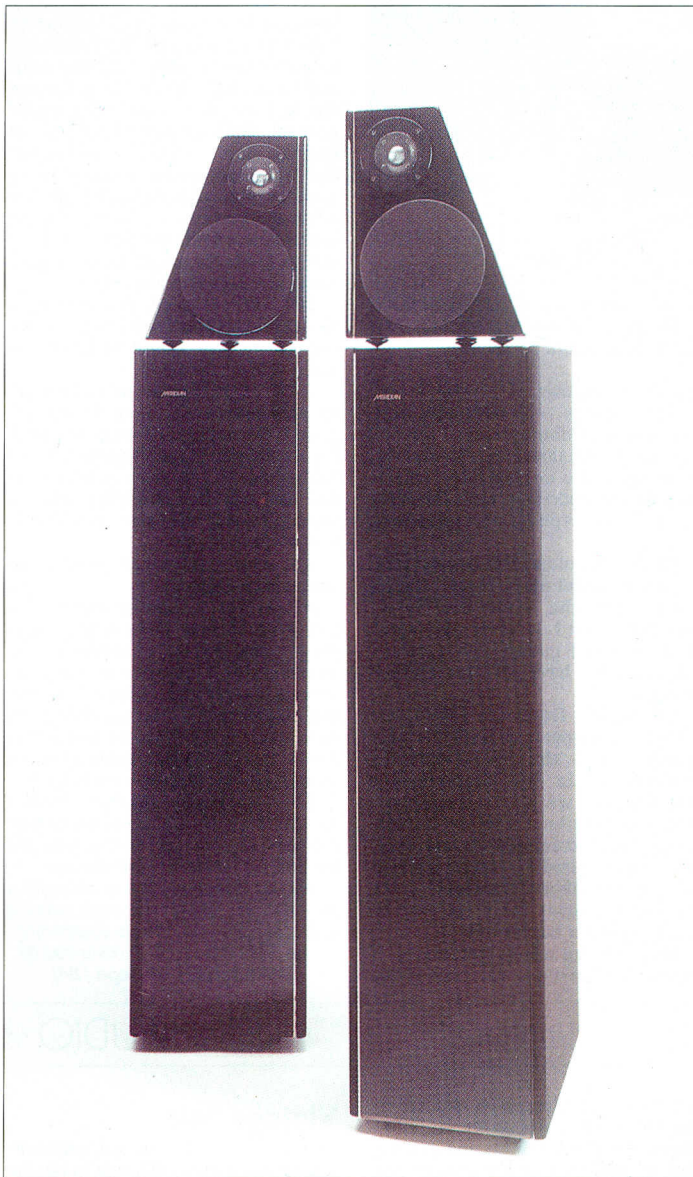


MERIDIAN D6000 DIGITAL ACTIVE LOUDSPEAKER



OVER the last 10–15 years our lives have been quietly invaded by electronic equipment of hitherto unbelievable complexity, but by skilful design it has been so successful in its presentation and so reliable in its operation that nowadays we just press a few buttons and unquestionably accept the result. I suppose that, pocket calculators apart, the real breakthrough was the video cassette recorder, now such a commonplace in millions of homes that it is known simply as 'the video'; as brilliant a mixture of clever thinking, precision mechanics and complicated circuitry as one could conceive. Now my six-year-old grandson races home from school to playback some 'un-missable' TV programme he has recorded during the day without a moment's thought as to the miracle that has taken place inside that innocent black

box; not too long ago, if indeed it was possible at all, this would have been a job for two men in white coats and £50,000 worth of Ampex VTR loaded with huge reels of two-inch tape!

What has that got to do with the subject of this report, you may ask? Well this Meridian product uses advanced digital technology to replace a tea-crate-full of analogue components and is, without doubt, the most sophisticated, intricate and technically advanced piece of audio equipment available today; but fortunately the same simplicity of operation rules. If the idea of 'operating' a loudspeaker seems strange, even intriguing, then read on and discover more about this radical new concept in sound.

The 'normal' part of Meridian's D6000s consists of complementary pairs of three-way, multiple-driver loudspeakers, each tri-amped by

SPECIFICATION

Type: Active three-way design with digital inputs and digital signal processing
 Drive units: 4 × 210mm bass, 1 × 170mm midrange, 1 × 25mm tweeter
 Amplification: 4 × 65 watts amplifiers per loudspeaker
 Distortion: any settings below clipping, typically <0.02%
 Signal-to-noise ratio: absolute, any channel, >110dB CCIR
 Digital processing: automatic sync to input signal
 automatic identification of CD or DAT to enhance lock-in
 proprietary PLL for lowest jitter
 CRC validity checking of input signal
 four-times oversampling digital filter
 error correction and concealment
 >15.7 bits precision
 passive D/A converter filtering
 processing and display of subcode

Power consumption: 10VA standby, 200VA max

Dimensions (W × H × D): 210 × 900 × 295mm

Weight: 68kg each

Manufacturer: Meridian Audio Ltd., 13 Clifton Road, Huntingdon, Cambs PE18 7EJ

Tel: 0480 434334

UK retail price: £7,600 per pair

groups of self-contained solid-state power amplifiers in the accepted analogue fashion. The 'novel' part takes a further step in Meridian's trend-setting reversal of conventional practice in the form of a most versatile remote-controlled digital preamplifier which can select signals from a number of external digital sources, the commonest example being a CD 'transport'. It can then adjust volume, balance, tone or phase as commanded and pass the signals on for frequency division and compensation to a trio of Bitstream digital-to-analogue converters coupled to their respective normal power amplifiers. At the same time a small display near the top of the main loudspeaker cabinet provides a read-out of the source, volume setting and other relevant information, as requested by the remote control unit, which will also converse with other Meridian units if present. I will return to discuss these digital goings-on in more detail, but first a description of the whole loudspeaker is indicated.

Each D6000, totalling some 1.3m (4ft 6in) in height, is constructed in two parts. The tweeter and midrange drive units which together are responsible for all sounds above 200Hz are installed in the face of a truncated pyramidal enclosure (avoiding parallel sides) 330mm tall and constructed of 25mm thick multi-ply. All corners are rounded and the whole of the exterior is finished in polished hard gloss black

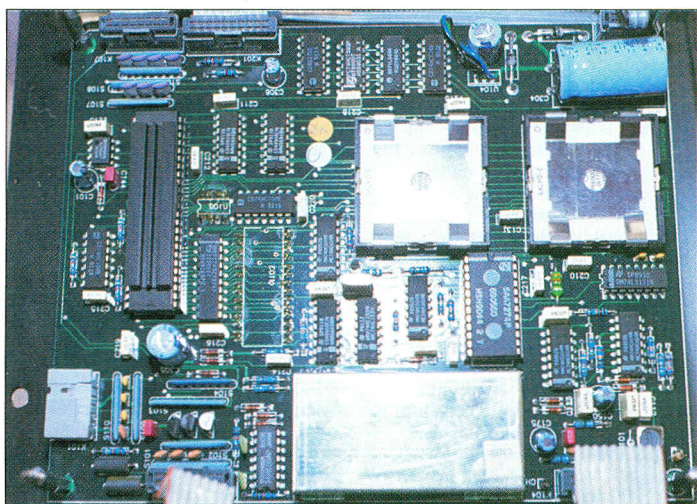
lacquer. These cabinets are made in complementary (i.e. handed) pairs, have stout internal bracing and bitumenized damping pads plus a filling of BAF wadding. The tweeter is made specifically for Meridian and has a 26mm aluminium dome, silver voice-coil wire of 4.5 ohms DC resistance, ferro-fluid cooling and a short flat-profiled horn behind a protective perforated metal grille.

A 115mm polypropylene cone is fitted in the 170mm die cast frame of the midrange unit. It has a concave half-roll convex rubber surround and corrugated rear suspension. The voice coil of 4.6 ohms DC resistance is 39mm in diameter and is not hidden behind the usual dust cap. Instead a solid phasing 'bullet' is fitted to the centre pole of the 108 × 28mm ceramic magnet assembly. The natural resonance of this unit is 60Hz and this rises to 90Hz in the sealed box, an octave below its minimum operating frequency. It is protected by a cloth-covered grille which is a press fit into the rebated perimeter of the cut-out.

The second and major part of the D6000 takes the form of a tall, slim but deep, solid closed box which contains the four bass drivers, two on each side. The rear face of the box is set back some 75mm; all the electronics—digital preamplifier, analogue power amplifiers and supplies—are fitted to the two sections of a metal rear panel and slip into this recess



Bass and midrange drive units



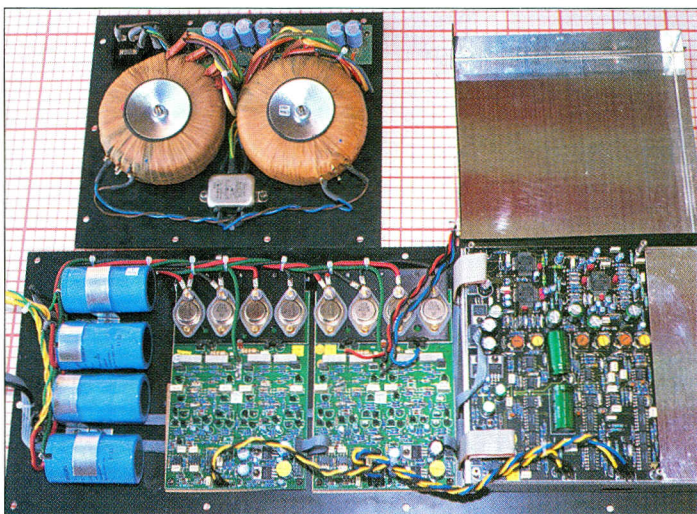
Digital Sound Processor board

where they are retained by 20 self-threading screws.

The front face of the enclosure is covered by a removable polished glass plate in a metal frame. The rear surface of the glass is blacked except for an oblong aperture near the top through which the small fluorescent display can be observed. A similarly blackened glass top-plate is drilled and bushed to allow three metal pegs to protrude and engage in matching sockets in the base of the mid/top pyramid. It is a tribute to the finish on the latter that there is no visible mismatch to the glass; a thin gold tape runs all the way up the inner face of the front glass and is continued up and over the pyramid, unifying the visual line. Two black cloth covered grilles are pegged to each side of the bass enclosure, covering the surface-mounted drivers. These are 215mm outside diameter paper cone units emanating from SEAS of Norway, as does the midrange driver. The actual cone is 150mm in diameter with a similar voice-coil, cast frame and magnet assembly; coil resistance, though, is 6.5 ohms as each side pair is driven in parallel. There is a 65mm dust cap and both this and the cone have a hard lacquer coating right up to the deep half-roll convex rubber sur-

round. These units each have a free-air resonance of 36Hz and this rises, with the four of them in the sealed box, to 75Hz. This might be thought high for such a large loudspeaker but in truth the enclosed volume is not that large; take away the amplifier compartment, the framed glass at the front, the side grilles, plus the 22mm thickness of the MDF cabinet walls and the volume taken up by some very substantial internal bracing and what is left is only about half of what it might appear. The cabinet walls are lined with plastics acoustic foam and there is a double curtain of BAF wadding held between the magnets of the opposing units.

It was over ten years ago that I first reviewed a Meridian Active Loudspeaker (Model M2 in August 1981) when domestic application of digital technology had yet to come. Nevertheless, much of the thinking which went into those early designs is carried through to the D6000; not least the basic ideas of housing all the electronics in a rear compartment, the dedication of separate power amplifiers to individual drive unit sections, frequency correction to straighten out and extend acoustic frequency response and the incorporation at the input of low-level active crossovers.

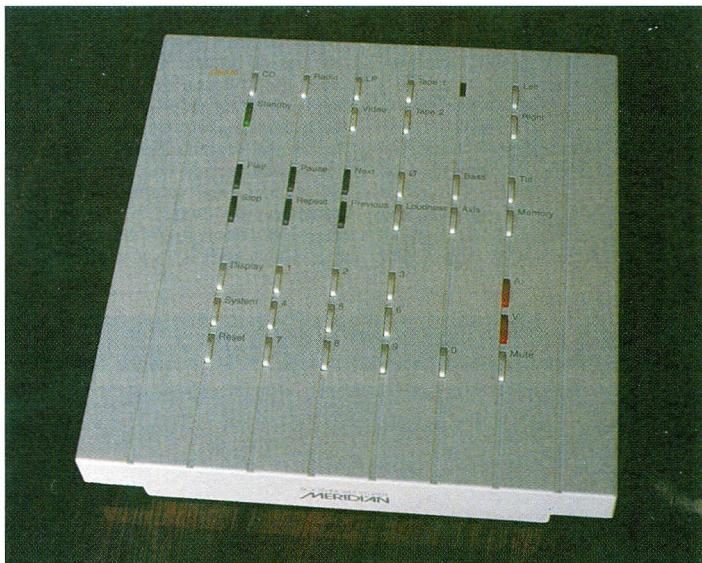


Power supply (top & left), power amplifiers (centre) and control circuitry (right)

The last two of these have now been transferred to the digital domain and added to them are: selection of four digital inputs; user control of volume in 1dB steps from 0dB to 99dB; 5dB of bass lift or fall in 0.5dB steps; an overall tilt of the frequency spectrum of ± 10 dB, also in 0.5dB steps; loudness contours related to actual sound level and taking account of tone settings; balance accompanied by delay to the nearer loudspeaker; 'tilt' because the listeners ears may be below-axis; and absolute phase because some people are sensitive to this. All these facilities fall to hand on the remote control unit and all are indicated in turn on the displays of the pair of loudspeakers.

The ability to carry out all these things and others which are hidden from you (e.g. individual built-in calibration of each loudspeaker to compensate for driver tolerances etc.) is made possible by the incorporation of a pair of Motorola 56001 DSPs

After all these digital operations—both predetermined and user selectable—have been carried out the three resulting streams of bits, which now represent the bass, mid and treble signals for one channel, are translated to the analogue domain by the latest Boothroyd Stuart/Philips Bitstream technology (the co-operation which exists between the Dutch giant and the prestigious Huntingdon expertise is a constant source of wonder), duly filtered and de-emphasised if required by the programme material. All this part of the operation is contained on two printed circuit boards in a couple of quite small stacked screened containers behind the top section of the rear panel, where all the various DIN and phono sockets are situated. I hate to think how many thousands of resistors, capacitors, chips and so on, you would need to do all this in the analogue domain; indeed some of these operations would not be possible at all.



Meridian Remote Control panel

(Digital Signal Processors—a usefully descriptive name). We are going to hear a lot of these clever massive 'chips' in future so we might as well briefly acknowledge them here for what they are: a computing action-station which can perform almost any function you care to name by mathematical manipulations (many millions each second) of the ones and zeros which constitute the digital signal stream. The necessary instructions to compute each required function are compiled and written as a computer programme and stored in an EPROM (Erasable Programmable Read Only Memory) chip; in the case of the D6000 this item of software, programmed and numbered individually for every loudspeaker, is plugged into a socket behind a removable hatch on the rear panel, permitting future updates. This same EPROM also carries the code for a microprocessor which controls the whole system and is produced by Boothroyd Stuart's brilliant staff mathematician (who happens to be a charming young lady from Sydney who also plays the bassoon).

The next section down on the panel is occupied by four (the bass section uses two) 75 watts power amplifiers which use DC servo control and direct-coupling to complementary pairs of output transistors operating in Class AA, coupled to the panel via heatsinks. The lowest, divided off, section mounts a pair of large toroidal power transformers and some of the components of the six individual supplies derived from separate secondary windings. It is obvious that high quality components have been liberally used and large quantities of expensive silvered van den Hul cable are to be observed.

The remote control panel which is supplied with the loudspeakers is the only means of accessing them, although limited operation is possible if certain other Meridian equipment is used as a source (so, keep a spare PP3 battery around the house just in case!). It comprises a 160mm-square and 22mm deep alloy die-casting, finished in-off white paint, with a removable steel bottom cover. There are 37 but widely spaced push switches, helpfully colour-coded and plainly

labelled. The upper group are source selection, the centre group CD operation and tone, with a numeric bank of ten below. Two red ones on the right are normally used to raise and lower the volume (the so-called default mode) but if another command is pressed first—say Bass—then they will change to give control of that as required, reverting to volume after a few seconds' rest. All the occasionally used commands self-cancel in this way.

The infra-red source used to transmit instructions is a pair of just-visibly operating LEDs protruding from the front face; the receiver on the loudspeaker is quite sensitive so that it is not necessary to aim the controller—in fact reflection off the ceiling will do. Incidentally, when first setting up a D6000 system it is necessary to designate one loudspeaker as the master (the one to which it is most convenient to connect the input sources) and link this by means of a single cable to the other, known as the slave. The display on the latter will always indicate the source, e.g. CD or radio, and the volume level in dB (65–70dB is a good starting point, which can be put in a memory); the display on the master can be called upon to show many other things—tonal settings, timing on CD or programme or frequency on radio. Some of these are forwarded-on from other items of Meridian equipment I have been using as sources but which are not part of this report. For

the record these are the 204 tuner/timer reviewed by IH in our January issue fed via a 607 Analogue-to-Digital converter and the 602 CD Transport. Others are available of course, but suffice it to say that all conceivable inputs can be accommodated—both analogue and digital—right back to 78rpm records. At that point you will have laid out well in excess of £10,000 so now it is time to sit back and consider what it all sounds like.

How they performed

The D6000s normally rest in a standby condition, where their amplifiers are biased back to a low-current condition, and it takes a few minutes before they are really ready to perform (this may be a function of the source components, which also drop into standby). Once that short time had elapsed they effortlessly produced some of the better sounds that have been imported into the Horn household; and such a lot of sound too; you would have to have a very large room indeed before a pair of these began to run out of breath. The only sound-level meter I could readily lay my hands on hit the stops at 110dB spl but these loudspeakers went on way past the painful region. Their highly sanitized sound leads one to listen at a higher than usual volume, but even at more usual levels this immense reserve is a boost to exciting dynamics and, allied as it is to a very neutral,

relatively uncoloured and evenly balanced spectrum of very wide range, a most realistic reproduction of a great variety of material awaits you. The small and smoothly contoured separate head assembly covers all but the bottom two or three octaves so the stereo focus and depth are remarkable, better even than the similarly formatted B&W 801s or KEF's original R105, probably helped here by a more realistic height. The bass end, in particular, was extended and filled out by the active equalization well below its normal slope off, and organ pedals were enthusiastically portrayed; in fact I soon found it desirable to tame it down a couple of decibels and this held over all kinds of programme material.

In my room it seemed impossible at first to get rid of an excess of energy in the 100 to 150Hz region without losing out on the extreme low end, even though I tried moving these 75kg behemoths to a different position. The subjective effect was to cloud the bottom end, blunting definition and timing; this was accompanied by an apparent weakness in the fundamental tones of male voice, elevating "The Three Tenors" to new heights. However, it didn't measure that way and I eventually came to the conclusion that this was an artefact of the extremely steep crossover slopes which are obtained without phase problems by the DSP, allied to the physical spacing of the bass and

midrange units. I became used to it after a while and was able to listen through it. Another product of the steep crossovers is that the tweeter comes in at a rather low frequency of about 2.5kHz. This unit has a very wide dispersion and as a consequence I noticed early reflections from the room side walls which could not be countered by the usual toeing in; I had to provide temporary suspended damping.

You may gather that using loudspeakers of this calibre is not all plain sailing; their very perfection leads one on to follow-up the small revealed discrepancies which inevitably exist. What remains is a model of natural clarity and the easiest of listening, with really only the occasional reminder when a sibilant sings to tell you that the main cone is of polypropylene.

It would be nice to include a shortlist of some of the things I have particularly enjoyed listening to but the Audio Editor's electronic scissors are poised. However, I can guarantee that unless you are one of the very few people who already own superlative equipment—and in my experience there is not a lot in the marketplace which can really treat these D6000s on anything like equal terms—not only will you hear things on your discs that you didn't know were there, but you may also discover things which you didn't think could be recorded.

GEOFFREY HORN.