

LINN ISOBARIK DMS

This unusual and costly loudspeaker has become something of a byword among audiophiles in recent years, partly because of its association with the fine Linn disc-playing system and partly because of its rarity; only 400 or so pairs have been produced to date. Few reviews have appeared in the press, as both the high cost and limited availability of the DMS has precluded their inclusion in large group tests. It must, however, be said in Linn's defence that after a heavy speaker such as this has undergone lab and listening sessions, it has usually sustained some veneer damage, and this is hardly something a supplier would relish with speakers that cost over £1,000 per pair.

The DMS reviewed here is of recent production, and does differ from earlier models in some respects. A number of small improvements have been made, notably to the driver output integration, colouration levels and frequency balance.

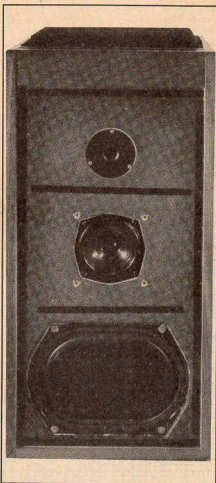
A 'PMS' version is also produced, the 'P' intended to indicate professional rather than domestic ('D') use, and indicating an active model where auxiliary electronic crossovers are employed, together with multiple cable connections and three stereo power amplifiers (normally Naim units, but more recently also including models from Meridian).

Depending on the final choice of amplifier, the working PMS system will cost between £2,000 and £4,000 per pair and, by comparison with the standard DMS version, it offers improvements in maximum dynamic range, as well as superior driver and crossover control, thereby offering gains as regards clarity and reduced distortion.

No instructions are provided with the DMS, as the manufacturer intends that the speaker should be offered for home trial by a specialist dealer before the customer makes his final decision. We took care to consult dealers and examined the leaflet provided by Linn. This states that the DMS is designed to function well in a domestic environment and goes on to suggest that the enclosure should be positioned close to the rear wall some 60-90cm from the nearest corner, with a '6-foot' distance recommended from the top of the cabinet to the ceiling. Ideally the front panel HF unit should be at ear level (which requires the use of rigid stands some 30cm high, elevation from the floor being specifically recommended) while inwards angling of the enclosures up to 20° is also considered permissible.

Accordingly, on test these speakers were tried in two rooms, one being fairly small and a little on the hard side in reverberation terms, the speakers set away from the corners and some 25 cm from the wall. In the main listening room, they were tried both against the wall and spaced well clear by 0.8m. In all cases rigid 33cm-high stands were used.

In its usual guise the DMS measures 38 x 38 x 76cm, excluding 20mm of extra grille protrusion, but looks slightly smaller than it really is. However, its massive internal construction results in a weight of around 40kg—once positioned you



are unlikely to move it very often!

A finely barred veneer is used for the front upper section of the fascia, while below the Declon foam grille continues with a vertical bar pattern. More driver units face upwards from the top surface of the speaker, and a second Declon grille is used to mask them.

SPECIFICATION

Linn say very little about the technical performance of these speakers; for example, the important impedance rating is omitted, as is sensitivity, distortion and frequency response. It is true that on the latter subject Linn do state that in the domestic environment the DMS is "broadly capable of reproducing sound from 20Hz to 20K (sic) with a few dB variations", but anything more vague than this would be difficult to imagine. The leaflet goes on to say that the speaker will produce signals down to and below 10Hz while the recommended amplifier power rating ranges from 50W minimum to a 500W maximum per channel. High but unspecified sound levels are claimed with "very low distortion levels, particularly at lower frequencies than other loudspeakers can acceptably produce".

TECHNICAL DETAILS

While six drivers are used for each system, the DMS is essentially a three-way model with a quite straightforward crossover operating at approximately 375 and 3,000Hz. There are twin bass, mid and

treble drivers, which are paired electrically, with one pair of mid and treble drivers disposed on the top surface, the treble being nearest to the rear of the enclosure.

The front panel shows a conventional vertical in-line format of the bass, mid and treble units, with the sixth (the second bass unit) hidden inside the enclosure. The latter configuration has been patented by Linn. It's called an 'isobarik' bass driver, and is claimed to give low distortion levels, more typical of the mid band. The patent describes the configuration essentially as a pair of closely-coupled (via a small and hence high-stiffness air chamber) bass units, one on the front of the enclosure and the other inside. They operate in tandem, electrically in parallel with the infinite baffle (sealed box) enclosure volume loading the rear of the inside driver. In simple terms, the approximate result at low frequencies is a bass unit of twice the moving mass and suspension stiffness, plus half the impedance of one driver alone. The voltage sensitivity remains unchanged while the doubled mass results in a reduction of the cut-off frequency of the sealed box enclosure of approximately $\sqrt{2}$. But in so doing a penalty is incurred, namely that twice the power is required to drive the system.

By incorporating additional vertically directed drivers, Linn's intention must be to improve the energy dispersion off-axis in the mid and treble where most speakers are weaker while, by continuing the vertical axis line, it is hoped that the stereo imaging will not be impaired. Inevitably, however, the polar response in the vertical axis will suffer, due to the additional parallel radiating elements.

For the bass, the well-known KEF B139 unit is employed, with a diecast frame and polystyrene wedge diaphragm/cone. The mid unit is also from KEF in the form of the well-established B110 — a 100mm Bextrene cone driver with a neoprene rubber roll surround plus a light doping layer applied by Linn. All the units are, in fact, of high power capability, the treble driver coming from Scan Speak in Denmark and designated the D2008. It comprises a highly sophisticated 19mm soft dome, loaded by a shallow horn phase corrector.

The internal volume of the enclosure approximates to 55 litres, the extremely rigid enclosure being constructed of 19mm veneered high density chipboard, mildly damped by an internal bonded layer of 12mm fibre board. The panels are extensively braced both at the seams and across weaker areas to add stiffness near the driver apertures. In addition, four tensioned 4mm steel bolts clamp top and bottom panels, with four more used front to back. The front and side walls are also braced by internal panels, while the top section almost forms a sub-enclosure—a feature which may help to break-up dominant standing wave modes.

The rear is theoretically removable via capped screws, but doing this damages the glue seals and would invalidate the customer's guarantee.

The drivers are neatly recessed and;>

TEST BENCH

overall the standard of workmanship is good. The mid-drivers are back-loaded via a capped cylindrical tube some 137mm in diameter and 280mm deep, these filled with acoustic absorptive material, while the main enclosure is also filled with absorbent — and generous — quantities of fine black sheep's wool.

The design indicates a potential impedance rating of 4ohms, particularly in view of the paralleled driver lineup. Input connection is via 3-pole XLR connectors; the large plug depth precludes really close wall positioning. In addition, a concealed bolt in the front midrange box must be removed.

LAB PERFORMANCE

The dual plane radiation axes of this model required careful interpretation of the anechoic test results in order to extract useful information.

At 2m, measured on the frontal high frequency axis, the response showed some interesting features (A). The 1m referenced sensitivity was quite average at 87dB/W — for example, higher than the R105 — but the unusually low impedance used in practice compromise the sensitivity due to protection limiting with many

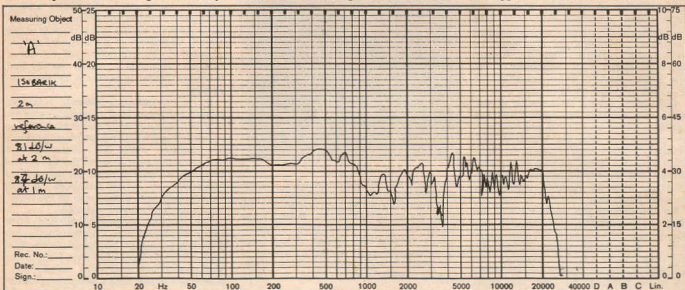
amplifiers. The low frequencies were well extended, with the nominal -6dB point at 30Hz. It was not possible to apply limits to the response owing to the lack of normally reflected output from the mid and treble drivers although, if the top panel output were to be reflected in full, the output at best could only improve by 3dB and the curve suggests that there would still be a shallow 2dB trough in the upper mid range. The high frequencies were quite good and well extended to 20kHz, beyond which there was a sharp cut-off (the graph extends to 25kHz).

With 1/2-octave averaging (B), a better idea of the subjective frequency balance was obtained, free of the interference and fine diffraction effects of the sinewave response in (A). The main axial response continued to show some prominence in the 350Hz-1kHz range, with some loss above this point, but the addition of an 0.8m-square hard reflector position behind the speaker to redirect the upper radiation in to the forward axis produced surprisingly little effect (++++ line). Changes of the order of 2dB were present from 200Hz to 3kHz, a region where such a reflecting plane could be expected to exert an influence, but the response trend did not

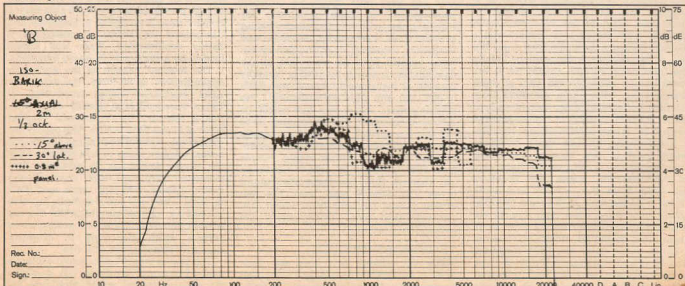
appear to be much improved.

Response uniformity in the vertical plane was poor, as evidenced by the 15° above-axis trace (dotted), where gross changes occurred up to 10dB, and the driver integration between mid and treble was also poor, this shown by the irregularities between 3 and 6kHz. This result indicates that the frequency response balance will vary somewhat with listener ear-height. Above 6kHz, however, the off-axis response was very good, just 1.5dB down at 15kHz. In the lateral or horizontal plane — the axis of symmetry for this system — the uniformity was much better at the 30° measuring angle, and the output was well maintained at just 2.5dB down at 15kHz.

In view of the manufacturer's claim of low distortion and wide dynamic range, the second and third harmonic distortion results (C) were disappointing at 96dB SPL, 1m (equivalent to a 9 watts input level referred to 8 ohms). Careful checking of the drive amplifier output assured us that the graphs were representative of the speaker and not the test equipment. The important third harmonic was typically 8% over much of the mid range and upper bass, this characteristic often



Linn Graph A



Linn Graph B

related to saturation of the crossover inductor cores. At 35Hz the third harmonic measured 15%, the results for the second harmonic being broadly similar, prior experience with the KEF units involved having shown that lower distortion is possible at this lower sound level. The lower pair of distortion curves were taken with sound level reduced by four times to the 90dB, and revealed that the third harmonic was better than 0.5%, 35Hz, and typically 0.2% or less elsewhere, with second harmonic at a maximum of 1.3%, 75Hz. These results demonstrated that the Isobarik distortion was quite normal at lower levels and thus to a good standard.

On the impedance graph (D), a normal sealed box system resonance at 31Hz was present with a cruelly low characteristic at higher frequencies, with dips to 30ohms, 100Hz, and 2.3ohms, 4kHz. The average value was barely higher than 4, with the 'nominal' value very low at 3Ω. These results show that the speaker represents a very difficult load to drive and will also be critical of the impedance of both the accompanying connecting cable and amplifier output; it was fortunate that the amp used for the listening tests was, in fact, capable of driving this load

quite happily (a Sansui AU919 II), and that low impedance speaker cable was used. Hardly surprising, in view of all this, that the Naim amplifiers with their capability to drive near impossible loads have emerged as one of the few devices compatible with the DMS!

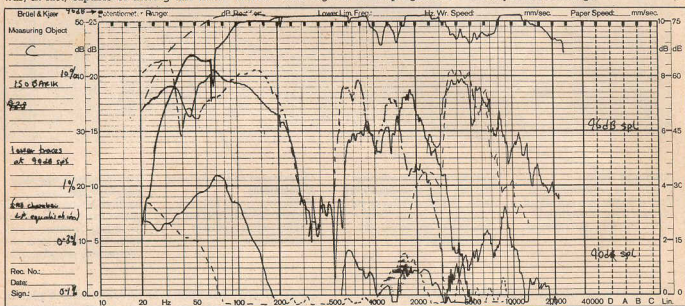
SOUND QUALITY

It quickly became apparent that the DMS possessed an individual balance and character that differed from our accepted references, attracting greater diversity of panel opinion than did any of the other systems in the report, while also demonstrating a greater variability and interaction with different programme sections. However, while the scores were below average for the group, this speaker certainly possesses some virtues. For example, it did not sound as dull as the simple axial response measurements might have suggested, the extra contribution of the upper drivers in a particular listening environment undoubtedly being a factor here.

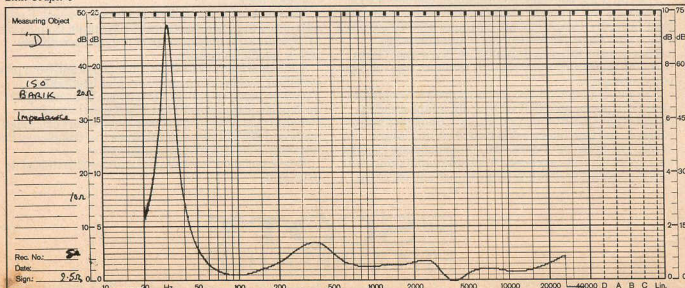
Significantly, the higher level results were the least favoured—a fact which accorded with the lab-measured distortion. With regards to its programme

interaction, the effects on spoken and solo singing voice, as well as piano and small string orchestra, were preferred to those on larger orchestral, church organ and massed choir.

The bass and treble registers were well presented, the former with good depth and clarity, and the latter with good detail and smoothness, although the lower treble did appear forward, this lending a sibilant, almost metallic, quality. The midrange sounded uneven and, on occasion, rather sharp, with the piano reproduction 'chilled' with a rather clinical effect overall. Colouration did not appear serious, being mainly of the 'tube' and 'sharp' type. Stereo imaging showed notable differences by comparison with more conventional systems. Classical crossed-mic recordings were distorted in perspective, lending a vague over-wide effect with diffuse central projection, although with a pleasing increase in height. Multi-miked and pop recordings were given an enhanced ambience with interesting spatial effects and an impression of detail; in particular, it seemed as if the DMS compensated for the excessive 'weight' and 'closeness' of many rock recordings. ▶



Linn Graph C



Linn Graph D

CONCLUSIONS

It would be easier to summarise the conclusions to this report if one system had sounded significantly poorer than the others, as this would enable me to draw some comparisons and contrasts; in the event, however, this did not prove to be the case.

The least favourably received were the Isobarik and the SEAS DD Tower. The latter did not provide the anticipated standard as regards bass quality and dynamic range, this partly due to the presence of some colouration and response imbalance which prevented the enjoyment of high sound levels. Stereo depth and precision were also a trifle weak considering the price level, but in its favour were the easy-to-drive impedance as well as the unusual styling. Its particular quality may suit some systems.


The Isobarik DMS was a different matter and required careful qualification. At the outset, I can only repeat that the nominal 3ohms loading impedance is certainly punishing, and accordingly the matching amplifier must be chosen with great care. The 'different' character of the DMS, together with its unusual dis-

person and spatial properties plus 'forward' balance, necessitate skilled matching to the rest of the purchaser's hi-fi system, and Linn's own recommendation of a prior demonstration at home is most pertinent in this context.

Despite the brochure's claim, the DMS dynamic range and distortion levels were not particularly good, and I can understand why those who do achieve satisfying results from this system are so enthusiastic about its brother, the more costly PMS or active version. Elimination of the passive crossover must solve the impedance and dynamic range problems, and offer a much reduced distortion level, particularly in the mid band; however, strictly speaking the PMS is not directly comparable with the DMS. The latter is worthy of audition but will require careful consideration of its pros and cons, not the least of which is its high price.

Overall, the R105 II comes out as certainly the best system as yet tried in my essentially neutral listening room. Its particular strengths are accurate stereo presentation, with at times an uncanny depth and ambience, plus the absence of

any obvious subjective faults or exaggerations. Clearly its character is based on balance and compromise, while the engineering achievement is also commensurately high and justifies the price.

The L150 surprised us all. The obvious JBL sound of the past has been superseded and the result was a creditably balanced system with good stereo and excellent rendition of detail. In this respect at least it is not unlike the broadly comparable Yamaha NS1000M. Like the Yamaha, the L150 is also capable of an impressive dynamic range, remaining in full control at high volume levels and excelling itself in the bass, where the depth, power and precision of its performance were only too apparent on test. It proved to be a little critical of vertical listener position, and showed a mild colouration as well as a 'sharpness' which did not particularly suit string tone, but the design is nonetheless well worth auditioning especially for use in larger rooms. On rock programme it can sound pretty devastating, while the classical performance is also quite satisfactory. Keen-eared listeners had better check the near-ultrasonic treble peak though! 

ISOBARIK'S DISTORTION REPRIEVED

In April *HiFi for Pleasure* we published exhaustive tests on four eminent loud-speaker systems — the KEF R105 MkII, JBL L150, Linn Isobarik DMS and SEAS DD Tower. Regrettably, the Isobarik distortion results have since been proven wrong. All four speakers underwent tests at the acoustics laboratory of GEC, Hirst Research, in Wembley, London, using their calibrated laboratory amplifier. During these anechoic tests, the Isobarik DMS yielded disappointing distortion results at 96dB at 1m, although figures were fine at 90dB.

Preliminary investigation indicated that Hirst's amplifier was not to blame for this discrepancy, but subsequent information tends to refute this. Recent discussions with Linn revealed that, while the overall results were not in general in dispute, those for distortion were considered unrepresentative. Accordingly Linn supplied us with a curve of a DMS taken in non-anechoic conditions which showed the maximum third order harmonic to be around 2.8% 30Hz, with typically better than 1% above 50Hz. The second harmonic peaked at around 5%, 70Hz, being typically 3% below 70Hz, then falling to a 1-1.5% level over the remaining frequency range.

These results are, in fact, similar in character to those printed in our review of the DMS as regards the 90dB reading, though naturally with some scale correction for the different power levels.

Raising our original 90dB SPL result by 10dB, for example, thereby increasing 1% to the 3% level, in fact provides close agreement with the Linn data.

Linn suggested that the drive amplifier was responsible for the problem, and stated that, in their experience, the Naim 250 was one of the few models found not to exhibit interface problems with the DMS.

In order to rapidly check the source of the problem, if one existed, a preliminary check of the distortion performance of our review samples was made, using a different amplifier at the full 96dB/metre level in a non-anechoic but well damped environment. Using an Ivie 30A real-time spectrum analyser it was possible for us to establish that the Linn data were in fact more typical of the DMS than our own original readings, indicating that our published results at 96dB were incorrect.

For example, the worst-case result for 2nd harmonic at 80Hz gave a figure of 4% with the 3rd order about 0.4%, and in the mid band (700-800Hz), where we originally printed figures of 3% 2nd and 8% third harmonic, the new readings were 1.3% and 0.3% respectively; again quite similar to the curve supplied by Linn. Finally at 5kHz where 10% or so was originally recorded the data now gave 0.8% second and 0.25% third harmonic — much better results than before.

The load matching problem of the DMS would appear to have resulted in a

faulty performance when driven by the lab amplifier at the higher 96dB sound level but, in all other respects, the graphs taken under less demanding impedances conformed to Linn's specification.

To conclude, the comments concerning the DMS' distortion printed in the original review last month clearly need modification. From the new data the Isobarik can be seen to offer respectably low levels of distortion throughout the range, particularly as regards the more subjectively important third harmonic. This is in keeping with the results for other high quality models in the DMS size and price range. Assuming that the Isobarik was not at its distortion limits at 96dB, it could thus be driven to produce a wide dynamic range provided that the amplifier chosen could sustain the loading. (As a matter of interest, to produce a 105dBA sound level at 1 metre with the DMS, peak currents of up to 16 amps are required, and thus very low resistance cables are also an important consideration.)

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Some news has also been received from JBL concerning the L150 speaker covered in the same review. JBL have stated that the minor peak in the treble at 19kHz will soon be under control, and furthermore, the crossover has been improved by the addition of low loss high-frequency capacitors to all the critical electrolytic components in the unit.

