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 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 it is claimed that the two-position cross-over, doubling 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, while the hump in 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, an additional 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 reduce the energy path radiating 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 responses 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 polyurethane wedge surrounds (100mm Bex-trene cone driver with a neoprene rubber roll surround plus light damping layer appau)/Linn. All the mid and treble drivers, in fact, of high power capability, are of a similar design, the treble driver coming from Scan Speak in Denmark and designated the D2006. It comprises a highly sophisticated 10mm 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 18mm 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 mid range, employing an additional 4mm bonded layer of steel clamps and bolted to the main面板s, 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 and 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...
overall the standard of workmanship is
good. The mid-drivers are back-loaded
via a capped cylindrical tube some 137mm
in diameter and 250mm deep, these filled
with acoustic absorptive material, while
the main enclosure is also filled with absob-ent — and generous — quantities of fine
black sheep’s wool.
The design indicates a potential im-
pedance rating of 4ohms, particularly in
view of the paralleled driver lineup.
Input connection is via 3-pole XLR con-
nectors; 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
RI05 — but the unusually low impedance
will in practice compromise the sensitivity
due to protection limiting with many
amplifiers. The low frequencies were well
extended, with the nominal -6dB point
at 50Hz. 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 1/3-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 irregulari-
ties between 2 and 6kHz. This result indi-
cates that the frequency response balance
will vary somewhat with listener ear-
height. Above 5kHz, however, the off-axis
response was very good, just 1-6dB 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 2-6dB down at
18kHz.

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 5 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](image)

![Linn Graph B](image)
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 1-5%. 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 230ohms, 4kHz. The average value was barely higher than 4, with the 'nominal' value very low at 3ohm. 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 positioning, 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.

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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 dispersion 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 loudspeaker 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% at 30Hz, with typically better than 1% above 50Hz. The second harmonic peaked at around 5% at 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 (700-900Hz), 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.

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