ION BRU

Keith Howard fires up the Magnat Plasma tweeter

Those of you who read last month's feature on ionic tweeters will need little introduction to the Magnat Plasma MP-02, but this is the holiday season, and I gather that copies of *Answers* are thin on the ground in Marbella newsagents. So I'll begin with a brief resumé, for those who weren't paying attention.

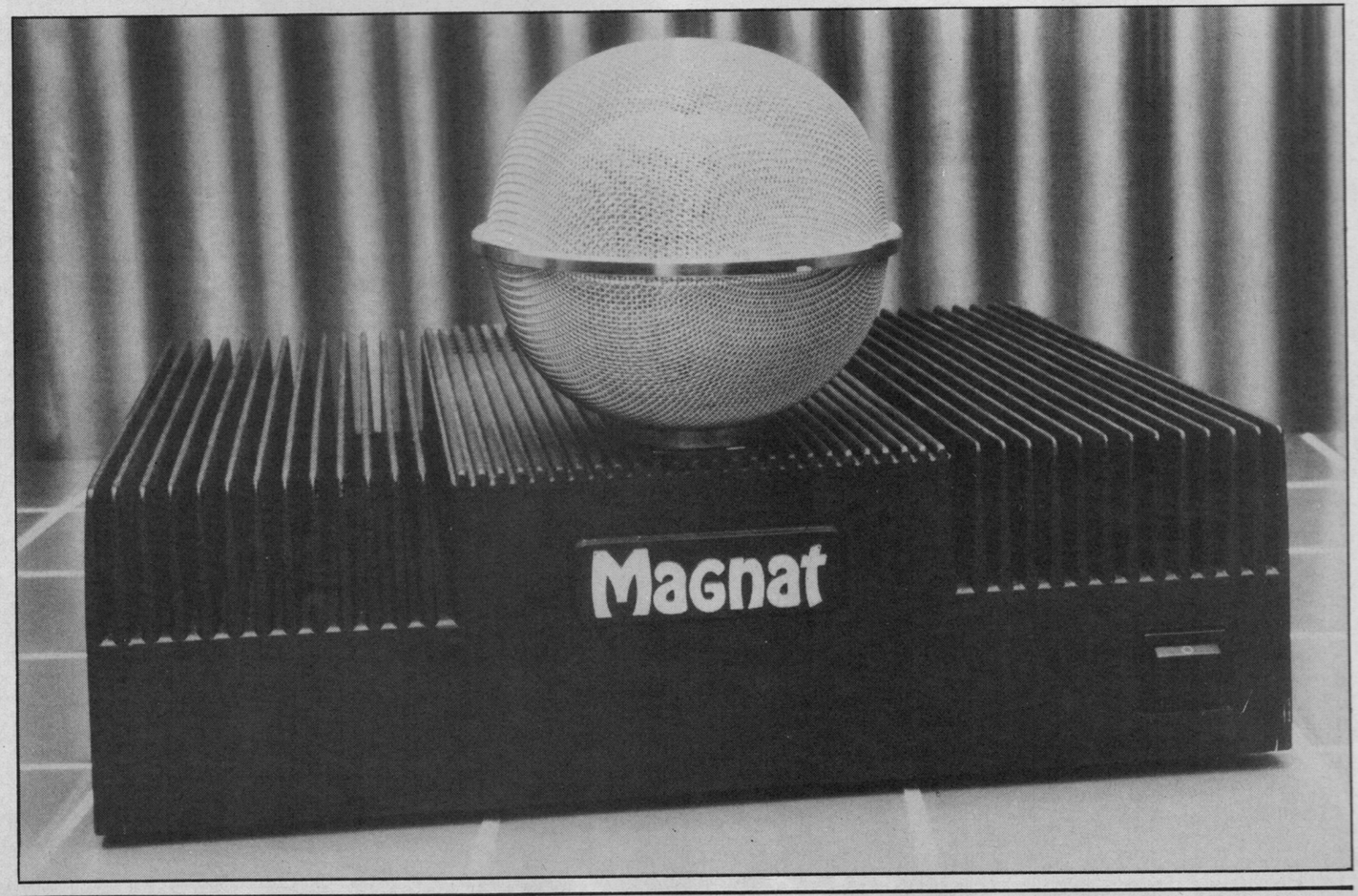
The Plasma has its origins in the early Fifties when a Frenchman, Siegfried Klein, filed patents describing a new form of loudspeaker which came to be known as the ionophone. The ionophone is unique in being the only loudspeaker to have no diaphragm. Instead it modulates a corona discharge, a 'flame' of ionised air molecules, which imparts pressure waves directly to the surrounding air. The ionophone's moving mass is negligible, therefore it has an extended high frequency response; 100kHz and beyond is typical. It has no diaphragm, therefore it has no resonances, and as there is no voice coil to heat up, it can sustain high levels without damage.

Early ionophones were horn-loaded to achieve the required sound pressures, but it is now possible, as the Magnat Plasma demonstrates, to dispense with the horn and radiate sound directly. For this latest evolution of the ionophone concept we can again thank Siegfried Klein, for while Magnat is a West German company, based in Cologne, it was the Frenchman who designed the MP-02 for them. The central electrode around which the corona discharge is formed is enveloped by two mesh electrodes, making the tweeter look rather like an over-sized microphone head.

That's the business end of the Plasma, but a sizeable chunk of electronics is required before it. The corona discharge is formed by an intense localised radio frequency field, so an RF oscillator precedes the electrode, its output voltage amplitude modulated by the incoming audio signal. To prevent leakage of RF and consequent interference, which was a thorny problem with early ionophones, careful screening of the oscillator is necessary, the electronics of the Magnat being enclosed in a substantial cast aluminium case measuring 31 × 26.5 × 9cm and finned to act as a heatsink for the electronics. As the tweeter is available as a separate component (it otherwise forms part of a complete Magnat speaker, the MP-X-088 pictured over), a crossover is also incorporated.

All this, and what is surely a relatively low volume of production, contributes to the MP-02's eyebrow-lifting UK price tag of £562.

To assemble and connect the Plasma is simplicity itself. The unit arrives well-packed, with the central and mesh electrodes separate from the main case. The central electrode is simply pushed firmly home into its sleeve, taking care to see that it contacts the igniter, and the outer electrode assembly is then screwed into place over it. Mains connection is via an IEC socket on the rear panel, for which leads are provided, though those supplied had German mains plugs attached, which had to be excised and UK plugs substituted. Considering the high cost of this product, I trust this is a matter which either Magnat or Beyer Dynamic will attend ▷



to in future. A mains switch on the front face of the case switches the tweeter on and off.

Connection to the power amplifier and main speakers is equally straightforward. Two pairs of spring-loaded terminals (the type we all know and hate) are provided on the rear panel, the outermost pair of which are designated the input and are connected direct to the power amp, while the innermost pair of terminals feeds the main speakers.

All is not what it seems here, however. I had assumed, logically enough I think, that the crossover in the MP-02 would have complementary high-pass and low-pass sections, the high-pass feeding the Plasma itself and the low-pass feeding the output terminals and thence the main speakers. In fact this is not the case at all. There is a high-pass section for the Plasma to isolate it from bass and midrange frequencies, but the back panel input and output terminals are simply paralleled. In other words, the main speakers continue to receive a full-range signal, while the Plasma parallels up at high frequencies.

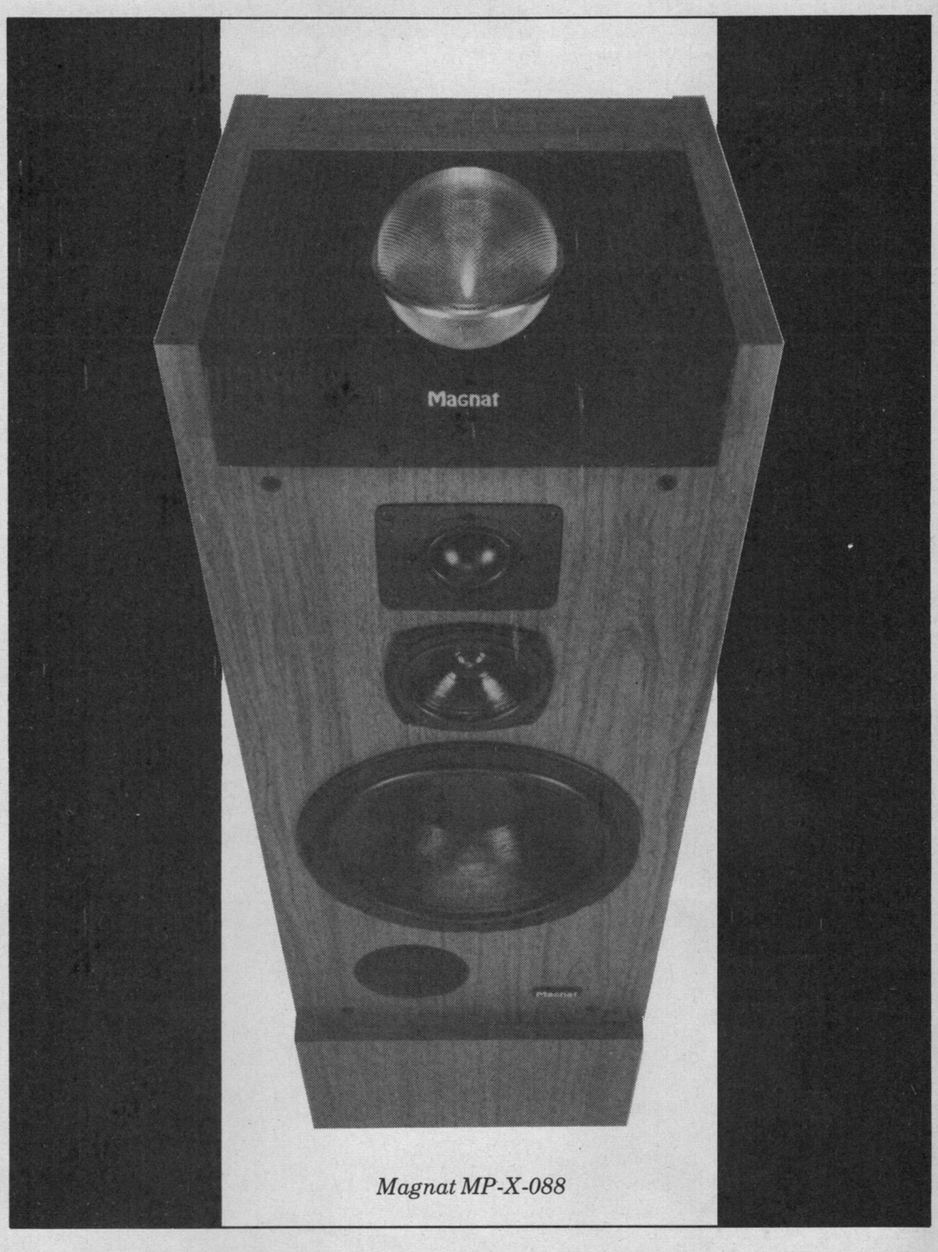
I hardly need explain what an unsatisfactory arrangement this is. It is folly to invest in this tweeter only to have it share the treble with a conventional unit supposedly its inferior. Also, the parallel arrangement will result in a treble lift. For example, if the sensitivity is set so that the Plasma and main speaker's tweeter have the same output, there will be a 6dB shelf in the overall response at high frequencies. Of course, this can be reduced by turning down the level of the Plasma — if you don't mind hearing even less of what you paid for! Ludicrous.

This is a very serious flaw in the MP-02's conception, but it is not the worst in practice. Categorically the most unsatisfactory aspect of this tweeter is its production of significant amounts of ozone.

Let me again reiterate something said last month by warning you that ozone, far from being a tonic you take lungfuls of at the seaside, is a poison. It is a powerful oxidant, it smells most unpleasant (to begin with — you lose sensitivity to ozone having breathed it for a short time), and it has well established harmful effects on humans. These begin with irritation of the eyes, nose and throat, and graduate, for prolonged exposure and/or high concentrations, to nausea, bronchitis and blood disorders.

Because of ozone's harmful effects, guidelines are laid down for maximum concentrations, though these more normally apply to industrial rather than domestic situations, the high ionising potentials which produce ozone being rarely encountered in the home. In the UK, the Health and Safety Executive has recommended a maximum level of 0.1ppm (parts per million) for 8 hour exposure, or 0.3ppm for 10 minutes exposure, this to limit peak concentrations (HSE Guidance Note EH38). Globally, the World Health Organisation has suggested a more stringent standard, recommending that ozone concentrations be limited to 0.05-0.1ppm for 1 hour exposure (WHO Guideline No7: Photochemical Oxidants).

The odour threshold for ozone (in other words, the concentration at which you can first smell it) is in the range 0.01-0.05ppm, so if your nose detects it it's a good sign that the recommended limits are being approached. I could smell ozone quite distinctly when the Plasmas were operating at home, so I set about determining the concentrations they were producing in my room.

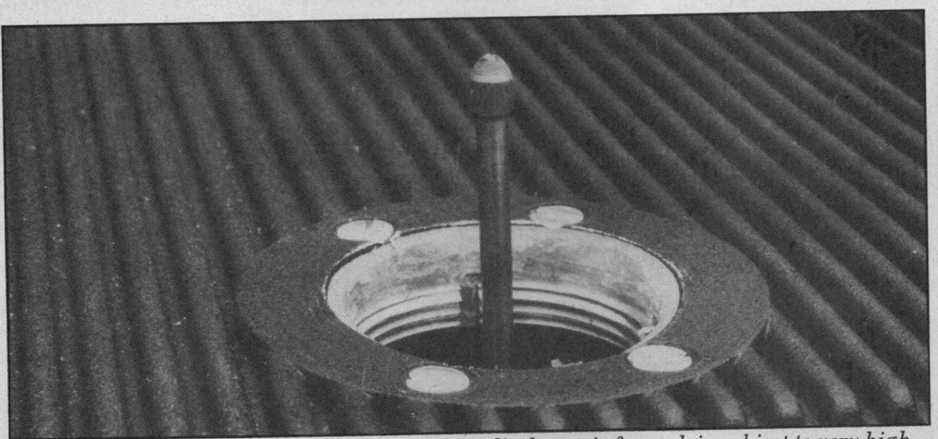


Magnat MP-X-088

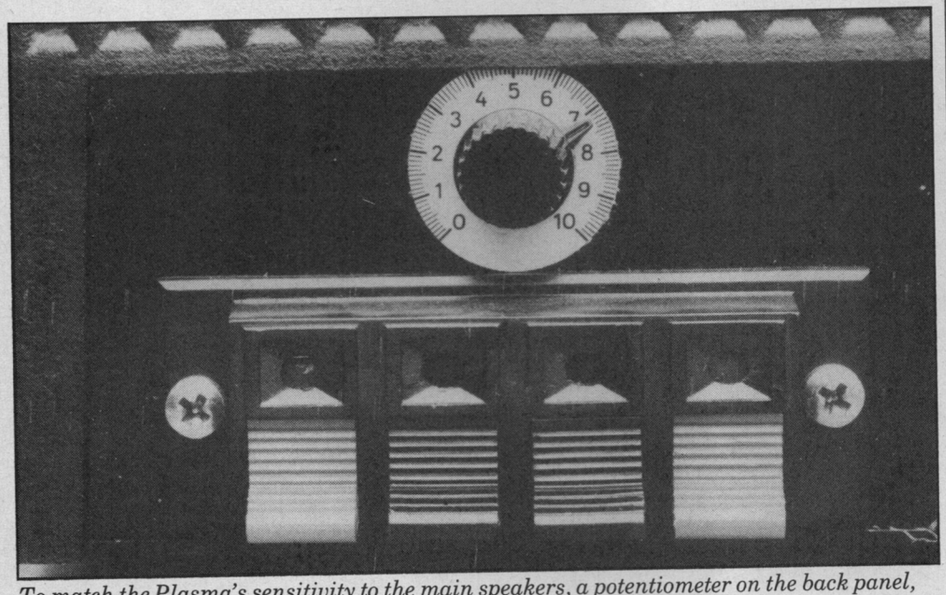
Having followed a number of blind alleys in an attempt to find someone who would measure the ozone concentration for me, I discovered that the accepted measurement method within industry and the Factory Inspectorate comprises simply a precision hand pump and replacement glass tube, filled with sensitised particles which change colour when the gas is present. (The same method is used for detecting a wide range of other gases — you just use the appropriate tube.) To take a measurement you break off the ends of the tube, connect it to the hand pump, squeeze the pump the required number of times, and then read off the concentration at the point of colour change.

Draeger Safety of Chesham, manufacturers of this apparatus, kindly lent me a pump; I bought the ozone tubes and set up a simple experiment. The pair of Plasmas was switched on in my 56m^3 lounge, and all doors and windows closed. One hour later, by which time the smell of ozone was strong in the room, I returned to take a measurement, at a distance of about 1 foot in front of one of the tweeters. (Taking the measurement close to the source is standard practice, and not at all unrepresentative here as the highest ozone concentration is to be found *above* the Plasma, since the heat from the corona discharge convects the gas around the room.)

The first pair of Plasmas I tried had seen some service, and had pitted electrodes. They produced in excess of 0.2ppm in the room, well above the established limits. Later the



The central electrode, around which the corona discharge is formed, is subject to very high temperatures and becomes pitted in time. Replacement only takes seconds



To match the Plasma's sensitivity to the main speakers, a potentiometer on the back panel, above the crossover connections, adjusts output level

Plasma's importers supplied a second, unused pair with mint electrodes. These I expected to produce less ozone, but in the event the smell after an hour was just as strong, and the measurements were indistinguishable from the previous ones. Whatever the electrode condition, then, the Plasmas are capable, in likely domestic circumstances, of producing unacceptable ozone concentrations.

That, for me, seals the fate of this tweeter, both in terms of wanting to use it at home and feeling able to recommend it. Health implications aside, ozone smells disgusting, and I cannot imagine many being prepared to put up with that however cavalier their attitude to their own well-being. It's all very well Magnat's instruction book stressing that the room should be 'sufficiently aired'; the truth of the matter is that the MP-02 produces too much ozone to be acceptable. What, if anything, the manufacturer can do to alleviate this problem I am unsure, though I suspect that the use of a catalyst, if an appropriate one exists, may be the only answer.

Ozone and crossover problems notwithstanding, I was still keen to find out just how good a tweeter the Plasma is, so with doors and windows flung open I continued. A number of circumstances conspired in the end to reduce the available listening time to a weekend only, but with that proviso this is what emerged. (Even this short time was almost lost to me when smoke and the acrid smell of burning insulation suddenly issued from one tweeter. It was hurriedly turned off, and the bottom plate removed to inspect the insides. There was no obvious damage nor an obvious fault, so I upped the mains voltage selector from 220 to 240 volts and reconnected. There was no more smoke, so the other tweeter was adjusted likewise. However, as the listening continued the first tweeter appeared to have elevated distortion levels. In the mono tests, therefore, the other was used.)

I lined up three sources for the listening tests: LP, played on a Linn/Mission 774SM/Koetsu Black; Compact Disc, from a Marantz CD63 player; and 'live' sound from a Neumann U87i microphone in an adjacent room, set up over a Paiste 18inch crash cymbal (these items courtesy of FWO Bauch and Tony Horkins respectively, to whom thanks). Amplification comprised a Musical Fidelity preamp and pair of bridged Electro 25watt power amps, while the main speakers were the Delta 70Bs I reviewed last month. These were chosen firstly because I can make good sounds with them at home, and secondly because their 'omnidirectional' radiation pattern better matches that of the Plasmas.

I was well pleased, as things turned out, to have the live source to hand. Results using LP and CD sources were generally not that good. It was all very much a botched job, mind you, owing to the lack of a low-pass section in the crossover, as already outlined. JB and I were reduced, having first tried the Plasmas simply in parallel, to absorbing as much of the main speakers' treble output as possible using towels (!), a very make-do approach that left the Plasmas sounding rather exposed, in all probability because their crossover frequency is a good deal higher than the Deltas'. (When used as part of the complete MP-X-088 speaker, in which application the crossover is presumably the same, the Plasma comes in at a high 4.5kHz, with a 4th-order (24dB per octave) slope.)

With LP or CD source, as I say, results were not encouraging. The treble register called attention to itself, was clearly poorly integrated with the rest of the frequency range, and although apparently more extended was qualitatively certainly not better than that of the Deltas' distinctly low-caste paper cones. We preferred the Delta alone.

With the microphone feed, however, and someone giving stick to the cymbal, the Plasma transended the crossover limitations and sounded altogether brighter, sharper and more lifelike than the Delta. One of the notorious review pair of Celestion SL600s was brought in to present stiffer opposition in the form of a metal dome tweeter, but still the Plasma sizzled its superiority.

What we have here, then, appears to be a tweeter of outstanding capability *given a source of sufficient quality*. Our brief exposure to it questions whether either LP or CD can or will, for the most part, do it justice, which in turn questions whether the high cost of this device can be justified in domestic use. Even if LP or CD can deliver the goods, does high fidelity from 4.5kHz up really contribute much *musically* to the overall sound?

These are important questions, but in the event it is in practical respects that this product truly fails. The crossover uncertainties rather limit its application to the complete MP-X-088, while the ozone levels the Plasma produces are in my opinion unacceptable, and may yet fall foul the consumer protection authorities.

Beyer Dynamic,
Unit 14, Cliffe Industrial Estate,
Lewes, Sussex BN8 6JL
☎ (07916) 79411
Price: £562