

B&W DM70

Instruction
manual
test certificate
and guarantee

DM70

B&W DM. Trade mark of B&W electronics

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I General description and introduction

The DM70 is a precision monitor loudspeaker for domestic and professional use, built to very high standards.

This loudspeaker, employing the combination of dynamic bass drive unit in conjunction with an electrostatic transducer for the mid-range and upper frequencies, is capable of most realistic reproduction of both speech and music programme material. Because of its low distortion, wide and balanced frequency response, and relative freedom from colouration, it will be analytical and may well reveal shortcomings in programme material and defects in ancillary equipment which an inferior product would mask.

We hope that this instruction book will help you to assemble with ease, and in connecting and placing your loudspeakers, and we have quite deliberately restricted these instructions to be simple and non-technical wherever possible.

For an explanation of unpacking and assembling your loudspeakers (each DM70 system, excluding stands, is packed in two cartons) refer to section 3 of this booklet.

In common with all B&W loudspeaker systems, the DM70 is subjected to stringent, quality control through every stage of manufacture and dispatch. Individual frequency response tests are made on every DM70 during manufacture and before dispatch, and we provide you with a calibration curve with the guarantee registration card.

Provided the instructions are followed, your loudspeaker should give you many years of completely trouble-free service. In the event of any query we would ask you to adopt the following procedure if service is required:—

England, Scotland & Wales :

Contact the dealer from whom you purchased the loudspeakers.

All other Countries :

Contact our distributor for your country—name and address supplied from our factory if in doubt.

B&W have appointed agents throughout the world, selected with great care to give you the best possible service. Should you have any reason to feel dissatisfied or if any queries arise, we will be pleased to assist wherever possible.

2 The listening room

Most people have relatively little control over their listening room in terms of size or shape, but as the environment in which the loudspeaker is used plays such a big part in the quality of sound we hear, some comments on room characteristics may be helpful before we proceed in section 3.

There are two aspects of listening rooms which will most widely influence sound reproduction : The basic dimensions of the room and large items of furniture controlling the lower frequencies; and items of soft furnishing together with wall and other coverings affecting the middle and upper frequencies.

All rooms have resonances, and so indeed does the concert hall, but in the case of the latter these are so low in frequency, and by design, so well spaced that they add ambience rather than colouration: The worst example in a listening room or studio would be the unlikely event of all dimensions being the same and the room forming a cube. The best case being a relatively large room where all dimensions are different. Fortunately the worst example is rarely, if ever, encountered but where a choice is possible as between a square or rectangular room the latter is to be preferred as the room resonances — known as eigentones — occur at spaced frequencies and are therefore of lower amplitude.

The most pronounced eigentones occur at low frequencies below approximately 200Hz. In addition to these eigentones there is another important influence the room has over the lower octaves of reproduced sound. Due to the relatively small dimensions of the loudspeaker compared with wavelengths of sound in the lower octaves, the radiation pattern or distribution of sound at these frequencies is effectively spherical. When operating a loudspeaker in a room, this sphere of sound is contained, to a greater or lesser degree, depending on position within a series of plain surfaces formed by the walls, floor and ceiling. This produces a factor known as 'room gain' and does in fact make the lower frequencies considerably louder than if, for instance, the loudspeaker were operated in the open air.

As a result of research carried out into the "room gain" and how this affects loudspeaker performance, the stand of the DM70 has been specifically designed to give optimum results over a range of listening conditions.

Before leaving the way in which the room affects the low frequency part of the sound spectrum, a word should be said on the construction

The ideal is a solidly built ground floor room with a concrete floor. In rooms where there is a board and joist floor this will play a part in both adding to bass gain and room colouration. The suspended floor acts as a supplementary bass radiator operating at the main resonance of the room. If your listening room has other than a solid floor and you are troubled by excessive or resonant bass response as a result, positioning your loudspeaker away from the corners will assist.

The subject of positioning your loudspeakers is dealt with in section 4, but before leaving the listening room we will mention its effect on middle and high frequencies.

The soft furnishings — chairs, curtains and carpet, together with wall and ceiling coverings are the main factors governing the performance of a room at middle and upper frequencies. Position of cupboards, bookshelves and other items of wall furniture also play an important role in these parts of the spectrum.

A room with insufficient soft furnishing will give a hard or steely tonal quality to middle and upper frequencies, with strings suffering especially. A room with too many soft furnishings — an over-damped room — will sound dull and lifeless, a somewhat similar effect to putting 'top cut' on your amplifier tone control.

The ideal mid/high frequency reverberation times (a measure of acoustic 'brilliance' or 'dullness') are somewhat subjective, but generally a good balance can be obtained by opposing a reflective surface with an absorbent one. As an example ceilings are usually bare and reflective and this can be well balanced by a fitted carpet. An unbroken wall facing large window areas can be broken by a bookcase on the opposite wall.

When furnishing a new room which is to be used for listening to reproduced music, it is usually wise initially to underdamp the room and then add absorbent articles after the correct balance has been determined.

3 Installation - unpacking and connection

For safety in transport the DM70 Improved system is packaged in three cartons, for each loudspeaker:—

Carton 1 Main cabinet with fitted power supply unit.

Carton 2 Two metal stands for the pair of loudspeakers.

Carton 3 The "702" electrostatic unit complete.

WARNING

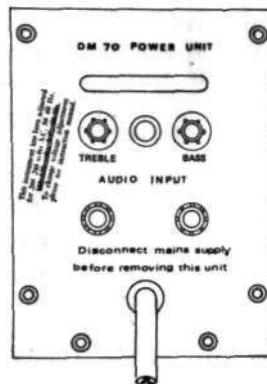
IT IS ESSENTIAL THAT THE ASSEMBLY AND INSTALLATION INSTRUCTIONS BE CAREFULLY READ BEFORE CONNECTING THIS SYSTEM TO THE MAINS OR AUDIO SUPPLY.

Unpacking. Unpack the largest cartons and remove the accessory bag tied to the rear of the power pack at the back of each cabinet. This bag contains all necessary hardware and spares, such as fuses. The smaller packages should then be unpacked. It is a worthwhile precaution to save the polystyrene pieces in which the electrostatic units are packed in case of any future transportation.

The stands may now be fitted to the base of the cabinets by means of the metal bolts provided which will mate with sealed captive nuts inside the base of the cabinet.

Mains. Before attempting to connect the mains supply to your DM70 check that your supply voltage agrees with the adjustment made to the system before it left our factory.

Fig. 1
Rear view of Continental power supply, showing label indicating the power supply voltage. The power supply for the Standard version is similar but rotated through 90 degrees.



The regulation of the power supply is such that, normally, no adjustment will be necessary and the unit is set for the country of destination, e.g. European or America, etc. If, after having made this check on mains supply, it is necessary to adjust the mains voltage, please refer to the above diagram and read the instructions regarding the removal of the power supply from the cabinet.

Adjustment of mains voltage setting.

IT IS IMPORTANT TO DISCONNECT THE MAINS POWER SUPPLY AND AUDIO FEED FROM AMPLIFIER (IF CONNECTED) BEFORE ATTEMPTING TO REMOVE THE POWER SUPPLY UNIT FROM THE CABINET.

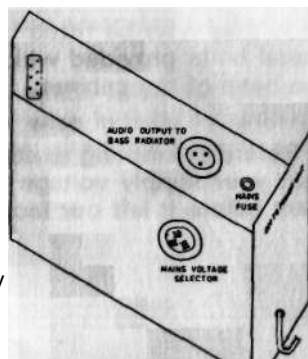


Fig. 2
Shows a 70C power supply unit removed from the cabinet.

To remove the power supply unit from the cabinet, unscrew the four screws at the side of the rear panel of the unit and withdraw it, unplugging the **audio output** to the bass unit. (If the 701 electrostatic unit has already been fitted to the cabinet, it will be necessary first to remove this, by reversing the assembling instructions which follow.)

The various adjustments to the mains voltage selector are self-explanatory. Re-insert the power supply unit into the cabinet, securing by means of the four screws.

Final Assembly. Having made the checks, and adjustments, if necessary, the 701 electrostatic unit may now be fitted. With the cabinet secured to its stand, the electrostatic may now be inserted into the sockets on the top of the cabinet. Spigots on both feet of the 701 locate in corresponding sockets and they can only be assembled in the correct manner. Having inserted the electrostatic unit, make it secure by screwing down to the cabinet through the hole in the rear of each 701 foot with the screws provided.

Connection. **UNDER NO CIRCUMSTANCES SHOULD THE 701 ELECTROSTATIC UNIT BE REMOVED WITH EITHER THE MAINS SUPPLY OR THE AUDIO FEED FROM THE AMPLIFIER CONNECTED.**

With the system completely assembled, connection may now be made to the necessary alternating current power supply — the power drain is negligible. Connection to the mains is made by the three-core cable provided, the standard colour-coding of which is:—

YELLOW/GREEN	—	EARTH
BROWN	—	LIVE
BLUE	—	NEUTRAL

FOR COMPLETE SAFETY, IT IS IMPORTANT TO USE A THREE PIN SUPPLY MAKING A SOUND EARTH CONNECTION.

The output from your amplifier should, of course, be connected to the **AUDIO INPUT** of the loudspeaker — located on the back panel of the power supply unit. Connection is made to the terminal sockets, either by connecting bared wires to the binding posts, or by using standard 4mm. "banana" plugs, or similar. The terminals are colour-coded red and black and these are connected to the positive and negative loudspeaker outputs respectively. of your amplifier.

It is advisable to keep the series resistance of connecting cables as low as possible by using reasonably heavy gauge cables. Our recommendations are.—

Loudspeakers under 10 metres away from amplifier: use 16/0.2mm.

Loudspeakers over 10 metres away from amplifier: use 24/0.2mm.

Phasing. The centre image and correct spread in stereophonic reproduction relies on "in phase" components of sound of equal amplitude, and it is essential to check that your loudspeaker and other items in the "reproducing chain" are correctly connected. If other items in the chain, such as pick-up cartridge, etc., are correctly connected, then the method of connection of the loudspeakers as outlined above will be correct. However, there is a simple test worth making:—

Feed both channels of your system with a monophonic source, e.g. mono radio, a mono record, or a stereophonic source with the function selector of the control unit of your amplifier switched to "A + B", "Left + Right", or "MONO." If phasing is correct, then, when listening from a central position between the loudspeakers, the sound should appear to emanate from a relatively small area between the loudspeakers. If the phasing is incorrect, the image will be broader and spread across the area between the loudspeakers. (Commercial gramophone records are available which illustrate this "phasing" procedure, should there remain any difficulty or doubt.)

If phasing of any item is incorrect, reversal of any one item will correct the fault.

Operation. At the rear of the 701 electrostatic unit will be found a removable absorbent pad, the function of which is to reduce rear radiation in locations where the loudspeaker is placed close to a wall or corner. This pad provides a useful method of varying the distribution pattern of the electrostatic unit above 500Hz. to suit both ambient conditions and the user's personal preference in terms of the ratio of direct to reflected sound. This absorbent pad can be readily withdrawn with the fingers from its recess in the rear of the electrostatic mount.

With the rear pad withdrawn, greater ambience will be experienced—depending on the reflective nature of the wall and furnishings behind the loudspeaker—there will be a slight increase in sound level above 500Hz. with the electrostatic unit operating in this condition. If it is

desired to operate the DM70 at very high sound levels, or where high powered continuous sine wave inputs are applied, the rear absorbent pad should be placed in position.

It will be observed that on the rear panel of the Power Unit there is a neon indicator. This shows that the mains supply is functioning. If the neon does not light when the mains is connected, the fuse should be checked. A spare fuse is provided — but repeated replacements should not be made — and if this fails you should consult your dealer.

The continental DM70 is protected on input with fuses, accessible on the rear panel of the power supply (see figure 1 page 6). The correct values are 1.5 amp for the fuse marked Treble, and 2 amp for the fuse marked Bass.

Although in the case of the DM70 (due to its remarkable dispersion characteristic) positioning is not as critical as with many conventional loudspeaker systems, this system is quite a substantial piece of furniture in its own right, and it is worthwhile taking care in siting the loudspeakers in the most acceptable positions, both visually and acoustically.

It will be found that the stereo image is preserved over a wide listening angle, and the satisfactory listening area larger in the case of the DM70 than with most conventionally designed loudspeakers.

Example of sitings of a pair of DM70's and a pair of conventional Loudspeakers are illustrated in figure 3.

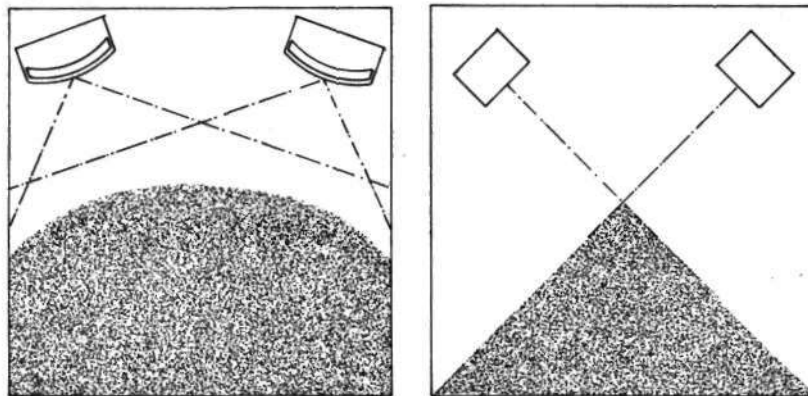


Fig. 3 Listening area shown hatched in.

A simple guide to siting.

1. It is suggested that in initial layout a flexible lead is used, and the positions of the loudspeakers experimented with on familiar music until a natural balance is obtained. Permanent installation may then be undertaken after the exact positions have been decided.
2. Bass response within the bottom two octaves will vary with the positions of the loudspeakers relative to any plane surfaces. Minimum bass will occur in the unlikely event of the loudspeakers being situated near the centre of a room. Conversely, maximum bass response will result should the loudspeakers be tightly "coupled" to the corners of the room.

3. Due to the wide and balanced horizontal dispersion of the DM70, their horizontal position will not be critical. We would normally suggest that in domestic rooms of normal size they be not closer than eight feet (2.5 metres) apart, or separated by more than fifteen feet (4.5 metres) to give an even and solid stereo image.
4. The final point for consideration is whether to place the loudspeakers parallel with the wall or surface or to angle them towards the listening area. The governing factors are the distance between the loudspeakers and the distance of the listeners from them. Considerable latitude is offered in the case of the DM70, but, as a general rule, the angle by which they should be turned is increased the further they are apart and the closer you are seated to them.

Ancillary equipment

Because of its exceptionally good frequency linearity and relative freedom from colouration and distortion, the DM70 is capable of extremely faithful reproduction, provided that the signal fed to it is of the very highest quality. A monitor loudspeaker — and the DM70 is such a high-quality system — is therefore analytical and will reveal faults in ancillary equipment and programme material which could well be masked by an inferior loudspeaker.

It is not appropriate in this instruction book to recommend specific items of ancillary equipment and fortunately there is a wide range of top quality equipment available. In general terms, however, it is wise to match the quality of the various items in the reproducing chain. A good guide being to spend approximately equal amounts on the pick-up arm and motor combination; on the amplifier or tuner/amplifier; and on the loudspeakers.

The power rating required of the amplifier will depend on the size of your listening room, on the preferred listening level, as well as on the sensitivity of the loudspeakers. True RMS outputs of between 25 and 100 watts per channel will meet all requirements.

Volume and Tone control Settings. The correct operation of these controls is important if realistic reproduction is to be obtained. Dealing firstly with volume control setting: it is important to set the volume control of your amplifier at such a level as to recreate the original level of sound that would be heard in the concert hall or place of original live performance.

For many reasons it may not always be possible to listen at original sound levels. For this and other reasons, tone controls are provided. The actual tone control settings will depend on a number of factors too numerous to detail. As a general guide, orchestral music will require some bass lift and little, if any, treble control when played below natural level, speech will require bass cut and slight treble cut when played above natural level. Between these two extremes there are many settings which will be quickly determined by listening.

Specification

General Description

B. & W. DM70 is a hybrid design employing exclusive Model 701 11-element wide dispersion doublet electrostatic unit (patent no. 1239658), DW 13/70 high power low distortion moving coil bass unit with complex crossover and filter unit and dividing network. Relative sensitivities between the dynamic and electrostatic units are accurately equalised by a massive auto transformer.

The vitally important middle and upper frequencies are handled without the attendant phase distortion associated with crossovers in this region and the exceptionally wide dispersion of these frequencies give a much greater degree of stability of the stereo image.

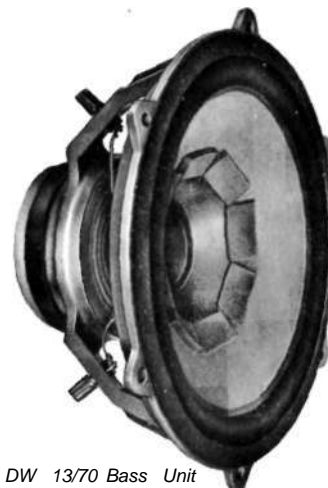
Alternative Cabinet stylings are available but both offer an extremely rigid critically damped infinite enclosure with low system resonance. The bass driver is a no compromise unit capable of handling high power with extremely low distortion and employs a specially braced cone assembly with damping pads at critical damping points and the exclusive B. & W. triple suspension.

Detailed Specification

Drive Units

DW13/70. This low frequency unit, of nominal piston diameter twelve inches (305 mm) is of size consistent with the enclosure volume and method of acoustic loading used. The resulting system resonance is 40 Hz., the unit itself having a free air resonance of approximately 28 Hz.

The cone is formed from long fibre paper material, with mass adjustment and damping (to discourage cone break-up) provided by critically positioned rectangular section of synthetic rubber attached to the cone face. The massive ceramic magnet assembly, in conjunction with the low impedance of the voice coil, ensures high damping leading to excellent transient-handling capacity.



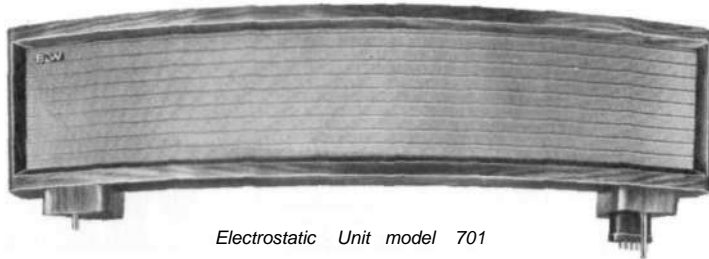
DW 13/70 Bass Unit

Electrostatic mid-and high-frequency unit.

The 701 electrostatic module (patent number 1239658) covers all audio frequencies above 500 Hz. By virtue of the relatively small vertical dimension of the unit, the vertical distribution is excellent in the mid-frequency region and the curved geometry of the eleven integrated modules in each 701 provides very wide and uniform frontal radiation of sound, with a strong rear radiation pattern which can be controlled to suit ambient conditions or personal judgement.

In terms of distortion, new standards are set and reference to the figures, in the following pages, showing harmonic content will demonstrate the extremely low levels of the commonly troublesome odd harmonics at high sound power output.

The power handling of this mid-high frequency unit confirms research findings that it is within the mid-frequency band (say 500 Hz. to 5 kHz) that maximum power is applied. The concept of the 701 electrostatic unit provides coverage of all audio frequencies above 500 Hz. reducing intermodulation distortion and Doppler effect.



Electrostatic Unit model 701

A prime design point of the 701 is that it is free-standing. This makes it possible easily to remove the unit in the event of damage etc., and service being required, thus avoiding the transportation of entire heavy and bulky system.

Crossover and Filter Unit

The 500 Hz. crossover frequency between the DW13/5 bass unit and the 701 electrostatic unit ensures that both these transducer elements operate over their optimum frequency ranges. Care has been taken in the design of the low-pass section of the filter to ensure that maximum amplifier damping may be transferred to the bass unit by the use of heavy gauge copper in the series inductor, over a ferrite core. In addition, an impedance- and level-controlling transformer forms a part of the bass unit filter.

The power supply and high-pass filter for the 701 electrostatic unit is solidly and safely housed in a steel case. The mains lead is captive, for safety.

Cabinet

The cabinet is constructed of 25mm chip-board; in the case of the "Continental" version, the curved front formed from 19mm plywood. The grille materials (earthed metal, front and rear for the electrostatic) have been chosen to give minimal deterioration of the acoustic performance.

The "Standard" version of the cabinet is available in teak or walnut veneers and a choice of walnut veneer or satin white finish for the "Continental's."

Acoustic Loading

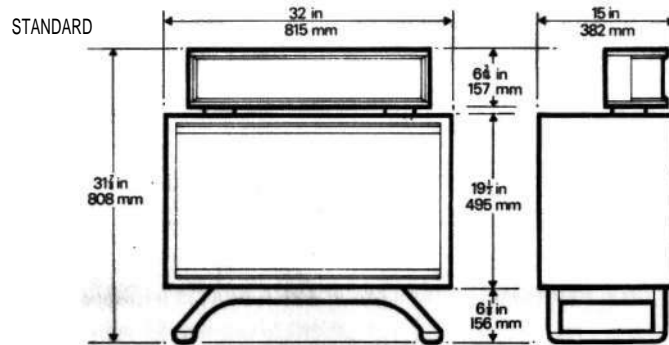
The acoustic loading for the bass drive unit is of the "infinite baffle" type, synthetic damping material being used to achieve optimum system "Q". A resonance-controlling removable pad is fitted to the rear of the electrostatic.

Sensitivity

17 watts into nominal impedance required to produce a sound level of 95 dB. at one metre at 400 Hz

Power Handling

The DM70 is suitable for high quality amplifiers with true RMS outputs of between 25 and 100 watts, with double fuse protection on C and CA versions.

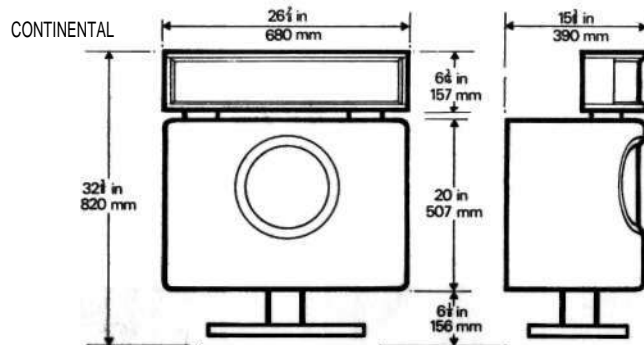


Dimensions.

Weight: Weight with stand: 45.4kg. (100 lbs)

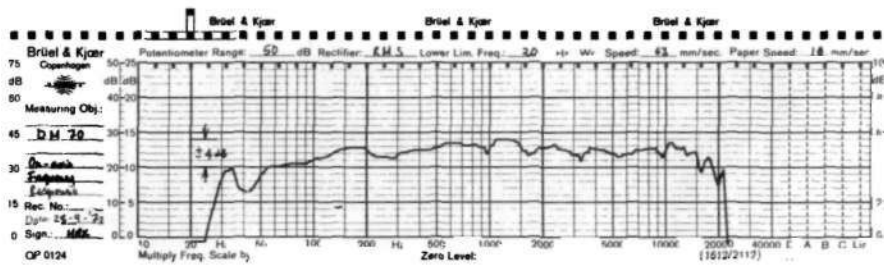
Standard

Overall Height (on Stand) 31 i " (808 mm)
 Overall Width 32 " (815 mm)
 Overall Depth 15 " (382 mm)

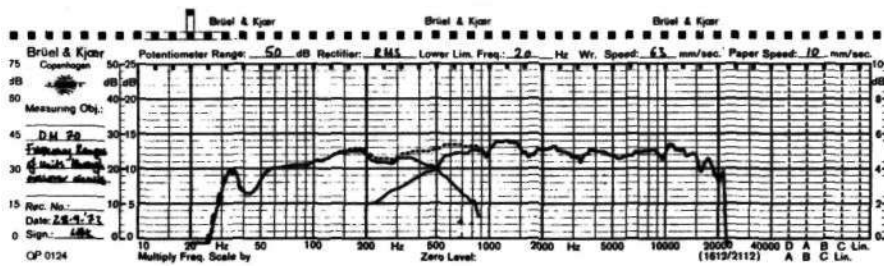


Continental

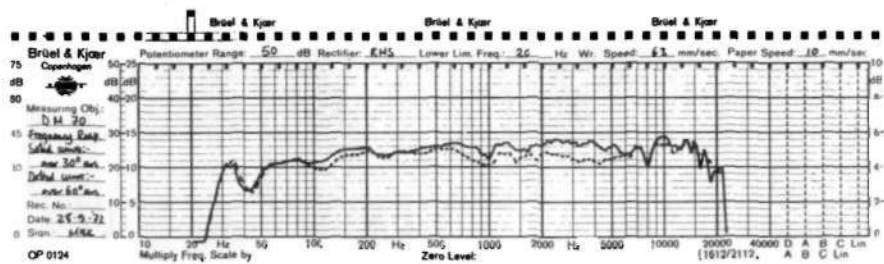
Overall Height (on Stand) 32 s " (820 mm)
 Overall Width 26 s " (680 mm)
 Overall Depth 15 1 " (390 mm)



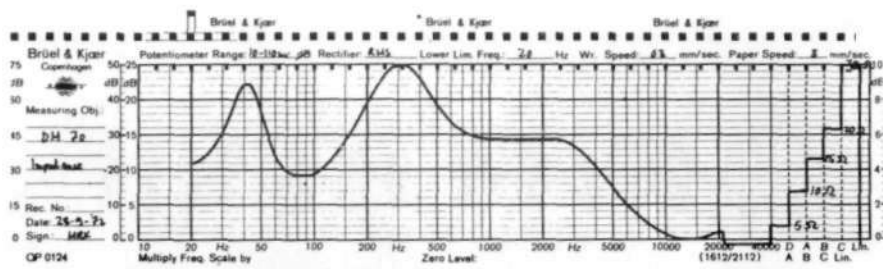
Frequency Response. On-axis ± 5 dB. 60 Hz. to 15kHz.
 On axis response of a production sample DM70 taken in Ft & D Anechoic Chamber.
 B & K equipment used throughout, with type 4133 microphone at 1 metre.



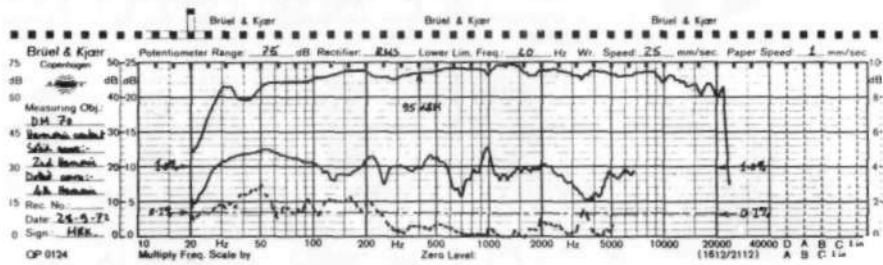
Crossover and Filter Unit. Individual Acoustic output from each Drive Unit, showing Crossover frequency.



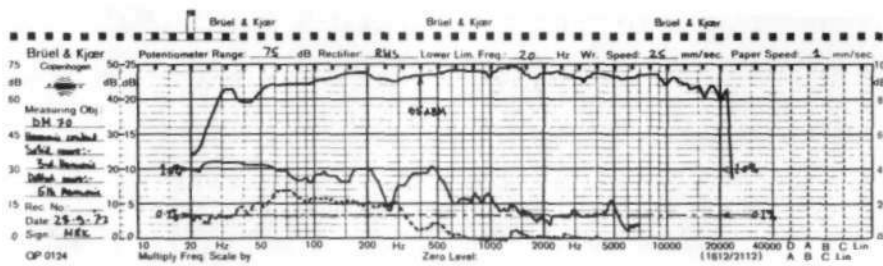
Polar Distribution. ± 3 dB envelope to on-axis from 20 Hz to 20 kHz over 60 degree arc.
 DM70 response for 30 degree arc and 60 degree arcs.



Impedance. Nominal impedance 8 ohms. Not greater than 30 ohms or less than 4 ohms 20 Hz to 9 k.Hz., the impedance minimum occurring in a frequency region of very low music energy.
Plot of impedance of production sample of DM70.

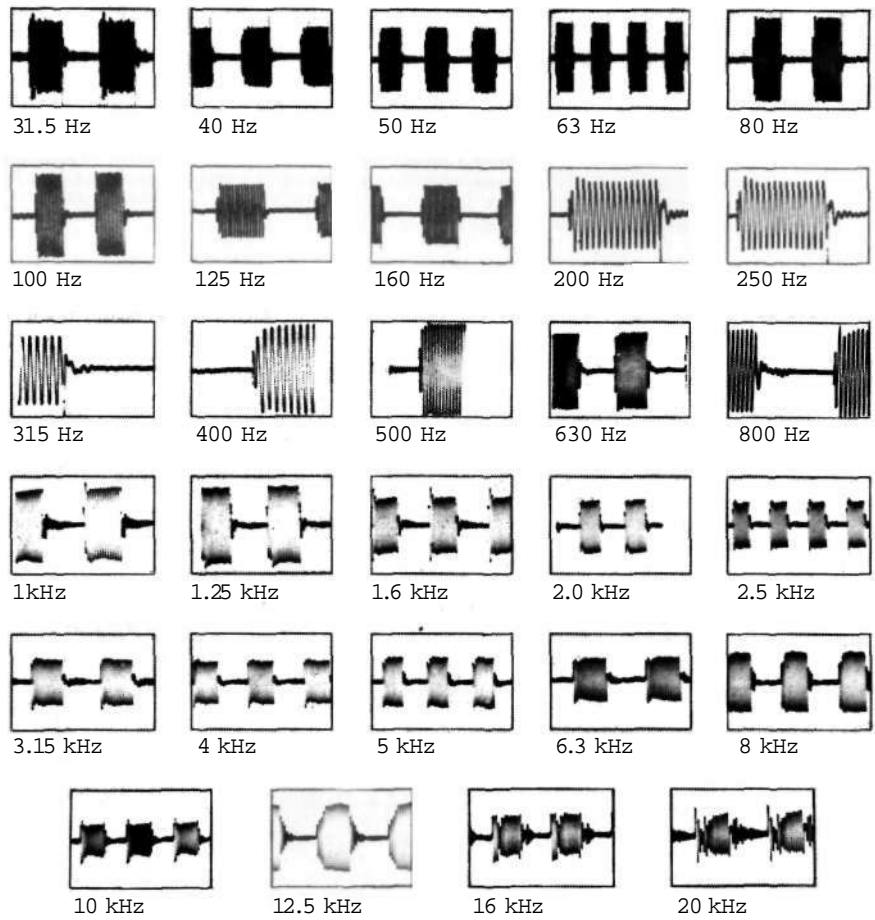


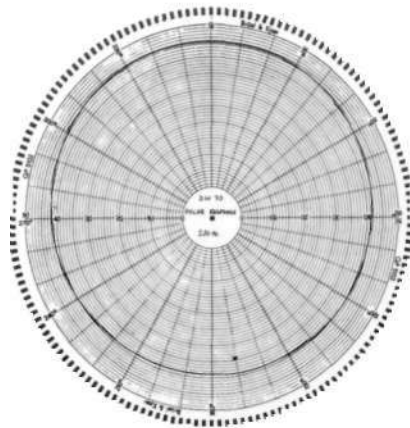
Distortion. Harmonic analysis plotted against frequency.
Content of 2nd. and 4th. Harmonics.



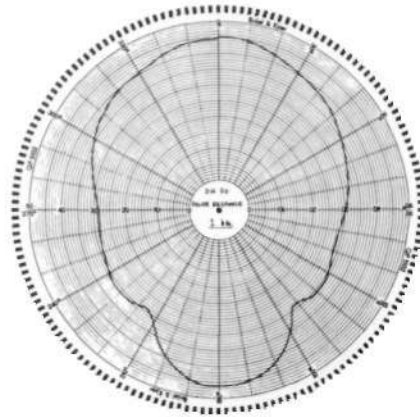
Content of 3rd. and 5th: Harmonics.

Transient Response. Tone Burst oscillograms taken at one-third octave intervals in ou Research Anechoic Chamber. Microphone type B & K 4133.

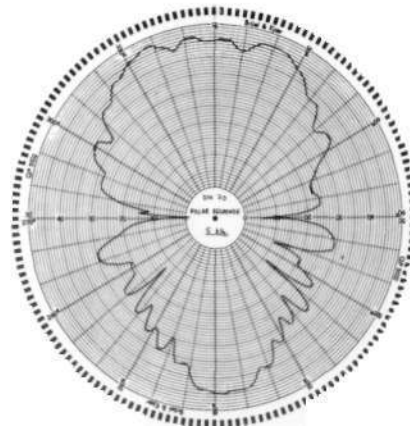




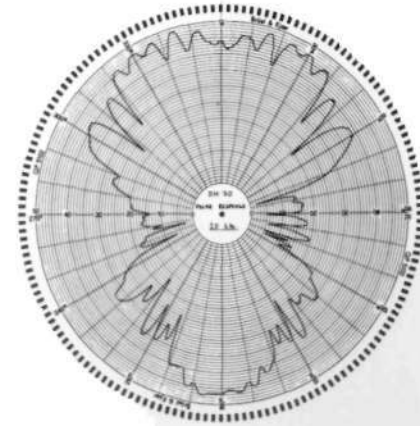
Polar response
100 Hz



Polar response
1 k.Hz.



Polar response
8 kH?



Polar response
10 k.Hz.