The ultimate listening experience

KEF's KM1 is a remarkable loudspeaker. Indeed, KM1 could fairly lay claim to being the Ultimate Loudspeaker.

To see KM1 for the first time is mildly awe-inspiring. To hear it is to be immediately struck by a sense of sureness, ease and authority in the reproduction of music, and indeed by how quiet they sound, despite the system's enormous loudness capability. For KM1 is an exercise in low distortion and headroom. KM1 can 'cruise' when playing at very high volume levels, with power to spare, and yet achieve a degree of dynamic resolution unknown to virtually any other conventional loudspeaker system.

Dynamic resolution

It is not sufficient for a loudspeaker to be capable of handling the full dynamic range between loud and soft; it must be able also to resolve fine, low level musical detail whilst simultaneously reproducing complex loud passages of music. It can only achieve this if the system has extremely low levels of colouration. This was a crucial element in the KM1 design brief.

Originally developed for the British Broadcasting Corporation as a high-level pop studio monitoring loudspeaker, they have been in use at the BBC's Maida Vale music studios in London since the spring of 1982 with extremely satisfactory results.

In the development of professional monitoring loudspeakers the demand for higher and higher sound pressure levels has tended to obscure the pursuit of sound quality.

There are many loudspeakers available which produce accurate, smooth sound but which are too fragile to be used at the very high continuous levels required in recording studios. On the other hand there are numerous loudspeakers capable of going very loud, but which have irregular frequency response, poor transient behaviour, considerable colouration and severe non-linear distortion. Today, with digital recording, compact disc and a substantial overall improvement in all programme material, the domestic requirements for the reproduction of music, more closely match then ever before those of the professional.

KM1 is therefore ideally suited to satisfy the professional recording engineer or the discerning audiophile with a large music room, in search of a system without compromise.

KM1 will satisfy the professional musician, perhaps with recording facilities in his home, who wishes to combine the finest possible domestic sound reproduction with his creative activities.

KM1 also makes an ideal auditorium loudspeaker for small to medium-sized halls and theatres.

Immutable physical laws – elegant engineering solutions

KEF engineers have never denied the laws of physics but have merely accepted the basic limitations of dynamic loudspeaker engineering – and then applied a variety of ingenious engineering techniques to push them harder than anyone has managed hitherto. The target for KM1 was 123dB spl, which compares with the 112dB maximum of Model 104/2 and 108dB max for Model 105.2. Considering that 6dB represents a doubling of sound pressure and quadrupling of sound power, and that 10dB involves ten times the sound power, the task was by no means easy. To achieve these design parameters, it was decided to use active drive, whereby each drive unit is powered by its own amplifier.

Multiple bass units can be used without prejudicing stereo performance, so four 300mm units, similar to those used in Model 105.2, are each driven by a 100W amplifier, each operating into its own separate enclosure. The midrange presents unique and conflicting problems. These arise from the need to achieve high output levels with low colouration, whilst at the same time maintaining good dispersion which necessitates the use of a small drive unit.

The KM1 solution is to use two units in a vertical array to create good stereo imaging, and then to drive each unit with a 350 watt amplifier to achieve the required levels.

B110 units with specially modified polypropylene diaphragms cope easily with the high g-forces involved. Fluid cooling conducts heat from the coils to the magnet structures and thence via 8mm diameter metal bars to a massive heatsink covering the entire rear face of the mid and high-frequency enclosure.

A single tweeter is necessary to obtain the best stereo performance, so a very special version of the T52 was developed. Efficiency is quadrupled by a massive 21,000 gauss magnet system – equivalent to two of the
magnets employed in the B300 bass units! Large voltage swings are needed by the amplifier over the treble range, so a pair of bridging amplifiers are employed, giving a total output for the tweeter of 400W. This unit is capable of handling an astonishing 160V peak to peak. Ferrofluid cooling ensures that the voice coil runs cool even at maximum output.

With KM1 it is not necessary to equalise the programme for the speaker!

Unlimited protection
Protection is important in a system designed to run at sustained high levels. Driver failure means 'down time' and that, for the professional, costs money.

KM1 is fitted with a comprehensive but entirely practical protection system. This system gets much closer to the heart of this problem area than any hitherto devised. Real time information on the voice coil and heat sink temperatures is provided by onboard analogue computers whilst the system is playing. When these temperatures approach predetermined thresholds the playback level is reduced until conditions return to normal.

The protection will never operate unless the power amplifier is grossly overloaded. The resulting distortion is normally clearly audible. Much electronically generated music already includes elements of distortion however, so in order to avoid distracting interruptions to the monitored signal a red LED gives visual warning of the onset of overload and the imminent triggering of protection. This allows the operator time to back off the volume to avoid such interruptions.

Modular construction
The construction of the system is modular. A metal frame centre section carries the MF/HF enclosure together with the amplifier and power supply. The two bass 'wings' bolt onto the sides of the frame thus forming the central chimney. The MF/HF and amplifier sections are mounted in two filing cabinet style slides which may be pulled forward for easy servicing.

A civilised loudspeaker
KM1's elegant design and immaculate finish allow it to blend equally well into a high-tech studio environment or a home music room. The swept back frontal aspect permits stereo imaging of astonishing accuracy.

It is a truism that a loudspeaker should be heard — yet not heard? In this latter respect KM1 is eminently successful. Its civilised performance is free from switching clicks or thumps, there is no hum if properly installed and no cooling fans to distract. Large and powerful it may be, but KM1 is a quiet loudspeaker. The greater part of music is quiet and KM1 does not intrude, except when the music demands it. Then KM1 can exhibit an awesome sense of unfettered power and authority, that must truly be heard.

In the communication of the musical experience KM1 has no equal.
Frequency Response of the Model KM1
Amplitude response of a KM1 measured on the reference axis at 2 metres in freefield conditions. The smooth and flat amplitude frequency response contributes to the KM1's low colouration design.

Specifications

<table>
<thead>
<tr>
<th>Frequency Response:</th>
<th>38Hz to 23kHz ± 2dB (−6dB at 34Hz and 25kHz)</th>
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<tbody>
<tr>
<td>Directional Characteristics:</td>
<td>Within 1.5dB of reference axis response for ±7.5° vertically, to 20kHz and for ±15° horizontally, to 8kHz</td>
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<tr>
<td>Maximum Output:</td>
<td>At least 120dB each third octave from 60Hz to 20kHz freefield from one system at 1 metre, or 2 systems at 2 metres</td>
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<tr>
<td>Thermal/Vivioption Compression:</td>
<td>Typically less than 0.5dB at any frequency and at any level up to maximum output under normal programme conditions</td>
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<tr>
<td>Distortion:</td>
<td>Second and third harmonic less than 3.2% @110dB, less than 1% @90dB both from 60Hz to 20kHz measured at 1m in anechoic conditions</td>
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<tr>
<td>Input Impedance:</td>
<td>22kohms - floating</td>
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<tr>
<td>Input Sensitivity:</td>
<td>Full output for nominal 0dBm input (0.774V) - adjustable in 3dB steps from −21dBm to +12dBm</td>
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<tr>
<td>Signal/Noise Ratio:</td>
<td>&gt;105dB</td>
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<tr>
<td>Driver Complement:</td>
<td>LF4 + 300mm Bexlene direct radiator</td>
</tr>
<tr>
<td>Enclosure:</td>
<td>Closed box with subsonic filter. Separate compartments for each driver</td>
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<tr>
<td>Weight:</td>
<td>140kg</td>
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<tr>
<td>Dimensions:</td>
<td>780(h) x 915(w) x 665(d) mm</td>
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KM1 Features:

High Performance input circuitry:
Combines the best attributes of balanced, and transformer input circuitry. Exceptionally low distortion, ultra wide bandwidth (1Hz to 100kHz). High common mode rejection for reduced hum pick up and high offset voltage tolerance.

Precision stepped input attenuator.
Adjustable contour control to optimise mid/low frequency balance for differing locations.

Amplification:
8 separate output sections feeding seven drive units giving a combined output approaching 1.6kW.
Computer optimised active three-way dividing/equalizing circuits.
3 separate power supplies incorporating stand-by mode and silent on/off switching.

Complete Protection against thermal overload:
Fluid cooling on mid- and high-frequency units.
64mm diameter metal bars transfer heat from mid-range unit rear plate to external heat sink.

6500cm² heat sink area for mid-range unit cooling.
On board analogue computers provide information on voice coil temperatures to trigger protection at a pre-determined threshold.
Silent system cooling by air convection.

Modular construction:
All sections assembled onto central framework.
Amplifier and mid/high frequency section slide out for easy servicing.
Bass units mounted using compliant KEF-mounts to minimise energy transmission into cabinet structure.
All drive units are selected to close tolerances and matched in pairs by an advanced computer programme so that every pair of Model KM1 is matched in frequency response and sensitivity to within 0.5dB of the original laboratory prototypes.
A range of stands are available to facilitate installation in control and listening rooms.
Studio designers and recording engineers should contact KEF Special Products Division for further technical details.

KEF maintains the right to incorporate developments and amend specifications without prior notice, in line with continuous research and development.

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