 20dB at 10kHz. The choice seems reasonable for the price level, though that is not to say that something better is ruled out. In fact the stylus had a shank-mounted tip, set in the cantilever with a rather obtrusive aluminium mount, and the elliptical tip finish was only fair.

With reasonably secure tracking at 1·3g, performance lacked ideal flair and smoothness on the more awkward of modern material, which it must be assumed users of such a turntable would play. Occasional roughness was noted. More subtlety of stereo presentation would have been welcomed, but the overall balance was not at all bad. Bass was fairly well extended if less crisply defined than from some more massive units.

On the whole the DL1 worked very well and appealed as a creditable example of advanced auto mechanics. The lasting impression is that the business end of the pickup, though by no means a let-down, could be a little bit better. But there is a lot of technical merit here, and value for money is attractive.

THE VERDICT

This is a cleverly devised player, likely to prove dependable. In most important respects the design seemed well in balance, although Technics might with advantage take another look at the pickup with a view to improving it a little without impact on cost. As things stand the price is about right and the unit provides what a lot of buyers would require.

Type	Direct-drive, servo, automatic with radial-tracking system. Pitch control
Speeds	33 and 45
Platter	Cast, 1·4kg approx
Standard of construction	Good
Pickup	Technics magnetic cartridge on radial-tracking arm

THORENS TD104 MK2

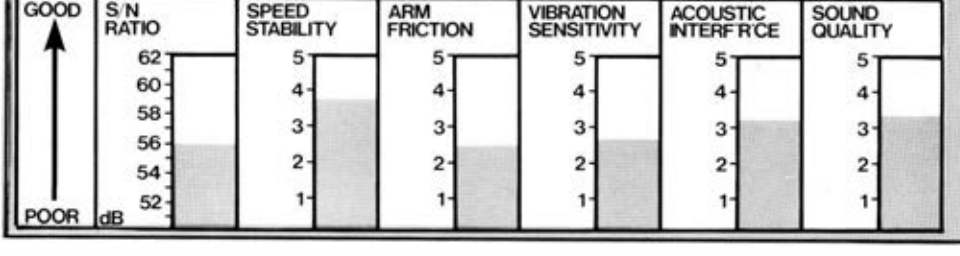
Hi-fi enthusiasts associate such robust and simple turntables as TD160 with the name of Thorens, and by such standards the 104 Mk2 may be considered something of a lightweight. However, it is nice looking and fairly simple, showing more popular 'cosmetic' allure than usual. It is a manual player so far as pickup handling is concerned, but an alternative model of semi-auto design is available.

At its recommended price of £161 this model seems rather expensive — at first sight and until the pickup arrangement is considered. This particular version was complete with an Isotrack TPO-63 arm and a fixed Ortofon Concorde head, forming a very neat low-mass integration. This integration does of course mean that no other cartridge can be used unless a spare plug-in arm tube is obtained. That item can in fact be ordered from the distributors.

To complete the explanation, the standard 104 Mk2 arrives with a basic Isotrack arm which accepts the user's choice of cartridge. Since that basic version of the player costs nearly £60 less than the one under review, your views on value may be affected. Apart from that the unit is belt-driven and electronically governed (DC motor and tachogenerator for monitoring).

Fine adjustment of speed is made with reference to a platter-edge strobe for 33 but using a marked disc centre adaptor for the 45 speed. The power supply to the motor circuits is at 10 volts, and conversion from mains is provided by a small adaptor, ready-fitted in the mains lead. It is unusual, but in this way Thorens can cater for any supply.

TEST RESULTS



THE FINDINGS

All main plinth parts are rigid mouldings and care has been taken to ensure the small but nicely made main bearing is well supported. The big surprise is the use of a deck plate sitting on damped coil springs within the plinth, for this was unexpected after familiarity with the floating sub-chassis design mostly employed by this manufacturer. However, the main resonance is kept well down the subsonic range and the system offers much more isolation from the dust cover than an integrated construction would do. The cover, counterbalanced by spring devices, was of reasonable quality.

The cast platter was found to weigh about 1·3kg including the centre hub and mat, the latter being a rather poor embellishment as it failed to provide ideal disc support. It may be difficult to fit a replacement on account of a slightly raised portion on the platter, although much depends on details of individual designs.

Start-up time to 33 was about 2·5 secs. Overall signal-noise result was 57dB and the low rumble content quite acceptably small. Long-term speed drift was negligible, not exceeding 0·15 per cent per hour, and dynamic behaviour was good. Conductive touch controls are fitted and these worked well; the speed adjusters, for what they are worth, gave about 5 per cent change of nominal.

The low-mass arm has become familiar through its use on other Thorens units and in this version yielded a total effective mass of about 7g. Offering adequate adjustability, the arm displayed a lateral pivot friction of 50mg, a bit higher than desirable, although in the other plane the friction was only 15mg. Slight play in the bearings detracted from an otherwise favourable impression.

This likeable pickup integration offered a tracking pressure of 1·2g, and the very good elliptical stylus was approved. The load capacitance approaching 400pF seemed somewhat high. If this applies to the version without an Ortofon head, the leads would certainly have to be shortened or replaced. Bias correction was adequate though a little low in force, so that an increase in relation to instructed settings would be advisable. Descent of the cue device in 1·8 secs was satisfactory.

Acoustic breakthrough was about average for the class of product, with vibration isolation barely as good, suggesting that special care over location and support will prove rewarding. Bass performance did not have the firm authority possible with more massive Thorens units but generally the results were smooth enough, if a little forward on the most energetic material with vague colouration. Stereo detailing was not always as clear as could be desired, but in all the performance was reasonably well balanced.

THE VERDICT

Some real merit and mostly minor vices. Hardly the choice of those who admire traditional Thorens ruggedness. Choice must in the end depend on preferences for particular pickups, and inevitably some will favour the basic model in which cartridge selection is left to the buyer.

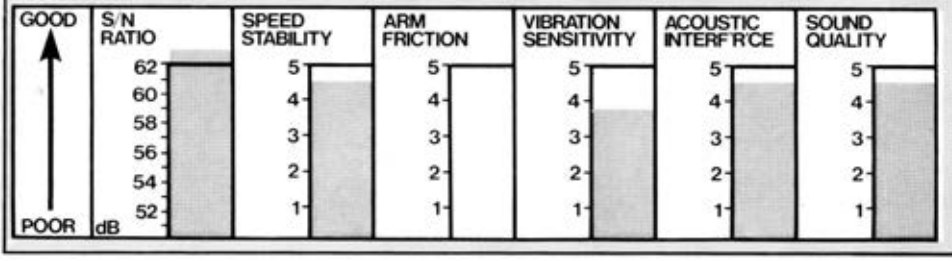
Type	Belt-driven, DC servo, manual control.
Platter	Cast alloy, 1·3kg approx.
Speeds	33 and 45, with adjustment.
Functions	Manual pickup control, lift/lower device.
Pickup	Low-mass arm, plug-in tube, integrated Ortofon head. Dial bias corr.

THORENS TD160-S

Already widely recognised as a high-value turntable, this two-speed version has a lot in common with other Thorens units employing a synchronous motor but is a 'special' version benefiting from certain detail refinements centred on bearing and platter quality as well as sub-chassis modification.

The 160-S is essentially a simple belt-driven unit supplied without a pickup arm. Particular features are the damped sub-chassis, well-gauged isolation via the spring suspension, and of course the massive two-part platter. Speed change is effected by simple mechanical means, the belt being urged on to the appropriate section of the motor pulley by a lever device operated from the front of the deck.

TEST RESULTS



THE FINDINGS

Investigation has tended to confirm that attention to details in even the simplest and most basic of turntables can mean quite a lot in performance. Since simplicity is what many buyers prefer if they have a choice, the Thorens approach to optimisation of results attracts much interest, bearing in mind the modest cost involved.

There is a fair balance here between the modest torque of a quiet low-power motor and the clear merit of a massive 'flywheel' platter with its high inertia. It is hardly surprising to find that start-up to 33 took 3·7secs, but many will not count this a demerit since it would be usual to leave the turntable running throughout a listening session. There is a slight snag, however, in that too many disc holes clash with the Thorens spindle to produce an inconveniently tight fit. This has been true of other models from this maker, and it's high time something was done about it.

A speed error of 0·25 per cent fast was considered to be needlessly great but otherwise the unit displayed excellent stability under dynamic conditions. Overall S/N result was 63dB. As for other details, the platter-mat was an improvement on earlier examples, giving better damping and disc support; and the chassis resonance was well placed, showing up at about 6Hz vertically.

Several high-grade pickup arms can qualify. Results with the Mission would be difficult to surpass and there are good reports of SME III as a partner, while the Mayware seems a possible at lower cost. Using the Mission for evaluation the results on acoustic breakthrough were well above average, with vibration and shock resistance almost as good. Sound quality was always clean and well balanced. The bass, if lacking to some small extent the authority of that from more massive units, was firm and well defined.

THE VERDICT

It is pleasing to be able to report that adverse criticism is difficult, for the basic requirements are well satisfied at moderate cost. The 160-S exemplifies sensible design at this level, and most users would face a significant price-jump if seeking an improvement of 'breakthrough' proportions.

Type:	Belt drive, synchronous motor
Speeds:	Fixed speeds 33 and 45
Platter:	Two-part cast alloy, 2·5kg approx.
Standard of Construction:	Very good
Pickup:	Not supplied
	Mounting insert fitted

TRIO KD-1600 MKIIC

This is a semi-auto player with a small difference. Usually with this type of unit the motor is started by moving the pickup away from its rest, and play then depends on manual operation of the lift/lower (cueing) control. With the Trio, one positions the pickup with the disc stationary. Then the start button is pressed to start the motor, whereupon the pickup lowers in one second.

With this arrangement there are options for interrupting play. The cue control can be used for a temporary pause, or the play/cut button will bring the pickup back to its rest. There is also the usual end-of-side trip and return.

The turntable is belt-driven, with fixed speeds, and of simple design with a light plastics plinth and dust cover. The 'C' suffix indicates inclusion of a cartridge, and in this instance it is a medium-compliance version of the lightweight Ortofon VMS type, mounted in a flat headshell with a miniature plug-in union (with locking screw) of the type now used on many Japanese players.

THE FINDINGS

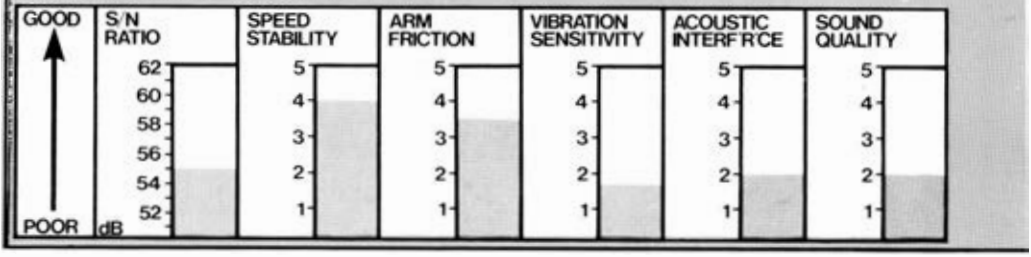
Test results gave rise to mild enthusiasm and a few reservations. The player worked very well and speed stability was exemplary for a unit in this price category, error being negligible and motor torque fully adequate for the application, all amounting to further evidence that belt-drive is at present a safer bet than direct-drive for low-budget designs.

Start-up of the platter (0·8kg including mat) to 33 was 1 sec. The mat design can only be described as perverse, for this item provides neither correct support nor damping, and to throw it away in favour of a sensible replacement would be a kindness. Overall S/N result was 55dB

In view of the level of ambition involved, the choice of the particular cartridge version seems apt and compatible, but the shank-mounted diamond (8 × 18µm elliptical) was dirty and of indifferent finish. Although the arm looked promising (10g effective mass), positive exception was taken to two features — the flexible loaded plastics headshell (axial orientation was poor too) and the marked degree of play in the bearings. Clearly, not enough attention has been given to this component in assembly and quality control.

Details of construction, with general lack of ideal rigidity, had results which were not unexpected, and with a little more care the sensitivity of this unit to acoustic interference could probably have been improved. Indifferent results in the face of vibration and shock represent a basic limitation. Sound quality lacked detail and tonal and dynamic contrast. It was considered that the pickup could, with some attention, offer a better standard than is actually achieved.

TEST RESULTS



£89 MERIT ★★
VALUE ★★★

THE VERDICT

Mixed feelings, alas. There is promising value here, and the turntable section has merit as a simple but dependable example of its kind, given limited hi-fi ambitions. The pickup needs some attention. Trio could probably upgrade this model without any great impact on cost.

Type	Belt-driven, synchronous motor
Speeds	33 and 45
Platter	Zinc alloy, 0·8kg approx
Standard of construction	Fair
Pickup	Straight arm, plug-in offset headshell. Ortofon cartridge fitted. Lever and weight bias corr.

TRIO KD-5100

A fairly recent addition to the Trio range, this direct-drive turntable offers fully automatic operation and is presented in a fairly luxurious style which is discreet in its mainly black finish plus a small amount of simulated rosewood trim (this seems at odds with the rest). The substantial, rigid plinth construction involves both plastics and metal parts and a dust cover of good quality is included, although as usual there is a short and direct coupling between cover hinge and the point of pickup mounting

This model is clearly aimed at those who give priority to push-button operation of all main functions, the addition of motorised pickup control being a feature in this instance. Further, remote control is possible if the turntable is linked to a special control centre in a Trio system.

Front controls, usable with the cover closed, include start/cut, repeat, cueing, speed and disc-size selection to determine pickup drop. The turntable servo system is quartz-referenced and there is no monitoring aid beyond a beacon which lights when the platter has run up to speed. Probably few users would demand anything more elaborate.

A variant of a widely used medium-mass arm with miniature plug-in fitting and locking screw is again a feature, and the flat headshell is a plastics moulding which turns out to be unduly flexible (see also report on Trio KD-1600 MkIIC). The bias device is a somewhat ornate pivoted weight, linked by a nylon filament to the bearing pillar. No cartridge is supplied.

THE FINDINGS

Construction and attention to detail generally appeared very satisfactory, as befits a player that is a fairly costly example of its kind, and the auto mechanics were approved, although slow action was a penalty for the presumed convenience offered. The motor and its bearing made a good impression and the drive system appeared well in keeping with the fairly massive platter. Speed stability was good, with negligible initial error or long-term drift.

Start-up time to 33 was 3 secs. Mass of the cast alloy platter was about 1·7kg including a flat mat which was much more sensible than most (though a piece of metal trim in the centre was quite pointless).

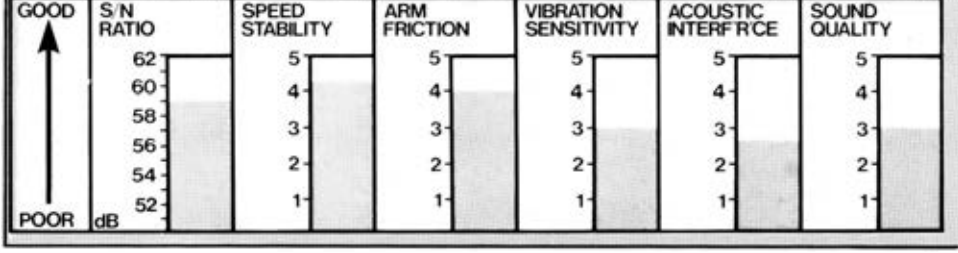
The pickup arm was on the whole a fair example of its kind, although the pivot arrangement was a bit fussy and lack of ideal rigidity in the cartridge-mounting platform was apparent. Pivot frictions were commendably low at about 25mg lateral and vertical. The bias device, too, tended to be fussy in its pivoting arrangement, but fortunately the friction introduced by it was kept to a negligibly low level. One or two minor extras were noted — an adjustable arm-rest, for example.

Cue descent took about 2·5 secs. The arm's cartridge acceptance range is 4 to 12 grams and the effective mass was 11g, indicating use of medium-compliance cartriges for correct matching, compatible examples by Sony and Osawa being tried for tests.

An overall S/N of 59dB was noted. The noise components were quite evenly distributed in the low range but the result was hardly to the standard one might obtain with a separate, more specialised turntable. Much the same applies to the acoustic breakthrough aspect, the result being barely average, but isolation from vibration was about average for integrated players.

Audition yielded a reasonably well balanced result but the bass was a bit lumpy and not really well extended, while departures from neutrality were evident in colouration appearing through the midrange on energetic inputs. Stereo detailing and perspective could be classed as fair.

TEST RESULTS



£199 MERIT ★★★
VALUE ★★★

THE VERDICT

On the whole the results suggested that the design was quite well in balance, but the unit is not entirely convincing in high quality audition. As middling value it may well have appeal for those who like the particular presentation of automatic functions.

Type	Direct-drive, DC servo, quartz lock with fixed speeds.
Speeds	33 and 45
Platter	Cast alloy, 1·7kg approx
Standard of construction	Good
Pickup	Straight arm, detachable offset headshell. Cartridge not supplied. Weight/lever bias corr.

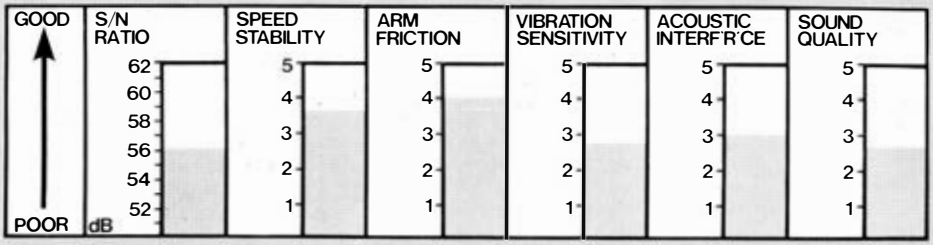
YAMAHA P350

It is characteristic of Yamaha that they present even a low-budget player with a flourish and a lot of detail. The specification abounds with data on platter inertia, arm pivot frictions, offset angle and effective mass. The P350 is smart in its silver finish, based on a rigid plastics plinth and equipped with an excellent dust cover.

This model is of the semi-auto type, with belt drive and a DC motor with servo regulation. It does not however have user-adjustment of speed, so that the result of changing from one fixed speed to the other has to be taken on trust. The now familiar miniature plug-in head union is used and the shell is fitted with a magnetic cartridge. This headshell is a lightweight of resin carbon fibre and, usually, a spare is included among the accessories.

There is the customary arrangement whereby the motor is started by moving the pickup toward the platter. A damped lift/lower control is provided and there is a reject button as well as the normal end-of-side trip.

TEST RESULTS



£75 MERIT ★★★ VALUE ★★★

THE FINDINGS

The simple mechanism supported under the plinth deck permitted flexing of the main bearing and this plus the condition of the bearing itself was reflected in an indifferent signal-noise result, with low rumble as a marked component. The well-made platter weighed nearly 1kg including a very sensible mat. Start-up to 33 took only 1·2 secs and speed stability was very good while torque was ample.

Yamaha's version of a familiar medium-mass arm was considered a fair effort, though the light headshell lacked ideal rigidity. Pivot frictions were to spec at 30mg lateral and 10mg vertical and bias was acceptable at 1·5g or above. A fussy counterweight design contributed to a total effective mass of 11·5g, but the fitted cartridge was a suitable match. However, this magnetic model yielded as coarse a sound as many in budget players. It tracked uneasily at 2g and the condition of the stylus (poorly finished shank-mounted tip) was below par. Inspection revealed a lot of adhesive behind the cantilever.

Experiment suggested that some uplift could be obtained with a cartridge replacement, but this was not a very bright prospect in view of the limitations imposed by the design as a whole. Bass was ill-defined and midrange colouration was often intrusive. Replay with balancing roll-off at the extremes of the range could be pleasant enough. Isolation from vibration and shock was to the usual standard for a unit of this class and signs of acoustic breakthrough marginally above average.

THE VERDICT

This unit has its attractions if an economy-class outfit is all that is demanded. It has its vices but is still middling value. There is some virtue in its simplicity, and it might just about be worth while to fit a better cartridge. Careful siting and support would make the best of its limited potential.

Type	Belt drive, servo, fixed speeds, semi-auto
Speeds	33 and 45
Platter	Cast, 0·9kg approx.
Standard of construction	Fairly good
Pickup	Straight arm, detachable offset headshell. Magnetic cartridge. Dial bias corr.

TURNTABLES: SUMMING UP

It may seem unnecessary to labour the contention that 'you get what you pay for'. However, this is pointed up pretty clearly in hi-fi and comes to mind with some force when turntables are examined. Very few of the economy-class units in the test group show much allegiance to hi-fi objectives; and it is even more broadly true, applying as it does to various cheap models which have been checked recently but not included in this Guide.

Both Japanese and European manufacturers are clearly able to make low-cost turntables that 'work' very well indeed while yielding a rather mediocre sound, limiting the application to uncritical background music, compact music centres and the like. Since one would not reasonably expect a performance appropriate to more precisely made and expensive machines, is there any reason to complain?

On the face of it there should be few quibbles. But there is a marked tendency to offer 'features' which appear to enhance user-convenience and value but do nothing whatever for performance. What a lot of users would like is a very simple, low-cost manual player in which costs have been allocated to essentials such as platter and bearing, the support for the bearing, and a pickup arm suited to good examples of cartridges in the low-to-medium price range.

To back this, more useful pointers to cartridge choice would help everyone, but in practice the manufacturers and importers fail dismally. There are of course a few honourable exceptions, particularly where a properly compatible cartridge is included in the package. More often a sorry specimen is fitted just to complete the player, the main factor being cheapness, not the audible result. It seems better — as is often done — to leave the headshell empty than to include an afterthought which has to be paid for but which will soon prove an embarrassment even at the budget stereo level.

At the lower end of the spectrum, and further up the range too, there are many examples of automation taking over the running from sonic essentials. Obviously a lot of buyers will insist on some degree of automatic operation; and if that is what they want, it is up to the manufacturers to devise mechanisms to satisfy the need without sacrificing advantages that follow from substantial and precise engineering. Technics are among the few companies proving that an acceptable compromise can be found.

We find, however, that direct-drive, which is virtually inseparable from some kind of auto system, now comes 'down market' where it offers little if anything of hi-fi merit. Marginal motor torque and fussy speed controls do not make a very happy combination.

Even with belt-driven units there are too many superfluous features, the cost of which could with advantage be applied to improving flimsy plinths and covers. As for that oddity adorning the platter, it seems that Japan must have a Ministry of Silly Mats, specially set up to foster inept designs.

If you really want to know what can be done very cheaply indeed, take a look at the Marantz TT1200, which exemplifies all that is cheap and cheerful. It has nothing to do with hi-fi but it plays discs quite well. However, a look at the reports shows how severe are the limitations imposed by low-cost constructions. It is a pity that Sansui (in particular) do not respond to an evident need in the way they used to. But the Dual CS-505 is a fair bet for really tight budgets and limited ambitions.

In the medium area, the Technics SL-DL1 and SL7 are among the most interesting products, but a reasonable selection is also offered by Dual, Lux, Sony, Thorens and Trio. The KD-5100 by Trio is possibly as representative as any when it comes to automatic functions and stylish presentation. Lux PD-284 and Thorens TD104 Mk2 appear as typical examples of a somewhat simpler approach.

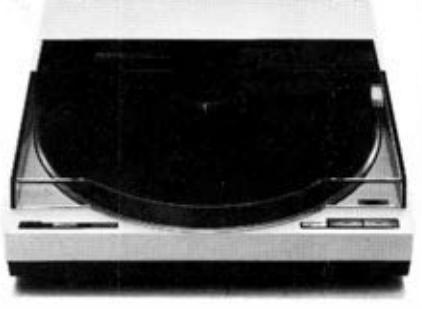
Considering the sensitivity of so many integrated players to mechanical disturbances and acoustic interference caused by energetic pressure-waves in the room, it is hardly surprising that the more massive units improve their shining reputations in hi-fi circles. You really cannot beat plenty of mass distributed in the right places

Such units are nearly all of the floating sub-chassis variety. If you want to check on the influences of local conditions, do what the testers do and try the turntable and

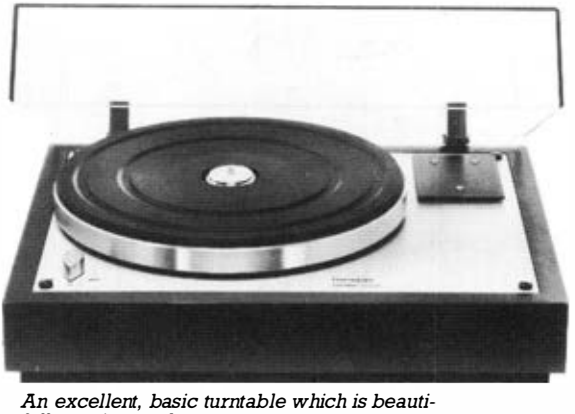
amplifier in a different room from the loudspeakers. Then bring the equipment together again in the more normal layout. However that may be, careful siting and support are always important. A relatively light unit has to be protected as much as possible from disturbance, while a massive one demands as much care in choice of support, if only because it is heavy.

Reports on a selection of separate pickup arms reveal specific attributes and once again demonstrate that shrewd choice of a purpose-made component brings attractive rewards. Partnering turntables of merit do not come very cheaply but fortunately there are some pleasing examples in the medium range. The Ariston RD80, the STD 305-S and Thorens TD160-S are simple and decently engineered, likely to provide what many buyers want, assuming that such trimmings as controls, beacons and strobes are rejected out of hand. All these are sub-chassis turntables.

Even more monolothic are the Dunlop Systemdek, the established Linn LP12 and the novel but effective Lux PD300. The direct-drive protagonists have less choice at this level but the Denon DP55K is a refined quartz-referenced heavyweight from a company making a success of luxury turntables based on a modern principle which has better potential than is realised in practice.



Left: the Lux PD300 is excellent, though costly. Technics SL-7 (above) is a totally different concept, but achieves a high ranking.



An excellent, basic turntable which is beautifully engineered.

A minor operation could bring major improvements to your hearing

When the symptoms are lifeless reproduction and tone deafness, it's all too easy to rush out and seek a cure in the form of a power oozing amplifier or sophisticated speakers. Which in many cases is quite the wrong medicine.

So often, it's the cartridge that's at the root of the problem.

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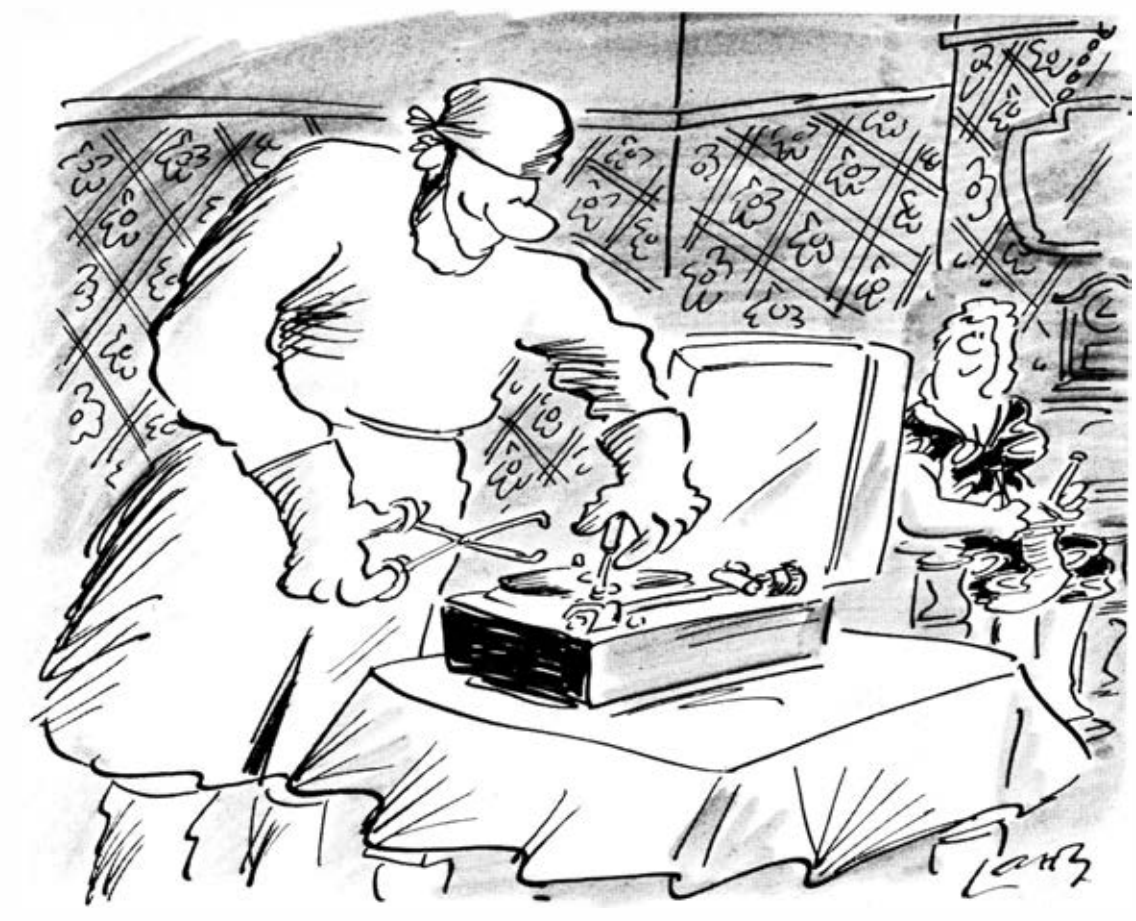
Call in and talk to him. His address is listed overleaf.

And should you feel in need of a second opinion about the quality of ADC cartridges, read on.



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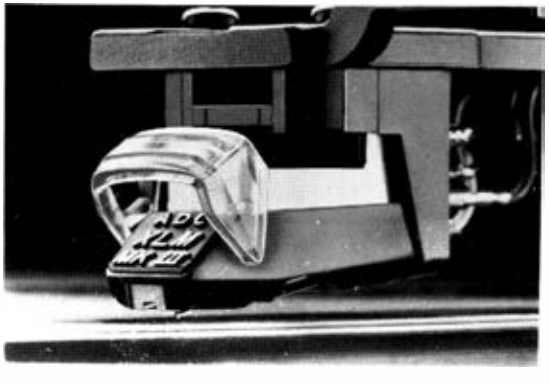
Paul Messenger in HI-FI NEWS & RECORD REVIEW.

"**It is well detailed and very refined where appropriate, and its dynamics are good, but all in a very musical way.**"
Alvin Gold reviewing the ADC XLM MkIII Improved in WHAT HI-FI?



"**This cartridge was universally liked for its clear natural rendition of voice which allowed each inflection to come over clearly.**"
Dave Berriman reviewing ADC QLM 36 MkIII Improved in PRACTICAL HI-FI.

"**Very good sound quality for the price is coupled with a fine lab performance.**"
HI-FI CHOICE reviewing the VLM MkIII Improved.

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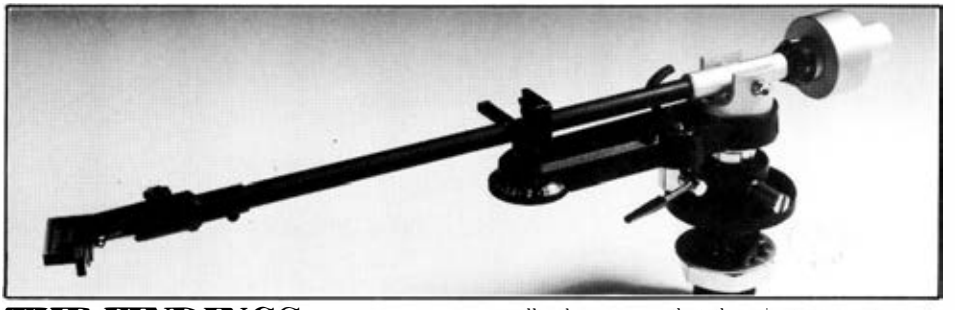
ADC ALT-1

£40 MERIT ★★★ VALUE ★★★★

In essentials this is a low-cost version of the celebrated LMF1/2 carbon-fibre models and displays a similar elegance of design. However, it has an aluminium arm-tube and a counterweight which has been simplified (and made shorter, which is a good point). Only a detachable headshell model is made and this provides a flat, rigid platform for cartridge fixing. Finish is largely matt black, and the arm is made in Japan for ADC.

Particularly welcome is the inclusion of a simple but effective SME-style sliding base to aid installation and alignment. Although the setting-up instructions are clear, the provision of a separate card protractor would have been useful for an arm which is thoughtfully devised to facilitate quick cartridge changes. The ALT-1 is not intended for damping, apart from a degree of decoupling included in the counterweight. Nominal length is 237mm, stylus to pivot.



THE FINDINGS

Adjustment range was adequate and the sliding-base mount soon proved its worth. A cartridge can be fitted and the arm re-adjusted in a few minutes. It was unfortunate that slight play was evident in the bearing for lateral pivoting (another sample was the same) and it is to be hoped that ADC's supplier can improve on it. Cartridge acceptance range was approximately 4–11 grams.

With an effective mass of 7·5g the arm is a match for a fair variety of cartridges of highish compliance, excluding the fussiest ultra-high types and, of course, any that specially require damping for best low-frequency behaviour. Tracking pressure calibration was remarkably accurate and the built-in bias device proved satisfactory. Lateral pivot friction was a bit high at 30mg but fortunately not too much out of line with requirements for tracking upwards of 1g. But it really does seem that the pivot warrants more attention in assembly.

Audition yielded generally good results in relation to modest pretensions and the arm should give great satisfaction in systems of medium calibre. It was inclined to promote some hardness and forwardness with typical low-cost cartridges of bright characteristics when coping with very energetic material, though this did not specially afflict suitable examples from ADC's own range. Has someone contrived this or was it just luck?

Otherwise the results displayed fair analysis and were quite well balanced. More remarkable stereo detailing and a closer approach to neutrality can be secured with more advanced components, no doubt, but the ALT-1 has distinct appeal as a high-value product. It is certainly convenient in use, and is best installed on a massive base.

Effective mass, excl. cartridge	7·5g
Adjustments	Good
Standard of manufacture	Fairly good
Pivot frictions	Lateral 30mg, vertical 15mg
Cue descent	2·3secs
Bias device	Internal spring and lever
Lead capacitance	200pF
Sound rating	Average

THE VERDICT

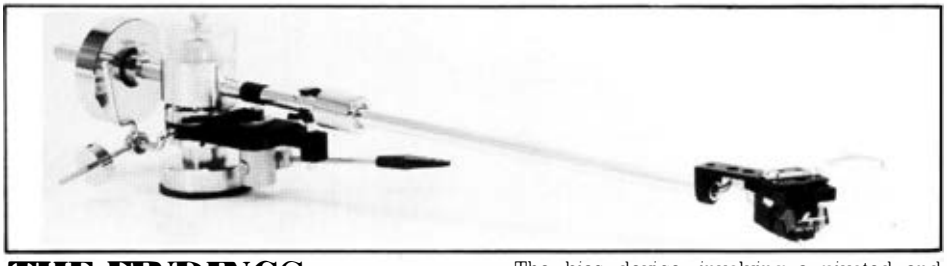
This arm can be purchased for less than the cost of some cartridges that could qualify for use in it. High marks for value. The ALT-1 might even be upgraded a notch if certain snags, minor that they are, could be overcome.

MAYWARE MK3

£59 MERIT ★★★★ VALUE ★★★★★

At the time of writing a new Mayware arm was mooted but meanwhile the Mk3 continues and has been the subject of detail improvements. This low-mass arm is of unipivot design in which an adjustable hard pivot locates in a central well, the assembly being damped by silicone fluid. Adjustment of the assembly is straightforward, bearing in mind that in many cases only a very light damping effect is required. Overdone damping is inclined to be more of a nuisance than a help.

Some authorities have argued against unipivots, preferring two-plane bearings on grounds of rigidity and stability, yet unipivot simplicity has its appeal when well executed — and friction should be extremely slight. Then, of course, viscous damping is virtually inseparable from such a design.



THE FINDINGS

The Mk3 is nicely engineered and intended for single-hole fixing, so an alignment protractor is supplied to aid final setting-up when the cartridge is in place. Rigidity of all parts including the flat cartridge platform appears very good, as do the adjustments for height, lift/lower control, and arm and head attitude. Final trimming is done by adjusting the eccentric counterweight, which also provides some decoupling.

With the arm balanced by the counterweight the tracking pressure can be set by a cursor weight on the arm-tube, and this affects the effective mass. However, with cartridges of low mass and high compliance one can slide the cursor to the rear and use the main weight for adjustment. In a condition where the arm was deliberately adjusted to minimise inertia for a light test cartridge the effective mass was approximately 6g. The cursor weight may be removed if required.

The bias device, involving a pivoted and adjustable weight, tended to over-correct but one can compensate for it. The device did not introduce significant friction. Arm geometry was fine and nominal length was 229mm, stylus to pivot. Negligible pivot friction and very accurate tracking pressure calibration were good points.

Initial checks were made with high-compliance magnetic cartridges in the 25-35cu region and tests were extended to moving-coil types. An advantage of a low-mass arm is that scope exists for matching cartridges of relatively low compliance simply by loading the head.

With care in setting-up the arm promoted a generally clean and open sound, with impeccable stereo imaging and plenty of detail. A very pleasing result in relation to price. There was thought to be a hint of edginess during the experiments but it is unlikely to be much of a factor if the transducer's tonal balance is well chosen. In any event the Mk3 deserves better than a cheap cartridge. Bass was firm and reasonably extended, sometimes seeming a shade light.

Effective mass, excl. cartridge	6g
Adjustments	Good
Standard of manufacture	Good
Pivot friction	Negligible
Cue descent	2secs
Lead capacitance	90pF
Bias device	Pivoted weight
Sound rating	High

THE VERDICT

In view of its versatility it is not possible to fault the product at this price. Tops for value and a lot of technical merit too.

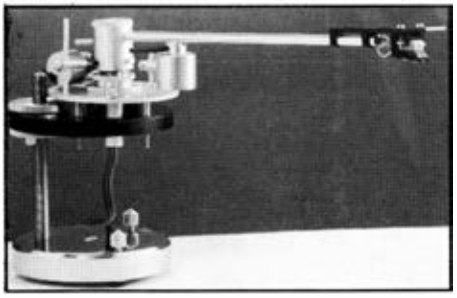
MICHELL FOCUS

£84 MERIT ★★★★ VALUE ★★★★

Another all-British component, we are glad to say! This low-mass arm was devised as a partner for the Focus turntable but in recent times has been available separately. Meanwhile a few detail improvements have been made.

Further, it was designed with the needs of high-compliance cartridges in mind, namely the more advanced magnetic types and (as things have turned out) an increasing number of MC models. In any event, given a low-mass arm of the right quality one can load the head a little to give compatibility when relatively low compliance is involved.

This arm is of the unipivot type in which the jewelled pivot is of precise construction and surrounded by a well into which silicone fluid (supplied) is introduced to give light and non-adjustable damping. The arm-tube is of double-skinned alloy and the skeletal magnesium cartridge platform is locked in two places, although it can be loosened to aid cartridge installation.



THE FINDINGS

Unipivot arms with good provision for adjustment tend to be a mite fiddly to set-up, and the Focus is no exception, but a lot of thought has gone into the arrangements. An example is the 'trimming' of the pickup to ensure that it takes up the right attitude to the disc. Here, the use of a split counterweight system permits lateral balance which is independent of tracking setting. Arm-height adjustment is simple and indeed all final setting-up can be done with fine accuracy. The bias device employs a suspended weight, the thread passing over a glass rod to avoid friction.

Installation is in a single hole in the mounting board and, as ever with such an arrangement, precise adjustment is aided if an over-size hole is formed. Principal characteristics were well liked, especially the negligible pivot friction, general adjustability and accurate bias correction. Although the lead capacitance was quite low on the sample, we understand that a recent change has reduced this to less than 40pF. This is very much lower than might actually be required in practice, but presumably the purpose is to leave keen users scope for tailoring the load capacitance to meet individual needs.

As the effective mass of 6g indicates, the appeal is primarily to admirers of high-grade magnetic cartridges exhibiting high stylus compliance, and audition featured good examples of this kind (Signet, Pickering, AKG). The Focus was found to promote a very clear sound with the best transducers, finely detailed, quite analytical and with very good imaging.

Balance was on the bright side while the bass range was nicely defined and clean though sometimes seeming a shade light or withdrawn. Such tests provided evidence that the Focus would be a contender where the user studies the details of smooth response and low distortion through the system. Moving-coils of the more compliant sort were reasonably well treated, but the arm is not so well in tune with the vogue for heavy MC trackers.

Effective mass, excl. cartridge	6g
Adjustments	Good
Standard of manufacture	Good
Pivot friction	15mg
Cue descent	2·2secs
Lead capacitance	70pF
Bias device	Suspended weight
Sound rating	High

THE VERDICT

This component is more for the enthusiast than for the user who lacks technical interest, and doubtless the designer had exactly that aim in mind. Realistic value and a creditable example of low–mass design of the no-nonsense kind.

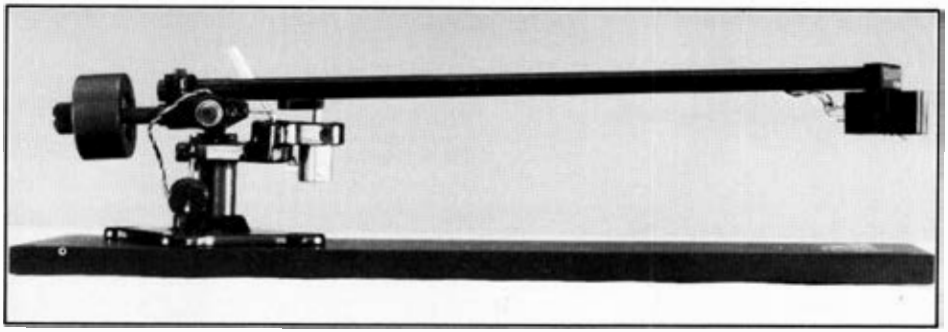
MISSION 774

£145

MERIT ★★★★★
VALUE ★★★★

An interesting piece of precision engineering, the 774 has gained quite a reputation, not least because it emphasises basics at the expense of cosmetics, and partly because of its versatility. It provides an instance of the practical advantage of buying a good low-mass arm, for not only can high-compliance super trackers be used, but those of lower compliance can also be tracked given judicious addition of head-weight.

Model 774 is in fact a good choice for a variety of MCs as well as high-grade magnetics, and needless to say Mission's own 773 is a prime contender. Arm features are silicone fluid damping (optional and adjustable), pre-stressed bearings to eliminate play, and integrated design in the sense that all main parts are firmly clamped. Then there is a counterweight core of Sorbothane, a polymer with a high energy loss — just the thing for wide absorption in an audio device.



THE FINDINGS

An offset cartridge block is firmly fixed to the straight arm-tube, which in turn is clamped on the pivot housing. A flying lead emerges at that point and terminates on the pivot base via a small plug and socket. Some may find the unusual design a bit fiddly but there is actually an advantage because the tracking error adjustment and the head setting (as viewed from the front) are done in one operation. The arm-clamp is tightened when everything is just right.

All other vital adjustments are catered for, but the bias device is not calibrated. It is of little importance, though, since the best way to establish a setting is to check bias in conjunction with tracking pressure using a suitable test disc.

Pivot frictions were extremely slight in relation to anticipated conditions of use and all aspects of design including geometric accuracy were approved. Many cartridges will not need the arm-damping, but in cases where it is advised it is likely that only the lightest possible application will be required.

Experience of this arm has been gained using such contrasting but massive turntables as a belt-driven Ariston and a Denon 55. The abiding impression is that the 774 offers the reward of neutrality and a clinical clarity, with details depending on the cartridges used. With the finest combinations this analysis, coupled with the impression of wide dynamic range, has been notable. Bass has been a shade light but crisply defined — probably right, therefore.

Effective mass, excl. cartridge	6g
Adjustments	Good
Standard of manufacture	Good
Pivot frictions	Lateral 15mg, vertical 10mg
Cue descent	1·5secs
Bias device	Weighted lever and thread
Lead capacitance	180pF
Sound rating	High

THE VERDICT

Although it cannot be called a popular-priced component, the 774 is a realistic proposition if you are going for results of top calibre. It is really an enthusiast's product — and that is intentional. Versatility is a strong attraction.

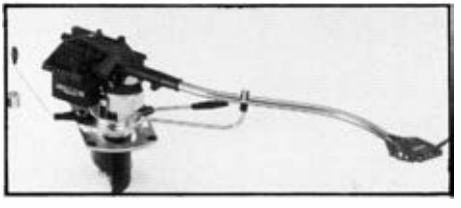
SME III-S

£121 MERIT ★★★★ VALUE ★★★★

The 'S' stands for simplified. This version has all the essentials of the standard model and for practical purposes the performance is the same, but a certain trimming of facilities has resulted in a significant saving. Main items accounting for the economy are some simplification of adjustments on the counterweight assembly and omission of the rack and pinion device on the sliding base. The silicone fluid damper is omitted but is available as an accessory.

There can be few readers who are not to some extent familiar with the SME arm, if only through its distinctive 'technical' look and general attention to detail. Many will know that, with the Series III, the emphasis is on low effective mass and the optimal conditions for use of light cartridges with high stylus compliance, and that an important element is the arm-tube of surface-hardened titanium. This plugs into the pivot assembly and carries a fixed headshell. Provision can be made for successful use of low-compliance cartridges (such as some MC types) and SME can advise.

As is true of many products, the III-S can be found at prices appreciably below the manufacturer's suggested VAT-inclusive figure quoted above.



THE FINDINGS

On a matter of detail, the reinforced plastics headshell is on the small side, so that some of the bulkier cartridges are an uncomfortable fit. A flat platform would be more convenient. However, the range of adjustments is generous and all that one would expect of SME. Setting-up depends on adjustment of the arm on its sliding base, with reference to the alignment protractor supplied, and this simple method is much preferable to any other. No wonder all manner of turntables come prepared with SME-style cutouts for pickup mounting.

Effective mass is 5g and pivot frictions are so low as to be difficult to measure. The lift/lower control gave an unusually slow descent of stylus to groove. SME have made it clear that they favour this slow action, though some users may find it irritating.

Bias correction with the familiar weight and thread was thought to exert unduly high side-force if the instructions were followed, but it was easy enough to get it right by experiment. It is preferable to use a test disc for final setting-up, as indeed is true of any specialised high-performance pickup.

So the spotlight is on the reduction of effective mass, and the SME III (S version or standard) beats most in that respect. The arm comes into its own with high-compliance cartridges (typically of 25–50cu) and can ensure excellent results with precision in all vital aspects. Colourations have been well controlled and a smooth performance results with the finest cartridges.

The excellent technical service offered by SME deserves acknowledgment, for it covers a multitude of practical needs such as choice of lead capacitance, application of damping and the use of the arm with various turntables.

Effective mass, excl. cartridge	5g
Adjustments	Good
Standard of manufacture	Good
Pivot frictions	Negligible
Cue descent	4secs
Bias device	Suspended weight
Lead capacitance	Choice available; specials to order
Sound rating	High

THE VERDICT

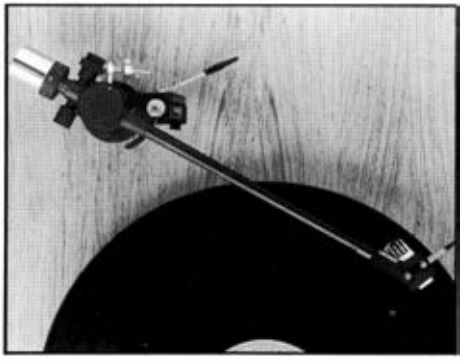
A leader among low-mass arms, versatile and beautifully made. This 'S' version would suit many users who can later decide whether the damping option is of relevance. Indisputable merit allied to realistic value.

ULTRACRAFT AC-30

£95 MERIT ★★★★ VALUE ★★★★

Made in Japan, this interesting component might well have attracted a less impressive value rating if it had been the subject of a report at a much earlier stage. That is good news, though, for the AC-30 has only changed in one detail — its price has been reduced!

The arm owes its main design features to the much more costly AC-300 Mk2, for it is of the same unipivot design, but it displays some simplification. The arm-tube carries a fixed headshell (a flat platform) and is in turn fixed to the pivot housing, and this arrangement has its impact on mass while making life a little difficult for anyone who changes cartridges often. It is best for the user who settles with a good cartridge for a considerable time. A matt black finish is applied to all visible parts except the calibrated counterweight.



THE FINDINGS

Nominal length, stylus to pivot, is 237mm. The range of adjustment is good, covering height, cartridge location and arm-tilt. Single single-hole fixing is required and the lateral adjustment is limited to the slots in the cartridge platform, installation is best started with an oversize fixing hole and continued with the help of an alignment protractor. No protractor is included but it is easy to buy or make one.

The AC-30 employs variable viscous damping, a well around the pivot being arranged to accept a small amount of silicone fluid. Only 0.3cc has to be inserted using the syringe supplied. Adjustment of damping is made via a knob above the pivot, altering the relative position of the cup and the well containing the fluid. A clever and effective arrangement.

With an effective mass of barely 9g the arm is well gauged for use with a considerable variety of popular cartridges, mainly in the middle range of compliance and embracing examples of the highest quality. A weight range of 5·5 to 12 grams is catered for. The makers could usefully revise this to lower the spread by a gram or so.

Pivot friction was too slight for really accurate measurement (not more than 10mg lateral) and the bias correction arrangement, with a weighted lever pulled by a thread, gave acceptable results while introducing negligible friction of its own. Add to this good arm rigidity and a generally high standard of manufacture.

Audition provided evidence that a unipivot arm can rival other types provided it is set-up with care. Colouration was clearly very slight, so that the results with high-grade and compatible cartridges gave the impression of neutrality. Only very occasionally was a slighly 'soft' character suspected, and mostly the analysis of detail was superior. So this is a component for quite general use in high-grade systems, only excluding fussy cartridges of very high compliance.

Effective mass, excl. cartridge	9g
Adjustments	Good
Standard of manufacture	Good
Pivot friction	Negligible
Cue descent	2secs
Bias device	Weighted lever and thread
Lead capacitance	100pF
Sound rating	High

THE VERDICT

At its current price this arm is excellent value and gains equally good marks for technical accomplishment. It is fairly versatile and the variable damping is cleverly executed. Well recommended.

CARTRIDGES IN CLOSE-UP

Reports in this Guide are intended to give the hi-fi enthusiasts, especially the first-time buyer, an impression of how well pickups and associated items do their job. But what exactly *is* the task of a pickup? The short answer is that it does much the same job as the dreadnought device fitted to the wind-up gramophone of a half-century ago. Whereas the old pickup was part of an acoustical system and ploughed the grooves at pressures of several ounces (to put it gently), the modern pickup is a precision-engineered instrument which translates small vibrations into electrical signals, tracking the grooves at pressures as low as one gram, or about a twenty-eighth of an ounce.

Accuracy of disc replay steadily improved during the development of sound reproduction, now reaching a very high standard. This and the reduction of distortion of the groove are related to modern featherweight tracking conditions and the refinement of tiny moving parts in pickups. The finest components track more securely at lower downward pressures than the best examples of a few years ago. There is plenty of evidence that sheer brute force does not keep the stylus in the groove when conditions are adverse.

A pickup is designed for a particular tracking pressure, or fairly narrow spread of pressures. For any given design an excessive pressure can only flex the stylus unduly, preventing correct operation while encouraging wear. On the other hand a reduction of pressure below the optimum will invite serious mistracking and a further risk of wear. In seeking the happy medium, audio specialists are interested in the total mechanical impedance of the device, reflecting the way in which the stylus reacts with the enormous groove accelerations and velocities with which it has to contend.

THE STYLUS

So the focus of attention is the stylus, the only moving part in the typical magnetic head or cartridge, and the aim is to keep the diamond tip intimately in contact with the groove-walls, whatever the forces tending to prevent this. Mistracking is a loss of contact which may be heard as splutter, roughness, a coarse quality or other distortion, and in severe cases the stylus tip may ride well up the groove.

This mistracking effect is not continuous, for when it happens it is usually noticed on isolated and severe recorded passages. However, the idea is to prevent it, even in the face of the most challenging material. It may perhaps seem a little discouraging to maintain that there is not one pickup that will surmount with complete aplomb every challenge — that is, every awkward fragment of impressed information at every frequency. But some pickups will be better than others and the finest will sound as though they balk at nothing.

The diminutive stylus is an assembly of several parts, depending on the working principle of the cartridge. At one end is a suitably contoured tip, always a diamond in hi-fi styli, and the part to which this is fitted is known as the cantilever or stylus-bar. Somewhere along its length the cantilever is pivoted in its suspension (such as a synthetic elastomer material with a yielding quality) and this permits the stylus to vibrate while also providing a restoring action. It is the suspension that is responsible for the 'compliance' mentioned in product descriptions.

Toward its rear a stylus may take several forms. For example, it may carry an extremely small magnet, as in moving-magnet cartridges; or there may be a fragment of magnetic material to form an armature, in which case the magnet and voltage-generating coils are fixed parts within the cartridge body and close to the armature. Again, there is the moving-coil type in which coils of extremely fine wire are formed on the stylus, close to the suspension, and the magnet is fixed.

These are the main possibilities. Others have been the subject of limited experiment — ribbon cartridges, strain-gauge cartridges, devices employing the photo-electric principle . . . too many to itemise.

Stylus characteristics dominate cartridge performance. In some cases the cartridge is required to be robust and dependable under adverse conditions, and this will demand a strong cantilever and low suspension compliance. Such components are usually intended for relatively high tracking pressures. At the other extreme are the

more delicate hi-fi products in which the stylus is more vulnerable but ability to track securely at very low pressures is a special feature.

Where advanced hi-fi is concerned the general trend is toward stylus assemblies which combine lightness with rigidity. Research has led to the use of unusual cantilever materials such as beryllium and boron. (Beryllium is not new, though: your author used it for a cantilever more than 20 years ago.) Costly gemstone materials are also used. All such innovations have their supporters, although many makers prefer thin-walled tubes of aluminium alloy for their cantilevers and evidently find no disadvantage in the use of this more readily manufactured material. Further, brittleness is a problem with certain new materials.

In any event the stylus, hurled about by the groove modulations, should respond with alacrity, presenting the least possible inertia. Or in hi-fi engineer's language, it must have the smallest possible effective mass. This is simply a reflection of the stylus mass as seen (or felt, as it happens) at the tip where this contacts the groove. Figures for this mass are quoted in fractions of a milligram nowadays.

A couple of possible misunderstandings demand comment here. It cannot be assumed that low stylus mass is firmly linked with high compliance. At the same time it should not be thought that compliance is in itself a 'goodness' factor, because a very high compliance may be more of a nuisance than a benefit. This does not alter the general drift, of course, which tends to show that designers have been striving for low-mass, high-compliance devices capable of light tracking. Such thinking is followed through to the pickup arms so far as effective mass is concerned.

The other comment has to do with the stylus tip. In most of the best cartridges the tip is the smallest possible naked fragment of diamond, held in the cantilever without any supporting collar or shank. The diamond then represents a very small proportion of the total effective mass and other parts have to be subjects of any whittling-down efforts. In contrast, the tip in many relatively cheap cartridges is held in an alloy support and this, together with any adhesive used, may form a significantly high proportion of total mass.

As you can see by inspection of popular ranges of cartridges, the stylus assembly is fitted in a holder or block, so that it can be pulled out when the time comes for replacement. Since the stylus is the working element, it is possible effectively to renew the cartridge by replacement. Further, it may be possible to upgrade the cartridge by fitting a replacement stylus of appropriate characteristics, although the cost is quite high in some instances.

Exceptions to the interchangeability rule are found mainly among the moving-coil cartridges, available in greater variety than ever before. Some have user-replaceable styli. More often, however, it is necessary to return the cartridge to the supplier or distributor for attention, and this may lead to either on-the-spot stylus replacement or (to save time) the provision of an exchange cartridge equivalent to the original. If the cartridge has been subject to further development since the original purchase, so much the better for the customer. In any event, moving-coil stylus replacement is inclined to be expensive, and the buyer who proposes to use an MC for a considerable time should inquire about this aspect at the outset.

The actual contour of the diamond tip is of great importance in hi-fi. At first styli were conical, with hemispherical tips, and this shape is still used in the less costly cartridges because it is more cheaply produced. It was not long before the merits of the 'elliptical' tip were recognised, and this type was first used widely for 78rpm discs more than 30 years ago. Today it is commonplace in hi-fi. In brief, it is a bi-radial tip, for the smallest dimension scans the modulations and fits the high-frequency wiggles more snugly than a hemispherical tip could do, while the larger dimension sits across the groove in the required attitude.

For a given set of working conditions the elliptical tip will wear out more quickly than a conical tip, but the audible advantages outweigh this. Without doubt, the elliptical contour has done a great deal for disc replay, bearing in mind that deficiencies in the stylus/groove relationship can cause more distortion than would normally be generated in the most complex array of electronic

equipment brought together for hi-fi purposes.

It makes sense to develop a stylus shape that is near to the shape of the cutting stylus used to form the groove of the master disc prior to mass-production of copies. The problem is to give the replay tip such a contour without also giving it the ability to cut! An elliptical tip is the best known approach, but in recent times we have seen the introduction of modified contours termed 'fine line', 'line-contact', 'hyper-elliptical' and so on, and sometimes labelled with the names of their inventors. Generally the aim is to improve groove contact and to control wear in the light of what has been learned about the extraordinary forces acting during the violent clash of diamond tip and vinyl groove.

THE PICKUP ARM

Students of hi-fi will soon discover that some emphasis is placed on the matching of a pickup's two parts — the 'business' end in the form of a cartridge, and the part that carries this, namely the arm. Since the union of these parts demands care, it seems odd that the 'universal' tag is still applied to arms. In fact the universatility is limited to basic mechanical matters. Most cartridges will fit into most arms — for what that is worth.

On the other hand this shows up the contrast with the all-in-one integrated pickup, an exclusive union of head and arm which at one time was strongly favoured but is no longer a very common feature of even the most advanced equipment. While looking at terminology it may be as well to question the frequent references to the 'tone arm', which seems quaintly outmoded with its reminder of old gramophones. However, some of the most modern expressions are as curious, an example being the mystery of the 'sensitive S-shaped' pickup. The peculiar merits of the shape and the sensitivity are not at all apparent.

So we are talking about the pickup arm and its main characteristics. With a few exceptions this component is pivoted, has a rear counterweight, and displays a rather odd-looking geometry. An arm for hi-fi does not have to display enormous strength but very high rigidity (not the same thing) is demanded, as are the slightest possible frictions in the pivots which permit lateral and vertical movement. Precision in design and assembly is important, as ill-fitting parts can affect audible results.

An adequate range of adjustment is essential in order to provide correct working conditions for high-grade cartridges. One of the adjustments is for downward tracking pressure (the pressure on the stylus) but the beginner should not try to relate this to light or massive looking constructions. To put it another way, an arm capable of tracking a cartridge at (say) 1g might be lightly made or more massive, and its ability to do the job would depend on a number of factors.

However, the way in which the mass of the pickup's materials is distributed along its length is of interest. In fact it is the 'effective mass' that proves relevant, for the good reason that the pickup is constantly in motion while it plays a disc. Those still in touch with their text-books may be more familiar with inertia, but the main thing to understand is that the stylus feels the effect of whatever mass is reflected at its tip. It has to cope with this as the pickup rides out the small undulations and swings which are normal in disc replay.

So we see that, like the stylus, the entire pickup has a certain effective mass, which can be determined by oscillating the component and studying its behaviour. The total figure must of course include the cartridge, as this item is at the extremity of the arm where it has the greatest impact. Likewise the counterweight at the rear influences effective mass to an extent depending on its design.

It can be visualised that the effective mass is a load poised above the stylus, and this delicate part has to shift the load about as the disc is played. In a typical case the mass may effectively be 10-15g while the tracking pressure setting is 1·5g. Although one may come to accept this readily enough, there is another aspect which proves important because it affects tracking accuracy.

The springiness of the stylus suspension and the total effective mass of the pickup are two factors determining the component's behaviour at the extreme bass end of the spectrum. Any device with a mass and a spring will exhibit resonance (oscillation) and, although it is possible to impose some

damping for purposes of control, the fact remains that the resonant effect will make itself known. (To some extent it is like the motor-car suspension in which the mass of the wheel is held on a spring suspension and damping is applied.)

Bass resonance in a pickup is not exactly welcome but we can live with it if it does not intrude seriously on the essentials of sound reproduction. It is widely held that resonant behaviour centred on the 10-12Hz region is least likely to be objectionable in practice. This is about half-way down the subsonic range. At a much higher frequency the effect is getting too close to the recorded range. Lower down, at only a few Hz, pickup tracking is likely to become unstable and any mechanical disturbances will be a hazard to accuracy of replay. There is no point in encouraging a pickup to produce output in a situation where there is a lot of possible noise (but no music). It all serves as a reminder that careless matching of cartridges and arms may have unlikeable results. So much for universal pickups!

This is not to say that the effect would be unpleasant, and in any case it might be mild rather than very pronounced, the cartridge having other desirable attributes such as fine tracking capability. A contrast could be provided by some moving-armature models which yield an overall decline of output in the form of a downward tilt from bass to extreme treble; and there are exceptions which give a more uniform response with a hint of a rise at the highest frequencies.

Again, there is the special reputation of the moving-coil cartridge. Unreserved commendation of this type is not justified, as too many give rise to qualms about tracking and other basic matters, suggesting that they are not fully developed devices. On the other hand, while MCs are seemingly a departure from the mainstream, a careful choice can bring its rewards in the form of a clear, open and finely detailed sound which it is far from easy to arrive at by any other route.

Would-be purchasers of cartridges must often wonder how a very wide price-span is reflected in sound quality. Indeed, is there any correlation at all? Any comment has to be cautious, since the links are tenuous and value for money is sometimes difficult to estimate. With a price ratio of at least 20 to 1 (as a modest guide) it is hardly possible to say that every few pounds extra will bring something tangible that everyone would recognise, although a little additional outlay may well bring a lot more listening pleasure in individual cases.

If we simply contrast the very expensive with the cheap, the gulf in audible terms is considerable, and that is no more than we would expect. One can pay a great deal for refinement, and those intent on technical advancement and the sound that goes with it will probably not have value judgments very firmly in mind. But anyone who is single-minded enough to spend (say) £150 or so on a cartridge will surely convince himself that he is getting the result he seeks. He is unlikely to be affected by the astonishment of the less ambitious enthusiast who will expect a complete turntable, arm and cartridge for that same sum.

However, the most costly products simply represent the small but prestigious tip of a very large iceberg. One of the world's most prolific manufacturers turns out half a million cartridges per month for much of the year, and only a very small proportion could be thought of as exotic flowerings of hi-fi technology. In fact three-quarters of the output consists of what the trade calls OEM products — cartridges produced for other companies, such as purveyors of turntables, which affix their own names, code numbers and so forth.

In the particular instance cited, the balance of production features a variety of mid-priced cartridges which are of prime importance in middle-of-the-road sound systems. That is not the exclusive province of one large manufacturer, however, and it is in this middle area that all manner of differences in sound quality are encountered, while links between performance and price become somewhat clearer and more amenable to study.

As for the low-cost end of this market, sound quality is not usually very interesting by any reasonable standard. On the other hand, those who buy cheap devices mostly do so because they cannot justify anything more advanced, bearing in mind the circumstances of use, and they will rarely have cause to complain about the value offered.

In fact the 'economy' class is worth a closer look than may at first seem warranted, since there are always a few new designs which, despite obvious limitations, show above-average promise. This is worth noting by those who buy popular-priced hi-fi outfits, such as rack systems, in which the turntable arrives as a package complete with cartridge. Such systems are too often prepared without acknowledgment of the cartridge's vital role, and the manufacturers put in whatever example suits them, cheapness being the main factor. It is often possible, within limits, to make an audible improvement.

Moving-coils and hi-fi

With a few exceptions, moving-coil cartridges generate very small signal voltages. This is because the coils are kept small and light in the interests of best possible performance, and so the impedance is small (a few ohms) and the output feeble. A typical MC delivers a signal that is a small fraction of that produced by the conventional magnetic cartridge. Ideally, therefore, the associated amplifier will be able to cope with such tiny voltages, such as a nominal 0·3m V. Many hi-fi amplifiers cannot do this, for they are intended for use exclusively with moving-magnet and other magnetic devices.

However, an increasing number of amplifiers offer a moving-coil facility by means of in-built preamplifier (or 'head amp') stages, giving the required high sensitivity and an appropriate load value. An input of at least 100ohms is currently canvassed. If such an arrangement is well devised there is nothing to prevent use of MC pickups in the expectation of good results. An interesting possibility is the provision of separate input sockets for MC and 'magnetic' making it easy for the experimenter to compare two types directly by switching on the front panel.

There is some criticism of in-built preamp arrangements, unfortunately, because the input condition is in some cases less than ideal and apparently contrived at low cost, as a token. In such an event the only possible course is to ignore the MC facility and use an external device to match-in the MC pickup. Thus a prime requirement is that the device must provide voltage gain (amplification).

One possibility is a transformer which, by virtue of the ratio of primary and secondary windings, gives a voltage step-up. In practice such units vary in quality and the best examples are inclined to be expensive. Among interesting devices for the experimenter is, for example, Audio-Technica's AT-650, which is a switched multi-impedance transformer.

Expert opinion is that electronic amplification is best, offering the preferred load condition most readily. Recent preamps are battery-powered (alkaline cells are advocated) in the interests of simplicity and low noise. A good low-cost unit is the QED MCA1, which offers the bonus of two settings of gain, selected by a switch. In any event the main requirements for preamplifiers include a linear frequency response, minimal distortion and the best possible signal-noise ratio. Coping with very small signals presents its hazards, and the expected benefits of a fine moving-coil cartridge can be at risk if electrical details are not closely studied.

So on the face of it a transformer is convenient because it gives a voltage step-up and is a passive device that is unlikely to go wrong. Nevertheless it does not make sense to confront the amplifier with a source which is the secondary side of a transformer; nor is it sensible to load the pickup down with a termination of relatively low value when all it requires is freedom to work as a voltage generator.

It seems that transformers are promoted more as a matter of expediency than for any particular merit they may offer. Many of them are ill-designed for the application and some are even wrongly specified. Preamps can now be cheaper and there is no problem in providing the requisite characteristics. For tests in this Guide preamps were favoured to the exclusion of transformers.

Returning to the pickup geometry, it is obvious that the arm has an offset in it. This is arranged at a precisely determined angle and may be incorporated in the arm-tube. Alternatively the headshell or carrier for the cartridge may be offset on a straight arm. If the pickup is moved across the turntable it will be found that the stylus overhangs (falls in front of) the disc centre. The offset-and-overhang feature is there to minimise tracking error in the pickup's traverse.

It can be seen that the stylus travels in an

arc as it passes across a disc. Contrast this with the passage of the cutter that formed the master groove prior to disc manufacture. The latter moved radially across the master and the former takes a different path across the LP, so clearly some error is involved. This lateral tracking error is well under control, though, and the general idea is to set-up the arm so that distortion due to error is minimised. This calls for special attention to conditions at the minimum recorded radius, where badly controlled error would be most serious. It is in this same region where errors in stylus alignment show up at their most serious.

The longer the pickup arm the smaller the offset has to be, and the lower the error can be made. On the other hand it is fair to say that a conventionally proportioned arm is acceptable for general use. After all, making the arm longer is bound to increase the mass. Since there are bigger hazards in hi-fi than tracking error, it does not seem very rewarding to depart from convention.

An effect due to the overhang of the pivoted arm requires a mention. As the stylus traces the groove a sidethrust is created, and this acts toward the disc centre. Since it would be necessary to impose extra downward pressure to counter such an effect, it is usual to provide a bias correction device which can exert a neutralising outward force, and in this way the tracking conditions can more nearly be optimised. Accuracy of correction is not always all that one could wish, but some attempt to provide it is better than none.

By the way, the term 'anti-skating' is sometimes used but it seems very inappropriate, considering that a pickup that actually tended to skate on a normal disc would be hopelessly faulty. It is possible that the usage has to do with the skating of a pickup on a smooth, blank disc for the study of sidethrust, but that would be pointless anyway since it would yield no information on the correction required. In fact one would only be checking whether the bias device introduced friction of its own! The only way to make a positive check of sidethrust and its correction is to use a dynamic test, with the stylus tracing a groove. Then correction and downward pressure can be adjusted in conjunction until the best settings are found.

Finally there is the radial-tracking pickup found on a few turntables; here the pickup is mounted on a carriage of some kind and moves bodily in a straight line across the disc radius. This arrangement avoids the tracking error which is a feature of ordinary pivoted arms and, since there is no overhang, the bias (sidethrust) problem can also be overcome. Most important, the pickup arm and head combination can be much reduced in size and mass. However, the mechanism is elaborate and is normally part of an automatic player incorporating electrical features such as track-selection.

How does it sound?

Although a minority of users may be keenly interested in the technical development of pickups and inclined to choose components on the strength of advanced technical features, a much larger proportion will surely be seeking the sound that pleases them. It is unfortunate that opportunities to audition pickups are somewhat limited (the trade could do a lot more in this area, to say the least of it) and that is why the audible qualities of products receive attention in this Guide, while brief notes on some technical findings are included to set the scene.

It will be appreciated that the cartridge is influential in the 'sound' of disc replay, and certain characteristics will always come through. However, a pickup is a union of cartridge and arm, and the results one hears are attributable to the complete component. Matching is the central feature, so that the cartridge can only sound its best if the conditions of use permit this.

This means that any comment on the characteristic sound of a cartridge is helpful only if the example concerned has been correctly set-up in an arm that offers compatibility. As we have seen, the basic tracking capability is dependent on this and the bass performance is also much influenced. To pursue the argument, but without complicating it too much, overall system balance is important, and clearly the listener is hearing both pickup and loudspeakers (room effects too). That is why reports in the Guide include occasional comments on the juxtaposition of pickup and speaker characteristics.

For example, a cartridge with a declining

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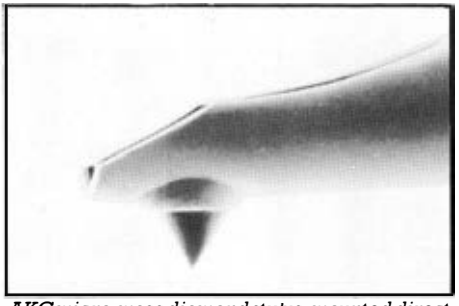
or retiring effect in the upper midrange and treble (not forward-sounding, in other words) might serve as a corrective if the speakers were thought to be too bright and 'shiny'. In the author's view over-bright speakers are much too common, and some listeners are attracted to their explicitly 'hi-fi' quality at first, finding them fatiguing after more experience. Looking at it another way, using a bright forward-sounding pickup with speakers of roughly similar qualities is very likely to produce a wearisome result.

Judicious adjustments of balance can be helpful — within limits — but do not change the fact that smoothness, with uniformity of response and low distortion, should be the aim at the outset, avoiding the need for palliatives. In particular it is desirable to seek good system 'transparency', so that the reproducer is open to the programme's qualities. Since one cannot alter the inner details of a programme, the best way is to reveal them honestly. The hardware to accomplish this does not usually come cheaply, but the objective is well to the fore in high fidelity.

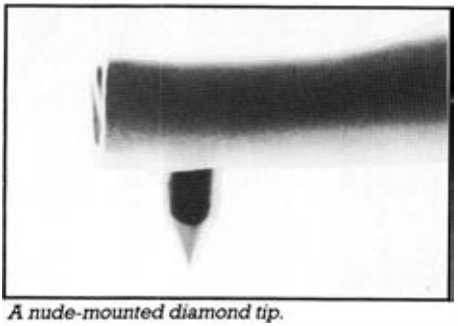
'Transparency' is just one word to label an impression of what one perceives, and there are many others such as 'bright', 'dull', 'coarse' and so on. The idea of 'thin' sound, lacking in substance, is another example. At their simplest these labels are useful working tools, likely to mean much the same to most people, and their use seems unavoidable in describing impressions. Complication over labels is avoided in this Guide, however, since it can lead to misunderstandings.

In all this, one thing is certain. An audition of two contrasting pickups can make it difficult to believe one is listening to the same familiar disc. It is possible for one replay to seem flat and uninteresting, with all the obvious stereo channel effects yet in the end strictly gramophonic, and for another replay to reveal more detail, subtlety and sheer sparkle.

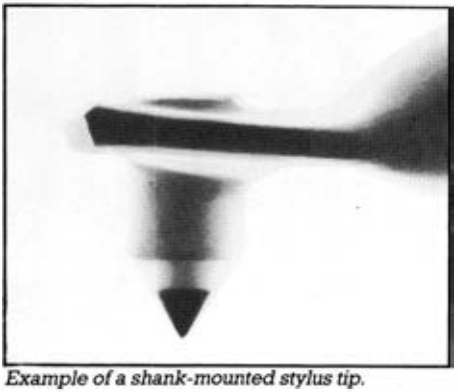
Certain types of cartridge do of course attract special reputations for characteristic sounds, accepted or rejected according to personal taste. As an example, many moving-magnet cartridges have been found on measurement to have a midrange droop in response, the extreme high frequencies being restored to a higher level. As it happens, some listeners notice a recession in the tonal balance of such cartridges, with some veiling or thinning of textures. In this connection remember that the ears and brain take close account of what goes on in the midrange.



AKG micro-mass diamond stylus, mounted directly on the cantilever.



A nude-mounted diamond tip.



Example of a shank-mounted stylus tip.

ADC QLM36 MK3 IMP. £17

MERIT ★★
VALUE ★★

This is an inexpensive example from the ADC series of induced-magnet cartridges, in which the small but powerful magnet is fixed in the nose of the replaceable stylus assembly. In this way you get a new magnet when you buy a new stylus! The Mk3 is of course the same as other ADCs in that respect, and the various cartridges differ mainly in stylus quality and characteristics. Some upgrading from one version to another is possible.

The 'improved' specification refers mainly to details of the stylus and its omni-pivot suspension. No tie-wire or other restriction is incorporated. Surprisingly, though, the stylus in this instance has an unusually high compliance. ADC have nothing to say about it, and with that omission they effectively excuse themselves from explaining that a pickup arm of very low effective mass is necessary for best results.

It seems rather doubtful (though one cannot rule it out) that anyone buying such a cartridge would equip himself with a compatible arm of high quality. And it cannot be supposed that anyone seeking a pickup of refinement would be satisfied with the standard of stylus finish offered here.

THE FINDINGS

The somewhat drooping frequency response was not too bad, and it was something of a surprise to find that the separation was better over much of the range than with the ZLM. Square-wave result was quite passable, differing from the ZLM mainly in respect of a more marked overshoot, while output was near to spec and channel balance fair with a 1dB differential.

Specified as a naked diasa elliptical with 8 x 18µm radii, the stylus tip was well enough aligned but dull and poorly finished, with questionable contour. Even at this modest level of cost a better standard should be attempted. Stylus compliance was about 35cu and compatibility with pickup arms (suitably priced examples, that is) poses a problem.

Tracking performance was very good. ADC do in any case suggest a low range of pressures, with 1·2g as the mean, and in the event the result was much the same as with the ZLM. The super-level test was negotiated well within the specified spread, although when hard-pushed by the most challenging material the cartridge yielded coarse sound, with marked loss of midrange and treble definition.

Bass was good with the ALT-1 arm. Over the range a more open sound would have been preferred, and the balance was not much liked. The indifferent stylus finish, however, was probably the most potent factor, and the cartridge was not kind to minor disc imperfections and noise.

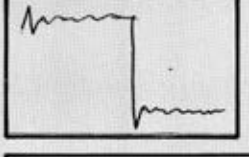
THE VERDICT

Nice tracking, a fair but not inspiring sound quality, poor stylus condition — an odd mixture. But oddest is the compliance anomaly, and some revision could make the cartridge more versatile.

TECHNICAL DATA AND DISTRIBUTOR

Tracking	Standard 1·0g Super 1·3g
Output	L 6·0mV R 5·5mV
Channel balance	1·0dB
Separation at 1kHz	L 30dB R 32dB
Stylus condition	Poor
Stylus replacement	U
Arm compatibility	L
Sound quality	Ba

See page 13 for key.



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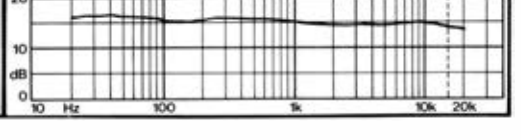


ADC VLM MK3 IMP.

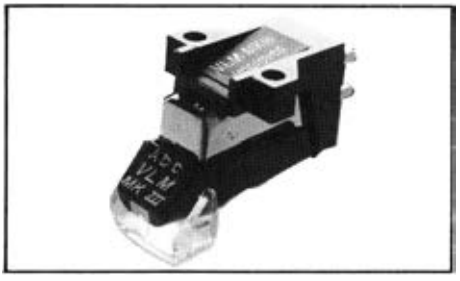
£30

MERIT ★★★
VALUE ★★★

Like the ZLM, the less expensive VLM has become well established. It is well favoured by enthusiasts seeking a moderately priced cartridge for use with systems other than the most advanced. Again the 'improved' label is applied, referring to a few details the most important of which is the stylus suspension.

Cartridge weight is 5·7 grams and a flip-down stylus guard is fitted. ADC specify a tracking pressure spread of 0·9 to 1·5g but make no claim concerning the stylus compliance which in fact is surprisingly high and bound to place a restriction on use if the cartridge is to be used successfully — that is, without damage or untoward effects. ADC's ALT-1 would appeal to those favouring a separate arm, but the choice of an integrated player (more likely to be used) may pose a bit of a problem.

THE FINDINGS



The mildly declining frequency response was somewhat like that seen with other models in the series, and the result with 200pF per channel termination was preferred. In view of load-sensitivity, some care is advisable here. The square-wave looked regular and indicative of good damping, while output was quite generous and channel balance better than the pessimistic spec figure. Separation trend was much as for the ZLM.

Stylus compliance has been mentioned. At 32cu this is well into the high range and the warning about a low-mass pickup arm can only be reiterated. Light arm-damping could be considered, though few users buying at this level of cost would encounter such a facility. Specified as an 8×18μm nude-mounted elliptical, the tip showed a fair finish and indifferent contour. It was felt that the cartridge was good enough to justify a better quality of tip.

ADC suggest a low range of tracking pressures, and indeed the VLM does impress as a confident, light tracker, acting like the ZLM with some stress and coarsening on isolated items which provoked a degree of mistracking. As ever, there is nothing to be gained in tracking flair by pushing the pressure past the top limit. The super-level was completed well within the specified range.

The cartridge was a bit fussy over small disc imperfections and particles. Sound quality was generally smooth and inoffensive, tending toward neutral, though somewhat short of real sparkle and high-end interest. What may be perceived as a dull effect may well have appeal or even positive advantage in some circumstances where explicit system characteristics can be tamed by careful matching. With care good bass can be secured.

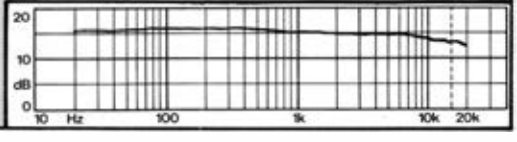
THE VERDICT

Another good tracker. Mild smoothness is the general impression — quite useful if that is your preference. High compliance, so beware the matching hazard.

TECHNICAL DATA AND DISTRIBUTOR

Tracking	Standard 0·9g Super 1·3g
Output	L 5·7mV R 6·2mV
Channel balance	0·8dB
Separation at 1kHz	L 27dB R 29dB
Stylus condition	Fair
Stylus replacement	U
Arm compatibility	L
Sound quality	Av

See page 13 for key.



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ADC ZLM IMPROVED

£60

MERIT ★★★
VALUE ★★★

So far as hi-fi enthusiasts are concerned, American-made ADC cartridges have a long history, and under British ownership in recent years the range had been extended to provide models for virtually all conditions of use. The cartridges are of the induced-magnet type in which a small, powerful magnet is fixed in the front of the stylus block, near the cantilever.

The 'improved' specification covers a refined omni-pivot suspension, the aim being predictability and repeatability of performance. Further, the cartridge fixing bracket has enclosed holes instead of the awkward open-sided apertures which proved inconvenient on earlier models. Also, it seems that an improvement has been made in precision of location of the stylus holder on the cartridge body, a point which used to attract criticism. The cartridge weighs 5·7 grams, features a tapered tube cantilever, and sports a naked diamond with Aliptic contour, scanning radius being 6µm.

THE FINDINGS

Although specific points are emphasised by ADC, the 'improved' performance advantages are not so very apparent. However, this cartridge displayed refinement in some important respects, and it is a low-distortion device with a smooth frequency response featuring a mild decline in the extreme top with the 200pF' capacitance loading which was considered most appropriate. Square-wave result was unexceptionable, channel balance very close, and output a little above specification.

The separation trend was curiously level, with little difference between 10kHz and the mid-band. Indeed, the results generally suggested some lack of symmetry of operation, although there were no particular exterior signs and subjectively the stereo imaging was satisfactory.

Stylus contour tended toward the familiar bi-radial, with 5 x 18µm dimensions, the tip being decently mounted but only adequately finished. Stylus compliance was in the high range at about 30cu and the use of an arm of low effective mass is imperative. Damping is not necessary.

All tracking tests were completed well within the specified range of pressures and the cartridge held tenaciously to awkward material, with some evidence of stress and roughening of quality at the point of occasional mistracking. It was not as tolerant of disc noise as some, though this remained a minor objection.

Sound quality displayed the expected ADC smoothness, the mild high-range decline being evident in the balance, while detailing was fairly good and there was a fair approach to neutrality. An enduring impression was of a slightly dull effect; a shade more bite and sparkle would have been preferred.

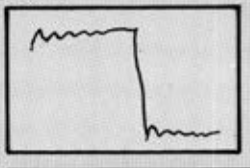
THE VERDICT

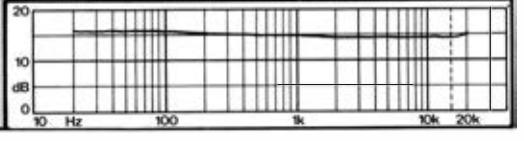
A worthy product, certainly, and middling value. The mild and smooth tonal balance, free from serious vices, will be acclaimed in some circumstances. As ever, it is a matter of personal preference. Secure tracking is a plus-point.

TECHNICAL DATA AND DISTRIBUTOR

Tracking	Standard 0·9g Super 1·3g
Output	L 6·1mV R 5·9mV
Channel balance	0·2dB
Separation at 1kHz	L 24dB R 29dB
Stylus condition	Fair
Stylus replacement	U
Arm compatibility	L
Sound quality	Av

See page 13 for key.





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AKG P25-MD

£90

MERIT ★★★
VALUE ★★

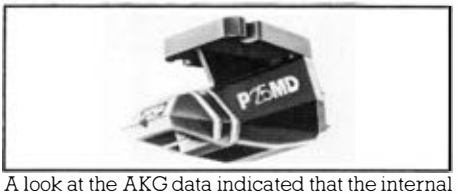
Of quite recent introduction, a new series of AKG variable reluctance cartridges replaces several previously familiar models and includes the prestigious P25-MD as top-of-the-range product. Radical design changes are exemplified in this costly cartridge.

A samarium cobalt cylinder magnet surrounds the four pole-pieces carrying the coils, and the rear of the armature is correctly located in relation to the poles when the push-in stylus block is clicked into the cartridge body. It is an elegant looking solution, applied with evident precision. Parts are kept to a minimum and the weight is held to a little under 4 grams.

Particular features are the short aluminium-magnesium cantilever, the knife edge suspension and a naked diamond of reduced mass, claimed not to exceed 0·15mg.

Other points are the reduction of internal impedance and the use of conductive plastics for the body. Stylus compliance is high and the tracking range is 0·75 to 1·25g. A couple of details warrant comment, and the first concerns the awkward little stylus guard which, when removed, can too easily bring with it the entire stylus block. Most users would dispense with it. The other concerns the flexible plastics fixing bracket. Greater rigidity is desirable.

THE FINDINGS



A look at the AKG data indicated that the internal inductance was lower than average, but still the cartridge was fairly load-conscious, with a top response amenable to some mild tailoring. However, the suggested 470pF capacitance termination (all leads plus amplifier input) was already high, so the result is reported on that basis. Flattish over much of the range, the response showed a humpy HF trend.

Channel balance was fair, output close to specification, and separation not bad on the whole if a bit meagre from 9kHz up. The square-wave showed good symmetry and a quickly damped overshoot. Finish and alignment of the tiny nude-mounted and faceted stylus tip appeared very good, and it did seem to aid a superior signal-noise ratio. Tolerance of minor particles and disc imperfections was good.

Stylus compliance was well into the high range at 32cu and the use of a low-mass arm is imperative (as was AKG's evident intention). Given care, the P25-MD is a confident and delicate tracker.

Impressions of detailing and imaging were favourable and the sense of ambience and depth fair with selected material, while some stress or constriction was noted with isolated items which tended to invite tracking unease. The cartridge was inclined to 'shout' on some complex high-level passages, with a hardening of quality. The brightish balance is likely to have its attractions but the sound could do with a little more real body, and misgivings remained about the frequency characteristic. Bass was firm.

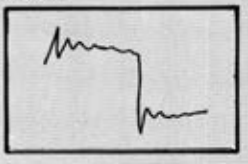
THE VERDICT

A super tracker of restricted application. Technically interesting, yet a few design points give rise to reservations. Very expensive in relation to achievement.

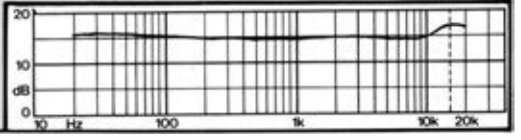
TECHNICAL DATA AND DISTRIBUTOR

Tracking	Standard 0·8g Super 1·1g
Output	L 3·6mV R 4·1mV
Channel balance	1·0dB
Separation at 1kHz	L 32dB R 33dB
Stylus condition	Good
Stylus replacement	U
Arm compatibility	L
Sound quality	Av

See page 13 for key.



AKG Acoustics Ltd,
191 The Vale,
London W3 7QS
Tel: 01-749 2042



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Separation	**25dB**	25dB	25dB	25dB
Tracking	**1.5gm±0.3**	1.8gm±0.3	1.8gm±0.3	1-2gm
Weight	**6.5gm**	9.5gm	6.9gm	9.2gm
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ACUTEX M312-IIISTR

£20

MERIT ★
VALUE ★

A series of magnetic cartridges made in Japan for Acutex, an American company, consists currently of four basic models, only one being cheaper than the example reviewed here. Of the induced-magnet variety, the cartridge is novel in that a complex armature and pole system is used, the label 'tri-induced' being applied by Acutex.

This particular model has the maker's STR stylus, held to be a symmetrical elliptical with a contour superior to modified shapes exemplified by the Shibata, although scant reference is made to the most recent tip-shape refinements. Apart from that there is a notable tendency to overstate stylus compliances in the specifications of the series.

Weighing 5·4 grams, the M312 can be fitted into a headshell via the standard bracket supplied or integrated with the Acutex Saturn fitting to form a head with a four-pin plug.

THE FINDINGS

It appeared than an attempt had been made to approach a true elliptical tip shape. The setting appeared neat and the stone itself was very small, but some slight error in orientation was apparent and the finish was only fair. Compliance was markedly less than the specified 24cu and it was soon established that the cartridge was best suited to arms in the upper medium range of mass.

It was also evident that the cartridge was not as tolerant as some in respect of minor disc imperfections and noise. Another discovery was that the long 'nose' containing the stylus assembly was a loose fit on the cartridge body and, although this did not lead to movement on the axis of the stylus (which would be disastrous), there was a risk that location of the nose could change. This had also been noticed on another sample from the series.

Results from the cartridge were of a mixed kind. Frequency response was not of the most elegant but the separation, while showing only fair figures, had a satisfactory trend with 17dB at 10kHz, and the evidence pointed to good symmetry of operation. Channel balance was reasonably close and output near to specification, although the signal is in fact on the low side for a device of this type.

Tracking performance was not impressive. In typical conditions a setting of about 2g would be used. The cartridge would not complete the super-level check cleanly within its specified range of 1·5 to 2·3g, and in any case an unusually high bias was required for the most complex high-level recorded material.

Sound quality was explicit, brightish and often brash on average programmes, and the results were more stressful on more challenging material, when the quality coarsened and became quite tiresome. Imaging and detail did not impress.

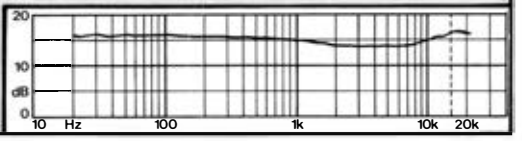
THE VERDICT

This is a clever design which probably has more potential than is actually exploited. As it stands it generates mixed feelings rather than super sound quality! Not attractive value in a competitive market which can offer several desirable models in the lower price ranges.

TECHNICAL DATA AND DISTRIBUTOR

Tracking	Standard 1·8g Super No Go
Output	L 3·0mV R 3·25mV
Channel balance	0·8dB
Separation at 1kHz	L 21dB R 18dB
Stylus condition	Fair
Stylus replacement	U
Arm compatibility	M
Sound quality	Ba

See page 13 for key.



Natural Sound Systems,
10 Byron Road,
Wealdstone, Harrow,
Middlesex HA3 7TL
Tel: 01-904 0141

AUDIO TECHNICA AT32

£86 MERIT ★★★★ VALUE ★★★★

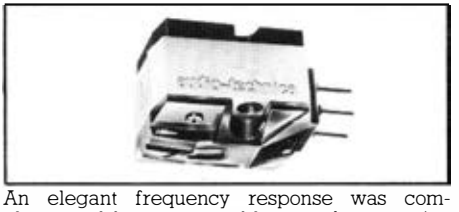
Model AT-32 is a moving-coil cartridge of advanced design, about twice the price of the well-known AT-30E but far superior in respect of tracking ability and sound quality. As a low-output device it demands a step-up circuit if it is to be used with an amplifier lacking the required MC input sensitivity.

The manufacturer's cartridge-plus-transformer deals are worth considering, the AT-630 fixed transformer being the cheapest. There is also the interesting multi-impedance AT-650 (and its counterpart in the Signet range). However, a preamp unit is preferred and the QED MCA1 is a good low-cost example.

In this design the coils are in a Vee formation close to the stylus suspension to minimise effective moving mass, and with the assembly is associated a damping device tensioned to a medium compliance value, each cartridge sample being hand-tuned. Other features include the beryllium cantilever and a 5x18μm tip on a naked square-shank stone, accurately mounted.

Specified tracking range is 1-2g. Weighing 6·5 grams, the cartridge looks bulky but this is an impression due to its width, and fitting will be simplest in a headshell taking the form of a flat platform (as many do).

THE FINDINGS



An elegant frequency response was complemented by a reasonably smooth separation trend, while output was above average for the type. The sample gave perfect channel balance. Square-wave testing revealed mild overshoot, fairly good damping and good symmetry.

This model's tracking flair was unmistakable and capable of putting some moving-coils to shame. Standard tracking was completed at a surprisingly low pressure and the super-level was completed well within the manufacturer's specified range, while modest bias requirements posed no problems. Tackling the most challenging commercial material the cartridge was mostly confident, betraying occasional loss of tracking security with a glassy quality and some coarsening.

Generally the results were characterised by a nice open clarity, born of low distortion, with a very good analysis of detail. In that connection, representation of subtle ambience in stereo was much liked and tended to show some justification for the choice of MC devices for high-grade audio systems. Bass was firm, tending to have a declining effect at the extreme of the recorded range.

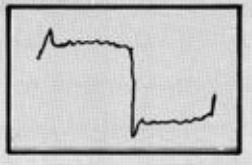
THE VERDICT

A clever design, and a successful one, bringing together some desirable attributes. In relation to the capabilities of moving-coil cartridges generally, the AT-32 shows up well in respect of integrity of tracking, frequency response and other key factors. It was easy on the ear and reasonably tolerant of the quirks of modern discs. So it attracts a high placing for technical merit, and value is not at all bad either.

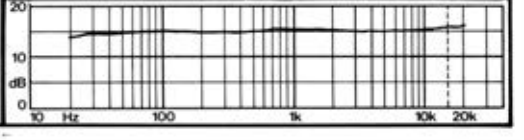
TECHNICAL DATA AND DISTRIBUTOR

Tracking	Standard 0·8g Super 1·6g
Output	L 0·5mV R 0·5mV
Channel balance	0dB
Separation at 1kHz	L 25dB R 21dB
Stylus condition	Good
Stylus replacement	W
Arm compatibility	M
Sound quality	Hi

See page 13 for key.



Audio Technica Ltd,
Unit 6, Hunslet Trading Estate, Low Road,
Leeds LS10
Tel: 0532 771441



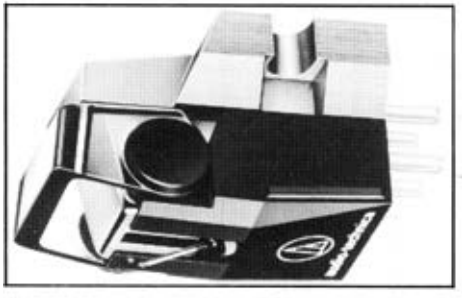
AUDIO TECHNICA AT-155LC

£55 MERIT ★★★ VALUE ★★

Heading a medium-priced series, this cartridge owes some allegiance to more costly AT models exemplified by the highly regarded AT-24. It features what is called a 'para-toroidal' coil system, a development of this manufacturer's laminated ring-core and toroidal coil arrangement, and the cartridge does, of course, have the dual-magnet configuration (a Vee-shaped assembly) for which AT is well known.

The importance of rigidity of non-moving parts is emphasised and accordingly the cartridge has a diecast aluminium housing. This accounts for the fact that the cartridge, at just over 8 grams, is a little heavier than the current norm for such types. Evidently the designers feel that solidity is more vital than extreme reduction of mass. A stylus tip of line-contact contour is formed on a square-shanked stone and set accurately in a beryllium cantilever.

THE FINDINGS



It is characteristic of moving-magnet cartridges from this maker that the sensitivity is generous, and indeed the sample's output was above specification, so it would be as well to check that the amplifier's input overload threshold is appropriately high (at least 200mV). The cartridge is a high-inductance type and is quite load-conscious, so that top-end tailoring warrants attention. Our response trace shows the result of 180pF load capacitance, which was preferred, although a 50 per cent increase can produce an extreme HF droop without otherwise making much difference to the relative lift (about 2dB) at around 14kHz.

The separation trend was unexceptionable and the sample gave perfect channel balance. Square-wave testing showed good symmetry and damping — note the mild overshoot. Stylus orientation and finish were above reproach. The high compliance stylus (above 30cu) firmly limits the AT-155LC to use in low-mass arms, the ideal being about 6g plus the cartridge (a total of 14g).

Tracking flair was much liked and the cartridge was rarely caught out, the super-level test being negotiated well within the specified spread of pressures. However, reservations were felt concerning the keen brightness of the sound, the somewhat upward tilted balance being evident throughout audition. Positive presentation of most material was though to be a plus point, and stereo imaging was good. Yet the general effect was somewhat relentless.

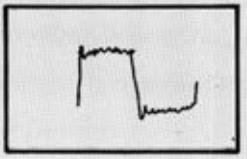
THE VERDICT

Much depends on the tonal balance you favour. Some willlike the impression of keen attack, especially if the loudspeakers are inclined to give a 'soft' effect in the treble. Subtlety is hardly a feature here, but tracking ability is good. Some technical merit . . . but not exactly tops for value.

TECHNICAL DATA AND DISTRIBUTOR

Tracking	Standard 0·8g Super 1·3g
Output	L 7·1mV R 7·1mV
Channel balance	0dB
Separation at 1kHz	L 32dB R 28dB
Stylus condition	Good
Stylus replacement	U
Arm compatibility	L
Sound quality	Av

See page 13 for key.



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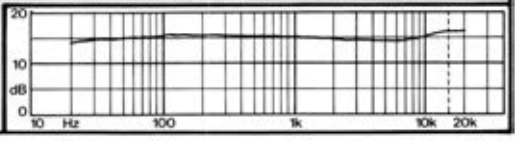
Unit 6, Hunslet Trading Estate, Low Road,
Leeds LS10
Tel: 0532 771441



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Myth. Cantilever mass must be large to match the magnet. Not so. Our VMS cantilever mass is as low as possible to give excellent tracking ability, low distortion and brilliant reproduction across all frequencies.

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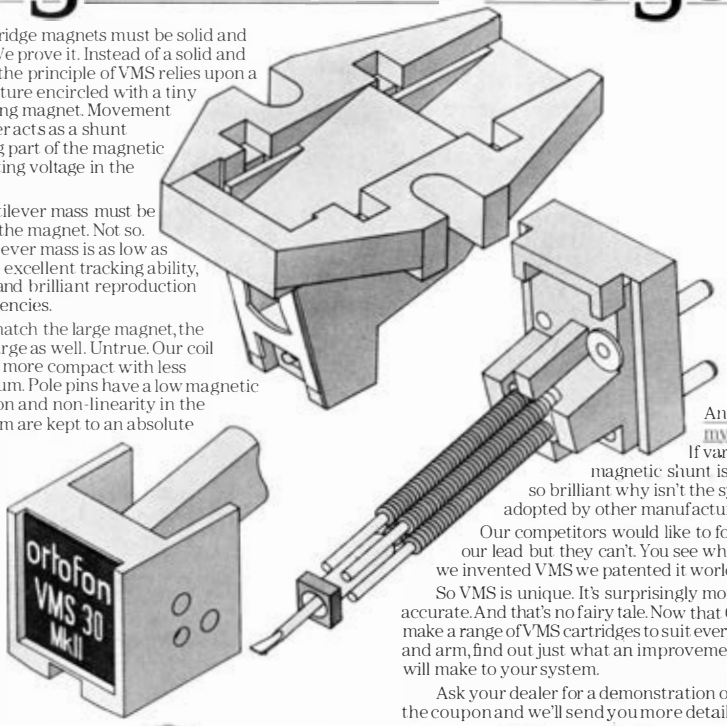

Another myth. If variable magnetic shunt is really so brilliant why isn't the system adopted by other manufacturers?

Our competitors would like to follow our lead but they can't. You see when we invented VMS we patented it worldwide.

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Harman UK,
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ortofon

AUDIO TECHNICA AT-3200XE

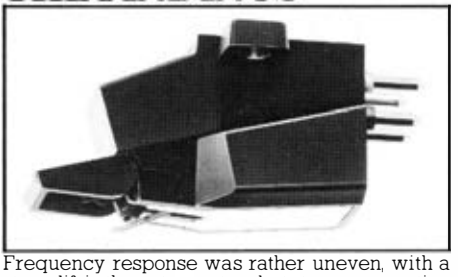
£39 MERIT ★★ VALUE ★★★

Recent extensions to the Audio-Technica range include moving-coil cartridges in a fairly wide price-span, and an inexpensive example has deliberately been chosen to demonstrate what standard is available to those who favour an adventure in the MC field without going too far into the possibly daunting realm of exotic hi-fi products.

In this context a moving-coil at less than £50 is deemed 'inexpensive'. The test sample is a high-output model. It must be added, though, that no cartridge of this breed yields a very generous voltage, and the nominal 2mV in this instance is poised rather uncomfortably between the sensitivity of conventional magnetics and that of the majority of MC designs.

Like certain others from this source, the new model has a user-replaceable stylus. This features a naked elliptical tip (8x18µm) mounted in an alloy cantilever. Weight is only 4·3 grams. Internal impedance is 10 ohms and the specification simply mentions that the load should be 'more than' that figure. A much higher termination is preferable, however, as provided by the QED preamp unit used for audition.

THE FINDINGS



Frequency response was rather uneven, with a steep lift in the extreme top, but stereo separation results were fairly good. Marked ringing was evident on the square-wave shape. Channel balance was close and output near to specification. Stylus orientation was accurate and finish adequate but there were signs of excess adhesive in the cantilever.

This cartridge could hardly be said to distinguish itself with tracking ability. The standard test was completed at 1·7g, which happens to be the designer's optimum figure, but the super-level was not negotiated cleanly within the specified range (top limit is 2g). Hum rejection was not particularly impressive but the relatively high output ensures that an adequate signal-noise result is obtained in practical conditions.

In fairness it must be said that the 3200XE sounded better than it measured, and on much of the programme material the brightish quality, with quite generous detail, made a good impression taking modest cost into account.

Hardness and blurring did, however, intrude on some material, and edgy mistracking effects were occasionally noted, while the stereo imaging seemed unrealistic at times. The cartridge was likeable enough if not challenged too hard. The maker's compliance estimate was optimistic (30cu has been mentioned) but the cartridge is not too fussy and will suit arms of low to medium mass.

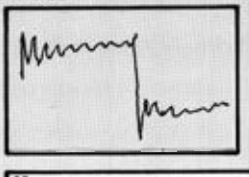
THE VERDICT

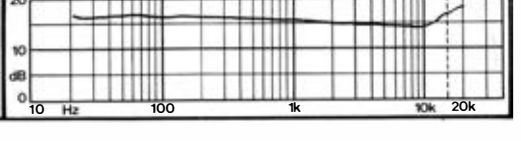
This model displays at least some of the pleasing attributes of MC types and, if its spasmodic lack of tracking elegance is forgiven, it can give a good deal of pleasure. It is fairly robust too. So an encouraging value rating cannot be denied AT's latest.

TECHNICAL DATA AND DISTRIBUTOR

Tracking	Standard 1·7g Super No go
Output	L 2·1mV R 1·9mV
Channel balance	0·5dB
Separation at 1kHz	L 31dB R 28dB
Stylus condition	Fair
Stylus replacement	U
Arm compatibility	M
Sound quality	Av

See page 13 for key.





Audio Technica Ltd,
Unit 6, Hunslet Trading Estate, Low Road,
Leeds LS10
Tel: 0532 771441

B&O MMC-20E

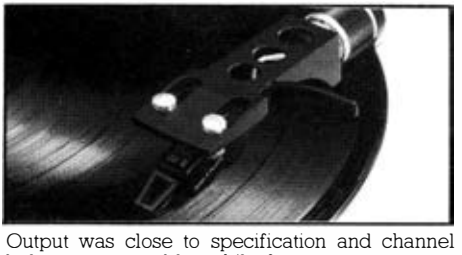
£28 MERIT ★★★ VALUE ★★★★

On the face of it, this cartridge is indistinguishable from the 20ENB version, for it is also in plug-in capsule form for use with an adaptor bracket having the usual half-inch fixing dimensions. Again, stylus renewal involves user-replacement of the capsule.

The moving micro-cross (MMC) armature is held by a suspension/damping element close to the magnet assembly on which the coil bobbins are fitted. This, of course, is a B&O speciality and a proven, successful design with which good consistency appears to have been achieved in manufacture. The alloy low-mass cantilever carries a shank-mounted diamond with elliptical tip (that is, the diamond fragment is mounted in a miniscule alloy part for fitting in the cantilever). Like the more expensive version this is a calibrated model, supplied with some test data.

B&O's suggested loading of 220pF capacitance proves appropriate and the cartridge is not unduly load-sensitive. Weight is 5·5 grams including the mounting bracket. Characteristically, this manufacturer is painstaking in the presentation of specification and description. But it would surely be helpful if colour-coding could be added to the cartridge terminals, for the existing tiny embossed legends are difficult to see.

THE FINDINGS



Output was close to specification and channel balance acceptable, while frequency response was good, with only mild peakiness. Separation trend was very satisfactory and nearly a match for that of the more costly version, and the square-wave result gave a similar impression.

With its alloy shank-mount the diamond was correctly aligned, the tip being a well-shaped and finished 5 x 18µm elliptical. Compliance in the medium area at about 20cu indicated use of a pickup arm of lowish to medium effective mass, born out by experiment. Arm-damping is not necessary.

Performance was very encouraging indeed, bearing in mind the modest price level, and the tracking ability was to a high standard and only a little less secure than with the 20ENB. Again there was some slight emphasis of disc noise and a few random imperfections. Some coarsening and splutter was the sign of occasional mistracking.

Although the stereo imaging and detailing were somewhat above average, the general balance was considered a bit dull and short of midrange interest. It was smooth, though, and may well be favoured by those who like to avoid a more explicit effect. So the cartridge comes out well in relation to price.

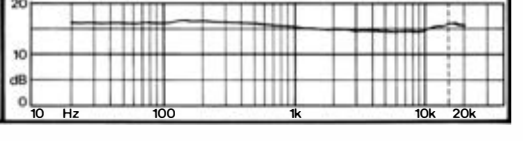
THE VERDICT

This one offeres a well balanced result and is above average for value in this popular price area. It is not too fussy about arm matching. On the other hand the 20ENB version is worth the extra cost if you own or wish to buy a low-mass arm of superior quality.

TECHNICAL DATA AND DISTRIBUTOR

Tracking	Standard 0·9g Super 1·4g
Output	L 4·7mV R 5·0mV
Channel balance	0·5dB
Separation at 1kHz	L 30dB R 32dB
Stylus condition	Good
Stylus replacement	U
Arm compatibility	M/L
Sound quality	Av

See page 13 for key.



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

B&O MMC-20ENB

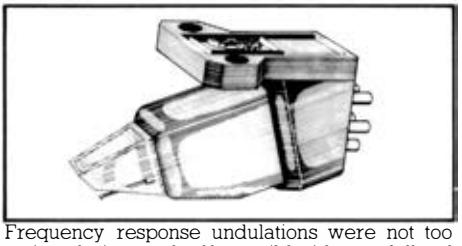
£35 MERIT ★★★★ VALUE ★★★★★

Cartridges by B&O are in capsule form, each designed to plug into an arm on one of the Beogram players. Thus the device is a head rather than a cartridge. However, on initial purchase one also gets an adaptor bracket, and this enables the capsule to be used in a suitable arm of virtually any make. In all instances stylus replacement involves exchange of the whole capsule, but this can be done by the user and prices are reasonable.

The MMC in the type number stands for 'moving micro-cross', and in fact the B&O is a form of moving-iron (armature) cartridge. This particular model incorporates a tapered cantilever of aluminium alloy and a very small nude diamond with elliptical tip, the claimed effective tip mass being 0·4mg. It is an individually calibrated model, in that some test data are packed with each sample.

Cartridge weight is 5·5 grams including the bracket. The device is not particularly load-conscious, and the recommended loading of 220pF capacitance seemed fair enough. It is to this manufacturer's credit that the descriptive information supplied is more explicit and accurate than average. Further, interested students of hi-fi can obtain some useful background reading on pickups from the company's UK office.

THE FINDINGS



Frequency response undulations were not too serious, being marked by a mild midrange fall and a bit of a rise to 20kHz. Output was near to specification, channel balance close, and separation very good indeed, maintained to about 20dB at 10kHz. Square-wave testing showed good symmetry and a generally clean result.

Stylus contour and alignment were approved, the tip on the nude diamond being 6 x 18µm radius, and the tip finish was considered acceptable though not outstanding. Cantilever finish and diamond setting, however, were particularly impressive. Compliance is quite high at 25cu and use of a low-mass pickup arm is advisable.

Tracking performance was excellent and the cartridge shirked very little apart from isolated high-level, complex passages, on which there was loss of definition and some splutter. Some slight intolerance of disc noise and minor surface imperfections was noted. A tendency to microphony was a curious finding, as evidenced by some noise when handling the pickup.

Sound quality was smooth, and a slightly dull and sometimes veiled or misty effect in the mid-band was evident, as it has been with other B&O cartridges. But the general effect was likeably clean and there was a fair measure of sparkle to the upper range. Bass was firm and the tracking security remained an attraction.

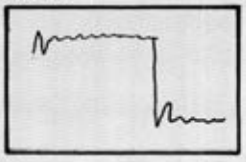
THE VERDICT

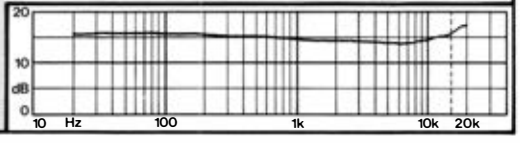
A clever design, a light tracker, and a good all-rounder with plenty of techical merit. This cartridge can challenge some costing twice as much, so the value rating is tops.

TECHNICAL DATA AND DISTRIBUTOR

Tracking	Standard 0·8g Super 1·3g
Output	L 3·8mV R 4·1mV
Channel balance	0·5dB
Separation at 1kHz	L 35dB R 33dB
Stylus condition	Good
Stylus replacement	U
Arm compatibility	L
Sound quality	Hi

See page 13 for key.





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

CORAL MC81

£49 MERIT ★★★★ VALUE ★★★★★

As Coral's well established top-flight MC cartridge, this model comes in three versions. One has an elliptical tip and the second is the same cartridge in a headshell. The third version, the subject of this report, is the cartridge less shell and fitted with a Shibata line-contact stylus.

Coral have little to say about pickup arms (though they are by no means alone in this) and do not specify the stylus compliance but they seem to have gauged the design to avoid problems of mechanical compatibility. Cartridge weight is 5 grams and the specified tracking range is 1·8 to 2·3g. This is a low-output model, not particularly fussy about loading, and an MC input of at least 100ohms provided by a preamp unit is to be preferred.

THE FINDINGS

Channel separation was to specification, balance was close, and output much as claimed. Test evidence indicated a well-damped tip mass resonance well out of the band, with the frequency response showing a steady high-end rise to about 3dB at the limit of measurement. Susceptibility to hum was extremely slight for a low-output cartridge.

The 8µm line-contact stylus, a nude-mounted stone of superior tip shape and polish, was neatly set in the long cantilever and well aligned. A compliance of 17cu suggests use of a pickup arm in the medium area of effective mass (about 8 to 12g or so) and of high quality, but the cartridge is quite unfussy about matching. Damping is unlikely to be necessary: not would it be available on many of the arms likely to be viewed as contenders.

This cartridge made a good impression with its tracking flair. It negotiated the super-level test at the top of its pressure spread and was secure on a wide variety of music discs. Some blurring and coarsening did occur on a few torture-track passages but generally the results were very good.

The sound could be characterised as fairly bright but not edgy, being saved by the delicacy with which a lot of detail was presented. Pleasing attack also, plus firm and clean bass — all plus points. Subtleties such as interesting ambience content of programmes were quite well set in the stereo scene, and in all the balance of performance was well liked. An unusually healthy set of findings for an MC at this price.

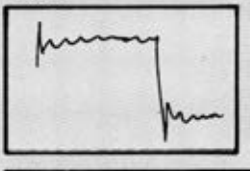
THE VERDICT

This one can rival some costing twice as much, so there is no doubt about a high value rating. Plenty of technical merit and a good stylus, too, in this attractive product.

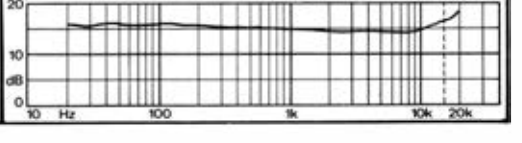
TECHNICAL DATA AND DISTRIBUTOR

Tracking	Standard 1·5g Super 2·3g
Output	L 0·26mV R 0·28mV
Channel balance	0·5dB
Separation at 1kHz	L 32dB R 30dB
Stylus condition	Good
Stylus replacement	W
Arm compatibility	M
Sound quality	Hi

See page 13 for key.



Videotone Ltd,
98 Crofton Park Road,
Crofton Park, London SE4
Tel: 01-690 1914



CORAL MC88E

£29 MERIT ★★ VALUE ★★★

Lower priced than usual for an MC model, the MC-88E is said to be aimed at those who are considering a cartridge of this type for the first time. Any assumption that the first-time buyer necessarily looks for something cheap is surely rather questionable. On the other hand there are many buyers who would not go above £30 for any sort of cartridge: so the Coral should therefore be of interest.

Further, this example offers a relatively high output and can be connected to the normal 'magnetic' pickup input of an amplifier, thus avoiding the extra cost of a boosting preamplifier. Indeed, the various models submitted for this publication provide evidence that there has been some increase in the variety of such high-output MCs at all price levels.

The MC-88E weighs 5 grams and has a specified tracking pressure range of 1·8 to 2·2g. Compliance is not listed but the product description blandly claims suitability for 'all JIS and EIA standard tone arms.' It would be an unusual cartridge that could live up to that claim; but the MC-88E will in fact partner a fair selection of popular arms of middling mass.

THE FINDINGS

Frequency response proved a bit bumpy however tailored by experimental loads and showed typically a departure of 2dB or so, while the separation trend was adequate if not remarkable. Channel balance was only fair, though within spec. Damping was probably overdone, judging by behaviour on test discs, but on the whole the results were not too bad in relation to modest cost.

Stylus tip orientation in the alloy cantilever appeared to be very slightly out but the finish was acceptable. Tip radius figures of 8 × 18µm are listed and the minor dimension was slightly under, the contour being reasonable. With a stylus compliance of 18cu the cartridge is suited to pickup arms of medium effective mass such as many found on popular integrated turntable units and is not particularly fussy about matching.

Tracking was not of the best, and of the statutory tests only a standard level was tackled cleanly anywhere near the suggested setting. In audition the sound displayed some blatancy and distortion on typically arduous discs (recent digitals and others) yet the cartridge proved capable of a quite attractive sound when the challenges were less severe. In general there was a strong hint of hardness and the finer stereo details were not very well conveyed.

In short, this model shares familiar MC attributes in only a limited way, but it would in any case be unwise to expect too much of a surprisingly cheap example of the breed.

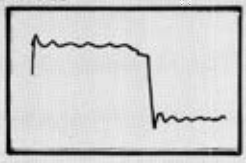
THE VERDICT

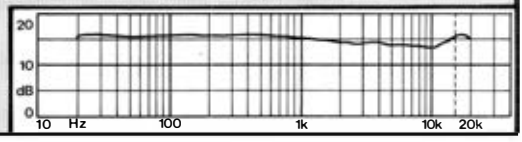
Hardly a super tracker — nor a subtle one — but there are no very strong complaints about value. A fair economy-class bet for a modest audio outfit.

TECHNICAL DATA AND DISTRIBUTOR

Tracking	Standard 1·8g Super No go
Output	L 2·0mV R 2·4mV
Channel balance	1·0dB
Separation at 1kHz	L 26dB R 28dB
Stylus condition	Fair
Stylus replacement	W
Arm compatibility	M
Sound quality	Av

See page 13 for key.





Videotone Ltd,
98 Crofton Park Road,
Crofton Park, London SE4
Tel: 01-690 1914

DENON DL301

£97 MERIT ★★★★ VALUE ★★★★

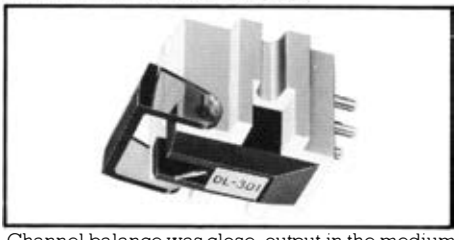
By Denon standards this moving-coil cartridge is a mid-priced product, from the same family as the excellent DL-305. There are indeed some similarities. Once again it is a low-output model and the stylus is not user-replaceable.

Among the specialised examples of its kind this cartridge is fairly light at about 5 grams. As with the DL-305 the design features a cross-bobbin arrangement to give good balance and symmetry, and again the stylus mass is evidently kept to a very low value. Other points are the tapered cantilever, of aluminium alloy, and the rare-earth magnet.

The stylus tip is described as a 'special elliptical', a form of line-contact contour. In this cartridge the stylus compliance is substantially higher than in the more costly model of the series, and Denon do in fact refer specifically to the use of low-mass pickup arms.

A separate preamp is of course required unless the hi-fi amplifier has a suitable MC input.

THE FINDINGS



Channel balance was close, output in the medium range for the type of cartridge, and the separation trend was good with 24dB at 10kHz. The square-wave check yielded a good result, much like that for the 305, and the frequency response was smooth and extended with a small rise in the extreme top.

The line-contact stylus tip was found to have a satisfactory contour (about 8µm scanning) formed on a naked diamond of rectangular section, accurately orientated and with a good finish. A rather high stylus compliance has already been mentioned. At about 35cu this inevitably calls for the use of a low-mass pickup arm, and light damping is preferable, the SME III and Mission arms being representative.

As the figures appended to this report suggest, the cartridge is a very good tracker and its performance on the most recent torture tracks was certainly impressive. As it happens, the super-level test was negotiated at the tracking pressure advised by Denon for general use. Some reduction would be permissible on a variety of material.

Any hint of tracking difficulty was heralded by a measure of audible stress and coarsening, but generally the cartridge's capability was admired. Sound quality displayed the expected sparkle and low distortion, and bass was firm. Subtle detail was well presented, with very good imaging, and the cartridge was kind to minor disc imperfections.

In all, it is doubtful whether many listeners would discern any important audible differences between this model and its more expensive relative, though the difference in compliance would of course be a factor to consider.

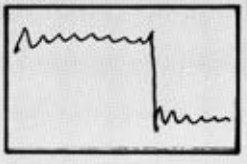
THE VERDICT

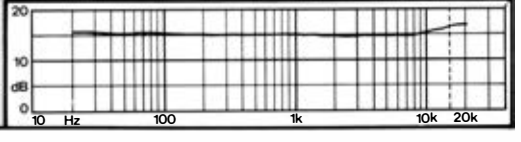
Compliance differences in the Denon series are not readily rationalised. But whatever the answer may be, the technical standard is high and the results from this particular example were very pleasing. Value not at all bad in relation to accomplishment.

TECHNICAL DATA AND DISTRIBUTOR

Tracking	Standard 0·9g Super 1·4g
Output	L 0·4mV R 0·36mV
Channel balance	0·5dB
Separation at 1kHz	L 35dB R 33dB
Stylus condition	Good
Stylus replacement	W
Arm compatibility	L
Sound quality	Hi

See page 13 for key.





Eumig (UK) Ltd,
14 Priestley Way,
London NW2 7TN
Tel: 01-450 8070

DENON DL-305

£270 MERIT ★★★★★ VALUE ★★

Nippon Columbia, proprietors of Denon products, have been well to the fore in moving-coil development in recent years and now have an interesting range of models to their credit. The DL-305 is their prestige model, dauntingly expensive but certainly very good.

This hand-tuned device weighs about 6 grams. Design features a cross shaped bobbin arrangement aimed at ensuring good symmetry and channel balance, while effective moving mass is kept as low as possible. Particular points are the rare-earth magnet and the amorphous boron tube cantilever.

This is of course a low-output cartridge suited to use with a separate preamp unit or an amplifier with suitably superior MC input facility. The input impedance offered should be at least 100 ohms and capacitance loading is not particularly critical. Tests were conducted primarily with a QED MCA1 preamplifier.

THE FINDINGS

Output was in the medium range for the type and there was almost channel balance, while the separation trend was adequate, if nothing special, with pleasing results up to 10kHz. The square-wave test gave a basically good result with fair squaring of response, not unlike that from other top-flight moving-coils.

Frequency response was smooth and extended. The 8 by 20µm elliptical stylus tip was formed on a naked diamond of rectangular section, displaying accurate orientation and a finish that could be accepted as adequate if not really outstanding.

A middling stylus compliance of 18cu leads to a requirement for a pickup arm in the medium range of effective mass and suitable quality (not a problem in itself), while mild arm-damping would be worth the trouble though not absolutely essential. Tracking capability of this cartridge was very good indeed and results generally suggested a reduction of stylus mass compared with earlier Denons.

It did not give up readily on a variety of torture tracks found among recent digital and direct-cut discs. Only a degree of hardening of quality and some loss of definition heralded the onset of tracking jitters on isolated passages.

Sound quality displayed nice transparency and good sparkle in the upper range, while the bass was hefty and well defined. Stereo imaging was good and there was always the feeling that fine inner detail and ambience information were being honestly conveyed. Open clarity and low distortion were evidence of an advanced design.

Obviously this model is firmly among the top-flight specialities with a very limited appeal due to its price, but it was a joy to listen to, given an audio system of suitable quality.

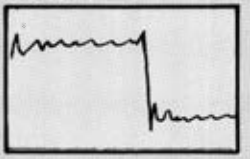
THE VERDICT

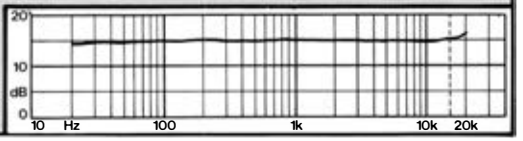
Pay up and look big, says the old tag, and one does indeed have to pay quite dearly for state-of-art products. In the circumstances it is hardly possible to offer anything but a token indication of a value rating, as views will differ. But technical merit is high.

TECHNICAL DATA AND DISTRIBUTOR

Tracking	Standard 0·8g Super 1·25g
Output	L 0·42mV R 0·4mV
Channel balance	0·2dB
Separation at 1kHz	L 30dB R 27dB
Stylus condition	Good
Stylus replacement	W
Arm compatibility	M
Sound quality	Hi

See page 13 for key.





Eumig (UK) Ltd,
14 Priestley Way,
London NW2 7TN
Tel: 01-450 8070

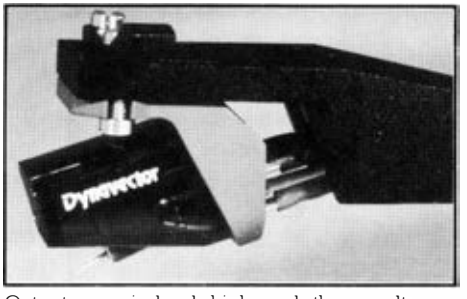
DYNAVECTOR 10X2

£55 MERIT ★★★ VALUE ★★★

With the addition of the '2' suffix this MC model is a development of the established 10X. The latter was a high-output cartridge (by moving-coil standards, that is) and the new version is even more generous with signal voltage. At 9·5 grams it is rather heavy, and this would be a positive hazard if the compliance was high, as it was in the 10X. However, the stylus proves to be less compliant this time — to a useful extent.

Dynavector seem to have some difficulty over the specification data, for differing tracking and compliance figures appear in their literature. However, they seem firm enough about the high output and the expected high internal impedance, which requires an appropriately high termination, the normal magnetic pickup input of the amplifier being the obvious solution.

THE FINDINGS



Output was indeed high and the results on separation, frequency response and balance were all to a commendable standard, while the square-wave was very neat too. An elliptical tip with 10×18μm radii, set in a tapered alloy cantilever, showed good alignment and contour, although the polish appeared marginally dull.

Compliance at about 21cu was not in accord with claimed figures but still suggested a revision of design to bring the device more in line with the expected application in an arm of medium effective mass. As for tracking, the findings suggested that the specified spread, with a 1·8g top limit, was misjudged. The cartridge would not look at a super-level test within the intended range.

However, there was no evidence that the sample was faulty, and with experimental setting of pressure the results on a wide variety of commercial material were secure enough, though not such as to encourage much use on modern super-discs of the more demanding kind. Marked coarsening, with loss of detail, soon became a feature of mistracking under provocation.

Overall the sound was considered to lack substance to some extent, but clarity was generally good and the fair approach to neutrality was liked. A rather keen and sometimes slightly brash sound, quite well detailed, with good results on surface noise. The 10X2 was less appealing than some on the more subtle stereo details present in the finest recordings.

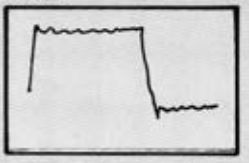
THE VERDICT

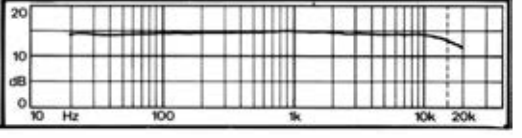
A 'distinctive' cartridge with some positive qualities. But its competitive position seems questionable in the light of current developments.

TECHNICAL DATA AND DISTRIBUTOR

Tracking	Standard 1·7g Super No go
Output	L 2·2mV R 2·0mV
Channel balance	0·5dB
Separation at 1kHz	L 31dB R 29dB
Stylus condition	Good
Stylus replacement	W
Arm compatibility	M
Sound quality	Av

See page 13 for key.





Dynavector Systems (UK) Ltd,
52 Park Road,
Kingston-on-Thames,
Surrey KT2 6AU
Tel: 01-546 1434

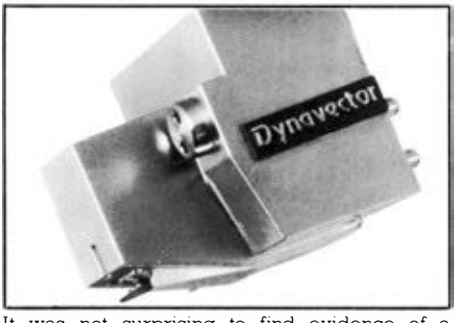
DYNAVECTOR DV-100R

£89 MERIT ★★★ VALUE ★★★

Of distinctive design, this Japanese moving-coil is an example of the exotica welcomed by pundits in various quarters who have been impressed by its novel features. Offering a choice of gemstone cantilevers — diamond or ruby — this device was from the outset enshrouded in the comforting mists of audiophile mystique.

The Karat Ruby, noticed here, is the less expensive version. Its short cantilever is an oblique cut naked ruby, a tiny fragment measuring 2·5 × 0·4 × 0·4mm. Mounted in a laser-pierced hole is the diamond tip, a square-section stone endowed with a line-contact contour. Other features are the rare-earth magnets, 11-micron silver wire coils and minimal use of damping material. Dynavector make specific mention of pickup arms of lowish effective mass, and the cartridge weighs 5·3 grams.

THE FINDINGS



It was not surprising to find evidence of a considerable bandwidth, the frequency response rising rather steeply out of the band and continuing to a very high tip mass resonance. The HF rise was quite truthfully depicted on a 'publicity' response trace packed with the cartridge — unusual enough to warrant a mention!

For a low-sensitivity MC the output is fairly typical — on the low side, perhaps — and channel balance was close. A lively looking square-wave reflected the nature of the system while showing a basically good shape. Separation was first-rate.

The stylus was a pleasing sight: the finely made ruby cantilever and well aligned and finished tip (8µm radius) were impeccable. In view of the stylus design it is fair to speculate on the possibility of compliance vagaries; but this one was 21cu and a little higher than implied in the product description, so that matching to arms is in accord with Dynavector advice.

Treatment of disc noise and imperfections was tolerant. Tracking capability was on the whole good, and the Karat negotiated a super-level check just within its specified range. There was some audible stress and hardening of quality on selected high-level music discs, the effect being generally clean in the absence of such stimuli.

Most evident was the bright and shiny clarity of the sound, with quite good stereo and a lot of detail, a characteristic which had an almost relentless keenness to it. Curiously the explicit analysis was not complemented by specially convincing presentation of subtle ambience content. The overall balance would probably be tiresome in association with very 'bright' loudspeakers.

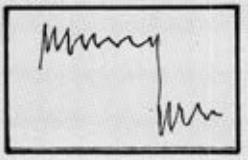
THE VERDICT

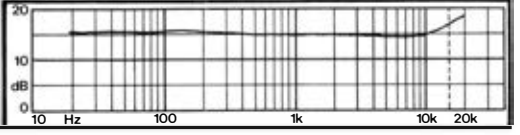
The Karat sound could become an acquired taste, no doubt. A technically interesting product, and it appears to be available at a somewhat lower price than formerly.

TECHNICAL DATA AND DISTRIBUTOR

Tracking	Standard 1·1g Super 1·75g
Output	L 0·21mV R 0·25mV
Channel balance	0·6dB
Separation at 1kHz	L 32dB R 30dB
Stylus condition	Good
Stylus replacement	W
Arm compatibility	M/L
Sound quality	Av

See page 13 for key.





Dynavector Systems (UK) Ltd,
52 Park Road,
Kingston-on-Thames,
Surrey KT2 6AU
Tel: 01-546 1434

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NAGAOKA	SUMIKO	DUAL
DYNA-VECTOR	MISSION	LOGIC

ELITE EEI-700

£49

MERIT ★★★
VALUE ★★★

This cartridge is one of a series manufactured in Japan for EEI, Australia, and marketed by Elite in the UK. Current models include a couple of fairly expensive moving-coils and several moving-magnet cartridges of which the 700 is the most exalted, though falling into the medium-price range for such devices.

It appears that EEI avoid high-compliance stylus characteristics, preferring to concentrate on the low-to-medium area and thereby appeal to users of disc players of popular type, many of which incorporate compatible pickup arms. This is as true of the 700 as of the others.

The 6-gram cartridge has the familiar push-in stylus assembly, in this case featuring a boron cantilever, and the nude diamond tip (termed 'parabolic' in this instance) is of the type giving an extended line of contact with the groove walls, the scanning radius being specified as 3μm. Tracking pressure range is quoted as 1·2 to 2g.

THE FINDINGS

With a fairly high inductance the cartridge is somewhat load-conscious, but some attention to tailoring could bring the top response rise to 1dB or so. The suggested 270pF capacitance loading seemed about right. No particular claim is made for separation but the general trend was satisfactory, while the results suggested a system of good symmetry. Channel balance was quite close and output a little above specification.

Stylus compliance was listed as 10cu but evidently was under-estimated a little. However, the compliance is firmly in the useful medium area, so that scope for matching to arms is wide. The cartridge is by no means fussy in that respect. Although the line-contact tip appeared well aligned, the finish was rather dull and a combination of adhesive and dirt was prominent around the setting and the end of the cantilever. Scanning radius, at about 5μm, was greater than specified.

Standard tracking checks were completed at the bottom of the specified pressure range, while the super-level required a pressure near to the top specified limit. Some hardening and thickening of sound quality was the sign of onset of mistracking on a few torture-tracks among the most demanding programmes, but generally the 700 put up a good performance and the bass end was liked.

Superior analysis of detail was a finding of some interest, and in that respect the cartridge was considered better than many devices of its particular type, although there was still some haze or veiling on examples of complex high-level material. A hardish character became apparent on occasion. Stereo imaging was good; but this was not considered to be a particularly subtle reproducer. Treatment of disc noise was adequate. The stylus tip could benefit from more care in manufacture and inspection.

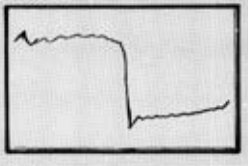
THE VERDICT

Some minor reservations are noted but this model is basically an interesting example of its kind and not bad value. Potentially wide application is a plus-point.

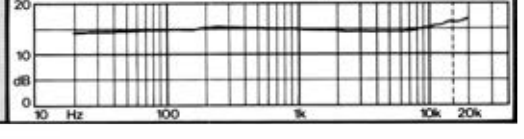
TECHNICAL DATA AND DISTRIBUTOR

Tracking	Standard 1·2g Super 1·8g
Output	L 4·2mV R 3·9mV
Channel balance	0·5dB
Separation at 1kHz	L 29dB R 31dB
Stylus condition	Fair
Stylus replacement	U
Arm compatibility	M
Sound quality	Av

See page 13 for key.



Elite Electronics,
33 Station Avenue,
Walton-on-Thames,
Surrey KT12 1NF
Tel: 09322 46850



EMPIRE 200E

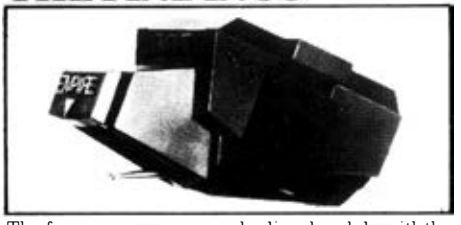
£19

MERIT ★★
VALUE ★★

Model 200E is a less ambitious example from Empire's Dynamic Interface Series, and a quick look at the description and data suggests that it is intended primarily for use in relatively massive pickup arms, possibly including those on automatic players of the cheaper or less advanced kit.

It has a few things in common with the 400TC, sharing the same body construction and fittings, but this time a straight-tube alloy cantilever is employed and the stylus tip is specified as a 8 x 18μm elliptical. Total weight is the same at 5·3 grams. The rather wide tracking pressure range of 2 to 4g is quoted along with a recommended figure of 2·5g. Output is high. Advice on capacitive loading suggests a figure of 250pF, lower than for the 400TC. For the low-cost system, then, and displaying a robustness which may well be appropriate for use by undemanding users.

THE FINDINGS



The frequency response declined unduly with the specified loading and the result was marginally preferred with a bit of a rise using 200pF per channel. Not much of a factor, though, in view of the likely application and the promise of a cartridge that hardly offers high-end accuracy as a big feature. Separation was good for a model in this class and channel balance fair, output being quite generous.

Specified as an elliptical the stylus tip appeared slightly oversize and in effect tended toward hemispherical but was neatly set and aligned, polish being fair rather than specially good. Compliance of 10cu and general behaviour indicated that the cartridge would be unfussy in respect of arm matching, with the possibility of compatibility with components of medium to high mass. A test arm loaded to 16g effective (21g with cartridge) offered a typical condition in which low-frequency potential was realised.

As for tracking, the cartridge was far from being an elegant performer but the results were secure enough on average commercial discs. The standard level check passed off at 2·4g, near to the recommended setting, while the super-level proved troublesome and could not be negotiated cleanly (which is not a strong criticism on this price stratum, of course). In audition the response to the more severe challenges of modern material was unpleasant, with congestion and some problems of tracking.

This is not an audiophile product, however, and less critical audition with run-of-the-mill programmes left the impression of reasonably smooth but not very well detailed reproduction — a bit wooden and lacking in character, with midrange colouration, though the touch of top brightness was acceptable.

THE VERDICT

Again there is some technical merit which may appeal to those who seek a heavy tracker for fairly low-cost application, but disappointment with overall results cannot be concealed.

TECHNICAL DATA AND DISTRIBUTOR

Tracking	Standard 2·4g Super No go
Output	L 6·8mV R 6·1mV
Channel balance	0·8dB
Separation at 1kHz	L 26dB R 22dB
Stylus condition	Fair
Stylus replacement	U
Arm compatibility	M/H
Sound quality	Ba

See page 13 for key.

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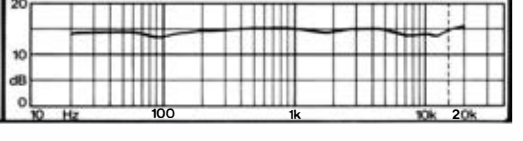


EMPIRE 400TC

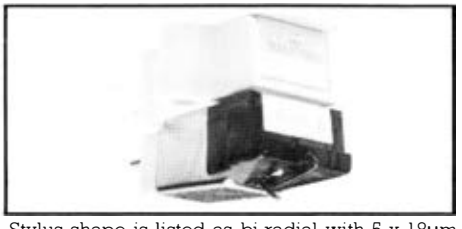
£32 MERIT ★★ VALUE ★★

Empire of the USA introduced a range of six new magnetic cartridges during the past year or more and have recently added yet another. The 600-LAC is tops in price in an array which carries the label Dynamic Interface Series.

Some features are not so obvious — for example the composite and elaborate cantilever/armature design adopted for the more costly models in the interests of stylus-resonance control. The 400TC is not quite in that league but is clearly gauged for use in medium-cost systems and, specifically, for arms of medium effective mass. Reduction of stylus tip mass is a point made about this model and the standard of manufacture appeared very good.

Like some other variable-reluctance cartridges from the same source, this one has a fairly high inductance, so specific recommendations are made concerning loading. The stylus is a nude elliptical-tip diamond and the suggested tracking pressure spread is somewhat wide at 0·75 to 2·0g. The recommended pressure for general use is 1·25g. Cartridge weight is 5·3g.

THE FINDINGS



Stylus shape is listed as bi-radial with 5 x 18µm dimensions (minor and major radius) and, while the scanning radius was on the large side, the tip was well finished and neatly set in the tapered alloy cantilever. The rolled and crimped end of the cantilever had a curious assymetrical look, a quirk of quality control, perhaps, and without apparent effect on the setting of the stone, which was properly aligned.

Compliance at about 20cu suggests the use of a pickup arm of medium mass. Frequency response did not impress but was least offensive with a mild decline using a terminating load of 300pF, a little less than the suggested optimum, while the separation trend was quite good and well supported to 10kHz at least. Channel balance was fair, output generous, and square-wave testing gave a basically good result with fair control.

It really could not be said that the 400TC impressed as a super tracker, for the standard level went above the suggested mean tracking pressure and the super-level was tackled somewhat uneasily at the top of the design range. Severe challenges from modern discs were not surmounted particularly elegantly for a cartridge in this price-bracket and the hardening of sound quality was not much liked.

Average performance suggested a reasonable tonal balance, fairly smooth, but in the long run the character was a bit disappointing, with veiling of high-range detail and some departure from neutrality in the form of constricted and almost nasal effects. More attack and sparkle would have been welcomed. There are more positive merits in explicit stereo imaging, the fair tolerance of disc noise and good hum rejection.

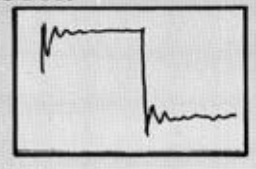
THE VERDICT

Mixed feelings remain, for this model has some technical and practical merit while failing to stimulate much enthusiasm in audition. Better can be expected in this middling price category.

TECHNICAL DATA AND DISTRIBUTOR

Tracking	Standard 1·4g Super 2·0g
Output	L 4·9mV R 5·4mV
Channel balance	0·6dB
Separation at 1kHz	L 29dB R 31dB
Stylus condition	Good
Stylus replacement	U
Arm compatibility	M
Sound quality	Av

See page 13 for key.



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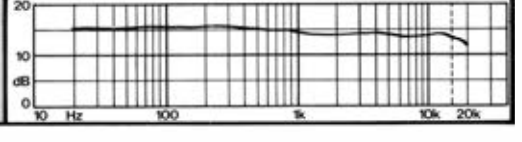

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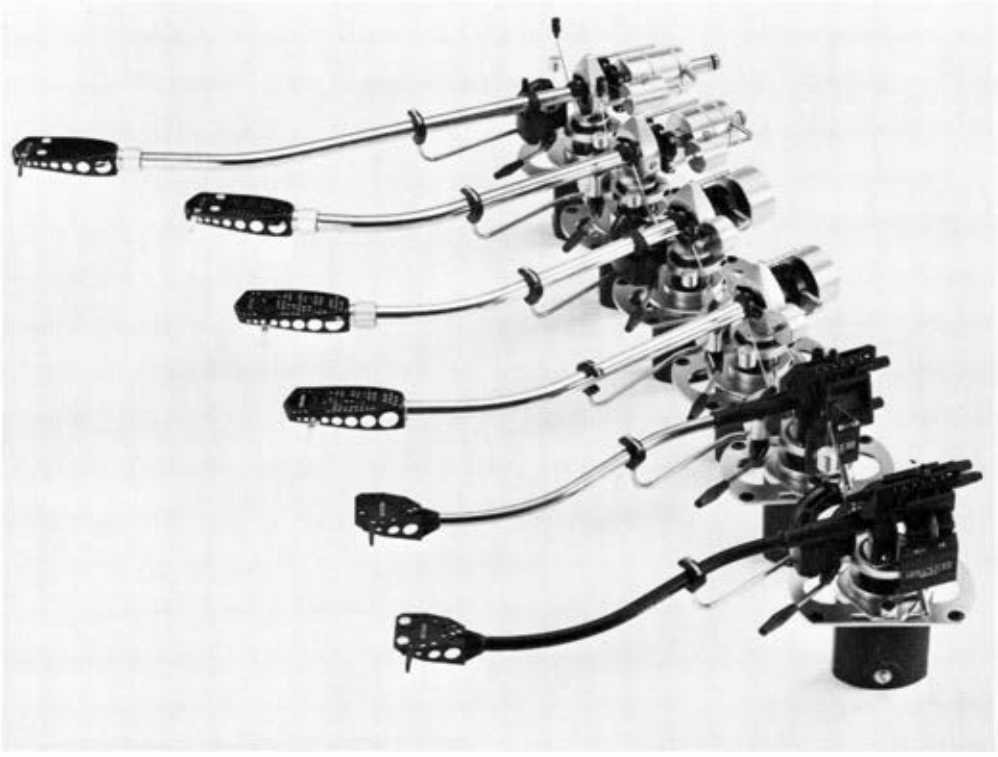

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EMPIRE 600LAC

£125 MERIT ★★★ VALUE ★★

Like ADC and some other specialists in the USA, Empire Scientific Corporation can look back on a considerable history of development during which their products have become more familiar to British hi-fi enthusiasts. With a further advance in design Empire have put forward their Dynamic Interface series, with the 600-LAC as leading model. It turns out to be even more costly than the excellent EDR9, introduced earlier and recently dropped from the range.

The 600-LAC is of the moving-armature or 'variable relunctance' type, continuing the four-coil, three-magnet layout previously associated with Empire. New thinking has been applied to the stylus and suspension, and the cartridge body looks different. Weight is 5·3 grams. A form of line-contact stylus tip is fitted.

In the past it seems to have been Empire's inclination to understate stylus compliance, and it looks as though the tendency continues. The cartridge is introduced in the upper middle area but turns out to be of high compliance and a contender for low-mass arms. A new feature is the tapered alloy cantilever, described as boron-vapoured, and another is the improved provision for positive location of the stylus block in the cartridge body.

THE FINDINGS

Tests results indicated signs of better damping than had been noted with some earlier models, although the separation and frequency response trends were nothing special. A high-end rise in response can be tailored down a bit with suitable termination if an extreme-top decline is acceptable. Empire mention a 150pF load but an increase to 200pF was preferred.

Output was generous and a little above specification, helping to ensure a good signal-noise result in practical conditions, while channel balance was very close in the mid-band if a little wayward elsewhere. Symmetry of operation was not ideally precise despite some experiment with mounting. The stylus tip was well mounted with a fair line contour and good finish. High compliance of about 30cu indicates choice of a low-mass arm.

Specified tracking range is 1·0-2·0g with a 1.5 mean, and in fact the cartridge completed super-level testing at only 1·25g. Higher than average bias correction was demanded on highly-scored material. Occasional warnings of mistracking were of a spluttery nature — certainly not a major factor in practice.

Audition revealed a fairly forward effect, with some hardness and even a hint of brittleness on some of the most complex modern material. Special delicacy and in-depth analysis of stereo niceties were not particular features of the reproduction, although reasonably positive presentation and solid bass were plus points.

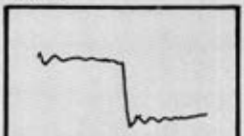
THE VERDICT

A good tracker with some positive merit, but not one of the more subtle reproducers. Very expensive in relation to potential. Careful choice of arm is advisable.

TECHNICAL DATA AND DISTRIBUTOR

Tracking	Standard 0·8g Super 1·25g
Output	L 5·7mV R 5·4mV
Channel balance	0·5dB
Separation at 1kHz	L 28dB R 19dB
Stylus condition	Good
Stylus replacement	U
Arm compatibility	L
Sound quality	Av

See page 13 for key.



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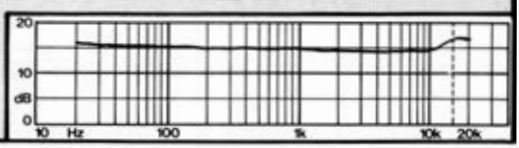
Tel: Rickmansworth 75242



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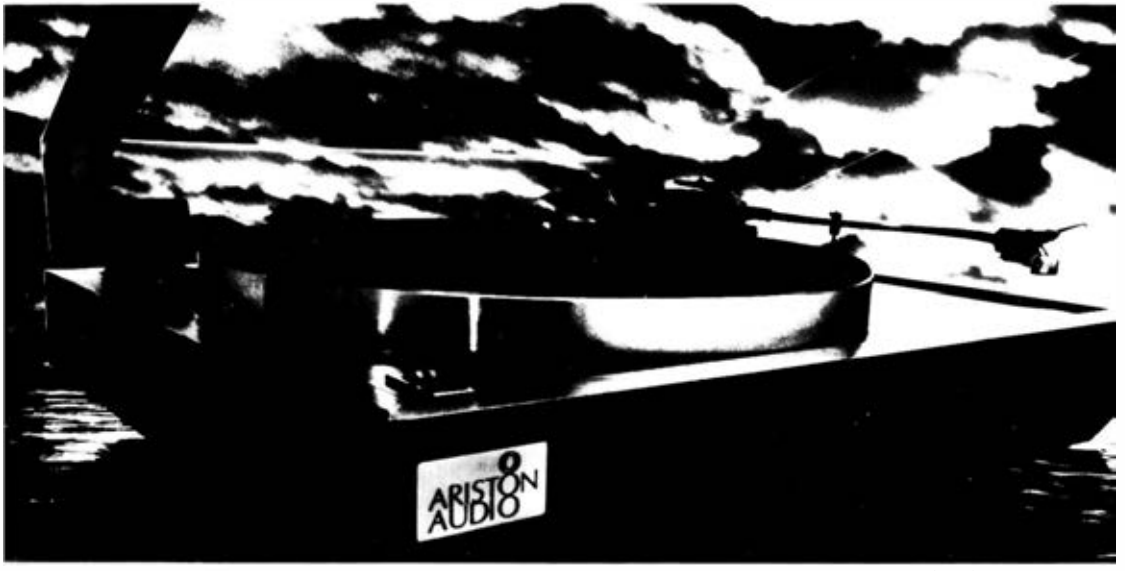

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ARISTON RD80

*Correct at time of going to press

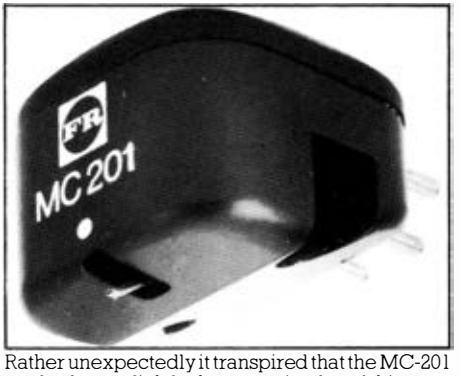
FIDELITY RESEARCH MC-201

£133 MERIT ★★★★ VALUE ★★

A new model received just in time for these reports, the MC-201 is a moving-coil of low output (lower than usual, in fact) from a Japanese maker with a reputation for cartridges that are among the sweeter sounding of exotic audio products.

Tracking pressure range was given as 1·5 to 2·0g and a nude-mounted stylus tip of the line-contact variety is fitted. The cartridge has to be returned to the supplier for stylus replacement. Cartridge weight is 7·5 grams. Specification data are somewhat meagre but the advocacy of a step-up transformer is clear enough and probably has more to do with the promotion of FR's own (such as FRT3G) than with study of the best possible termination. A preamp with at least 100-ohm input is a much better proposition.

THE FINDINGS



Rather unexpectedly it transpired that the MC-201 tracked more lightly than promised, and this gave cause to wonder whether the designer had misjudged his recommendation. The rather lean set of data supplied also failed to mention the fairly high compliance of 22cu, and there is no guidance whatever on arm compatibility.

It seems reasonable to expect all audiophile cartridges such as the MC-201 to be accompanied by wise words on usage. In short, this model is best suited by an arm of high quality and low mass, for with careful adjustment it will beat the tracking claim if this sample is anything to judge by.

The stylus, with its low-mass cantilever, made a good impression, for it was a miniature stone with a well contoured tip (7μm scanning radius) displaying very good finish and orientation. There was, however, some excess bonding material under the cantilever. Reduction of tip mass and extended response were evident in the findings.

Channel balance was reasonable, the separation trend good and hum rejection passable. In audition the cartridge tracked with fair elegance and proved forgiving of all manner of awkward items as well as minor surface imperfections. The sound was gracious, with good transparency, though not free from edgy effects in the face of severe challenges. Stereo imaging was not always as precise as could be wished, yet ambience content and suchlike subtleties were usually pleasing, as was the sense of depth. The specification — or the expression of it, rather — has its quirks and could with advantage be revised.

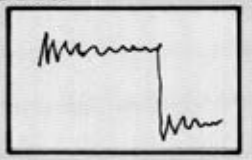
THE VERDICT

Value is open to question but it depends how you view the distinctive qualities of the product, which has a lot of technical merit.

TECHNICAL DATA AND DISTRIBUTOR

Tracking	Standard 1·0g Super 1·5g
Output	L 0·22mV R 0·25mV
Channel balance	0·5dB
Separation at 1kHz	L 35dB R 37dB
Stylus condition	Good
Stylus replacement	W
Arm compatibility	L/M
Sound rating	Hi

See page 13 for key.



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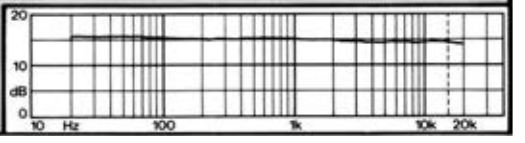


GLANZ MFG-11T

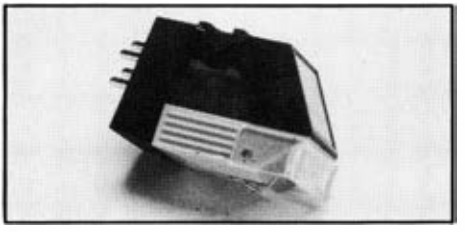
£18

MERIT ★★★
VALUE ★★★

This moderately priced cartridge shares some design features with its more expensive brethren in the series but employs a cheaper bonded diamond stylus with elliptical tip (it is titanium-bonded according to the maker's description). The 11T version takes a place at the bottom of the range together with the related 11R, which has a conical tip and therefore costs less.

As with the MFG-31L, contrast in stylus compliance figures appeared in Glanz literature and the conclusion could be drawn that a lowish compliance was really intended. But in fact early samples displayed a compliance that was unduly high in relation to intended use, this restricting versatility, and recent samples are said to show a reduction due to a revision of the suspension. Tracking range is 1·5 to 2·0, with a 1·75 mean on which spec data appear to have been based. Weight is 5·5 grams.

THE FINDINGS



A termination similar to that for the 31L was appropriate, and again the frequency response was reasonably uniform for the class of transducer, with more peakiness at the extreme top, while the separation trend was no more than adequate. Output was quite high and channel balance fair. The neatly bonded elliptical diamond displayed good finish and an acceptable shape with 8 x 20µm radii, while the cantilever was exemplary in respect of finish and attention to detail in tip-mounting.

In the event the stylus compliance had not been reduced to the low range — at least in the context of products covered in these reports — and given a figure of about 18cu a pickup arm in the medium area of effective mass would be preferable for best results. This does, however, provide fair scope for manoeuvre. As for tracking, the specification implied that a super-level test would be negotiated at 1·75g but this was not borne out in practice, for the results were not adequately secure at the top of the range.

In audition the results reflected to some extent the statutory testing, with such familiar effects as coarsening and loss of definition on highly-scored programme material. Otherwise the sound was smooth enough and, apart from the more severe challenges, displayed some characteristics of the 31L. A touch of brightness on the more complex material was not unwelcome as a foil to the basically bland character which remained. Bass was good, explicit stereo imaging acceptable, and in all the general effect was quite pleasant.

The Glanz series is topped by the MFG-71L and a new model was mooted at the time this report was prepared.

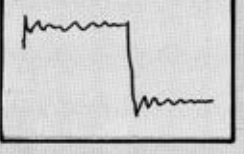
THE VERDICT

Here we have a marked contrast with some keener-sounding magnetics in the same low range of cost. This could influence choice; and in that case there would probably be no quarrel with value.

TECHNICAL DATA AND DISTRIBUTOR

Tracking	Standard 1·7g Super No go
Output	L 5·2mV R 6·4mV
Channel balance	0·8dB
Separation at 1kHz	L 23dB R 20dB
Stylus condition	Good
Stylus replacement	U
Arm compatibility	M
Sound quality	Av

See page 13 for key.



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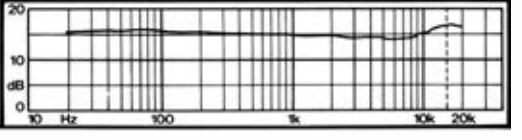


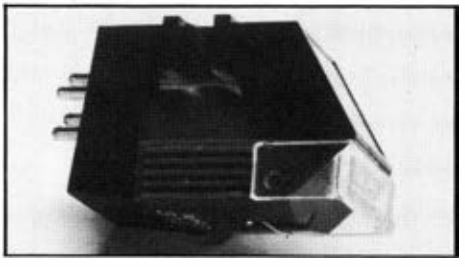
GLANZ MFG-31L

£36 MERIT ★★★★ VALUE ★★★

An extensive and interesting series of Glanz magnetic cartridges made by Mitachi of Japan share the same operating principle and differ in respect of stylus tip shapes, compliance and effective tip mass. Since Mitachi can boast a considerable history of design and manufacture of audio devices, including production for other companies, signs of superior expertise are to be expected, and indeed the standard of manufacture is high.

A variant of the variable-reluctance type, the cartridge is well specified and features a line-contact stylus tip in a thin alloy cantilever. It does not have the relatively costly tapered cantilever used in more expensive models of the series. Weight is 5·5 grams, and the specified tracking range is 1·25 to 1·75g.

THE FINDINGS



Load-sensitivity is not a special feature. However, a termination of 100pF capacitance was mentioned in the maker's literature but the result of an increase to 200pF per channel was preferred, the response being commendably uniform and with little midrange depression. Separation was not particularly impressive but channel balance was reasonably close and output significantly above specification. The square-wave was neat and regular with just a slight overshoot.

The nude-mounted stylus tip of line-contact contour with a 8µm scanning radius was well shaped and finished, though showing a very slight error in orientation despite neat setting. Glanz do not seem to have decided on expression of the dynamic compliance, for contrasting 'typical' figures appear, but in fact the stylus is firmly in the high range at 30cu and an arm of quite low mass is called for. Arm-damping is unlikely to be necessary but a mass range of 5 to 8g effective would be appropriate if this can be achieved with a component that is not disproportionately costly for the application.

This cartridge showed some real tracking flair and was not caught out too often. Blurring of detail was the prelude to any notable mistracking on torture-tracks. As for statutory tests, the super-level was completed just within the specified top limit and, as is generally true, no real advance could be expected from increase of pressure.

Smooth quality prevailed but subtlety on complex material with interesting ambience content was not a strong point. The sound was a bit dull in the midrange and top, and more sparkle would have been welcome. Handling of disc noise and minor imperfections was fairly good. Glanz offer a fair set of compromises, gauging them rather well for the mid-price range.

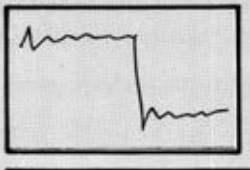
THE VERDICT

Middling to good value in its category, this cartridge commands attention but the restriction on choice of arm may be thought a disadvantage. Tonal balance suggests use when loudspeakers are inclined to sizzle in the high range.

TECHNICAL DATA AND DISTRIBUTOR

Tracking	Standard 1·4g Super 1·7g
Output	L 4·8mV R 5·2mV
Channel balance	0·5dB
Separation at 1kHz	L 24dB R 21dB
Stylus condition	Good
Stylus replacement	U
Arm compatibility	L
Sound quality	Av

See page 13 for key.



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GOLDRING G910-IGC

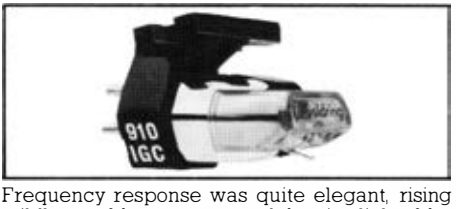
£55 MERIT ★★★★ VALUE ★★★

Goldring cartridges with the IGC suffix are developments of the earlier SE type but have a Van den Hul line-contact stylus tip for 'improved groove contact'. A model 900-IGC has been well received, and now the 910-IGC (a 920 also) extends the series. An early sample is the subject of this report.

The 910-IGC is identical to the 900-IGC in all essentials except for the stylus, which is stiffer. In a word, the compliance is much lower, and about half of that of the other version (for which around 40cu is typical), so that the appeal of this excellent cartridge is extended to buyers who have pickup arms displaying effective mass in the medium area. It is an important point, as the 900 type is restricted to low-mass arms of high quality.

A stylus scanning radius of 3·5μm is mentioned, and the stone is a nude diamond in an alloy cantilever. Cartridge weight is slightly over 4 grams, making it one of the lightest of fairly conventional construction. A total load capacitance of 150-200pF is specified. Incidentally, cartridges from this maker used to be of the induced-magnet type, but the moving-magnet principle is applied in the new series.

THE FINDINGS



Frequency response was quite elegant, rising mildly out of the spectrum and showing little of the midrange droop sometimes associated with MM designs. A load per channel of 180pF was an acceptable compromise. Midrange separation was excellent, though the high-frequency result was pretty ordinary. Channel balance was much better than the pessimistic 2dB of the specification.

Output was generous, it will be seen, and that is good for signal-noise ratios, but as usual with such figures it is as well to make sure that the amplifier will not be in trouble with input overload. Square-wave testing revealed a bit of an overshoot, quickly damped, and good squaring.

The stylus minor radius was somewhat greater than specified, but alignment and finish were satisfactory, while the compliance at about 20cu opens up the prospect of use of medium-mass arms (10g or so, plus cartridge), as are found on many integrated players of good quality.

Rated highly on tracking, the cartridge sailed through the standard check near the bottom of its pressure range and negotiated the super-level well inside the top limit. In audition the most complex, energetic material provoked some coarse effects and occasional blurring, with loss of fine detail. Generally, though, the results were characterised by an open and clean quality, with an attractively crisp high range. Excellent stereo imaging, firm bass, and in all a convincing balance. Tolerance of disc noise was mildly in question.

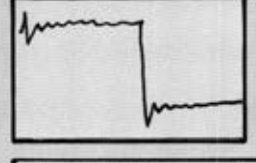
THE VERDICT

It is a pleasure to welcome such a creditable product from a British company. There is obvious technical merit and no really serious vices. What more could one want — a somewhat lower price, perhaps?

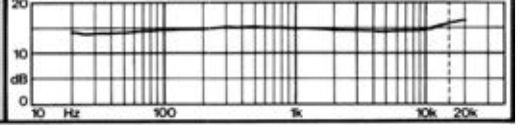
TECHNICAL DATA AND DISTRIBUTOR

Tracking	Standard 1·2g Super 1·9g
Output	L 5·8mV R 6·1mV
Channel balance	0·5dB
Separation at 1kHz	L 33dB R 31dB
Stylus condition	Good
Stylus replacement	U
Arm compatibility	M
Sound quality	Hi

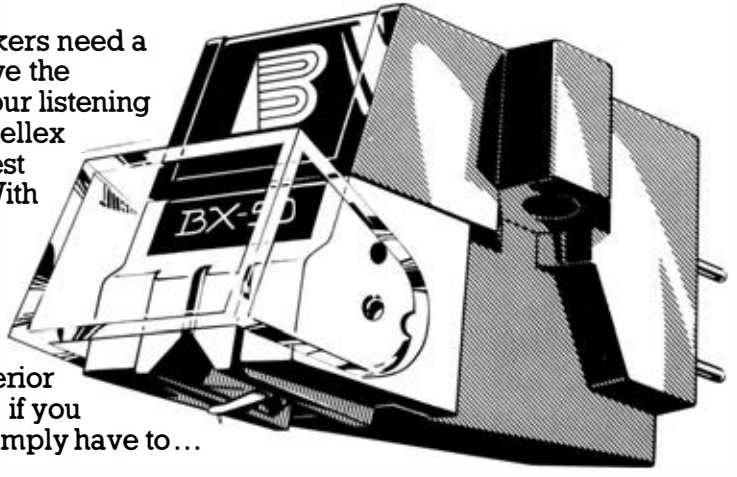
See page 13 for key.



Goldring Products Ltd,
Anglian Lane,
Bury St. Edmunds,
Suffolk IP32 6SS
Tel: 0284 64011



Ten good tips for you...



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BG 1

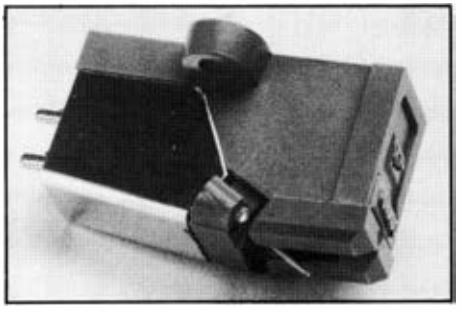
GRADO FTE+1

£12 MERIT ★★★ VALUE ★★★★

This 'budget' model is in principle very much like more costly Grados, featuring what the maker calls the flux-bridger magnetic design and the familiar pull-out stylus assembly with its four-element armature. An obvious difference is the more massive stylus, more easily made and of lower cost. The tip is an elliptical and the cartridge weight is only 4·5 grams because of the light plastics parts, though there is no great emphasis on rigidity.

Stylus compliance is in the medium range and, fortunately, Grado do not intend the use of arms other than those found on low-cost players. The practical top limit of tracking is 2g. A mention of 'budget hi-fi systems and the better music centres' has been observed among the literature.

THE FINDINGS



This cartridge is not specially load-sensitive, being of low inductance, but one has to live with a steep HF rise amounting to 3dB by the time 15kHz has been reached. Square-wave testing showed a sharp ring (lack of stylus damping) but channel balance was close and output generous. Separation was good, with as much as 21dB differential at 10kHz.

Evidently the stylus tip, with 8µm scanning radius, represents an attempt to secure a true elliptical contour. Finish was off-colour but orientation was good, and it is not a bad effort at the price. Compliance at 19cu is well into the medium area, so arms of medium effective mass (about 8 to 16g effective plus cartridge) will be the best match, and such may be found on economy-class turntables. A low-frequency check suggested somewhat alarming resonant behaviour which arm damping might help to control, but such a feature is not usually seen on the type of player likely to be used.

Tracking was rather good and the super-level was negotiated well within the working range. An edgy effect, rather coarse, was to be expected on the more energetically modulated material and there was a degree of masking of detail which was not too remarkable, bearing in mind the good stereo imaging. Results were tolerably well balanced on the gentler programmes. Items with interesting ambience detail were not liked, but that would be asking too much at this level of cost. Disc noise (minor blemishes and particles) did not meet with very kind treatment.

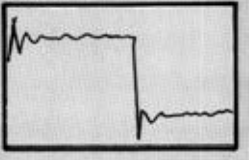
THE VERDICT

There is always a market for a good-value product such as this. It is a good tracker and, for an economy-class cartridge, sounds quite well balanced. Beware of putting it in a too-massive arm.

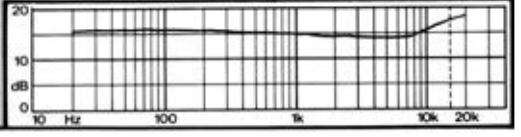
TECHNICAL DATA AND DISTRIBUTOR

Tracking	Standard 1·0g Super 1·6g
Output	L 4·5mV R 4·7mV
Channel balance	0·5dB
Separation at 1kHz	L 26dB R 30dB
Stylus condition	Fair
Stylus replacement	U
Arm compatibility	M
Sound quality	Av

See page 13 for key.



Transonic Imports
(Acoustical) Ltd,
Brooks Court,
Stamford, Lincs.
Tel: 0780 55551



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BG 1

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OSAWA's
NAGAOKA MP CARTRIDGES

JVC X1 IMP.

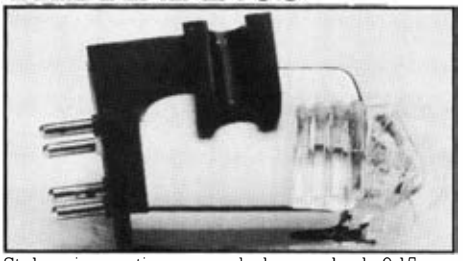
£79 MERIT ★★★★ VALUE ★★★

The sample, from recent production of this well-established moving-magnet model, was held to be an 'improved' version. Where the improvement may reside is not at all clear, but the design is in any case acknowledged to be advanced in important respects including tip mass.

This model was introduced to meet the need for a CD4 cartridge of quality, for JVC were much involved in the now discredited 'quadraphonic' venture. However, we can ignore the origins and benefit from the extended response resulting from the stimulus of development.

Particular features are the beryllium cantilever, nude-mounted Shibata tip (on a miniature stone), laminated poles and samarium cobalt magnet. Tracking pressure range is quoted as 1·5 to 2·0g with a suggested 1·7g optimum — a bit pessimistic as it turns out. Cartridge weight is 6 grams.

THE FINDINGS



Stylus inspection revealed a naked 0·15mm square stone, well orientated and finished; the line contour was of Shibata variety but the minor radius at about 9µm seemed a bit larger than expected. Compliance of 22cu was on the high side and an arm of lowish mass will be appropriate. Damping is not essential.

This cartridge is not unduly load-conscious but the specification had nothing to say about that aspect. A loading of 120pF was a fair compromise and the frequency response was then reasonably uniform with a linear midrange and declining HF, falling smoothly out of the audio range. Separation was good, well maintained in the high range, while channel balance was fairly close.

Output was higher than specification, though below that from some MM cartridges. Tracking claims were modest, since the statutory super-level test was negotiated at 1·5g, below the suggested normal setting. Indeed, the upper limit of the specified spread appeared to be mis-judged, for the stylus was flexed well up to the body at such a setting, a condition which is hardly to be recommended.

The X1 dealt with minor disc noise and imperfections fairly kindly. Sound quality was generously clear, bright and analytical, while stereo presentation was first-rate and impressions of subtle detail were mostly favourable. The provocative material among the torture-tracks brought up a noticeably hard effect with a less realistic bite, when detail suffered a little, but there were no really noisy signs of mistracking.

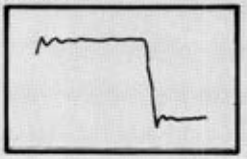
THE VERDICT

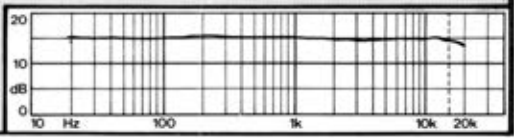
Possibly a little expensive when judged against its competition, this cartridge is a nice tracker and a fine example of the MM type. It displays much technical merit and should appeal for high-grade systems if a brightish balance is required.

TECHNICAL DATA AND DISTRIBUTOR

Tracking	Standard 1·0g Super 1·5g
Output	L 2·9mV R 3·1mV
Channel balance	0·5dB
Separation at 1kHz	L 27dB R 29dB
Stylus condition	Good
Stylus replacement	U
Arm compatibility	L/M
Sound quality	Hi

See page 13 for key.





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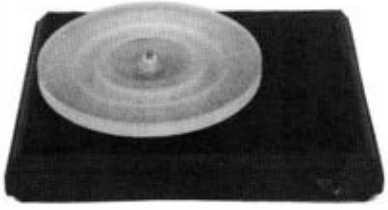

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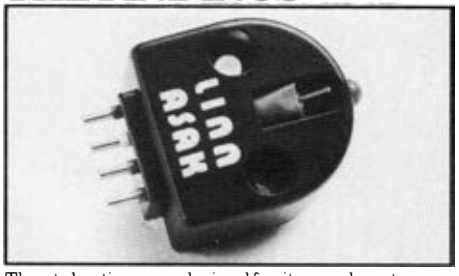
LINN ASAK

£207 MERIT ★★★ VALUE ★★

Also designated model DC-2100K, this expensive Japanese moving-coil cartridge is of the low-output type and of fairly low stylus compliance. It is primarily intended for use in pickup arms in the middle to high region of effective mass but could be used with some examples of lower mass given additional head loading. Cartridge weight is 6 grams.

Particular features are the selection of a fine stylus tip, a nude-mounted stone with elliptical contour (replacement only by the supplier, of course), and very careful magnetic shielding. The pressure specified is 2·0g with a 0·2g spread.

THE FINDINGS



The stylus tip was admired for its good contour — elliptical with 6µm scanning radius — and accurate orientation. It was well finished and fairly neatly set in the straight cantilever, although some excess bonding material appeared at the back. Compliance was lowish at 13cu, confirming that an arm in the middling to high range of mass (about 12 to 20g effective) will be the preferred partner. The Ittok is Linn's preference, of course.

Loading is not particularly critical and the cartridge was terminated with 100ohms as used for tests on various other MC models. Frequency response was attractively uniform through much of the range, rising a bit in the extreme HF area, while the separation trend was on the whole good, though with some worsening above 8kHz compared with the superior result in the midband. Channel balance was fairly close. Good hum rejection was noted.

From tests it might be presumed that much more emphasis has been placed on the expectation of agreeable reproduction of average commercial material than on keeping up with the demands of modern audiophile discs. In truth this cartridge is not a very enthusiastic tracker, and the super-level check was not tackled cleanly anywhere near the advised setting.

Mistracking on the more challenging material was marked by blurring of detail and general unease, with occasional edgy effects which did not intrude under more relaxed conditions. When not exposed to very severe provocation the Asak yielded a clean, musical, open sound with pleasing neutrality and very good presentation of fine detail.

Results were marginally preferred with the Ittok arm, for the matching was ideal, but in general it was always possible to secure a truthful account of a reasonable variety of programmes. The lack of tracking flair remained a cause of misgivings. Bass was firm. Tolerance of mild noise and imperfections was good.

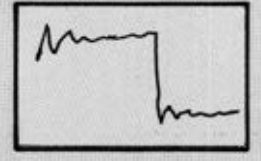
THE VERDICT

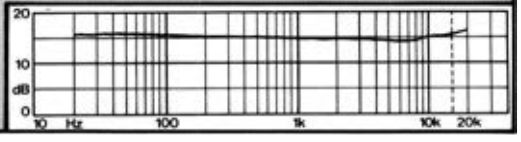
Although the Asak displays some desirable attributes of good moving-coils it is hardly an inspiring tracker. In view of modern developments the price is high for a cartridge that is fussy about accepting the fare likely to be set before it by the hi-fi enthusiast.

TECHNICAL DATA AND DISTRIBUTOR

Tracking	Standard 2·0g Super No go
Output	L 0·21mV R 0·20mV
Channel balance	0·2dB
Separation at 1kHz	L 35dB R 33dB
Stylus condition	Good
Stylus replacement	W
Arm compatibility	M/H
Sound quality	Av

See page 13 for key.





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MAYWARE MC-2V

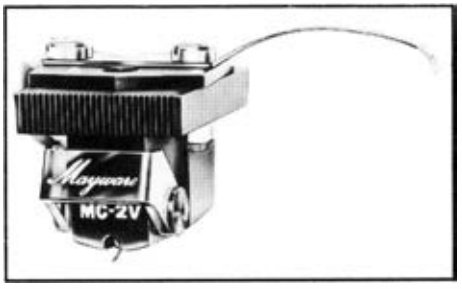
£59

MERIT ★★★★
VALUE ★★★★

Made in Japan and imported by Mayware as an own-brand cartridge, the MC-2V moving-coil has a fixed stylus featuring an Ogura 'vital' nude diamond with a form of line-contact tip contour. Generating an output which is quite low even for low-output devices, the cartridge has a tapered alloy cantilever. Weight is about 6·5 grams and a well made flip-down stylus guard is fitted.

This model offers a contrast with an MC cartridge of earlier introduction from this source and generating a relatively high output. The MC-2V is of very low impedance and therefore demands the use of a step-up device such as the transformer which Mayware offer at slightly higher cost than the cartridge. However, the test regime for the Guide involved only preamps. The MC-2V is, by the way, introduced in the lower range of stylus compliance, promising flexibility in arm matching.

THE FINDINGS



Smooth frequency response, with negligible midrange decline and only a modest rise in the extreme top, gave a favourable impression, while the separation trend was acceptable through the range with particular distinction at 10kHz where the result was almost as good as in the midband. Channel balance was closer than specification and output was slightly higher than listed, although this is still a transducer of very low output.

The stylus tip was aligned and finished and the setting particularly neat and clean. Tip contour looked closer to spherical than anticipated but the resolution of HF detail was not in question, the extended contact shape was on the right lines, and the tip is thought to be in accord with the intended tracking pressure. Compliance was evidently a little higher than the specified 8cu but still the cartridge is one for arms of highish effective mass.

Tracking performance was well liked and standard checks were completed at the bottom of the suggest range of pressures. The super-level was negotiated just within the range (high bias was needed) and there seems little reason to doubt the claim that this is a 2g tracker. In other words it is not a featherweight but at least it sounds secure, with only the mildest hints of incipient mistracking, and there is the advantage of wide applicability so far as mechanical matching is concerned.

Sound quality was brightish, displaying plenty of detail, while stereo imaging and impressions of depth were likeable. With fair bite and attack in evidence the quality tended toward a glassy and almost edgy effect on some of the most challenging material. But generally the balance suggested a fair approach to neutrality, and the bass was clean and firm.

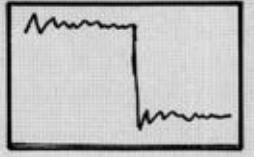
THE VERDICT

A useful model which could prove to have wide appeal, for it is an unfussy device with a performance which looks well against the price. Fair value, then.

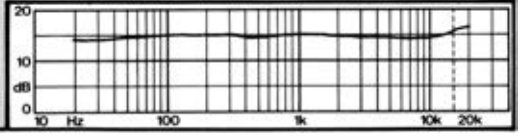
TECHNICAL DATA AND DISTRIBUTOR

Tracking	Standard 1·7g Super 2·1g
Output	L 0·29mV R 0·32mV
Channel balance	0·5dB
Separation at 1kHz	L 29dB R 27dB
Stylus condition	Good
Stylus replacement	W
Arm compatibility	H/M
Sound quality	Hi

See page 13 for key.



Mayware Ltd,
PO Box 58, Edgware,
Middlesex HA8 9UH
Tel: 01-958 9421



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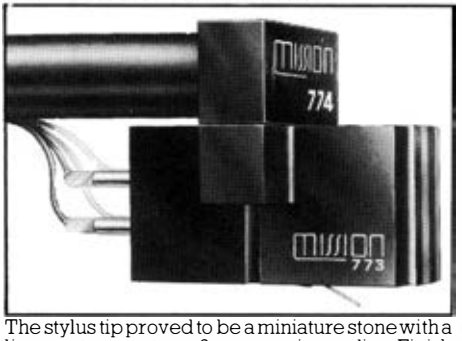
MISSION 773

£145 MERIT ★★★★ VALUE ★★

Moving-coil cartridges yielding a relatively high output voltage are quite rare, and of these the examples proving attractive for audiophile use are rarer still. But the Mission 773 is one such. That does not alter the fact that a device of this sort, in respect of output, is poised a little uneasily between the average MC with its feeble signal and the conventional magnetic with its more generous voltage.

However, one can connect it directly to the magnetic pickup input on a hi-fi amplifier, and the best units will provide adequate sensitivity and signal-noise ratio. Lead length is not particularly critical. Weighing 5·6 grams, the cartridge is of quite high compliance and intended for use in arms of fairly low effective mass, such as Mission's own — a report is included in this Guide. A stylus tip of the line-contact variety is fitted. The 773 is made in Japan for the British company.

THE FINDINGS



The stylus tip proved to be a miniature stone with a line-contact contour, 6µm scanning radius. Finish was particularly good, as was the orientation. Compliance was nearly 40cu and an arm of low mass (about 3 to 7g effective) is needed. Very light damping can be applied but is not essential.

Output was healthy for a device of this type. A good S/N ratio must be preserved in the hi-fi system, but fortunately the 773 helps in that it is not especially prone to hum (nor, by the way, to microphony). Channel balance was close and the separation trend excellent. Square-wave testing showed a controlled overshoot and reflected the even and quite smooth frequency response.

This cartridge has turned out to be a secure and lightish tracker and the super-lever was negotiated within the normal range. An earlier sample had not displayed quite such flair. The sound became a bit coarse or brash, with hardening and loss of detail, on isolated examples of complex high-level material, but this was not more remarkable than average. More generally the balance was brightish, and a nice impression of attack and analysis was gained. Presentation of subtle details, as with the ambience content of superior programmes, was pleasing.

Further, there was fairly marked tolerance of small imperfections and particles on discs. Rather costly, but avoidance of the need for a special preamp is a plus-point.

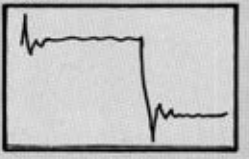
THE VERDICT

A smooth example with some very real merit, placing it somewhere in the top branches of the technical tree. Value is open to question, perhaps, and presumably will lie in the ear of the listener. Some well-endowed folk may feel like adding an extra value star.

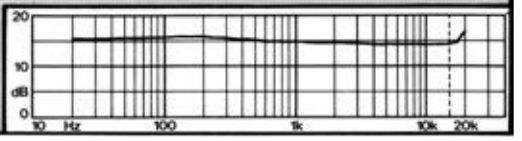
TECHNICAL DATA AND DISTRIBUTOR

Tracking	Standard 1·1g Super 1·5g
Output	L 2·0mV R 1·8mV
Channel balance	0·5dB
Separation at 1kHz	L 35dB R 33dB
Stylus condition	Good
Stylus replacement	W
Arm compatibility	L
Sound quality	Hi

See page 13 for key.



Mission Electronics Ltd,
Unit 9a, George Street,
Huntingdon, Cambs.
Tel: 048057151



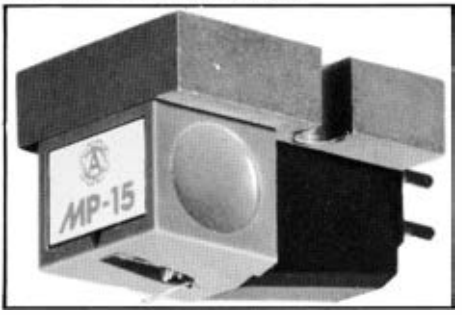
NAGAOKA MP15

£31 MERIT ★★★ VALUE ★★

One of the less expensive examples from the Nagaoka induced-magnet series, the MP-15 is a little simpler than its near-relatives such as the MP-30. For example, the stylus block does not lock into place with screws; on the other hand it is a very positive fit and well above average in that respect. A nude-mounted miniature diamond with 7 x 18µm elliptical tip is fitted.

A combination of details, including the use of a hard and rigid injection-moulded frame instead of alloy parts, makes this model a little lighter, at 7·8g, than the MP-30. The body is Permalloy shielded, the armature is a Permalloy tube as a short extension of the tapered alloy cantilever, and there is a novel laminated magnetic circuit. Specified tracking pressure range is 1·5 to 2·0g.

THE FINDINGS



Well finished and orientated, the miniature diamond showed a reasonable tip contour and was particularly neat in its setting in the cantilever. Stylus compliance, if somewhat higher than claimed, was nevertheless in the middle range at about 19cu. Pickup arms of medium effective mass will qualify and the matching situation will not be particularly fussy. The cartridge was notably tolerant of any minor disc noise.

The frequency response trend was fairly smooth and not so very much different from MP-30, given the same capacitance loading, and the satisfactory separation and square-wave results were also comparable. Output was slightly above specification and balance quite close.

This proved to be a secure tracker if not a very light one, and it was not often caught out. Super-level checking took it to the top of its range. In audition, moments of stress materialised with coarsening and a brash effect, though more generally the sound conveyed plenty of detail and the stereo imaging was acceptable if not outstanding. This was not thought to be a reproducer from which a very interesting acount of ambience in programmes could be expected.

So there are few features which might cause offence, and a smooth rendition of programmes was offered so long as the cartridge was not severely provoked. Good stylus quality was considered to be a plus-point, but the MP-15 seemed at the end of it all to be a little pricey in relation to achievement.

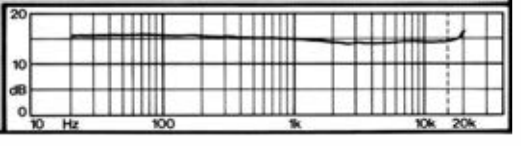
THE VERDICT

A fair tracker, this one, with an overall performance that is pleasing if not specially remarkable. Two stars for value, but add another if the nice standard of manufacture really sways you.

TECHNICAL DATA AND DISTRIBUTOR

Tracking	Standard 1·6g Super 2·0g
Output	L 4·6mV R 4·9mV
Channel balance	0·5dB
Separation at 1kHz	L 21dB R 24dB
Stylus condition	Good
Stylus replacement	U
Arm compatibility	M
Sound quality	Av

See page 13 for key.



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10 Forge Court,
Reading Road, Yateley,
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Surrey GU17 7RX
Tel: 0252 879121

NAGAOKA MP30

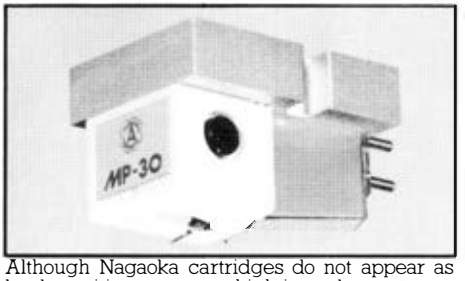
£46 MERIT ★★★ VALUE ★★★

The Nagaoka series, imported by Osawa UK, is headed by the excellent MP-50 and comprises related models which differ in such matters as stylus tip contours, cantilever materials and body details. Nagaoka are noted for a high standard of manufacture and for their own production of diamond tips many of which they supply to other companies.

Second from top in the series, the MP-30 shares with the more costly MP-50 the novel feature of a locked-in stylus block. Side-screws keep this part firmly in place and a locking key is supplied. It does, by the way, also share the fairly high weight of 9 grams. Stylus compliance falls into the high range, so that a pickup arm of fairly low effective mass is appropriate.

Particular features are a rigid aluminium body frame, a Permalloy armature, a boron-rod cantilever and an elliptical nude low-mass stylus tip, the radius figures being 10 x 18µm. Specified output is a shade lower than average for such devices and the tracking pressure spread is stated as 1·3 to 1·8g.

THE FINDINGS



Although Nagaoka cartridges do not appear as load-sensitive as some high-impedance types, experiment yielded a preferred frequency balance with 200pF termination, the characteristic being fairly uniform. Results suggested good symmetry of operation and damping, while the separation trend was satisfactory. Channel balance was close and output above specification but still less than from some magnetics.

The stylus tip has a large minor radius and it is not clear why it has not been made more usefully elliptical in view of the potential of this model in respect of low-pressure tracking. The setting and finish of the naked tip were satisfactory, with a very minor reservation about polish. Compliance was higher than specified at about 27cu and matching with an appropriate arm must be carefully considered, the required effective mass range being about 5 to 9g (plus cartridge). Very light arm-damping will be beneficial, so it looks as though only the more advanced arms will really suit — with few exceptions.

While it negotiated the super-level test at a fairly low pressure, the MP-30 did reveal some stress on high-scored commercial material, bringing to the sound a degree of hardness and some detail loss which fortunately was not a feature of audition with average programmes. Reasonable high-end sparkle, generous detail and firm, extended bass were characteristics. No special emphases and in all an innocuous effect. It seems to have much in common with the MP-50, of which recent experience has been gained, and the tracking ability plus a good standard of manufacture may well have strong appeal.

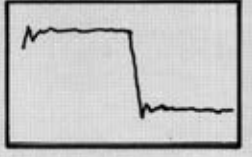
THE VERDICT

An enthusiast's cartridge with a creditable turn of performance. A good tracker and fair value. Arm matching warrants care.

TECHNICAL DATA AND DISTRIBUTOR

Tracking	Standard 1·1g Super 1·5g
Output	L 4·0mV R 3·8mV
Channel balance	0·3dB
Separation at 1kHz	L 22dB R 24dB
Stylus condition	Fair
Stylus replacement	U
Arm compatibility	L
Sound quality	Hi

See page 13 for key.



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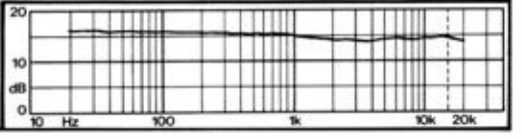


ORTOFON MC10 MK2

£48

MERIT ★★★★
VALUE ★★★★★

Ortofon's MC10 has been around for some time and has proved to be one of the more interesting moving-coils in the medium-compliance category. This Mk2 version, which arrived in the UK just as work started on compilation of these reports, is an improved model showing signs of reduced stylus mass and some advance in tracking capability. Internal impedance is 3 ohms.

According to Ortofon the newcomer gives a 'more detailed' sound and a 'deeper perspective' to the music. Superficially it is like the earlier version, with the same monoblock body, total weight 7 grams. The stylus is not user-replaceable. The tip is a 8 x 18µm elliptical nude diamond in an alloy cantilever and suggested tracking pressure is 1·5g. On a point of detail the cartridge still has open apertures for fixing in a headshell — rather fiddly and less convenient than closed holes.

As with the original version the output is unusually low and care must be taken over the step-up arrangement if an acceptable signal-noise ratio is to be ensured. A gain of at least 30 is advisable and Harman UK, the Ortofon distributors, can advise in cases of difficulty.

THE FINDINGS

The frequency response trend was elegant, with a rise which was not too marked until well outside the audio spectrum, while separation was superior, with good results up to high frequencies. Channel balance was fairly close. Output was above that claimed, and in the circumstances that must be counted a blessing, but this is still a low-output device. Load by at least 100 ohms.

A nicely set nude diamond with the claimed elliptical contour was observed, and both alignment and finish were approved. Stylus compliance was a little greater that the specified 11cu but the cartridge remains firmly in the medium area and results suggest an effective arm mass in the middle range (upwards of 10g plus cartridge) will be best. Mild arm damping would be worth considering.

Compared with the earlier model, this version reflects a step forward in tracking ability, and the standard test was completed below the maker's figure while the super-level was just about negotiated at the top of the range. In audition the onset of mistracking was marked by veiling of detail and an edgy quality.

Otherwise the results were smooth, with nice clarity and analysis, and the rendition of subtle ambience information in high-grade programmes was as expected from a good MC. There was not quite the same neutrality admired in some advanced devices, but in relation to price the Ortofon achievement is truly creditable.

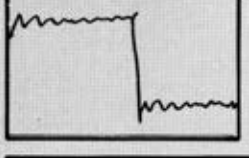
THE VERDICT

This looks like the welcome return of the prodigal! The technical accomplishment is admirable, and in the light of current developments the cartridge must be acclaimed as tops for value.

TECHNICAL DATA AND DISTRIBUTOR

Tracking	Standard 1·4g Super 1·8g
Output	L 0·15mV R 0·18mV
Channel balance	0·4dB
Separation at 1kHz	L 32dB R 30dB
Stylus condition	Good
Stylus replacement	W
Arm compatibility	M
Sound quality	Hi

See page 13 for key.



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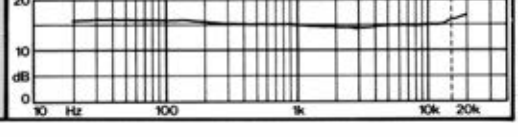
Berkshire SL2 5DD
Tel: 0753 76911



ORTOFON VMS10E MK2

£19

MERIT ★★★
VALUE ★★★★

Superficially this model is like the more expensive VMS noted on the adjacent page. However, it does seem to have a greater effective stylus mass and presumably the tip is cheaper to produce. The latter has an elliptical contour, although the dimensions are not listed in the specification packed with the cartridge.

Ortofon data show this to be a medium-compliance model for which a 2g tracking pressure is recommended. Cartridge weight is 5g and a flip-down stylus guard is fitted — much better than the loose guards which, one suspects, rarely receive any use after they are first removed.

As with other models in the series Ortofon advise use of a total capacitance of 400pF per channel. If the leads do not account for this, seek advice with a view to either lengthening them or fitting Ortofon's CAP210 capacitor between the terminal pins of the cartridge.

THE FINDINGS

The frequency response proved to be nearly as regular as for the VMS30, given the specified load condition; the separation trend was little different, with 19dB at 10kHz; and the channel balance was again quite close. Output was near to specification. The square-wave result was reasonably well shaped, and again signs of symmetry were good.

As with the companion model, the stylus tip finish was hardly of the finest, but orientation was approved and the round diamond was set neatly enough. The tip contour was 9 x 18µm bi-radial. Stylus compliance was firmly in the medium area at 15cu and a pickup arm in the middle of the range of effective mass, as found on some integrated players in the popular market, will be a compatible partner.

For a cartridge in this price-bracket the tracking performance was pretty healthy. The standard check required a pressure far below the manufacturer's recommended figure and the super-level was negotiated significantly below the limit. Challenged by the more severe examples of modern disc recording this model's sound quality coarsened, losing the gracious character which was otherwise often a source of pleasure.

In general, while transparency was never a particular feature of the presentation, the sound displayed a likeable tonal balance. A hint of brightness was found acceptable, stereo imaging was good, and detail was competently conveyed. Tolerance of disc noise and imperfections could be classed as fair rather than specially good.

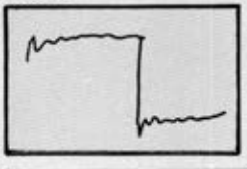
THE VERDICT

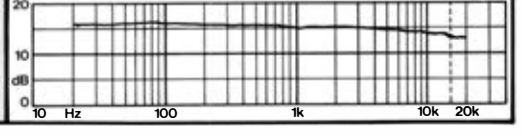
Good on tracking and, indeed, on most counts in relation to the moderate price. No doubt this model will provide what a lot of buyers require. Rather good value.

TECHNICAL DATA AND DISTRIBUTOR

Tracking	Standard 1·2g Super 1·8g
Output	L 5·4mV R 5·7mV
Channel balance	0·5dB
Separation at 1kHz	L 34dB R 31dB
Stylus condition	Fair
Stylus replacement	U
Arm compatibility	M
Sound quality	Hi

See page 13 for key.





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ORTOFON VMS30 MK2

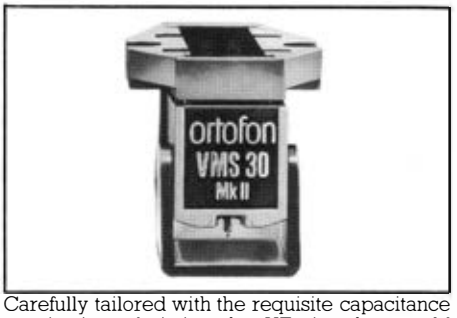
£35 MERIT ★★★ VALUE ★★★★

Apart from the celebrated moving-coil cartridges from Ortofon of Denmark there is a series of VMS (variable magnetic shunt) models which have gained wide acceptance and favour. They are noted for their tracking flair and the VMS20E is an example that has earned special distinction. The VMS30 is similar but is not claimed to be quite such a featherweight tracker.

On the other hand it boasts a 'fine-line' contoured stylus tip and a reduced effective stylus mass. Cartridge weight is 5 grams and a flip-down stylus guard is included. Specified tracking pressure range is 1·0 to 1·6g, with a recommended 1·3g setting, and output is generous.

For this and other high-inductance models Ortofon specify a total load of 400pF per channel. If the pickup lead capacitance is too low (and that is quite likely), a major increase can be obtained by running a longer lead or, more conveniently, by fitting the neat CAP210 device, available as an accessory. It is a tiny capacitor which fits between the cartridge terminal pins and thereby connects to both channels.

THE FINDINGS



Carefully tailored with the requisite capacitance termination, obviating the HF rise that would otherwise be obtrusive, the frequency response proved to be quite smooth, while the separation result was very good, maintained to 20dB at 10kHz. The square-wave, with a mild ring and good shape, backed up the findings, and in all the results were indicative of low stylus mass and good symmetry in the transducer's operation.

Stylus tip polish could not be called anything better than fair, but the nude-mounted diamond of a line-contact contour was properly aligned and neatly set, while the 9µm scanning radius seemed on the large side. Compliance of nearly 30cu was obviously high and a low-mass arm (about 4 to 8g effective, plus cartridge) will be preferred. Some damping would not be amiss.

As the figures suggest, the cartridge tracked lightly at average recorded levels and responded well to the super-level, completing this at 1·4g, which is well within the top specified limit. In audition the distortion rose rather noticeably with the stimulus of high levels and complex material, and the onset of mistracking was marked by blurring and loss of detail.

More generally, though, the performance was distinguished by fine, precise stereo presentation and a good account of detail. At the same time the tonal character was considered to be a bit dull, with something less than ideal transparency — even a shade thick in texture. Well extended bass, given a suitable low-mass arm, and fair tolerance of disc imperfections.

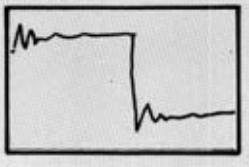
THE VERDICT

A good tracker with a fair share of technical merit. A distinctive sound emerges, so do try it. High marks for value seem warranted.

TECHNICAL DATA AND DISTRIBUTOR

Tracking	Standard 0·9g Super 1·4g
Output	L 5·3mV R 5·6mV
Channel balance	0·5dB
Separation at 1kHz	L 32dB R 34dB
Stylus condition	Fair
Stylus replacement	U
Arm compatibility	L
Sound quality	Av

See page 13 for key.



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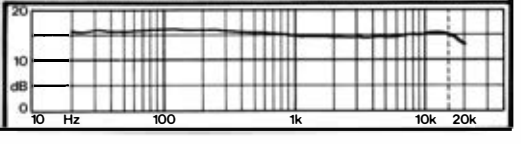


OSAWA OS-60L

£100 MERIT ★★★★ VALUE ★★

This addition to the more exotic flowers of moving-coil development was introduced by J. Osawa & Co as a sort of 'flagship' model at about the time this Guide was compiled, and indeed the sample was one of the first available. It seems that the cartridge is made for Osawa by Supex, a company with a certain reputation for MC types, although some of the interest in their efforts may well have been deflected by all the recent activity by other sources of supply.

Model OS-60L is a low-output cartridge of fairly low stylus compliance (about 10cu), evidently intended to partner pickup arms in the upper range of effective mass. Weight is about 5 grams and construction of a four-square kind such that a large area is clamped against the headshell when the cartridge is installed. Rigidity is good. A cross coil arrangement is incorporated, a short alloy cantilever is used, and the naked diamond has a true elliptical contour with approximate 6 by 18μm radii.

THE FINDINGS

Output was near to specification and channel balance quite close, while the separation trend was tidy and regular-looking and the frequency response well extended, notwithstanding a small droop in the midrange. Study of the cartridge's behaviour indicated a very small stylus mass, and the resonance evidently falls very high, while damping seems fairly good. Square-wave testing revealed moderate ringing and good symmetry. Slight arm damping could be beneficial but is certainly not imperative.

From inspection the alignment of the naked elliptical diamond appeared accurate, while the tip finish was adequate. The cartridge proved reasonably tolerant of mild disc imperfections, which were subdued rather than emphasised. The adhesive showing behind the cantilever tip appeared to be over-generous.

Tracking was good on most material but the super-level test took the cartridge well to the top of the permissible range. On audition there were in fact some signs of incipient mistracking with a hardening of quality, with a glassy or brittle effect, conveying some impression of stress. Not at all unusual among moving-coils, though.

Generally the stereo imaging was pleasing and revelation of detail very good. A favourable impression of transparency and depth was gained, with satisfactory presentation of interesting ambience content of programmes. The general balance was slightly inclined toward warmth or richness — not quite as explicit in the high range as with some up-market MC models. On the whole a good result from what is clearly a contender for arms in the higher range of mass and of superior quality.

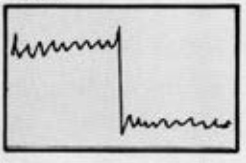
THE VERDICT

A pleasing cartridge of somewhat specialised appeal and with a good share of technical merit. The price does seem a little high, though, and reservations are felt about the value offered.

TECHNICAL DATA AND DISTRIBUTOR

Tracking	Standard 1·5g Super 2·3g
Output	L 0·31mV R 0·33mV
Channel balance	0·5dB
Separation at 1kHz	L 30dB R 32dB
Stylus condition	Good
Stylus replacement	W
Arm compatibility	H
Sound quality	Hi

See page 13 for key.



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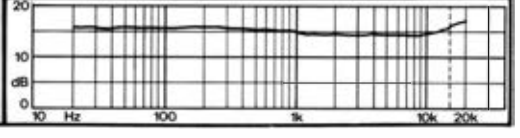


OSAWA OS-2001

£13

MERIT ★★★
VALUE ★★★★

Osawa UK, known as importers of Nagaoka cartridges, have recently spread their interests down-market by introducing with their own brand-name a group of three magnetic cartridges to sell in the £10-20 bracket. The middle example is the subject of this report.

The cheaper model has a conical stylus and the more expensive one a nude elliptical. All are induced-magnet types, the fixed magnet being located at the front of the body close to the tubular armature which is an extension of the alloy cantilever.

Model OS-2001 has a bonded elliptical stylus tip with specified 10 x 18μm radii. Weight is just over 4 grams and the standard of manufacture is good. Compliance is listed as 12cu and the specified tracking pressure range is 1·3 to 2·0g with a 1·8g mean suggested for general use.

A reference to a permissible increase of down-pressure to 3·5g in the event of 'vibration' seemed very curious, for the cartridge simply does not work properly at that pressure, and if there is vibration there must be something wrong with the hi-fi!

THE FINDINGS

Stylus compliance was a little greater than specified but firmly in the middle area, indicating use of an arm of medium effective mass (around 9 to 13g) without damping. The shank-mounted tip was acceptably shaped and well aligned, though the finish was nothing special and the setting in the aluminium alloy cantilever not very neat.

The cartridge was a little intolerant of disc imperfections but not unduly so for a cheap product. Channel balance was better than specification and output higher, though this cartridge is still rather meagre with output compared with, say, many moving-magnet types. Fortunately the screening is adequate and signal-noise problems are unlikely to arise.

Separation showed a regular trend and the results generally indicated good symmetry of operation. Frequency response was no rougher than average in the low-budget context. The makers offered no guidance on loading but 220pF was thought reasonable for tests.

It was pleasing to find the cartridge was a good tracker, completing the test regime within its normal range, although it could hardly be expected to respond very gracefully to the most awkward modulations, which tended to provoke a thickening of textures and some hardness. Otherwise the sound was smoother than the technical observations seemed to promise.

It lacked sparkle and attack to some extent, but the lightish quality, with good bass, was remarkably satisfying on all but the really challenging material. Explicit stereo imaging good, impressions of depth only fair.

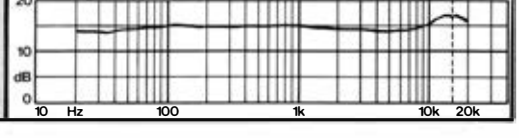
THE VERDICT

A welcome newcomer in its class and a fair bet for any carefully chosen low-cost outfit. Very good value. Its near-relative, model 3001, has a nude-mounted stylus and marginally higher compliance and should be worth a try if conditions of use permit.

TECHNICAL DATA AND DISTRIBUTOR

Tracking	Standard 1·4g Super 1·9g
Output	L 3·2mV R 3·6mV
Channel balance	0·8dB
Separation at 1kHz	L 26dB R 30dB
Stylus condition	Fair
Stylus replacement	U
Arm compatibility	M
Sound quality	Av

See page 13 for key.



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Camberley,
Surrey GU17 7RX
Tel: 0252 879121

PICKERING NP/ATE

£9

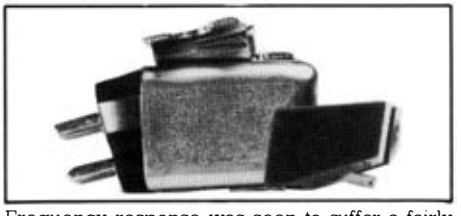
MERIT ★★★
VALUE ★★★

Although enthusiasts know Pickering for their medium-priced and even madly expensive and prestigious products (such as the new low-Z cartridge reviewed in this Guide), they may not be aware that this manufacturer claims a good share of the market in much cheaper devices, especially the robust cartridges required by the less ambitious owners of record players, itinerant disc jockeys and groove-grinders of all persuasions.

At a glance the NP/ATE looks like most from the same source — the same type of stylus block and body design, the same fixing bracket. Closer inspection reveals a stout alloy cantilever (enormous seen against the delicate styli in up-market models), while the compliance is very low, as befits the massive and possibly maladjusted arms typical of the intended applications.

Description is otherwise difficult, as little information is supplied. One learns that this particular version has an elliptical tip, radius figures being 10 x 18μm. Tracking range is 2 to 5g and the nominal output 10mV. This cartridge weighs little more than 7 grams.

THE FINDINGS



Frequency response was seen to suffer a fairly rough passage, but not unacceptably so, and separation was small in the high range while reasonably well maintained in the midband. A capacitance load of 200pF was a reasonable compromise, although an increase could tailor the top response with more marked decline.

Channel balance was fair and the very high output was expected. Amplifier input overload would not be much of a consideration with the type of equipment likely to be used, and the highest possible signal voltage might often be counted an advantage. The situation is not at all the same with systems having any hi-fi pretensions.

Inspection showed the stylus to be a shank-mounted diamond, the bi-radial grind of the tip being well on the way to a hemispherical shape. It was not very neatly set and the finish was rather dull. Compliance was about 6cu. As for tracking, the NP/ATE completed the standard level at 2·4g, near the bottom of the specified spread, while the super-level was negotiated, barely and uneasily at 5g. Experiment was not pursued at any length, as such a pressure was not thought practicable for a cartridge that could not in any case be expected to surmount the obstacles of very challenging modern material. The matter of groove wear has also to be considered.

Given average material rather than torture-tracks, the cartridge yielded a fairly forward and positive sound, with moderate imaging. High-end sparkle was not a feature, and on some material the HF distortion was evident. The effect was coarsened on passages of relatively high level such as strong vocals, but the sound was less brash — almost smooth — on less provoking material.

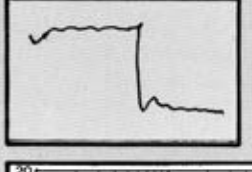
THE VERDICT

It is fair to say that the cartridge sounded better than it measured. There are obvious limitations but the result was quite good for the price. Don't expect too much, but you will hardly criticise the value offered.

TECHNICAL DATA AND DISTRIBUTOR

Tracking	Standard 2·4g Super No Go
Output	L 10·4mV R 12·0mV
Channel balance	1·0dB
Separation at 1kHz	L 20dB R 18dB
Stylus condition	Fair
Stylus replacement	U
Arm compatibility	H
Sound quality	Av

See page 13 for key.



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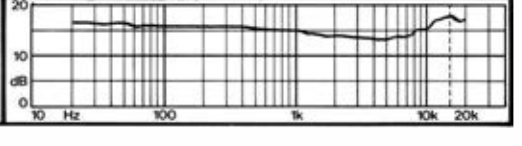
Tel: 01-607 8141



PICKERING XEV/3001

£60 MERIT ★★★★ VALUE ★★★

Apart from Pickering's low-impedance cartridge, which of course is of recent introduction, the XEV/3001 is the latest model of more conventional type to come off the production line. It is a moving-magnet and of the usual high impedance. Weight is 5·5 grams.

At first sight the most evident development is the use of a shorter cantilever in the push-in stylus assembly. This straight alloy-tube part carries a nude-mounted elliptical tip and the product description also mentions a rare-earth magnet of reduced mass. Although Pickering do not say much about tracking capability it is apparent that they have gone for lower tip mass and very light tracking while not adventuring in the ultra-high compliance region.

THE FINDINGS

The mildly drooping frequency response is characteristic of an MM from this source and proved most acceptable with the recommended 275pF loading. Other results, all very satisfactory, were a regular looking square-wave, superior separation (at high frequencies too) and close channel balance. Output was near to spec.

Stylus inspection revealed a well contoured naked tip with a good polish, neatly set and orientated. Radii are 6 × 18µm, in keeping with the design as a whole. Compliance of 24cu comes into the higher range without imposing any special problems with arm matching, and components of lowish effective mass would be the wisest choice.

This model made a good impression with its tracking flair, negotiating the super-level test at the top of its specified range, which is 0·75 to 1·5g, and tackling a variety of the more challenging of modern discs with a nice show of security. Only very occasional cracking or blurring intruded.

A likeable account was given of the more subtle stereo effects and there was also a fair display of detail on the stable stereo image, except on odd occasions when incipient mistracking robbed any of it. A sharper analysis was wished for on some recent recordings and it was felt that the balance tended to be a bit dull, but what one listener may regard as a lack of 'life' another will admire as acceptable smoothness.

Indeed, the strongest impression concerned the generally smooth and easy quality — it seems to be a Pickering house-style. The firm bass was approved, as was the tolerant handling of disc noise and distortion.

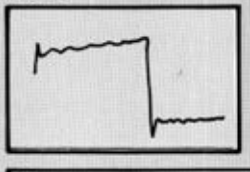
THE VERDICT

Although no more than middling on value, the XEV/3001 can provide some very gracious sounds and should be well liked for its tracking integrity. It's not for indifferent turntable units, though.

TECHNICAL DATA AND DISTRIBUTOR

Tracking	Standard 1·0g Super 1·5g
Output	L 4·3mV R 4.1mV
Channel balance	0·5dB
Separation at 1kHz	L 33dB R 34dB
Stylus condition	Good
Stylus replacement	U
Arm compatibility	L/M
Sound quality	Hi

See page 13 for key.



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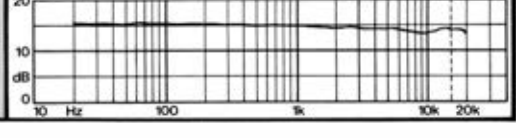


PICKERING XLZ/7500S

£120 MERIT ★★★★ VALUE ★★

This cartridge is one of the few true novelties to emerge recently, for it is a moving-magnet model with the electrical characteristics of a moving-coil. Its internal impedance consists of only 1mH and 3 ohms per channel, so that it views its load in much the same way as a MC.

However, the XLZ/7500S differs from most MC types in that it has a push-in stylus, like any other Pickering and the great majority of magnetic cartridges. The naked tip is of the line-contact variety (scanning radius 8µm), known in this instance as a Stereohedron, designed to improve stylus/groove contact while maintaining high-frequency tracing precision. Weighing only 5·5 grams, the new model is ostensibly like others from this manufacturer — and that goes for the quaint little brush pivoted on the front. This appendage, of questionable value, was removed lest in interfere with tracking and bias investigations.

Pickering are not at all keen on loading the cartridge down with a transformer, and justifiably they refer to the deficiencies of that method while criticising the MC input conditions on many amplifiers. They are among the authorities now promoting the use of a load of 100 ohms (as a minimum) and have produced a neat battery-powered preamp unit, model P20, to provide the required conditions.

THE FINDINGS

Frequency response was fairly smooth and the separation trend of some distinction, while output was slightly above specification, with very close channel balance. Note, however, that the output voltage is still very meagre and lower than from some moving-coil models. Square-wave checks indicated good symmetry and fairly good damping. Mild arm damping would be worth considering, though it is not really essential.

The cartridge sailed through the tracking tests and subsequent audition confirmed the ease with which it could tackle awkward high-level torture tracks.

Results with both Pickering P20 and QED MCA1 preamps were excellent. At all times the cartridge impressed as a tenacious and refined tracker and in general the balance could be described as slightly 'soft' and forgiving, yet certainly elegant and easy on the ear. Bass was firm and extended.

Stereo imaging was outstandingly good and the amount of detail retrieved was impressive. While the cartridge did not display the sweet and transparent quality of the finest moving-coils, its distinguished place among magnetic devices seems assured.

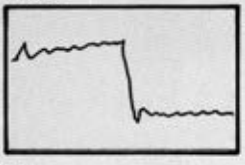
THE VERDICT

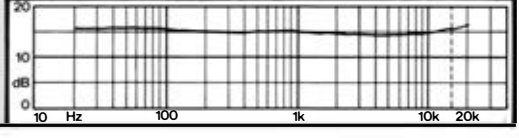
If value for money headed our criteria, the new Pickering could hardly be taken more seriously than some of the moving-coil 'cult' products now attracting attention out of proportion to their merit. But Pickering are appealing to a very limited market and doing it well, and those who appreciate the technical innovation offered here are unlikely to be disappointed.

TECHNICAL DATA AND DISTRIBUTOR

Tracking	Standard 0·9g Super 1·3g
Output	L 0·35mV R 0·38mV
Channel balance	0·2dB
Separation at 1kHz	L 31dB R 33dB
Stylus condition	Good
Stylus replacement	U
Arm compatibility	L
Sound quality	Hi

See page 13 for key.





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PICKERING XV15/625E

£23

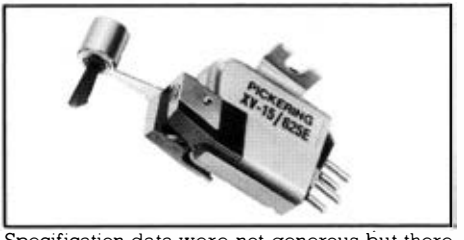
MERIT ★★★
VALUE ★★★

One of an extensive series, this well established model seems appropriate to the simpler audio systems, music centres and suchlike in the popular price area. The importers suggest that it could be useful for upgrading performance of equipment in that category, and to judge from its characteristics their suggestion is a reasonable one.

At any rate it is certainly true that cheap and cheerful cartridges are too often put into players more as an obligation to complete the outfit than because they are thought to have any merit. Fair to say that this Pickering can qualify as a medium-compliance example suited to the pickup arms found on at least some of the good quality popular turntables. A few other keenly priced cartridges sprinkled through the pages of this Guide can qualify in like fashion.

The usual push-in stylus assembly features a straight-tube alloy cantilever and an elliptical 7 x 18µm diamond. A narrow tracking range is centred on a 1·2g mean and the 625E weighs 5·5 grams. There is the familiar little tracking brush found on many Pickerings, and this was discarded to avoid interference with tracking investigations.

THE FINDINGS



Specification data were not generous but there was a mention of 275pF capacitance loading and this was adopted for tests. Even then the response trend was mildly declining. Channel balance was close, output near to specification, and separation fairly good, while a clean square-wave result was obtained — in all a reasonable start to the findings.

The stylus was a shank-mounted diamond, an elliptical with minor and major dimensions as specified. The mounting was a bit rough, the tip correctly aligned, and the polish just a little on the dull side. Stylus compliance in the middle range (about 20cu) does, as already indicated, suggest use of medium-mass arms. Light arm-damping would be worth considering.

Pickering seem a shade optimistic over tracking and in fact the cartridge barely lives up to the promise contained in the advice about a mean setting of about 1·2g. It tackled the standard level at exactly that figure but technically the result was a 'No go' for the super-level check. However, it did respond to the latter in uneasy style just outside its range at 1·7g. Not bad, perhaps, in relation to price.

As for audition, mistracking on demanding items showed up with some congestion and splutter, with loss of detail, but otherwise the sound could be described as smooth and innocuous. A bit dull, maybe, but quite easy on the ear, given average material and not much provocation. Fairly good stereo imaging, commendably firm bass.

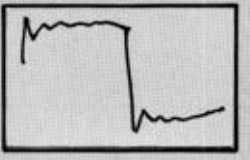
THE VERDICT

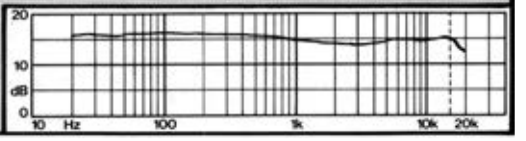
You will have to go up the price-scale if you want a more elegant tracker, but on the whole the results are not too bad and the value is fair. The character of the sound suggests that this one could help compensate if your speakers are too brilliant or brash. And that takes us back to the opening of this report . . .

TECHNICAL DATA AND DISTRIBUTOR

Tracking	Standard 1·2g Super No go
Output	L 4·8mV R 5·0mV
Channel balance	0·3dB
Separation at 1kHz	L 24dB R 21dB
Stylus condition	Fair
Stylus replacement	U
Arm compatibility	M
Sound quality	Av

See page 13 for key.





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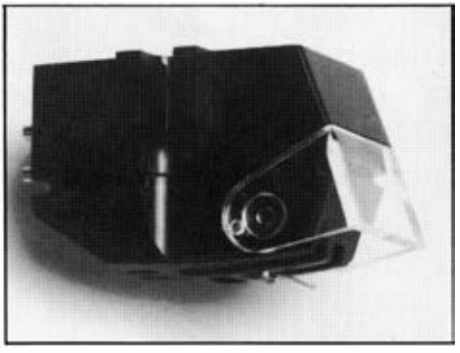
REFERENCE SPECTRE

£80 MERIT ★★★ VALUE ★★

A relatively recent model, manufactured in Japan for Reference, this is a low-output MC cartridge requiring either a suitable preamp unit or a special moving-coil input on the hi-fi amplifier. The specification gave no direct instructions about this but Reference will be able to advise. An input of 100 ohms or so would be preferable.

Cartridge weight is about 8 grams and the specified tracking pressure range is 1·5 to 2g. A naked elliptical-tip diamond with 8 × 18μm radii is listed and the compliance falls into the upper medium area, while consideration of the design leads to the expectation of superior separation. The stylus is not replaceable by the user.

THE FINDINGS



The frequency response was found to be commendably uniform and extended, and results of that standard should be readily secured with a linear preamp. Lead length is not particularly critical. Output was above the specified nominal, channel balance was only fair, the square-wave suggested adequate damping of the system. Separation results were very good indeed, with a high midband figure lessening to a creditable 24dB at 10kHz.

A well-contoured stylus tip, nude-mounted and neatly set, was inspected. Finish was a bit dull. Compliance was 23cu, well up the medium range and indicating the use of an arm in the middle area of mass (or less), although a super lightweight would hardly be appropriate. There is no need for arm-damping.

Tracking capability could not be described as advanced, although a fair variety of average commercial material was tackled sweetly enough within the specified top limit of pressure. On the other hand, statutory testing showed that only the standard level could be cleanly negotiated. In audition there was often a sense of stress on the more highly-scored material, with hardening or even edginess in the upper range.

More unmusical signs of mistracking appeared just occasionally. However, there were rewards in the form of precise and detailed stereo, with nice presentation of subtleties such as ambience information, in the absence of the direct provocation caused by some modern programmes. Bass was tight and clean. Surface imperfections were treated tolerably rather than outstandingly well.

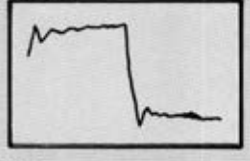
THE VERDICT

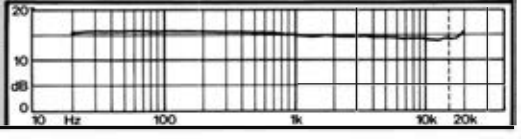
A creditable example of the MC type. Not particularly distinguished for tracking flair, but it does offer specific merits in stereo performance and is not too fussy about arm matching.

TECHNICAL DATA AND DISTRIBUTOR

Tracking	Standard 1·6g Super No. go
Output	L 0·21mV R 0·27mV
Channel balance	1·5dB
Separation at 1kHz	L 32dB R 36dB
Stylus condition	Good
Stylus replacement	W
Arm compatibility	M/L
Sound quality	Av

See page 13 for key.





Reference Audio Products,
PO Box 86,
Headington,
Oxford OX3 9JZ
Tel: Oxford (0865) 60844

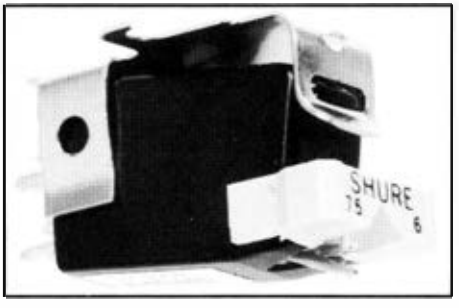
SHURE M75-6S

£13 MERIT ★★ VALUE ★

Another version of Shure's M75 series, this time with a conical stylus and of a compliance that is lowish, just falling in the medium range. By the way, a figure 6 in the suffix means that the stylus is of 0·6 thou. radius, and that happens to be 15μm.

The 75-6S is of course long established, a sort of golden oldy, but that is not to say that uses for it have totally disappeared. The intention seems to be to offer M75 'trackability' while keeping price down (via the low-cost stylus) and ensuring the cartridge suits the less demanding applications in popular turntable units. Cartridge weight is 5 grams, the standard of manufacture is good, and the specified tracking pressure range is 1·5 to 3g.

THE FINDINGS



Given a 400pF per channel loading, approximately as recommended, the frequency response showed the fairly pronounced and expected decline toward the HF range, while the square-wave result again showed some affinity with that characteristic. Separation was acceptable with fairly good results to HF, while output was a bit above spec and channel balance reasonably close.

The hemispherical-tip diamond had a 15μm radius and both finish and setting in the cantilever were good. Robust design and compliance at about 14cu give compatibility with pickup arms in the medium to high region of mass, suiting the less advanced types of component fitted to inexpensive players.

Tracking performance was good for a cartridge in this category and the tests were tackled within the specified spread, with standard tracking at 1·5g and the higher level within the normal top limit. However, there were some particularly strangled sounds from many of the more challenging modern discs, and for much of the audition no real high-frequency information emerged at all. It may, however, be said that much of the audio gear encountered in the 'budget' and 'music centre' area has no real treble either . . .

Although no great elegance can be expected at this price level, and bearing in mind that the cartridge can probably be obtained for less than the price quoted above, it must still be said that the tonal balance was disliked for its dullness and thick-textured quality. Detail was lacking, and that is a reminder of (among other things) the benefits of using an elliptical stylus under suitable conditions.

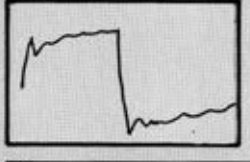
THE VERDICT

A fair tracker but a dull dish, though compatible with the lowly kind of audio gear for which it is evidently intended. Not very appealing value, though it may have its uses.

TECHNICAL DATA AND DISTRIBUTOR

Tracking	Standard 1·5g Super 2·5g
Output	L 7·1mV R 6·5mV
Channel balance	1·0dB
Separation at 1kHz	L 21dB R 23dB
Stylus condition	Good
Stylus replacement	U
Arm compatibility	M/H
Sound quality	Ba

See page 13 for key.



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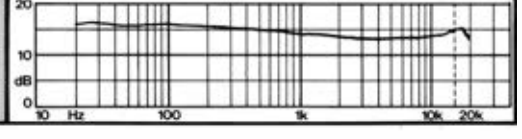


SHURE M75HE/2

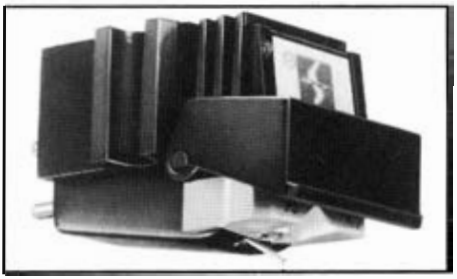
£33 MERIT ★★ VALUE ★★

With a considerable history, extending over a period during which there have been many developments in pickups, the M75 type 2 is now refined a little and arrives with a 'hyper-elliptical' (HE) stylus similar to that introduced on the M97HE.

This moving-magnet cartridge has been among the more popular Shure models, and doubtless the stylus tip innovation is intended to extend its commercial life. From inspection it appears that the cantilever and suspension have also been subject to some refinement. The M75HE/2 lacks the damping gadget fitted to more costly models such as M97HE but it does have a flip-up stylus guard.

Weighing about 6 grams, the cartridge is of the high-compliance variety requiring an arm of low effective mass for best results. On the other hand, at this price level it is unlikely that many users would feel justified in partnering the cartridge with an arm of very advanced type. As for details, one could wish that Shure would aid the user by fitting colour-coded terminals, for the indentifying legends on M75 and some other models are quite difficult to see.

THE FINDINGS



With this fairly load-sensitive cartridge the recommended loading of 400-500pF total capacitance per channel took the high-frequency response down more than was liked, and the result with 350pF was slightly preferred despite a degree of lumpiness at the top end. Not a particularly elegant result in any event.

Separation was fairly good and channel balance very close, the output being marginally above specification. Square-wave testing gave a reasonably tidy result. Stylus inspection showed a well-mounted naked elliptical tip, the finish of which left something to be desired. Tracking capability was impressive, for it did not lag far behind the more costly models. Light damping of the pickup arm would be worth considering but, again, it seems unlikely that many users would choose a suitably-equipped component at this level of outlay

Despite basically secure tracking, replay of a variety of material was marked by some hardness of treble and a rather dull overall balance. Detailing was often dim, or veiled, and stereo subtleties were not as well presented as could be wished. The M97HE was considered much preferable, perhaps to a stronger degree than the price difference would suggest.

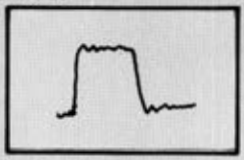
THE VERDICT

The new stylus is not at all a bad idea, but still there is nothing special to enthuse over. Some listeners may have a higher opinion of this model, and in any case much depends on the kind of audio system used, but the results are to some extent disappointing.

TECHNICAL DATA AND DISTRIBUTOR

Tracking	Standard 1·0g Super 1·5g
Output	L 6·5mV R 6·2mV
Channel balance	0·5dB
Separation at 1kHz	L 27dB R 24dB
Stylus condition	Fair
Stylus replacement	U
Arm compatibility	L
Sound quality	Ba

See page 13 for key.



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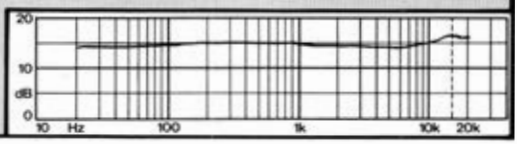


SHURE M95HE

£41

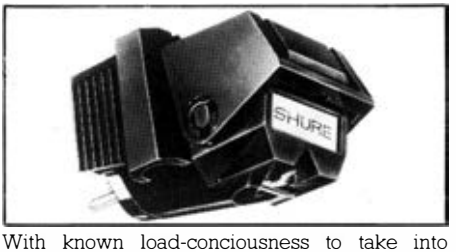
MERIT ★★★
VALUE ★★★

In a closely arrayed Shure moving-magnet range this model falls between the M75 and M97 types included in this Guide, and the price reflects this. Some price reduction may be found in the market-place, but that can be said of many other cartridges as well.

This particular version now sports the HE suffix and, therefore, the hyper-elliptical stylus, amounting to a step-up for a design that is firmly established as a Hi-Track model. The 'trackability' claim quotes 33cm/sec velocity tracking at 1kHz and 19cm/sec at 10kHz for 1g pressure, and the tracking spread is 0·75 to 1·5g.

Weight of the cartridge of 6·3 grams (the same as M97 types) and the stylus compliance is fairly high, so that use of an arm of low effective mass is appropriate. In that connection, scope for manoeuvre is not very wide because the cartridge does not have the damping device which is fitted to some other Shures.

THE FINDINGS



With known load-conciousness to take into account is was decided to look a little below the advised 400-500pF loading per chanel and settle for 350pF, the same as applied to the M75HE, giving a mildly declining but preferred high-end response, maintained for audition.

Output was above specification, as is often the case with this maker's products, and channel balance better than claimed. The separation trend was satisfactory and not much different from M97HE findings, while the square-wave result was as neat and regular as expected.

Well mounted and aligned, the HE naked tip was a modified elliptical, essentially the same as in the 97HE and exemplary in respect of finish and its setting in the alloy cantilever. In all the cartridge seemed a shining example of a device falling within specification on all important counts. With a stylus compliance around 30cu the cartridge really needs a low-mass arm, as already mentioned, and light damping will be conducive to best results.

It was no surprise to discover tracking flair of some note, and the cartridge lagged behind its more costly relatives by only a small margin with its ability to tackle the more tortuous material near the top of its range. Inclusion of the damper gadget would have been worthwhile, one feels; but you have to buy the M97 for such a refinement . . .

Some may find the sound on the dull side, with a down-tilted balance tending to bring attention to the lower energy programme content, but still the detail presentation and stereo imaging through the range are commendable. Some veiling in the high range, plenty of bass (but be careful with arm matching), a bit of stress on complex, high scored material.

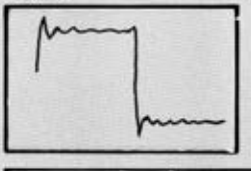
THE VERDICT

Poised somewhat uneasily between other, well related designs, the cartridge is middling value and has the merit to appeal to those who will use it carefully. But the M97HE is more attractive and worth the extra cost.

TECHNICAL DATA AND DISTRIBUTOR

Tracking	Standard 1·0g Super 1·4g
Output	L 5·8mV R 5·5mV
Channel balance	0·4dB
Separation at 1kHz	L 29dB R 32dB
Stylus condition	Good
Stylus replacement	U
Arm compatibility	L
Sound quality	Av

See page 13 for key.



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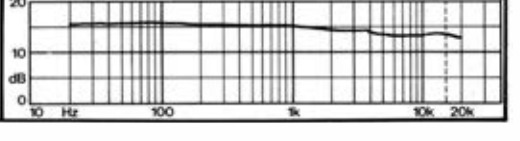


SHURE M97HE/2

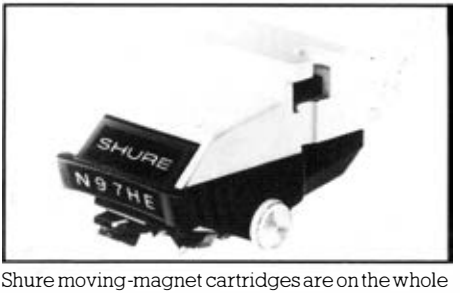
£57 MERIT ★★★★ VALUE ★★★★

Shure's well established M97 series cuts across the medium-price range with a choice of styli to suit various conditions of use. The 'HE' suffix indicates the use of a 'hyper-elliptical' stylus, which is supposed to be a variety of line-contact tip, and the stylus assembly has a high-compliance characteristic.

Particular features are a composite cantilever designed to combine increased stiffness with reduced mass and, of course, a subsonic damper/brush device, viscous damped and hinged at the front of the cartridge. This latter item can be allowed to contact the disc or it can be disengaged by pushing it up. There is, by the way, some expert support for the idea of imposing damping near the stylus instead of at the pickup arm's pivot.

Then, one need hardly say, there is the 'trackability' aspect. All cartridges have it but only Shure coined a special work to label it. Weight of the cartridge is just over 6 grams. Due to its high stylus compliance it is primarily a candidate for arms of low effective mass, although the use of the damper improves stability and makes this model less fussy about mechanical matching than might be expected.

THE FINDINGS



Shure moving-magnet cartridges are on the whole quite load-conscious because of a high internal impedance and this is true of the example under review, which after experiment was loaded with approximately 300pF capacitance to give a mildly declining but regular-looking response. This was maintained for audition. Output was slightly above specification, separation trend very good, and the well damped square-wave result had Shure's usual neat look.

The naked and accurately mounted stylus tip proved to be essentially an elliptical with some slight modification of contour, and the finish was good. With such a high compliance (more than 30cu) the use of a low-mass arm is preferred, the SME IIIS being used for tests.

As expected, the M97HE was an elegant and confident tracker, sailing through the statutory tests and also showing its considerable flair on the most challenging music discs. Quality was lightish and clean, with a fair approach to neutrality and excellent stereo imaging, although the somewhat retiring presentation of fine detail could fairly be described as a Shure characteristic. Many folks like it; others favour more explicit qualities.

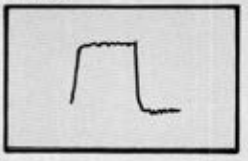
THE VERDICT

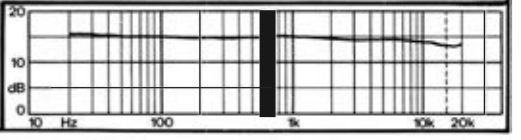
This cartridge exemplifies a contrast that can be made between design approaches. Just try it against a good MC type to complete your audio education! On its own merit the M97HE deserves high praise and an unreserved high-value rating. Anyone more partisan than your cautious reporter may feel inclined to add the final star. . .

TECHNICAL DATA AND DISTRIBUTOR

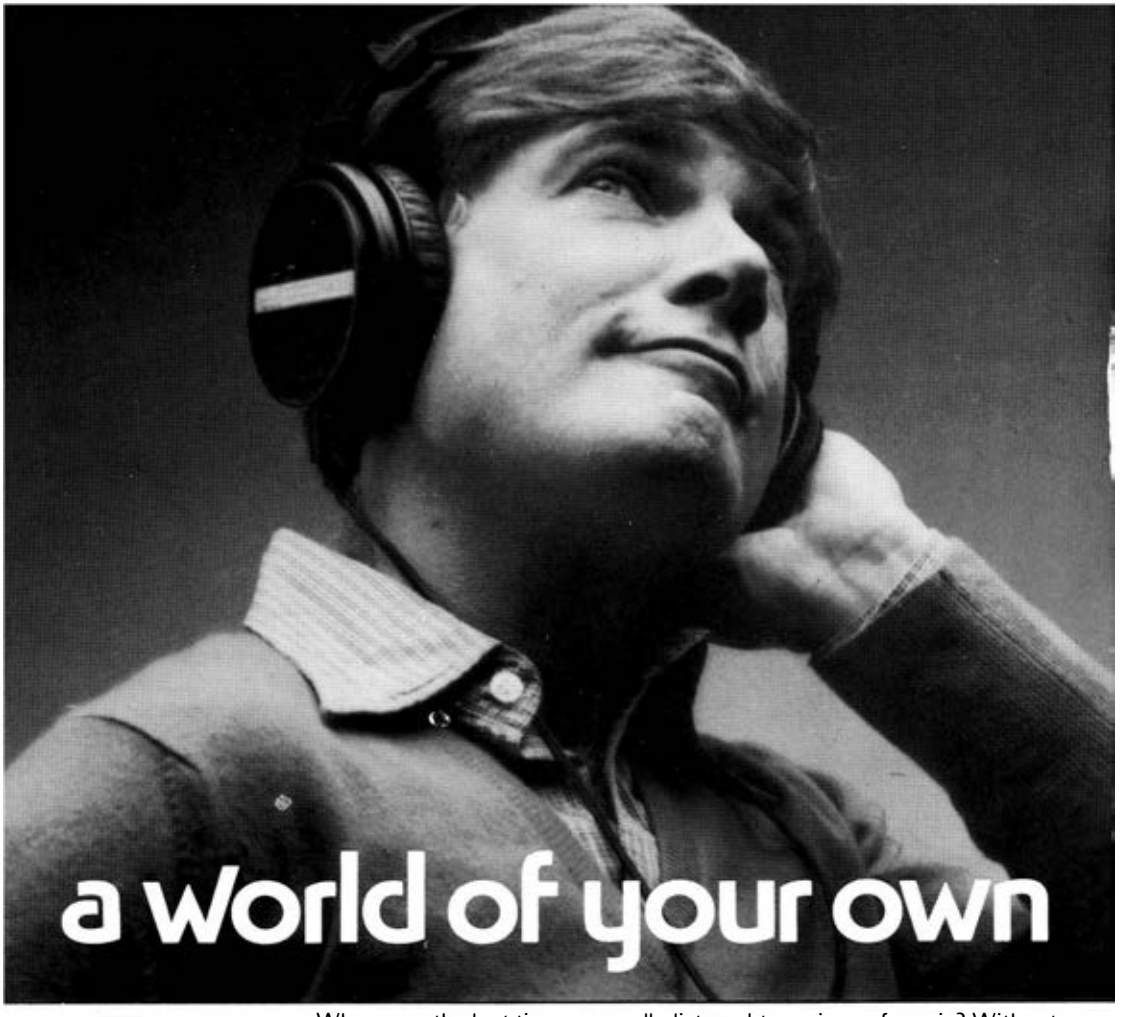
Tracking	Standard 0·8g Super 1·2g
Output	L 6·0mV R 5·7mV
Channel balance	0·75dB
Separation at 1kHz	L 35dB R 32dB
Stylus condition	Good
Stylus replacement	U
Arm compatibility	L/M
Sound quality	Hi

See page 13 for key.





Shure Electronics Ltd,
Eccleston Road, Maidstone,
Kent ME15 6AU
Tel: 0622 59881



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SHURE V15/3HE

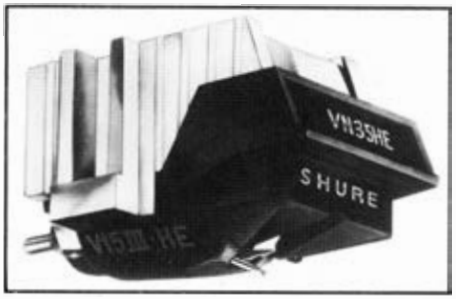
£85

MERIT ★★★★
VALUE ★★★

An old moving-magnet favourite makes its mark in a new guise — or at least with the new hyper-elliptical stylus tip. It looks the same as ever, though, with its metallic finish and flip-down stylus guard. Stylus compliance is among the highest encountered (at least 45cu), so that application is restricted to arms of very low effective mass, despite conflicting advice sometimes proferred in trade circles where arm compatibility is not always as well studied as one could wish.

This cartridge does not sport the new damper-brush device which is standard on the M97HE (and is also a feature of the V15/4). It does, however, boast advanced 'trackability', as the results show. Weight of the cartridge is 6 grams. It should be possible to improve an earlier V15/3 by fitting the new stylus assembly, although the cost of doing so is quite substantial.

THE FINDINGS



Respectable results in all important departments, with featherweight tracking well to the fore. A decent frequency response trend was complemented by very good stereo separation, a clean-looking result on the square-wave test, and close channel balance, output being a little above specification.

Performance was best liked with 300pF capacitance per channel loading (lower than the manufacturer's suggestion) to give the preferred balance.

The elliptical stylus tip showed good finish and alignment and was a naked diamond with 7 by 20µm contour. As might be expected, the cartridge negotiated all tracking tests in a very confident way, the super level being passed just below the 1·25g top specified working limit.

A fairly open and positive sound, with very good revelation of detail right through the range — all backed by superior tracking security — was evident from the outset. Bass was splendidly solid and extended. Stereo imaging was convincing, even if it was not quite to the top moving-coil standard. There was a slight constriction and hardening effect in the midrange and lower treble on a few of the more complex examples of modern programme material.

In all, a distinguished old-timer with a lot of fresh appeal due to stylus improvement. However, the low-mass arm requirement must be emphasised, for it is in the interests of stable tracking, and light arm damping is recommended. Bass resonance fell as low as 7Hz in an ADC arm and was much the same with the SME III.

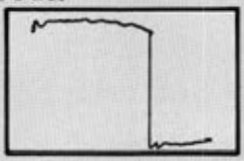
THE VERDICT

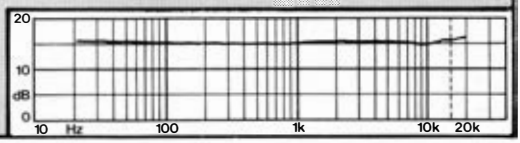
A very winsome cartridge for those who favour the Shure sound and place 'trackability' high on the list of priorities. Somewhat costly, alas, though the price in the marketplace may on occasion be more attractive and thus lead to the addition of a star for value.

TECHNICAL DATA AND DISTRIBUTOR

Tracking	Standard 0·9g Super 1·2g
Output	L 3·9mV R 4·1mV
Channel balance	0·4dB
Separation at 1kHz	L 29dB R 31dB
Stylus condition	Good
Stylus replacement	U
Arm compatibility	L
Sound quality	Hi

See page 13 for key.





Shure Electronics Ltd,
Eccleston Road, Maidstone,
Kent ME15 6AU
Tel: 0622 59881

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SIGNET MK-111E

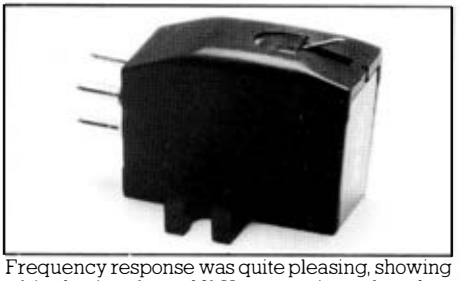
£92 MERIT ★★★★ VALUE ★★★

Signet is Audio-Technica's second brandname, doubtless introduced with commercial and marketing motives to the fore. Technical differences between Signet and AT are less evident. However, there is often not a strong correspondence between the two either, and the Mk-111E does not have an AT counterpart.

It is a well established model of the moving-coil type with medium stylus compliance, and its weight of 4·8 grams makes it one of the lightest MC cartridges presently available. Although it is a low-output cartridge, the signal voltage is in fact a little above that from some examples.

Particular features are the dual micro-coil arrangement (an AT speciality) on a non-metallic support and the powerful but small samarium cobalt magnet which makes its contribution to the reduction of size of the total structure. The cantilever is a beryllium rod to provide lightness and rigidity, and the unusually small square-section nude-mounted diamond tip is designed to aid reduction of stylus mass. A special study of grain orientation for tip grinding is claimed.

THE FINDINGS



Frequency response was quite pleasing, showing a bit of a rise above 10kHz amounting to less than 2dB, and separation was fair — somewhat lean above 8kHz. Output was a little above average for the type and channel balance fairly close. Square-wave testing revealed a reasonably regular-looking result with a sharp overshoot.

Tracking capability was impressive, and the cartridge came through super-level checks well within its specified range of pressures. It behaved very confidently on a variety of challenging programme material. With a stylus compliance a little over 20cu the cartridge is a bit fussy about mechanical matching and an arm of lowish mass (around 7 to 9g effective plus cartridge) is advisable, while light damping is worth considering.

The naked diamond with 6x18μ elliptical tip was seen to be unusually small-shanked and displayed excellent alignment and finish. It is worth adding that matching into a preamp input of at least 100 ohms is advisable.

Model MK-111E was well liked on audition and could even be said to surpass the standard suggested by technical tests. The sound was clean and brightish, with good transparency, and the bass was firm. Revelation of detail made a good impression, as did important aspects of imaging, and subtle ambience elements of programmes were reasonably well presented. Quality became a bit glassy on some highly scored modern material.

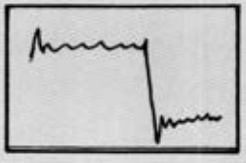
THE VERDICT

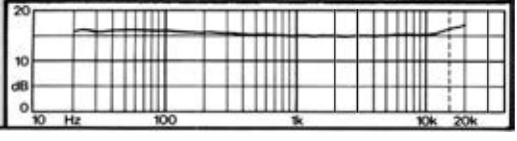
In all a well-balanced result from a fairly costly product, with light tracking as an attraction. Technically quite advanced, and value also fair

TECHNICAL DATA AND DISTRIBUTOR

Tracking	Standard 0·9g Super 1·3g
Output	L 0·5mV R 0·54mV
Channel balance	0·7dB
Separation at 1kHz	L 22dB R 28dB
Stylus condition	Good
Stylus replacement	W
Arm compatibility	L/M
Sound quality	Hi

See page 13 for key.





Audio Technica Ltd,
Unit 6,
Hunslet Trading Estate,
Low Road, Leeds LS10
Tel: 0532 771441

SONY XL-70

£98 MERIT ★★★★ VALUE ★★

Another example from Sony's new series, the XL-70 is well endowed with innovations, small though it is (weight is only 4·2 grams). This interesting and well-made little device is of the moving-magnet type and features an amorphous alloy core, a material with a non-crystalline structure and desirable permeability, claimed to improve high-frequency performance.

The search for cantilever rigidity has in Sony's case led to the choice of a sapphire pipe, and a nude elliptical tip is specified without benefit of data on dimensions. The small push-in stylus block is held in place by a screw in the cartridge body. Tracking pressure range is 1·2 to 1·8 with a recommended 1·5g setting, and the output is below average for a cartridge of the MM type.

THE FINDINGS

Closer inspection revealed the neat and accurate bonded setting of the naked stone in the sapphire cantilever — a very attractive sight. Tip polish was good and the contour a fair elliptical with 7 x 18μm radii. Compliance, listed as 20cu, was significantly higher, and the cartridge would be a partner for refined arms of lowish mass, the area of interest being about 4 to 8 grams effective. Arms on Sony equipment do not on the whole qualify. Vertical tracking angle was unusually high at about 30 degrees. The mounting bracket lacked ideal rigidity.

A rising HF trend resulted from the advised 100pF termination and, if preferred, a small modification of response could be made with increase of load. Output was near to specification, channel balance fairly close, and separation very satisfactory with above average results in the high range. Test results suggested the stylus was somewhat underdamped.

Tracking performance was good and the design median setting of 1·5g would be reasonable for a wide variety of material, with a few exceptions among the most highly modulated modern discs. This cartridge did not give up readily and rarely showed severe signs of mistracking except for momentary hardening of quality. The statutory super-level was negotiated near the top of the spread at 1·7g.

Bass sound in compatible arms was liked, for it was clean and crisp though a shade light. The bright HF quality was very evident — a feature that some listeners would prefer to avoid, perhaps. In comparison the midrange seemed a bit recessed, yet the fine detail emerging in the stereo was still generous and impressions of ambience content was mostly favourable. Handling of disc noise and imperfections was fairly good.

The low output was evident but not a hazard in practice, though it is a reminder of the need for care in matching.

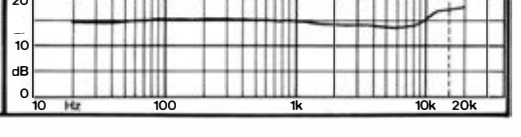
THE VERDICT

An interesting example of new pickup technology and a more refined (or better developed) product than the XL-88 moving-coil. Technically a credit to its designer but difficult to assess for value.

TECHNICAL DATA AND DISTRIBUTOR

Tracking	Standard 1·1g Super 1·7g
Output	L 2·1mV R 2·3mV
Channel balance	0·5dB
Separation at 1kHz	L 31dB R 33dB
Stylus condition	Good
Stylus replacement	U
Arm compatibility	L
Sound quality	Hi

See page 13 for key.



Sony (UK) Ltd,
Pyrene House,
Sunbury Cross,
Sunbury-on-Thames,
Middlesex
Tel: Sunbury 87644

SONY XL-88

£124 MERIT ★★★ VALUE ★★

Joining the Sony range at the time these reports were compiled, this low-output MC model is evidently a development of the XL-55. It has, for example, a similar composite cantilever consisting of beryllium, carbon fibre and aluminium. However, with further refinement and use of new materials the weight has been reduced to 6·8 grams.

Use of a 'permandur' alloy is claimed to eliminate distortion due to electro-magnetic effects while an improved cross-bobbin coil arrangement and damping device are also features. Compliance is listed as 20cu and the tracking pressure spread is 1·2 to 1·8g with a 1·5g mean figure. Sony make a firm recommendation of 100 ohms loading, which was provided by preamp input for tests.

A naked elliptical stylus is specified. Sony are among a minority of manufacturers offering positive advice on stylus life, specifying replacement after 400 hours of use. This seems to reflect the more cautious attitude now becoming more common, especially with regard to elliptical tips.

THE FINDINGS

Frequency response was reasonably smooth, with some HF rise and a tip mass resonance well out of the band, while the separation trend was not bad, though not better than 19dB at 10kHz. Impulsive response indicated some overshoot but quite effective damping. Channel balance was fairly close, output being a bit more generous than is sometimes found.

The stylus tip was found to be a nude-mounted and well shaped elliptical, 7 × 20µm, nicely set in the elaborate cantilever and showing a good polish. A nice example of its kind, though perhaps with a marginally small minor radius for its application. A compliance of 18cu brought the cartridge into the area of medium-mass pickup arms. Damping is not necessary.

Certain aspects of performance gave rise to mixed feelings. Technical tests yielded reasonable tracking results, with the standard level tackled near the bottom of the specified range and the super level at the top. Things went well with a proportion of the more difficult music discs but with others there were some signs of cracking and coarsening.

Generally the tracking was secure enough with the cartridge held near the top of its range, and the low-frequency behaviour was liked. Overall the balance was on the bright side; midrange quality left the feeling that a better approach to neutrality would have been welcomed. There was no doubt about the fine details that emerged, and the stereo imaging was very good. Hum induction was not a problem but tolerance of disc imperfections and particles was something less than the best.

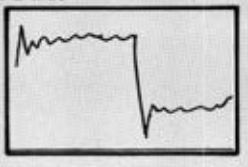
THE VERDICT

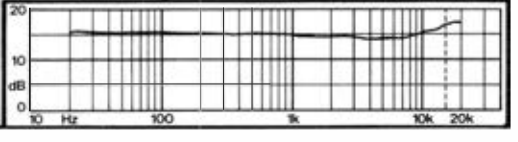
Offering a share of expected MC attributes, the XL-88 still leaves mixed impressions about tracking and tonal qualities. Rather costly in relation to accomplishment.

TECHNICAL DATA AND DISTRIBUTOR

Tracking	Standard 1·3g Super 1·8g
Output	L 0·35mV R 0·39mV
Channel balance	0·7dB
Separation at 1kHz	L 32dB R 34dB
Stylus condition	Good
Stylus replacement	W
Arm compatibility	M
Sound quality	Av

See page 13 for key.





Sony (UK) Ltd,
Pyrene House,
Sunbury Cross,
Sunbury-on-Thames,
Middlesex
Tel: Sunbury 87644

STANTON 500E

£19

MERIT ★★
VALUE ★★★

This cartridge is from a low-cost group which Stanton call their Broadcast Standard Series, a description suggesting fittingly enough a certain robustness of construction. The 500A has become very well known as an inexpensive model of merit, though its conical stylus represents a limitation whereas the E variety has the advantage of an elliptical tip. There are other versions differing in compliance and tracking pressure range.

Model 500E is intended for a 2 to 5g range and has an elliptical tip with specified 10 x 18μm radii. Cartridge weight is only 5 grams but the design indicates the main use will be in quite massive pickup arms with characteristics which may well include high pivot frictions and something less than hi-fi precision.

THE FINDINGS

Inspection revealed a poorly finished stylus tip of rather questionable contour, possibly a sample quirk, not truly typical, for styli from this source are generally better. With compliance of 11cu the cartridge is indeed a contender for arms of fairly high mass — typically 18 to 25g effective.

Frequency response was preferred with the trend shown, secured with 200pF loading. The tip mass resonance appears lowish in the spectrum with a cartridge of this modest type but damping is evidently good (square-wave a bit round-shouldered). Channel balance was very good and separation satisfactory. Output was above specification and, as is sometimes the case in a hi-fi context, could raise slight doubts about amplifier input overload thresholds.

So far as basic tests are concerned the 500E seemed a fair tracker, coping with the standard level test just below its normal range and mastering the super-level reasonably well too. In practice distortion ran rather high with blatancy on a lot of complex programme material.

Also, the cartridge had only fair tolerance of minor disc imperfections. Misgivings remained about stylus quality, but with a tip replacement the sound had a robustness about it which seemed to reflect design and which had some merit. On the whole, though, the dull and often thick sound characteristic was not much favoured and a lack of real detail proved fatiguing as audition proceeded.

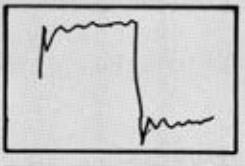
THE VERDICT

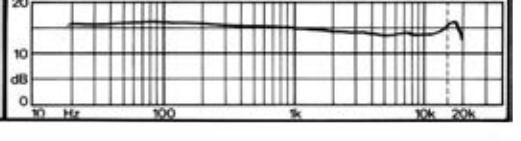
Clearly this one has its role somewhere, but it does seem a bit lacking against a hi-fi background. May appeal to some on value.

TECHNICAL DATA AND DISTRIBUTOR

Tracking	Standard 1·9g Super 3·5g
Output	L 7·0mV R 6·8mV
Channel balance	0·5dB
Separation at 1kHz	L 24dB R 27dB
Stylus condition	Poor
Stylus replacement	U
Arm compatibility	H/M
Sound quality	Ba

See page 13 for key.





Wilmex Ltd,
Compton House,
New Malden,
Surrey KT3 4DE
Tel: 01-949 2545

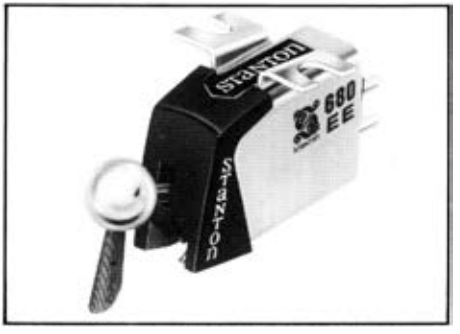
STANTON 680EE

£32 MERIT ★★★ VALUE ★★★

An extensive range by the American specialists Stanton Magnetics includes several 600-series models, the 680EE being presented as a relatively rugged device which may appeal for professional work as well as domestic hi-fi. Nevertheless its stylus compliance falls into the higher range and arm compatibility requires particular attention.

Output is specified as about average for the type, while the internal inductance is high and raises the matter of careful loading for best electrical results. An elliptical stylus is standard and the tracking pressure spread is listed as 0·75 to 1·5g. Weight of the cartridge is 5·5 grams. The trailing tracking brush was removed lest it interfere with tests: this gadget is, of course, also found on cartridges by Pickering, a related company.

THE FINDINGS



Finish of the shank-mounted stylus tip was only just acceptable but alignment was good and setting in the alloy cantilever satisfactory. There was a fair elliptical contour, 7 x 16µm, the major radius being marginally less than specified. With a stylus compliance of 25cu (not mentioned in the spec) the cartridge is best suited to arms of low to medium effective mass, up to 10–12g being a fair estimate. Light arm-damping could be considered.

Although a load capacitance of 275pF is specified, the result of some increase was preferred, the final solution being an additional 100pF per channel to bring down the HF peakiness by about 1dB, in which condition the decline of frequency response was considered acceptable. A fairly good square-wave result reflected the trend and showed the damping of an initial resonance.

Output was close to specification, channel balance was also very good, and hum rejection was superior. On the other hand the tolerance of minor disc noise and imperfections was not so impressive. Separation trend was acceptable, with 18dB at 10kHz. A mild tendency to microphony was noted.

This cartridge was an adequate if not remarkable tracker, requiring a moderate setting for standard tests and completing the super-level at the top specified limit. Audition revealed some hardness, increasing with loss of detail on the most awkward programmes. The most evident feature, however, was a dull balance with somewhat depressed textures and no great sense of depth. More sparkle would have been welcome. On the other hand, the balance may suit those who have reason to avoid greater keenness of sound in the upper range.

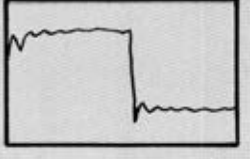
THE VERDICT

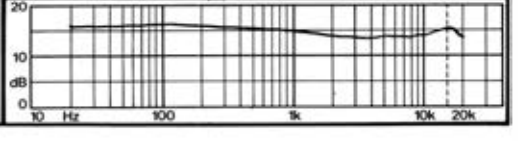
This model costs less than it did at one time, tilting the verdict in favour of three stars. A worthy but not brilliant contender in a hi-fi context.

TECHNICAL DATA AND DISTRIBUTOR

Tracking	Standard 1·0g Super 1·5g
Output	L 5·3mV R 5·0mV
Channel balance	0·5dB
Separation at 1kHz	L 24dB R 30dB
Stylus condition	Fair
Stylus replacement	U
Arm compatibility	M/L
Sound quality	Av

See page 13 for key.





Wilmex Ltd,
Compton House,
New Malden,
Surrey KT3 4DE
Tel: 01-949 2545

STANTON 881S

£93 MERIT ★★★★ VALUE ★★

This prestigious model is presented with a flourish and some play with the words Professional Calibration Standard and the (desirable, we must suppose) 'calibration concept'. Some production test data are indeed packed with each cartridge. Stylus compliance is fairly high and arm compatibility requires some thought. Particular features are a reduction of stylus mass and the use of a rare-earth magnet.

The stylus tip is nude-mounted and described as a Stereohedron, a kind of line-contact contour with 8μm scanning radius. Output is specified as about average for the type of cartridge and the listed tracking pressure range is 0·75 to 1·25g. As with other Stantons the impedance is quite high and the loading demands careful attention. Cartridge weight is 5·7 grams. The miniature tracking brush, hinged at the front of the stylus block, was removed to avoid the possibility of interference with tests.

THE FINDINGS

The optimum load capacitance of 275pF per channel resulted in a mildly declining frequency response as shown, and no increase in this value was thought desirable. A fairly smooth effect, as with the square-wave, and the trend was reflected in the sound. Channel balance was close, output near specification, and separation good.

In all a satisfactory set of results, backed by respectable tracking performance. Standard testing was completed at 1·0g, though the super-level challenged the cartridge right to the limit of its range. The nicely finished 'stereohedron' tip of complex shape was well aligned and set in the slim alloy cantilever, the tip radius being 8μm. Compliance of 20cu does not feature in the maker's data: use of an arm of low to medium effective mass will be appropriate, while damping should be helpful if not absolutely essential.

Textures were slightly depressed, with a distant effect, and not without a hint of hardness on complex material, though there was more bite and certainly more sparkle than from other Stantons. Fine analysis of detail was not a strong feature of the 881S, which again was not among the most neutral sounding of transducers. Acceptance of the characteristic must in the end be a matter of taste. Tolerance of disc noise was very satisfactory.

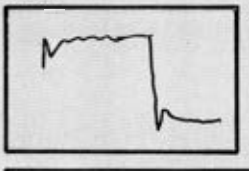
THE VERDICT

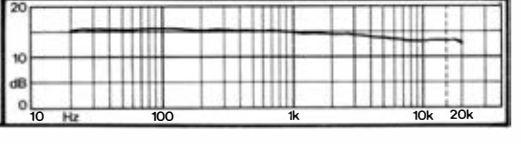
On the whole this one offers a fairly gracious effect, and the tonal balance could help to compensate when loudspeakers seem too glassy. But it is dauntingly expensive, despite some real technical merit, and so fails to impress on value.

TECHNICAL DATA AND DISTRIBUTOR

Tracking	Standard 1·0g Super 1·3g
Output	L 5·4mV R 5·1mV
Channel balance	0·3dB
Separation at 1kHz	L 30dB R 32dB
Stylus condition	Good
Stylus replacement	U
Arm compatibility	M/L
Sound quality	Hi

See page 13 for key.





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STANTON 980-LZS

£143 MERIT ★★★★ VALUE ★★

In view of Stanton's technical affinity with Pickering it was no surprise to find that another manifestation of the low-Z moving-magnet innovation had reached the market. Like the XLZ/7500S, the new Stanton has a very low impedance amounting to 3ohms and 1mH and is much the same as its near-relative all the way down to the little pivoted brush (removed for test purposes).

So again, we have a moving-magnet model with the main electrical characteristics of a moving-coil, viewing its load much as a MC device would do; and again the length of leads is not critical. The naked tip is a Stereohedron line-contact (8μm scanning radius) and the specified tracking pressure spread is 0·5 to 1·5g. Cartridge weight is 5·5 grams.

Although Stanton have less to say (so far) about any particular preamp they would prefer to see used, it seems clear that they share the Pickering dislike of loading the cartridge down with a transformer. A load of at least 100ohms is advised, so only a limited selection of boosters will qualify anyway. As for the step-up a preamp gain of around 25dB should be suitable.

THE FINDINGS

Frequency response and separation trends were of some distinction and much the same as for the Pickering. Output was slightly lower while channel balance was again very close. A very low stylus mass and fairly good damping were evidenced in the results, and in all the findings showed the expected family resemblance.

Stylus finish, contour and alignment were to a satisfactory standard, while the 32cu compliance indicates use of a low-mass arm only. Very light arm-damping would be a possible benefit. Stanton do not in fact dwell on compliance, possibly wishing to avoid any implication that it is a 'goodness' factor, and that is fair enough. But they achieve nothing else, since they fail to include any instructions on choice of arm or the low-mass requirement.

Tracking capability was outstanding, and the 980-LZS scanned the tests almost as if they were not there. In audition it impressed with the way it tackled high-level material of the most demanding kind, bringing out plenty of detail — firm bass too. The balance was a bit 'soft' and gentle rather than notably bright, although top-end sparkle was not absent. In this way a contrast between moving-magnet and the best MC sound was pointed up. Experienced listeners would hardly mistake one for the other.

However, the low-Z development has its own technical merit and also, on this evidence, makes for a gracious and comfortable sound, deserving a high rating.

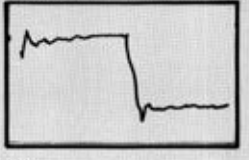
THE VERDICT

See the Pickering report! Any comment on value for money is equally problematical. But the sound is seductive enough to win over a good smattering of affluent cognoscenti.

TECHNICAL DATA AND DISTRIBUTOR

Tracking	Standard 0·8g Super 1·3g
Output	L 0·3mV R 0·29mV
Channel balance	0·3dB
Separation at 1kHz	L 32dB R 35dB
Stylus condition	Good
Stylus replacement	U
Arm compatibility	L
Sound rating	Hi

See page 13 for key.



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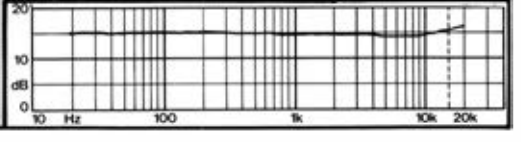

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Can we 'Sound Off' a little about the current trend for reducing the enthusiast market to one budget system?

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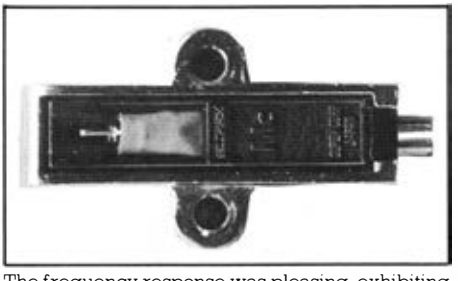
SUPEX SD-901S

£120 MERIT ★★★ VALUE ★★

As speciality imports of Linn, the Supex series of cartridges have been enjoying an enviable reputation that is in accord with what many see as a moving-coil resurgence. This particular MC model is the high-output version in the 900 series, although the signal is still quite meagre and the signal-noise performance of the overall system demands due attention. But that is hardly surprising, for one would expect an up-market pickup to be used with compatible ancillaries.

This cartridge does of course have a higher internal impedance than a low-output counterpart but it is still quite small and the matter of loading is not particularly critical. A special elliptical stylus is fitted and the standard of manufacture overall is commendable. Cartridge deadweight is approximately 9 grams, which is fairly high but not out of line with the intended application in pickup arms of medium effective mass. Connection is to a normal magnetic pickup input of an amplifier, assuming adequate sensitivity.

THE FINDINGS



The frequency response was pleasing, exhibiting a mild rise at the top, where the output goes sailing on outside the band, while further examination confirmed adequately damped resonance. Separation was unusually good, nearly 30dB at 10kHz and far surpassing the Supex claim, and channel balance was quite close.

As an attempt at a true elliptical the tip, nude-mounted and accurately set, was of a very high standard with an appropriately good finish. Stylus compliance of 13cu indicates the use of a pickup arm in the middle range of effective mass (about 13-16g plus cartridge); and with a suitable component, well adjusted, damping is not really necessary.

This cartridge was by no means the most exuberant of trackers, nor is it a lightweight, and it was caught out on examples of the more demanding and severe of modern material, with hardening and coarsening of textures. It was uneasy on super-level testing at the top of its pressure range, where the result was technically a no-go. Prime compensation for this, on critical audition, was the fine transparency and superior stereo imaging for which good MCs are noted, and such an impression was gained with a good range of programmes.

Top-end sparkle was liked, for it often had a nice delicacy, and the bass was solid, even fulsome. Generally the results were smooth and detailed, but reservations about tracking security leave the impression that this model is a mite costly for what is offered. Kind treatment of disc noise was a good point, though.

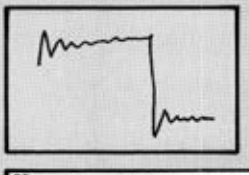
THE VERDICT

Mixed feelings. Tonal balance and performance generally must win wide favour if insistence on super tracking is not too strong. Rather expensive.

TECHNICAL DATA AND DISTRIBUTOR

Tracking	Standard 1·6g Super No go
Output	L 1·8mV R 1·9mV
Channel balance	0·2dB
Separation at 1kHz	L 36dB R 38dB
Stylus condition	Good
Stylus replacement	W
Arm compatibility	M
Sound quality	Av

See page 13 for key.



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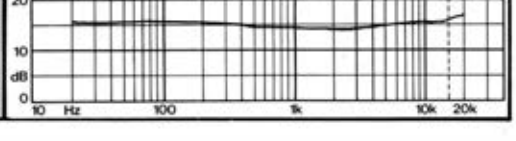
Tel: 041-634 0371



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TECHNICS U205C MK3

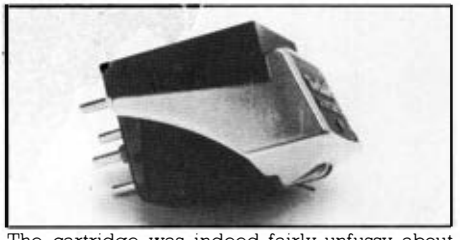
£63

MERIT ★★★★★
VALUE ★★★★★

Technics' prestige moving-magnet model, of advanced design, is also available in an integrated head form. The review sample was in the conventional cartridge format (weight 6.5grams) and of uprated Mk3 status. It comes complete with generous data and a frequency response trace which appears to have been drawn with the aid of a ruler, though that turns out to be more nearly justifiable than usual.

Tracking pressure range is based on a 1·25g mean with 0·25g spread. An immediately obvious specification feature is the below-average output, and another is a lowish impedance that promises less sensitivity than usual to loading. Technical points include the short boron-pipe cantilever, a novel core system, a samarium-cobalt magnet and an improved damper. Very low tip mass is claimed.

THE FINDINGS



The cartridge was indeed fairly unfussy about loading and it was decided to keep capacitance down to 100pF, as Technics evidently do for their own tests. The result was a splendidly uniform frequency response, complemented by an equally satisfactory square-wave. HF response fell smoothly away, with resonance well outside the band.

Channel balance was fairly close and the separation trend excellent, with a high 25dB at 10kHz. Output was lowish as expected, and in practice it will be essential to guard against hazards to signal-noise performance. The cartridge's hum rejection works in favour.

Neatly set in the boron-pipe cantilever, the nude-mounted stone was admired. This 7 × 18μm elliptical, with scanning radius a little above spec, was impeccable in respect of contour and finish.

Stylus compliance at 21cu was above that suggested by Technics, but high-grade arms in the low-to-medium range of mass (about 7 to 12g effective) will be compatible. Light damping would be a bonus but is not absolutely essential.

Super-level testing was completed within the normal pressure range, and that is just as well since the stylus rode well up to the cartridge body at the top of the specified spread. Pursuing tests with highly demanding commercial material it was found that the cartridge coped well.

Sound quality was remarkably clean, open and detailed, with superior stereo imaging. Subtle programme content was well conveyed and the neutral balance marked the cartridge out as a transducer of distinction. Tolerant treatment of minor disc noise was another good point. All pickup designs involve compromises, and the particular balance chosen by Technics results in special merit.

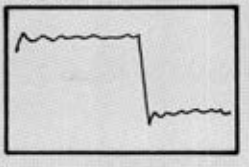
THE VERDICT

Firmly in the top class, this cartridge challenges some of the best moving-coils in audition. It costs less, too, so it attracts the highest technical rating while warranting a high place in the value assessment.

TECHNICAL DATA AND DISTRIBUTOR

Tracking	Standard 1·0g Super 1·4g
Output	L 2·2mV R 2·4mV
Channel balance	0·6dB
Separation at 1kHz	L 32dB R 30dB
Stylus condition	Good
Stylus replacement	U
Arm compatibility	M/L
Sound quality	Hi

See page 13 for key.



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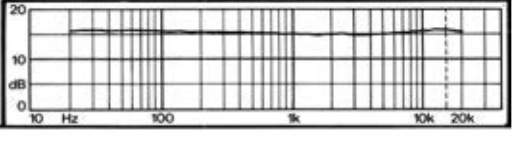

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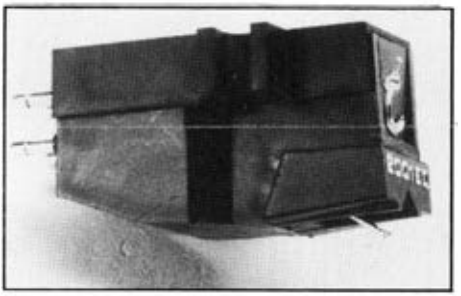
TENOREL T2001-ED

£10 MERIT ★ VALUE ★★

Of the moving-magnet type, this very robust cartridge is evidently intended for quite general use in disc players of the less exalted variety, as encountered in compact audio outfits, music centres and the like. Output is quite high and a particular feature is a nude-mounted elliptical stylus tip.

Internal impedance is in the high range but no advice is proferred on the subject of load capacitance. The packed specification lists a tracking pressure range of 1 to 3g while a separate leaflet puts the limit at 2·5g, Cartridge weight is 7 grams.

THE FINDINGS



Trimming of the peaky frequency response could slope it down a little but the use of 300pF capacitance per channel was thought to be a fair solution. Separation was poor above 8kHz but satisfactory elsewhere and channel balance was acceptable, while the output was distinctly generous and probably to be welcomed in the likely applications.

The diamond tip was quite neatly installed and aligned, showing a fairly good polish, but its profile was far from ideal and the minor radius was above spec. That is just as well, perhaps, for a claimed 5µm is well at odds with the expected use of the cartridge. There was some mention of a 25cu compliance, and it would have been disastrous if true, but with a value of 8cu the cartridge is actually in accord with the high-mass arms which are likely to be encountered in practical use.

Success on super-level testing would hardly be expected, but the T2001-ED was secure enough on a reasonable variety of non-critical material. A setting of about 2g would be a fair bet in practice. Mistracking on awkward discs was obvious enough to warn against persisting in experiments. Sound quality was harsh and forward, with poor detail, while there was some heightening of disc noise and imperfections.

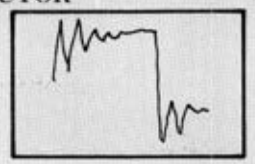
THE VERDICT

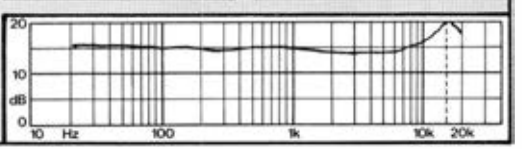
Not a very inspiring result, and there are at least a few better bets in the low-budget area. Also, even for a cheap product the specification data should be more clearly expressed than they are here.

TECHNICAL DATA AND DISTRIBUTOR

Tracking	Standard 1·4g Super No go
Output	L 6·7mV R 6·2mV
Channel balance	1·0dB
Separation at 1kHz	L 24dB R 27dB
Stylus condition	Fair
Stylus replacement	U
Arm compatibility	H
Sound quality	Ba

See page 13 for key.





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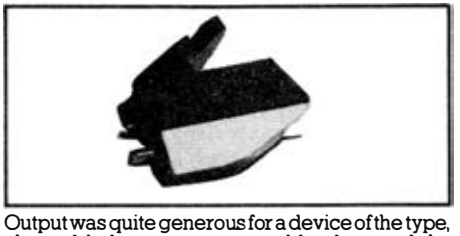
TENOREL TMC-TEN

£39 MERIT ★★ VALUE ★★★

Condor, the distributors of the Dutch-made Tenorel cartridges, make it their business to offer very keenly priced products and are inclined to back claims by making comparisons with other, ostensibly similar but more expensive examples from well known makers.

In the case of their new TMC-TEN moving-coil model they also give a 10-year guarantee (which excludes stylus wear or damage, of course!) and arrange for the cartridge to be replaced at half price when the time comes for stylus replacement. This regard for the customer barely extends to the specification in every aspect, for mildly conflicting data may be found in sales leaflet and carton. However, one thing accurately heads the list — this is a high-output MC which should be connected to the normal 'magnetic' input on the amplifier. Weight is 6·5 grams.

THE FINDINGS



Output was quite generous for a device of the type, channel balance was reasonably close and the separation trend acceptable though not very impressive in the high range. A top-end rise in response was not unexpected and to a certain extent was reflected in listening experience.

An elliptical stylus is specified without data on dimensions, but the tip was found to be a 10 × 18μm of something less than ideal contour. It was quite roughly set in the alloy cantilever and some dirt had to be removed to permit inspection, which then revealed a rather dull finish. Some improvement could probably raise the status of the cartridge. However, it was more tolerant of disc noise than might be expected. Vertical tracking angle was unduly high at 30 degrees or so.

Compliance was high at 32cu and the low-frequency performance pretty good, but once more arm compatibility is called into question. A low-mass arm, preferably with light damping, would be the best choice, but one wonders whether many buyers looking for an inexpensive moving-coil would go to the necessary trouble. Further, tracking is not this model's strong point, for technically there was a no-go result on the super-level check, though it was tackled uneasily outside the range at 2·1g and with the stylus over-flexed.

A setting of 1·7g is a compromise of sorts, given a suitable arm, but the cartridge does not promise very satisfactory results in the arms fitted to many popular integrated units. Performance on average commercial material was reasonably secure but loss of detail on more provocative items was often evident.

Overall the sound was fairly smooth but tended to be bland, with indifferent stereo presentation. As is sometimes found at this price level, the advantages of going MC, as against MM and the like, are not very apparent.

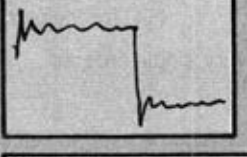
THE VERDICT

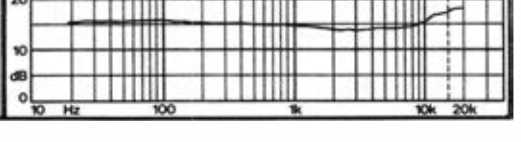
It can sound pleasant if used with care, but the high stylus compliance seems at odds with the probable use of the cartridge. Stylus finish should be improved.

TECHNICAL DATA AND DISTRIBUTOR

Tracking	Standard 1·4g Super No go
Output	L 2·2mV R 2·4mV
Channel balance	0·8dB
Separation at 1kHz	L 26dB R 23dB
Stylus condition	Poor
Stylus replacement	W
Arm compatibility	L
Sound quality	Av

See page 13 for key.





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450 Hz at NAB reference level.

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WESTRAK C101-E

£14

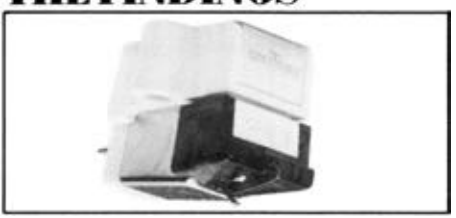
MERIT ★★★
VALUE ★★★★

Three Westrak moving-magnet cartridges from Japan are based on a common body with an option of intechangeable styli. Cheapest version is the 101-C with conical stylus, while the 101-SH has a Shibata-contour tip and costs about £6 more than the elliptical-tip model reviewed here. Standard of manufacture is high but the packaging is very simple.

An early SH-type sample was the subject of a report in Hi Fi for Pleasure magazine nearly two years ago, when the stylus compliance was found to be in the medium range. This new 101-E, according to specification, would have a slightly lower compliance but in the event turns out to be understated by the manufacturer, a finding that has its implications and in any case is surprising at this price level.

The tracking pressure is quoted as 1 to 2g and the stylus tip is listed as a 5 x 20µm elliptical. Output is on the generous side. Cartridge deadweight is 6 grams. The shape of the body underside is such that very careful arm adjustment is needed to obtain the correct attitude.

THE FINDINGS



No specific recommendation was made concerning terminating capacitance and it was soon apparent that the cartridge was quite load-conscious. The preferred load was determined at 300pF to control the top peak to some degree.

Separation results were fair and output above sepcification, while channel balance improved on the maker's rather pessimistic claim. Square-wave result was regular and fairly good for the category of transducer. The stylus tip was distinctly dull in finish but of reasonably good contour, the setting in the straight-tube alloy cantilever being very neat. Specified dimensions seemed a bit at odds with the intended application but in fact the scanning radius was above that quoted and the other dimension marginally less.

A compliance falling into the high area at an estimated 26cu is not entirely practical in such a cartridge and is inclined to be in conflict with requirements for components in the popular price area, bearing in mind that an arm of fairly low effective mass would be the preferred partner. The manufacturer should consider doing a version with reduced compliance.

However, the 101-E showed distinct tracking flair and negotiated the super-level at a modest pressure which, in a compatible arm (ADC ALT-1), did not cause over-flexing of the stylus (though inept choice of arm would give a different impression). Onset of mistracking in audition was a constriction and coarsening of textures. Keen analysis and subtlety could hardly be expected from a low-cost design in any case, but certainly the pleasant tonal balance and touch of brightness were well liked.

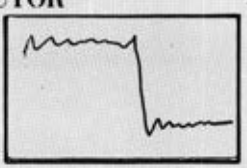
THE VERDICT

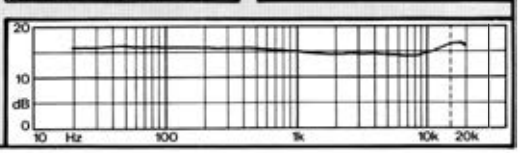
Despite comments about the possible effect of high compliance, this cartridge gets a good rating for its evident merit and a higher one for attractive value. We can forgive Westrak for not packing it in a walnut casket.

TECHNICAL DATA AND DISTRIBUTOR

Tracking	Standard 1·0g Super 1·4g
Output	L 5·5mV R 5·9mV
Channel balance	0·8dB
Separation at 1kHz	L 21dB R 18dB
Stylus condition	Fair
Stylus replacement	U
Arm compatibility	L
Sound quality	Hi

See page 13 for key.





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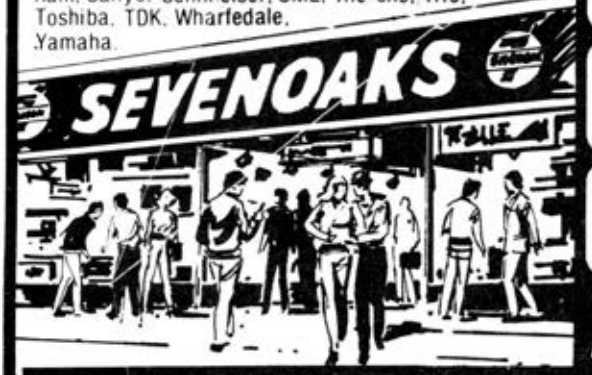

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YAMAHA MC7

£50

MERIT ★★★
VALUE ★★★

As reports in this Guide demonstrate, MC cartridges in the (relatively) low-cost range are a minority. All the more reason, therefore, to look at a few examples that qualify. The MC7 is a neat design and seems representative of the care over detail taken by Nippon Gakki.

Weighing about 5·7 grams, the cartridge is in monoblock form to ensure solidity, being moulded from a resin material. Stylus compliance is in the medium range and the use of popular medium-mass arms, as fitted to many integrated turntable units, is intended.

Operation is based on what is described as a VH matrix design, which is apparently like some others in that it is a kind of cross-bobbin arrangement, the coils being close to and between the straight poles attached to a rare-earth magnet. The coils are placed as close as possible to the stylus pivot. Stylus is elliptical and the cartridge is claimed to be a 1·5g tracker.

THE FINDINGS

Frequency response was reasonably uniform, not without quirks in the extreme top, and the square-wave result, with a damped overshoot, was not as elegant as some. Tip mass is called into question and audition was inclined to support that. Channel balance was close, output was near to specification, and separation was a bit messy except in the high range, where 24dB was noted at 10kHz. Results as a whole suggested slight lack of symmetry of operation, with vague confirmation in stereo replay.

The stylus tip was a 6 x 18µm elliptical on a well aligned square stone, mounted in a tapered aluminium alloy cantilever. Tip finish was adequate but not quite all that might be wished. Compliance was firmly in the medium range, arms of medium effective mass would be appropriate, and matching in that sense is not particularly fussy. As for electrical input a load of 100 to 400 ohms would be suitable.

Tracking peformance was rather good, although at this level of outlay one is hardly expecting a featherweight which will negotiate every obstacle. The super-level check was completed within the specified range of pressures. Some high-end brittleness and coarsening, and eventually some splutter, was the sign of incipient mistracking during audition with the most challenging material. Otherwise the general balance was liked and the sound was free from serious emphases. Bass was acceptably solid.

Not surprisingly, the graceful transparency of some more advanced devices was not a feature, but still the cartridge was thought to be a possible for those wishing to adventure into the realms of moving-coils at modest cost. The cartridge was found to be mildly intolerant of disc noise and minor surface imperfections.

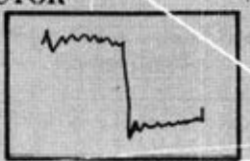
THE VERDICT

It would be interesting to see what Yamaha could do with a no-compromise design at an appropriately higher level of cost. But the MC7 is good enough to be taken seriously, and if it is not quite out of the top drawer it is undeniably fair value.

TECHNICAL DATA AND DISTRIBUTOR

Tracking	Standard 1·0g Super 1·5g
Output	L 0·32mV R 0·36mV
Channel balance	0·5dB
Separation at 1kHz	L 32dB R 24dB
Stylus condition	Fair
Stylus replacement	W
Arm compatibility	M
Sound quality	Av

See page 13 for key.



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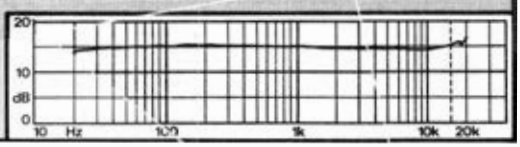

BUYER'S GUIDE TO TURNTABLES

Model	£	Drive	Type	Speeds	Cartridge	Arm
ADC						
B3001	190	D	SA	33, 45	—	No
AIWA						
APD 30	90	D	SA	33, 45	MM	Yes
APD35	60	B	SA	33, 45	MM	Yes
APD50	150	D	A	33, 45	MM	Yes
APD60	100	D	A	33, 45	MM	Yes
AKAI						
APB10C	55	B	M	33, 45	dual magnet	Yes
APB20E	70	B	SA	33, 45	dual magnet	Yes
APD30C	80	D	SA	33, 45	VM Type	Yes
APQ50C	130	D	SA	33, 45	VM Type	Yes
APQ70C	200	D	SA	33, 45	Ortofon LMB-12	Yes
APQ80C	250	D	P, SA	33, 45	Ortofon LMB-12	Yes
ALBA						
3002	—	B	SA	33, 45	moving magnet	—
ARISTON						
AASS Speed Selector	79	—	—	33, 45	—	—
RD80SL	169	B	M	33, 45	—	No
RD80SLE	229	B	ES	33, 45	—	No
RD11S	259	B	M	33, 45	—	No
RD110SL	249	B	M	33, 45	—	No
RD110SLE	319	B	ES	33, 45	—	No
AUDIO LINEAR						
TD4001-S	196	B	M	33, 45	—	No
AUREX						
SR-D45	100	D	A	33, 45	C-60M	Yes
SR-Q65	133	D	A	33, 45	C-60M	Yes
SR-Q770	144	D, Q	A	33, 45	—	Yes
BANG & OLUFSEN						
1700	99	B	A	33, 45	20S	Yes
2202	169	B	A	33, 45	20E	Yes
2402	195	B	A, Re	33, 45	20EN	Yes
8000	395	L	A	33, 45	20CL	Yes
DAIS						
Dais	399	B	—	33, 45	No	No
DENON						
DP30L(S)	139	D, Q	SA	33, 45	Yes	Yes
DP31L	115	D, Q	SA	33, 45	Yes	Yes
DP31F	129	D, Q	A	33, 45	Yes	Yes
DP33F	199	D, Q	A	33, 45	DL/8A	Yes
DP55K	230	D	M	33, 45	No	No
DP60L	279	D, Q	A	33, 45	No	T
DUAL						
CS505-1	75	B	SA	33, 45	—	Yes
CS506-1	89	B	SA	33, 45	ULM 45E	Yes
CS508	80	B	SA	33, 45	ULM 45E	Yes
CS607	110	D	SA	33, 45	ULM 52E	Yes
CS617Q	119	D, Q	SA	33, 45	ULM 55E	Yes
CS627Q	149	D, Q	A	33, 45	ULM 55E	Yes
CS728Q	125	D, Q	A	33, 45	TKS 380E	Yes
CS741Q	240	D, Q	A	33, 45	TKS 390E	Yes
EAGLE						
D7500	84	B	SA	33, 45	—	Yes
FERGUSON						
3941	60	B	SA	33, 45	Audio Technica CN2700	Yes
FIDELITY						
200P	65	B	SA	33, 45	Shure M75-6S	Yes
350P	89	D	SA	33, 45	Shure M75-65	Yes
450P	55	B	SA	33, 45	ADCQLM30 Mk3	Yes
GARRARD						
DD450	90	D	SA	33, 45	FF15EOII	Yes
DD455	92	D	A	33, 45	FF15EOII	Yes
DDQ550	135	D	SA	33, 45	VMS20EOII	Yes
DDQ650	152	D	SA	33, 45	VMS20EOII	Yes
Disco Driver	40	B	M	33, 45	less cart	Yes
GT255AP	70	B	A	33, 45	FF15EOII	Yes
GT255P	68	B	SA	33, 45	FF15EOII	Yes
GRUNDIG						
PS2500	89	B	A	33, 45	AT71	Yes
PS3500	112	D	A	33, 45	AT71	Yes
HEYBROOK						
TT2	195	B	M	33, 45	No	No
HITACHI						
HT20S	55	B	SA	33, 45	MT30	Yes
HT50S	79	D	SA	33, 45	MT35	Yes
HT66S	109	D	A	33, 45	MT35	Yes
HTR10	109	D	A	33, 45	MT35	Yes
HT660	169	D	A	33, 45	—	Yes
INPUT DESIGN						
Cadet	80	B	M	33, 45	No	No
Kitdeck	105	B	M	33, 45	No	No
JBE						
JBE Series III	264	D	M	33, 45	—	No
JVC						
L-A21	—	B	SA	33, 45	Z-15	Yes
L-A31	80	D	SA	33, 45	—	Yes
L-E5	160	D	A	33, 45	MD-1034	T
L-F41	105	D	A	33, 45	—	Yes
L-F71	166	D	A	33, 45	MD-1039	Yes
QL-A51	120	D	SA	33, 45	—	Yes
QL-Y5F	225	D, Q	A	33, 45	—	Yes
QL-Y3F	180	D, Q	A	33, 45	—	Yes
LINN						
LP12	POA	B	M	33	No	No
LOGIC						
DM101	345	B	M	33, 45	No	No
LUXMAN						
PD284	144	D	SA	33, 45	—	Yes
PD272	155	D	M	33, 45	—	Yes
PD288	219	D	A	33, 45	—	Yes
PD300	575	D	M	33, 45	—	No
PD555	1725	B	M	33, 45, 78–		No
MARANTZ						
TT1200CT	49	B	SA	33, 45	500	Yes
TT2200CT	69	D	SA	33, 45	500	Yes
TT4200CT	79	D	A	33, 45	500	Yes
TT6200CT	99	D, Q	A	33, 45	500	Yes
MELCO						
3533 System	1500	B	M	33, 45	—	No
3560 System	2000	B	M	33, 45	—	No
J. A. MICHELL						
Focus One	135	B	M	33, 45	No	No
Focus One + arm	209	B	M	33, 45	No	Yes
Hydraulic Reference	195	B	M	33, 45	No	No
Hydraulic Reference +arm	269	B	M	33, 45	No	Yes
Electronic Reference	225	B	M	33, 45	No	No
Electronics Reference +arm	299	B	M	33, 45	No	Yes
Marble Electronic	265	B	M	33, 45	No	No
Marble Electronic +arm	339	B	M	33, 45	No	Yes
MITSUBISHI						
DP630	105	D	A	33, 45	AT71	Yes
DPEC7	170	D	A	33, 45	AT12E	Yes
LT-5V	199	B	A, V	33, 45	AT12E	T
MONITOR						
ET500	172	D	M	33, 45	—	No
N.A.D.						
5080	89	D	M	33, 45	—	Yes

CARTRIDGES: SUMMING-UP

There are plenty of indications that designs have been pushed forward in recent times. The most interesting advances are in the medium-to-high range of cost, and it cannot honestly be said that many very inexpensive models have great merit beyond the obvious one of cheapness. But honourable exceptions which beat the budget barrier are to be found, and the only regret is that their numbers are so limited.

Points to be watched, especially by first-time buyers, include stylus characteristics and the general compatibility of the cartridge with the proposed hi-fi system. Another point for study is the way in which performance is influenced by loading (capacitance due to leads and amplifier input) and it is seen that some cartridges are touchy about this while others are little affected by load changes.

It is worth repeating here that stylus compliance is not a 'goodness' factor enabling you to make a snap judgment about product quality. Many other matters, not least stylus-tip shape and finish, are more influential. However, the inquiring buyer should observe that compliance values are spread over a wide range (as the reports demonstrate) and that correct selection is imperative because it has a direct bearing on tracking stability and, ultimately, on audible performance.

A very good pickup may have high, middling or low compliance and what matters in practice is that the cartridge and arm should be compatible partners.

As for the question of sheer sound quality, the 'musical' compatibility of a pickup with the audio system deserves some thought. It is one thing to select a pickup on its own merits, and quite another to assess it in relation to the equipment with which it will be used. If the system is of such a calibre that it clearly offers high transparency to the programmes, allied to low distortion and other attributes, then a pickup with a neutral characteristic may well be best.

Such matching would be normal in an ideal hi-fi world, but in the realms of practical affairs there is scope for manoeuvre. An obvious example is the use of a pickup with a tilted or declining balance to compensate for undue or disliked brightness in the system. There are limits to such correctives but often a little experiment is worthwhile.

Of the many magnetic cartridges, notable examples at modest cost include Ortofon's VMS10E Mk2, Westrak's C101E and Osawa's new OS-2001 (all good-value models), while Grado's cheapest has a special role in catering for low-budget systems. Moving up the scale a special word of acknowlegment is due to Glanz for their 31L and of course Ortofon for the popular VMS30E Mk2. B&O's models are also attractive (though stylus cost is high), with the MMC-20EN tops for value. Further up is Pickering's new XEV/3001.

If difficult to sum-up for value, some high-cost cartridges are very attractive to those who take an interest in the finest modern discs. Technics' U205C Mk3 is a particularly sweet example, and the Sony XL-70 is another. Stanton's 881S has interesting qualities but is costly in relation to achievement. Shure's V15/3 has fresh appeal with its HE stylus, and the M97HE also achieves distinction. The novel low-impedance models by Pickering and Stanton sound smooth and track securely but very high cost must restrict their appeal.

Experience of a representative clutch of moving-coil cartridges tends to confirm that a really good example of the breed is pricey. At its best the MC sound is something special. On the whole the cheapest examples lack appeal — unless you are determined to go moving-coil without much thought for results.

In any case, at the low end of the range one is likely to find that the ordinary magnetic cartridge is a more refined and fully developed product. However, the Coral MC81 is hardly what one would call expensive and it certainly has merit. The Mayware MC-2V also came out well, and the Ortofon MC10 Mk2 is a shining example of good value.

In the higher range it is difficult to assess value, although those who think well of such specialities will be inclined to rate them highly in all respects. As ever, results do not relate very clearly to price, but in audition the Denons made a good impression, as did the Mission, and the AT-32 by Audio-Technica is a nice example of a light tracker at a somewhat lower premium. It is at least a small comfort that prices do not appear to be climbing sharply.

BUYER'S GUIDE TO TURNTABLES

Model	£	Drive	Type	Speeds	Cartridge	Arm
ONKYO						
CP1000	59	B	SA	33, 45	MM	Yes
CP1010A	70	B	SA	33, 45	MM	Yes
CP1011F	80	D	A	33, 45	MM	Yes
CP1015A	90	D	SA	33, 45	MM	Yes
CP1130F	130	D, Q	AR	33, 45	–	Yes
OPTONICA						
RP4100E	82	B	A	33, 45	Yes	Yes
RP5100	119	D	A	33, 45	–	Yes
RP5200H	125	D	A	33, 45	—	Yes
RP7100	179	D	A	33, 45	–	Yes
RP9100	419	D	A,Re	33, 45	–	Yes
ORACLE						
Oracle	747	B	M	33, 45	–	No
PHILIPS						
AF677	59	B	SA	33, 45	GP400MkII	Yes
AF685	50	B	SA	33, 45	GP400MkII	Yes
AF729 BT	120	B	A	33, 45	GP401MkII	Yes
AF777	96	B	A	33, 45	GP400MkII	Yes
AF829 BT	166	B	A	33, 45	GP412MkII	Yes
AF877	99	B	SA	33, 45	GP401MkII	Yes
AF977 BT	208	B, Q	A	33, 45	GP412MkII	Yes
PINK TRIANGLE						
Pink Triangle	298	B	M	33, 45	—	No
PIONEER						
PL2	60	B	SA	33, 45	PC220	Yes
PL4	100	D	SA	33, 45	PC3MC	Yes
PL6	110	D	SA	33, 45	PC3MC	Yes
PL7	140	D	A	33, 45	PC3MC	Yes
PL8	175	D	A	33, 45	PC3MC	Yes
PL100X	65	B	SA	33, 45	PC11011	Yes
PL120	60	B	SA	33, 45	PC220	Yes
PL200X	85	D	SA	33, 45	PC1011	Yes
PL300X	100	D	SA	33, 45	PC150	Yes
PL320	85	D	SA	33, 45	PC220	Yes
PL400X	120	D, Q	A	33, 45	PC150	Yes
PL600X	205	D, Q	A	33, 45	–	Yes
PL620	110	D	SA	33, 45	PC3MC	Yes
PL720	140	D	A	33, 45	PC3MC	Yes
PL-L1000	410	D	A	33, 45	Opt	Yes
REGA						
PLANAR 2	115	B	M	33, 45	–	Yes
PLANAR 3	148	B	M	33, 45	—	Yes
REVOX						
B790	450	D	A	33, 45	AKGP8ESR	Yes
B795	339	D	A	33, 45	P20MDR	Yes
ROTEL						
RP400X	50	B	SA	33, 45	MM	Yes
RP510	75	D	SA	33, 45	MM	Yes
RP500	75	B	SA	33, 45	MC	Yes
RP560	90	D	A	33, 45	AT51	Yes
RP700	100	D	A	33, 45	AT51	Yes
RP1001	100	D	SA	33, 45	AT31 MC	Yes
RP1010	140	D	A	33, 45	AT31 MC	Yes
SANSUI						
FR-D25	70	B	SA	33, 45	Yes	Yes
FR-D35	86	D	SA	33, 45	Yes	Yes
FR-D45	129	D	A	33, 45	No	Yes
FR-D55	180	D	A	33, 45	Yes	Yes
SONY						
PSLX2	80	D	SA	33, 45	XL150	Yes
PSLX4	100	D	SA	33, 45	XL200	Yes
PSLX5	120	D	SA	33, 45	XL200	Yes
PSX600	180	D	SA	33, 45	opt.	Yes
PSX800	377	D	SA	33, 45	opt.	Yes
STD						
305M	200	B	M	33, 45	–	No
305S	149	B	M	33, 45	–	No
TEAC						
PX300	79	D	M	33, 45	No	Yes
PX500	109	D, Q	SA	33, 45	No	Yes
TECHNICS						
SL7	200	D, Q	A	33, 45	EPC202	Yes
SL10	300	D, Q	A	33, 45	EPC310MC	Yes
SL-B202	75	B	Semi	33, 45	EPC-425	Yes
SLD1	160	D	A	33, 45	EPC202	Yes
SL-D202	89	DD	Semi	33, 45	EPC-U25	Yes
SL-D303	99	DD	Fully	33, 45	EPC-U25	Yes
SLQL1	200	D, Q	A	33, 45	EPC202	Yes
SL-Q202	116	DD/Q	Semi	33, 45	EPC-U25	Yes
SL-Q303	135	DD/Q	Fully	33, 45	EPC-U25	Yes
SL1200 MkII	180	D, Q	M	33, 45	—	Yes
SL120 MkII	150	D, Q	M	33, 45	—	No
SP10-II	595	D, Q	M	33, 45, 78	—	No
TENSAI						
TD530D	85	D	SA	33, 45	Audio Technica	Yes
TD750Q	100	D	A *	33, 45	Audio Technica	Yes
TD862B	49	B	SA	33, 45	Jelco 9A	Yes
TD535D	69	D	SA	33, 45	Audio Technica CN5440	Yes
TD870B	99	B	SA	33, 45	Audio Technica CN5440	Yes
THORENS						
TD 104 MkII C	87	B	SA	33, 45	No	Yes
TD 105 MkII C	104	B	SA	33, 45	No	Yes
TD 115 MkII C	174	B	SA	33, 45, 78	No	Yes
TD 126 MkIII BC	230	B	SA	33, 45, 78	No	No
TD 126 MkIII C	322	B	SA	33, 45, 78	No	Yes
TD 126 MkIII SME 3	400	B	SA	33, 45, 78	No	Yes
TD 160BC	122	B	SA	33, 45	No	No
TD 160BC SME 2	209	B	SA	33, 45	No	Yes
TD 160C	161	B	SA	33, 45	No	Yes
TD 160 Super	170	B	SA	33, 45	No	No
TOSHIBA						
SRQ660	131	D, Q	A	33, 45	C290M	Yes
TRIO						
KD 40R	89	D	SA	33, 45	–	Yes
KD 50F	105	D	A	33, 45	–	Yes
KD 600	249	D	M	33, 45	–	No
KD 650	299	D	M	33, 45	–	Yes
KD 850	399	D	A	33, 45	–	Yes
KD 1033S	59	B	M	33, 45	–	Yes
KD 1033SC	65	B	M	33, 45	Ortofon FF15E	Yes
KD 1600	69	B	SA	33, 45	–	Yes
KD 1600C	75	B	SA	33, 45	Ortofon FF15E	Yes
KD 5100	199	D	A	33, 45	–	Yes
L07D	1150	D	M	33, 45	–	Yes
UHER						
CR 4100	215	B	A	33, 45	–	Yes, T
VISONIK						
5010	94	B	SA	33, 45	Yes	Yes
WIN LABORATORIES						
SDC-10	1495	B	M	33, 45	–	No
YAMAHA						
P 350	75	B	SA	33, 45	MM N6500	Yes

Abbreviations
A – automatic. B – beltdrive. D – direct drive. F-L – front loading. L – linear motor. M – manual. P – programmable. Q – quartz locked. Re – remote control. Rn – return. V – vertical. SA – semi-automatic. R – rim. AC – auto-change.

TURNTABLE MANUFACTURERS & DISTRIBUTORS

ADC: BSR Ltd, Powke Lane, Cradley Heath, Warley, West Midlands B64 5QH (Tel: 0384-65191).
ARGOMOUNT: GA Audio, 171 New Birmingham Road, Tividale, Warley, West Midlands (Tel: 021-557 8534).
AKAI: Akai (UK) Ltd, 12 Silver Jubilee Way, Haslemere Heathrow Estate, Hounslow, Middlesex TW4 6NF (Tel: 01-897 7171).
ARISTON: Ariston Acoustics, Unit 176, Brieryside, Prestwick Airport, Ayrshire KA9 2RD (Tel: 0655-82424).
AUREX: Toshiba (UK) Ltd, Toshiba House, Frimley Road, Frimley, Camberley, Surrey GU16 5JJ (Tel: 0276-62222).
B&O: Bang & Olufsen UK Ltd, Eastbrook Road, Gloucester GL4 7DE (Tel: 0452-21591).
DENON: Eumig (UK) Ltd, 14 Priestley Way, London NW2 7TN (Tel: 01-450 8070).
DUAL: Hayden Laboratories Ltd, Hayden House, Chiltern Hill, Chalfont St Peter, Gerrards Cross, Buckinghamshire SL9 9UG (Tel: 02813-88447).
DUNLOP: Dunlop System Transcriptions Ltd, PO Box 9, Troon, Ayrshire (Tel: 0563-29777).
HITACHI: Hitachi Sales (UK) Ltd, Hitachi House, Hayes, Middlesex UB3 4DR (Tel: 01-848 8787).
JVC: JVC (UK) Ltd, Eldonwall Trading Estate, Staples Corner, 6-8 Priestley Way, London NW2 7AF (Tel: 01-450 2621).
LINN: Linn Products Ltd, 235 Drakemire Drive, Glasgow G45 9SZ (Tel: 041-634 0371
LUX: Howland-West Ltd, 3-5 Eden Grove, London N7 8EQ (Tel: 01-609 0293).
MARANTZ: Marantz Audio (UK) Ltd, Unit 15/16, Saxon Way Industrial Estate, Moor Lane, Harmondsworth UB7 0LW (Tel: 01-897 6633).
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REVOX: F.W.O. Bauch Ltd, 49 Theobald Street, Borehamwood, Hertfordshire WD6 4RZ (Tel: 01-953 0091).
SANSUI: Sansui Audio Europe NV, Unit 10A, Lyon Industrial Estate, Lyon Way, Greenford, Middlesex UB6 0AA (Tel: 01-575 1133).
TECHNICS: National Panasonic (UK) Ltd, 107/109 Whitby Road, Slough, Berkshire SL1 3DR (Tel: 0753-34522).
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SONY: Sony (UK) Ltd, Pyrene House, Sunbury Cross, Sunbury-on-Thames, Middlesex (Tel: 09327-87644).
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