PHILIPS

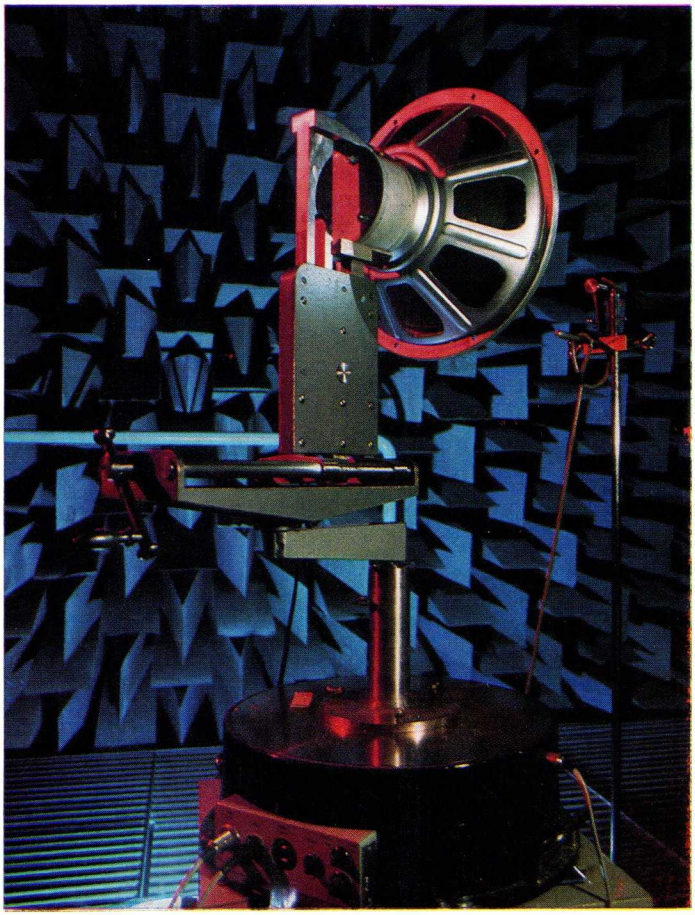
APPLICATION BOOK

ELECTRONIC COMPONENTS AND MATERIALS DIVISION

SELECTED HI-FI SPEAKER SYSTEMS

constructional details

24 Selected Hi-Fi Speaker Systems



A high fidelity speaker on test in the anechoic room. The speaker is held in a clamp on the test fixture and the microphone positioned 50 cm away. The polyurethane 'wedges' which cover the walls and ceiling absorb all reflections and the room simulates 'free space' conditions. Wedges are also fitted on the floor below the metal grid.

24 Selected Hi-Fi Speaker Systems

constructional details

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ELECTRONIC COMPONENTS AND MATERIALSDIVISION

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List of Contents

1 Introduction

Table 1 summarizes the 24 high fidelity speaker systems which are described in this book.

Table 1. Summary of 24 High Fidelity Speaker Systems

system number	woofer		squawker		tweeter		volume (litres)	volume (cu ft)	watts
	(in)	(Ω)	(in)	(Ω)	(in)	(Ω)			
1	5	8	—	—	2	8	3	0.1	10
2	5	4	—	—	2	4	3	0.1	10
3	5	8	—	—	1	8	3	0.1	10
4	5	4	—	—	1	4	3	0.1	10
5	7	8	—	—	5	8	7	0.25	20
6	7	4	—	—	5	4	7	0.25	20
7	7	8	—	—	5	4	7	0.25	20
8	7	4	—	—	5	8	7	0.25	20
9	7	8	—	—	1	8	7	0.25	20
10	7	4	—	—	1	4	7	0.25	20
11	8	8	—	—	5	4	15	0.53	20
12	8	4	—	—	5	8	15	0.53	20
13	8	8	—	—	1	8	15	0.53	20
14	8	4	—	—	1	4	15	0.53	20
15	8	8	5	8	1	8	25	0.88	20
16	8	4	5	4	1	4	25	0.88	20
17	10	8	5	8	1	8	35	1.24	40
18	10	4	5	4	1	4	35	1.24	40
19	10	8	2×5	4	2×1	4	40	1.4	40
20	10	4	2×5	8	2×1	8	40	1.4	40
21	12	8	2×5	4	2×1	4	50	1.77	40
22	12	4	2×5	8	2×1	8	50	1.77	40
23	12	8	4×5	8	4×1	8	80	2.83	40
24	12	4	4×5	4	4×1	4	80	2.83	40

The speaker systems described use only our *high fidelity* range of speakers. This range consists of 14 different types designed specially to meet the stringent requirements of high fidelity reproduction defined by International Standards. They are additional to our *high quality* range and also the 127 different types of speakers of our *standard* range.

Table 2. Showing the Range of Loudspeakers for High Fidelity Multi-Way Systems

speaker	type number	overall [1]) diameter (mm)	total [1]) depth (mm)	power handling capacity (W)	impedance (Ω)	resonance frequency (Hz)	total flux (μWb)	flux density (mT)	hole [1]) diameter in enclosure (mm)
1″ Tweeter	AD 0160/T4 AD 0160/T8	43	27	[2])	4 8	1000	270	1200	74
2″ Tweeter	AD 2070/T4 AD 2070/T8	58	29	[3])	4 8	800	69	690	52
5″ Woofer	AD 5060/W4 AD 5060/W8	129	56	10 [4])	4 8	50	390	930	106
7″ Woofer	AD 7065/W4 AD 7065/W8	166	74	20 [4])	4 8	28	450	960	142
8″ Woofer	AD 8065/W4 AD 8065/W8	206	93	20 [4])	4 8	28 [6])	450	900	180
10″ Woofer	AD 1055/W4 AD 1055/W8	261	153	40 [4])	4 [5]) 8	20	1300	900	230
12″ Woofer	AD 1256/W4 AD 1256/W8	315	164	40 [4])	4 8	19	1210	1070	279

[1]) For full details refer to the mechanical drawings given in Chapter 4.

[2]) Applicable to speaker systems having a maximum power input of 40 W (DIN 45573) when used with the recommended cross-over filter.

[3]) Applicable to speaker systems having a maximum power input of 20 W (DIN 45573) when used with the recommended cross-over filter.

[4]) In an enclosure of appropriate volume.

[5]) The 4 Ω version of the 10″ woofer will become available later in the production programme.

[6]) The *system* resonance frequency is lower with this speaker than when the 7″ woofer is used because the larger enclosure required by the 8″ woofer results in reduced stiffness and the rise in the enclosure resonance frequency is less.

Concise details of our high fidelity speakers are given in Table 2. In the interests of economy some manufacturers may prefer alternatives to the recommended tweeters. Two suitable speakers have been selected for this purpose from our standard range and these are given below in Table 3.

Table 3. Alternative Tweeters

commercial type number	power handling capacity (W)	impedance (Ω)	resonance frequency (Hz)	total flux (μWb)	flux density (mT)
AD5080/M4	4	4	130	180	1000
AD5080/M8		8			
AD5780/M4	4	4	100	175	980
AD5780/M8		8			

Full technical details of all the speakers described in this publication are given in our Data Handbook, Components and Materials, Part 3.

For the benefit of the home-constructor and hi-fi enthusiast, a non-technical treatment of the subject of building enclosures is also available under the title "Building Hi-Fi Speaker Systems". Written in an easy-to-read style, the book gives helpful advice to the uninitiated and follows the step-by-step construction of a 7 litre enclosure, with photographs of each stage of construction.

A selection of the high quality and high fidelity loudspeakers which are used to build the recommended systems.

2 Loudspeakers for High Fidelity Reproduction

2.1 Speaker Specifications and Test Methods

The frequency response curves of the high fidelity speakers are given in Chapter 4. These were obtained by testing the speakers in an anechoic room under 'free-space' conditions without a baffle. A constant voltage was applied at an input power of 50 mW and the frequency swept slowly to 20 kHz. The recording microphone was mounted a distance of 50 cm away in line with the speaker axis and the acoustic output was plotted with a pen-recorder. 0 dB on these response curves corresponds to 52 dB above 2×10^{-4} μbar.

The stated impedance of any speaker is the lowest value measured just above resonance.

Power handling capacity is given in terms of continuous r.m.s. sine-wave input power. This rating is obtained by subjecting the speaker to two tests: an operational test and a continuous load test. In the operational test an audio frequency signal voltage V is applied to the loudspeaker, such that

$$V = 0.7 \sqrt{Z \times P_{max}},$$

where Z = nominal impedance in ohms, and P_{max} = power handling capacity in watts. The speaker is checked for buzzing, rattling and cone break-up. The continuous load test involves 100 hours testing at full power with a 'white' noise source. The power handling capacity is the maximum power that the speaker can withstand when subjected to these tests.

2.2 Multi-speaker Systems and Cross-over Filter Networks

The speaker systems described in this book are all two-way and three-way systems in which the power output is divided between the speakers by means of a cross-over filter network. The cross-over filters range from a simple bi-polar capacitor to a complex network involving numerous components. Most of the filters are asymmetric and have been specially designed for use with particular speakers, full circuit details being given in the next Section.

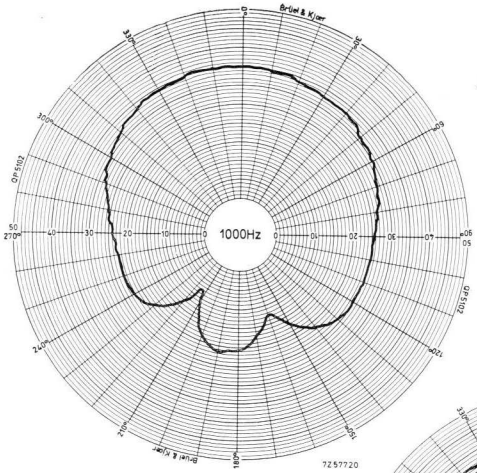


Fig. 1(a). Polar response at 1000 Hz.

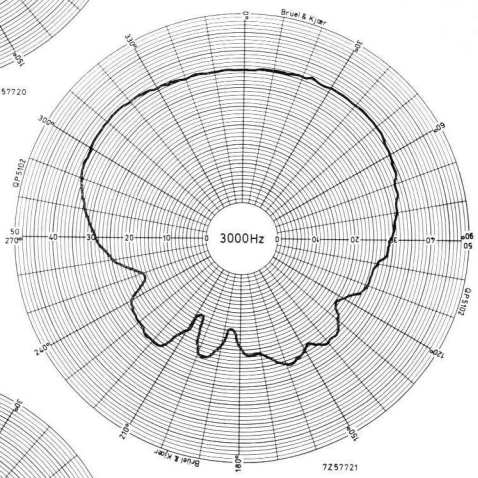


Fig. 1(b). Polar response at 3000 Hz.

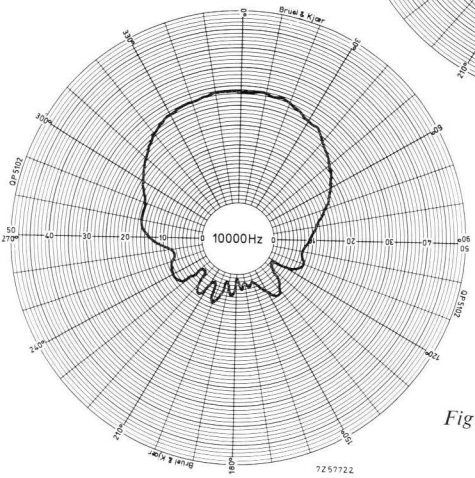


Fig. 1(c). Polar response at 10000 Hz.

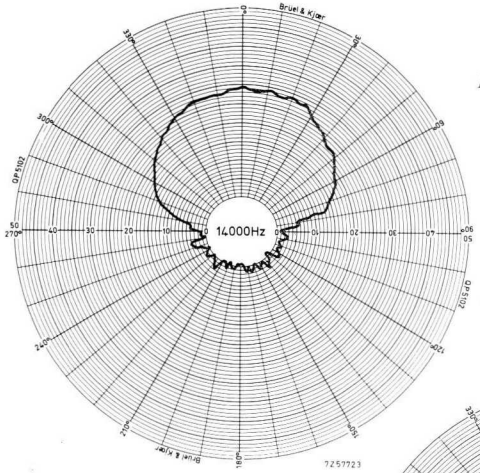
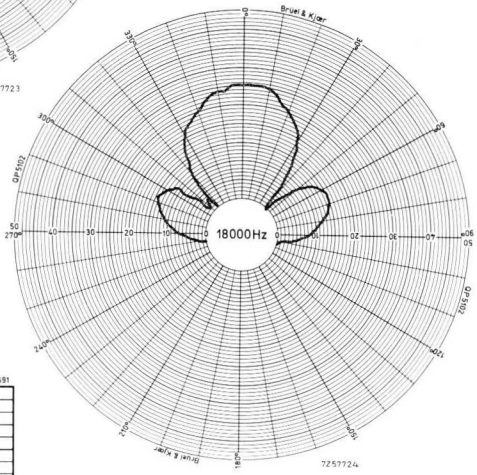


Fig. 1 (d). Polar response at 14000 Hz.

Fig. 1(e).
Polar response at 18000 Hz.



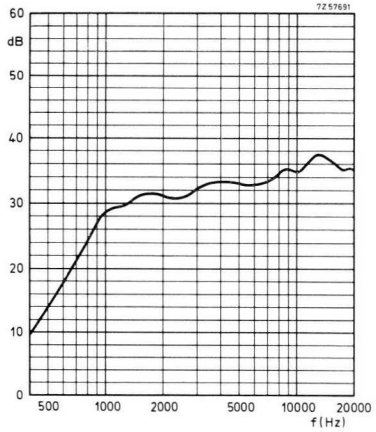


Fig. 1(f).
Frequency response curve of the AD 0160/T.

Fig. 1. Performance characteristics of the one inch tweeter, AD 0160/T.

The frequency response curves of the speaker systems were obtained with the speakers mounted in their enclosures in an anechoic room. The enclosures are all of the *infinite baffle* type, being completely air-tight, and so their power handling capacity does not, of course, apply to the speakers individually, since the effect of the enclosure plus the power distribution characteristics of the cross-over filter network have to be taken into account.

Open-frame speakers employed as tweeters and mid-range units have to be acoustically isolated from the back-radiation of the woofer with which they share the enclosure. A plastic 'pot', or acoustic isolating box is therefore required, and this should be made just as air-tight as the enclosure itself. The 1″ tweeter requires no acoustic isolation, since it is a sealed unit.

The 1″ tweeter has excellent transient handling capabilities and, with a resonance frequency of 1 kHz and a smooth response to over 20 kHz, a very well-balanced omni-direction polar diagram in the forward region is obtained at frequencies in excess of 15 kHz. This is clearly shown in Fig. 1. Distortion arising from the 1″ tweeter, when it is fitted as shown in the recommended enclosures, does not exceed 1%.

In the laboratory outside the anechoic room the recorder plots the frequency response of the speaker under test. The signal fed to the speaker is swept from 20 Hz to 20,000 Hz whilst the graph paper is fed through the recorder in synchronism. The amplitude of the response in the microphone controls the pen movement. When the polar response is required, the speaker is rotated in front of the microphone and a polar plotter is used, the test frequency remaining constant.

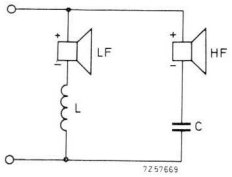
2.3 Electrical Details of 14 Two-way Systems

SYSTEM 1 IMPEDANCE 8 Ω

5″ WOOFER + 2″ TWEETER

Woofer — AD 5060/W8
Tweeter — AD 2070/T8

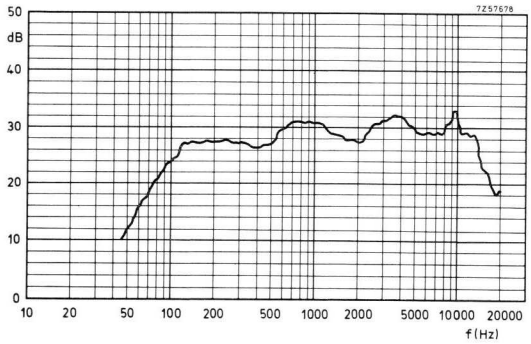
Power Handling Capacity 10 W
Enclosure Volume 3 litres (0.1 cu ft)



Cross-over Frequency = 2000 Hz.

Cross-over Filter Components:
L = 1 mH, Cat.No. 4804 078 21160
C = 5 μF, Cat.No. 2222 066 90019
Use Printed Wiring Board, Cat.No. 4304 073 00700.

Frequency response curve for System 1 measured with speakers mounted in the enclosure.



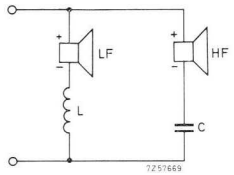
Resonance Frequency = 100 Hz.

SYSTEM 2 IMPEDANCE 4 Ω

5″ WOOFER + 2″ TWEETER

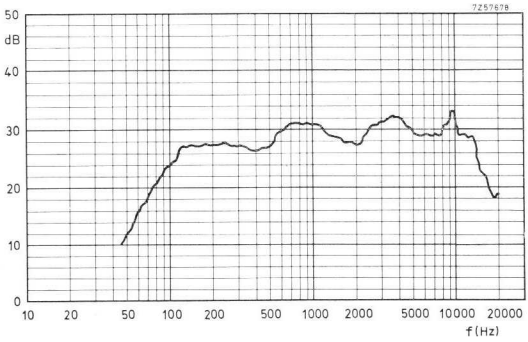
Woofer — AD 5060/W4
Tweeter — AD 2070/T4

Power Handling Capacity 10 W
Enclosure Volume 3 litres (0.1 cu ft)



Cross-over Frequency = 2000 Hz.

Cross-over Filter Components:
L = 0.5 mH, Cat.No. 4304 078 21100
C = 10 μF. Use two 5 μF in parallel, Cat.No. 2222 066 90019.



Frequency response curve for System 2 measured with speakers mounted in the enclosure.

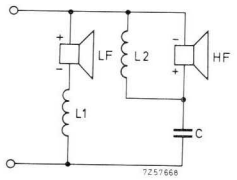
Resonance Frequency = 100 Hz.

SYSTEM 3 IMPEDANCE 8 Ω

5″ WOOFER + 1″ TWEETER

Woofer — AD 5060/W8
Tweeter — AD 0160/T8

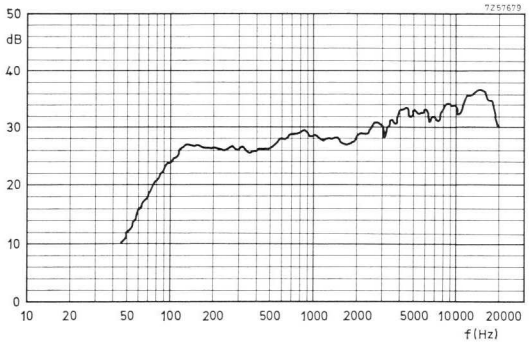
Power Handling Capacity 10 W
Enclosure Volume 3 litres (0.1 cu ft)



Cross-over Frequency = 1000 Hz.

Cross-over Filter Components:
L_1 = 1 mH, Cat.No. 4304 078 21160
L_2 = 0.35 mH, Cat.No. 4304 078 21090
C = 5 μF, Cat.No. 2222 066 90019
Use Printed Wiring Board, Cat.No. 4304 073 00700.

Frequency response curve for System 3 measured with speakers mounted in the enclosure.



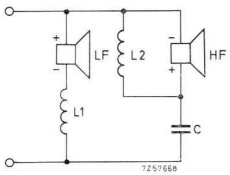
Resonance Frequency = 70 Hz.

SYSTEM 4 IMPEDANCE 4 Ω

5″ WOOFER + 1″ TWEETER

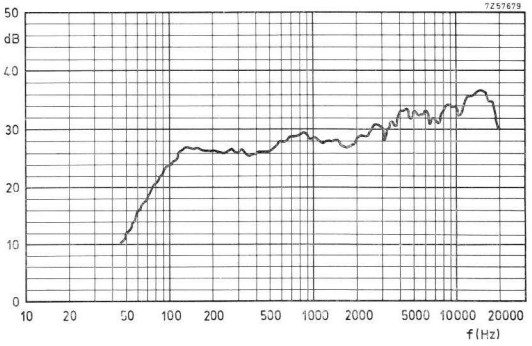
Woofer — AD 5060/W4
Tweeter — AD 0160/T4

Power Handling Capacity 10 W
Enclosure Volume 3 litres (0.1 cu ft)



Cross-over Frequency = 1000 Hz.

Cross-over Filter Components:
L_1 = 0.5 mH, Cat.No. 4304 078 21100
L_2 = 0.175 mH. Use two 0.35 mH in parallel, Cat.No. 4304 078 21090
C = 10 μF. Use two 5 μF in parallel, Cat.No. 2222 066 90019.



Frequency response curve for System 4 measured with speakers mounted in the enclosure.

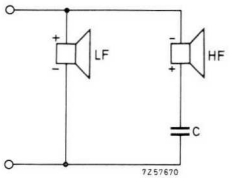
Resonance Frequency = 70 Hz.

SYSTEM 5 IMPEDANCE 8 Ω

7″ WOOFER + 5″ TWEETER

Woofer — AD 7065/W8
Tweeter — AD 5080/M8

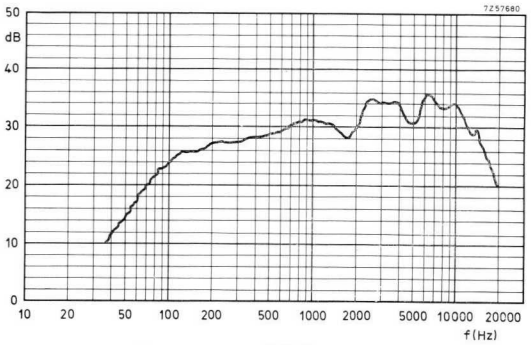
Power Handling Capacity 20 W
Enclosure Volume 7 litres (0.25 cu ft)



Cross-over Frequency = 1000 Hz.

Cross-over Filter Component:
C = 5 μF, Cat.No. 2222 066 90019.

Frequency response curve for System 5 measured with speakers mounted in the enclosure.



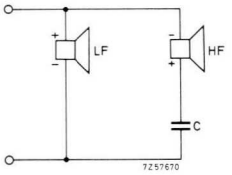
Resonance Frequency = 70 Hz.

SYSTEM 6 IMPEDANCE 4 Ω

7″ WOOFER + 5″ TWEETER

Woofer — AD 7065/W4
Tweeter — AD 5080/M4

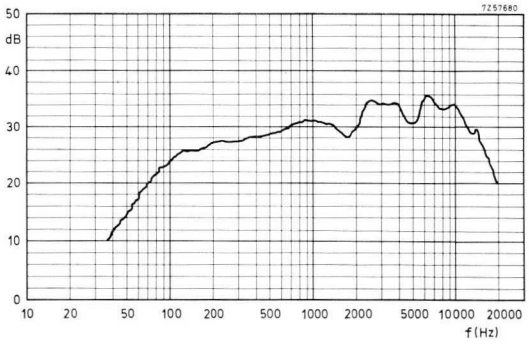
Power Handling Capacity 20 W
Enclosure Volume 7 litres (0.25 cu ft)



Cross-over Frequency = 1000 Hz.

Cross-over Filter Component:
C = 10 μF. Use two 5 μF in parallel, Cat.No. 2222 066 90019.

Frequency response curve for System 6 measured with speakers mounted in the enclosure.



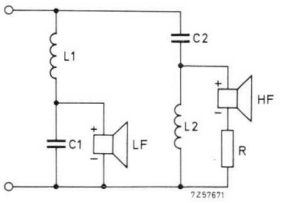
Resonance Frequency = 70 Hz.

SYSTEM 7 IMPEDANCE 8 Ω

7″ WOOFER + 5″ TWEETER

Woofer — AD 7065/W8
Tweeter — AD 5080/M4

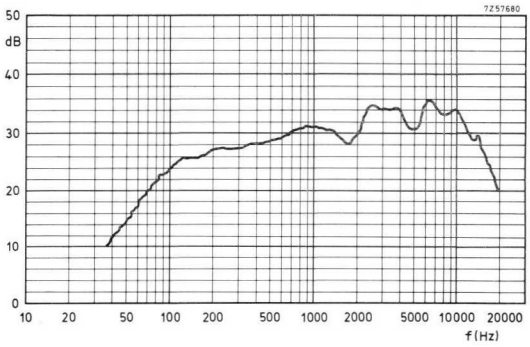
Power Handling Capacity 20 W
Enclosure Volume 7 litres (0.25 cu ft)



Cross-over Frequency = 850 Hz.

Cross-over Filter Components:
$L_1 = L_2 = 1.2$ mH
$C_1 = 36\ \mu F$ $C_2 = 12\ \mu F$
R = 3 Ω 2 W
Filter Cat.No. 4304 078 71331.

Frequency response curve for System 7 measured with speakers mounted in the enclosure.



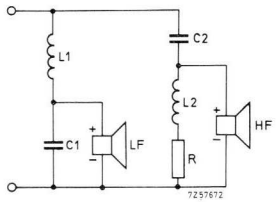
Resonance Frequency = 70 Hz.

SYSTEM 8 IMPEDANCE 4 Ω

7″ WOOFER + 5″ TWEETER

Woofer — AD 7065/W4
Tweeter — AD 5080/M8

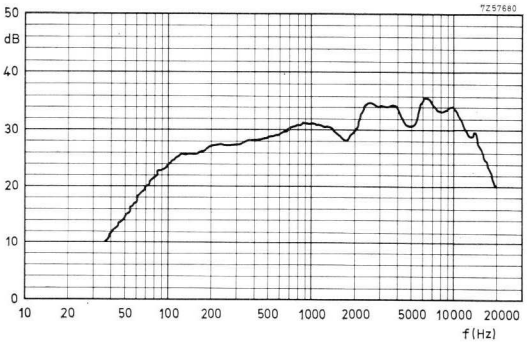
Power Handling Capacity 20 W
Enclosure Volume 7 litres (0.25 cu ft)



Cross-over Frequency = 850 Hz.

Cross-over Filter Components:
$L_1 = L_2 = 1.2$ mH, Cat.No. 3122 108 31350
$C_1 = 72$ μF. Use two 36 μF in parallel, Cat.No. 2222 066 90017
$C_2 = 24$ μF. Use two 12 μF in parallel, Cat.No. 2222 066 90016
R = 10 Ω 5W, Cat. No. 2322 325 31109.

Frequency response curve for System 8 measured with speakers mounted in the enclosure.



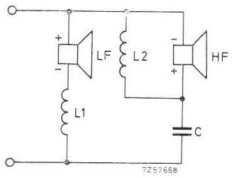
Resonance Frequency = 70 Hz.

SYSTEM 9 IMPEDANCE 8 Ω

7″ WOOFER + 1″ TWEETER

Woofer — AD 7065/W8
Tweeter — AD 0160/T8

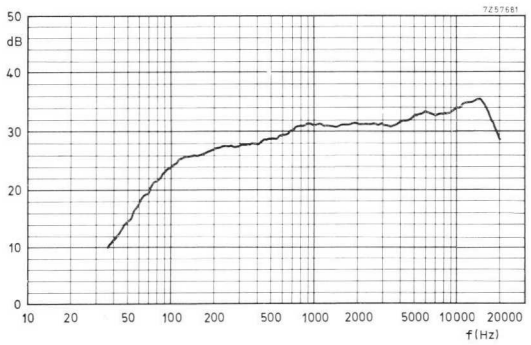
Power Handling Capacity 20 W
Enclosure Volume 7 litres (0.25 cu ft)



Cross-over Frequency = 1500 Hz.

Cross-over Filter Components:
L_1 = 2.1 mH, Cat.No. 3122 108 33570
L_2 = 0.5 mH, Cat.No. 4304 078 21100
C = 8 μF, Cat.No. 2222 066 90023
Use Printed Wiring Board, Cat.No. 4304 073 00700.

Frequency response curve for System 9 measured with speakers mounted in the enclosure.



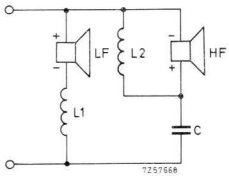
Resonance Frequency = 70 Hz.

SYSTEM 10 IMPEDANCE 4 Ω

7″ WOOFER + 1″ TWEETER

Woofer — AD 7065/W4
Tweeter — AD 0160/T4

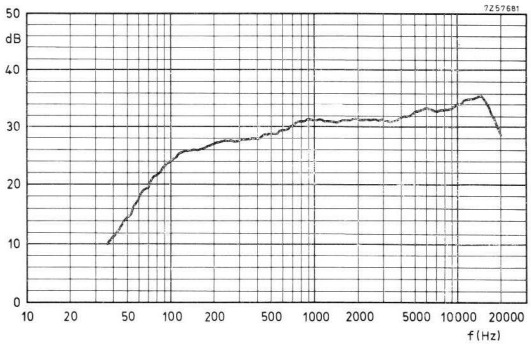
Power Handling Capacity 20 W
Enclosure Volume 7 litres (0.25 cu ft)



Cross-over Frequency = 1500 Hz.

Cross-over Filter Components:
L_1 = 1 mH, Cat.No. 4304 078 21160
L_2 = 0.25 mH. Use two 0.5 mH in parallel, Cat.No. 4304 078 21100
C = 16 μF. Use two 8 μF in parallel, Cat.No. 2222 066 90023.

Frequency response curve for System 10 measured with speakers mounted in the enclosure.



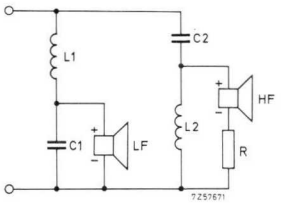
Resonance Frequency = 70 Hz.

SYSTEM 11 IMPEDANCE 8 Ω

8″ WOOFER + 5″ TWEETER

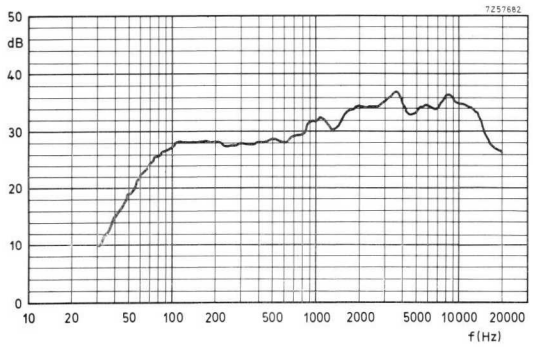
Woofer — AD 8065/W8
Tweeter — AD 5780/M4

Power Handling Capacity 20 W
Enclosure Volume 15 litres (0.53 cu ft)



Cross-over Frequency = 850 Hz.

Cross-over Filter Components:
$L_1 = L_2 = 1.2$ mH
$C_1 = 36\ \mu F$ $C_2 = 12\ \mu F$
$R = 3\ \Omega$ 2 W
Filter Cat.No. 4304 078 71331.



Frequency response curve for System 11 measured with speakers mounted in the enclosure.

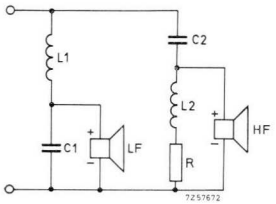
Resonance Frequency = 60 Hz.

SYSTEM 12 IMPEDANCE 4 Ω

8″ WOOFER + 5″ TWEETER

Woofer — AD 8065/W4
Tweeter — AD 5780/M8

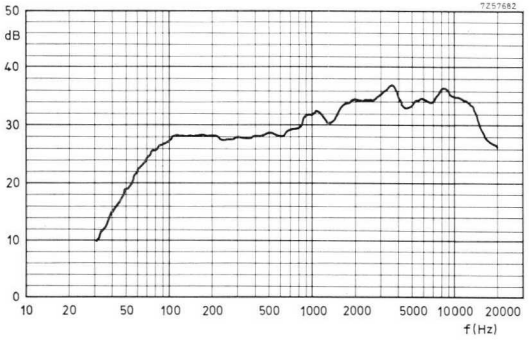
Power Handling Capacity 20 W
Enclosure Volume 15 litres (0.53 cu ft)



Cross-over Frequency = 850 Hz.

Cross-over Filter Components:
$L_1 = L_2 = 1.2$ mH, Cat.No. 3122 108 31350
$C_1 = 72$ μF. Use two 36 μF in parallel. Cat.No. 2222 066 90017
$C_2 = 24$ μF. Use two 12 μF in parallel, Cat.No. 2222 066 90016
R = 10 Ω 5 W, Cat.No. 2322 325 31109.

Frequency response curve for System 12 measured with speakers mounted in the enclosure.



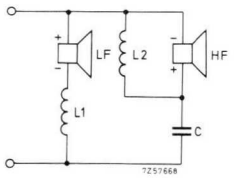
Resonance Frequency = 60 Hz.

SYSTEM 13 IMPEDANCE 8 Ω

8″ WOOFER + 1″ TWEETER

Woofer — AD 8065/W8
Tweeter — AD 0160/T8

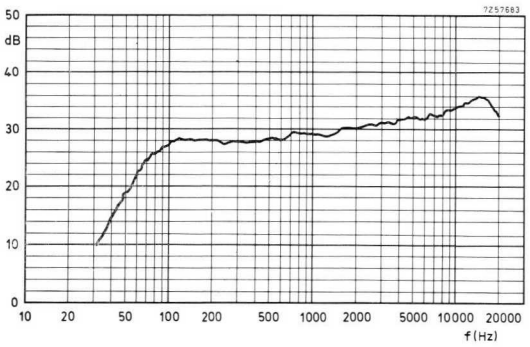
Power Handling Capacity 20 W
Enclosure Volume 15 litres (0.53 cu ft)



Cross-over Frequency = 1500 Hz.

Cross-over Filter Components:
L_1 = 2.1 mH, Cat.No. 3122 108 33570
L_2 = 0.5 mH, Cat.No. 4304 078 21100
C = 8 μF, Cat.No. 2222 066 90023
Use Printed Wiring Board, Cat.No. 4304 073 00700.

Frequency response curve for System 13 measured with speakers mounted in the enclosure.



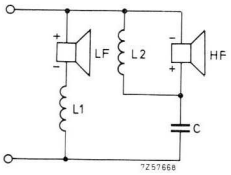
Resonance Frequency = 60 Hz.

SYSTEM 14 IMPEDANCE 4 Ω

8″ WOOFER + 1″ TWEETER

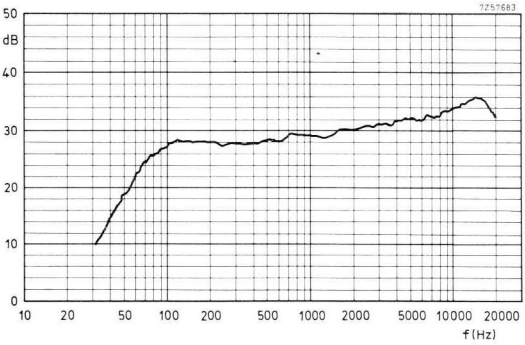
Woofer — AD 8065/W4
Tweeter — AD 0160/T4

Power Handling Capacity 20 W
Enclosure Volume 15 litres (0.53 cu ft)



Cross-over Frequency = 1500 Hz.

Cross-over Filter Components:
L_1 = 1 mH, Cat.No. 4304 078 21160
L_2 = 0.25 mH. Use two 0.5 mH in parallel, Cat.No. 4304 078 21100
C = 16 μF. Use two 8 μF in parallel, Cat.No. 2222 066 90023.



Frequency response curve for System 14 measured with speakers mounted in the enclosure.

Resonance Frequency = 60 Hz.

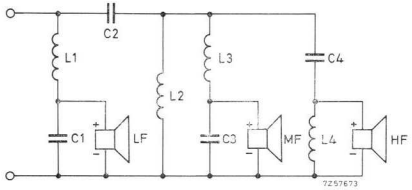
2.4 Electrical Details of 10 Three-way Systems

SYSTEM 15 IMPEDANCE 8 Ω

8″ WOOFER + 5″ SQUAWKER + 1″ TWEETER

Woofer — AD 8065/W8
Squawker — AD 5060/W8
Tweeter — AD 0160/T8

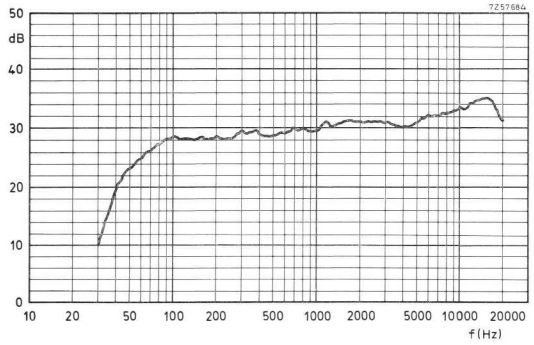
Power Handling Capacity 20 W
Enclosure Volume 25 litres (0.88 cu ft)



Cross-over Frequencies
700 Hz and 3000 Hz.

Cross-over Filter Components:
$L_1 = 6.4$ mH $L_2 = 1.2$ mH
$L_3 = 0.5$ mH $L_4 = 0.35$ mH
$C_1 = 12\ \mu F$ $C_2 = 12\ \mu F$
$C_3 = 8\ \mu F$ $C_4 = 3.3\ \mu F$
Filter Cat.No. 4304 078 71971.

Frequency response curve for System 15 measured with speakers mounted in the enclosure.



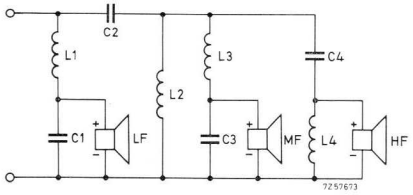
Resonance Frequency = 50 Hz.

SYSTEM 16 IMPEDANCE 4 Ω

8″ WOOFER + 5″ SQUAWKER + 1″ TWEETER

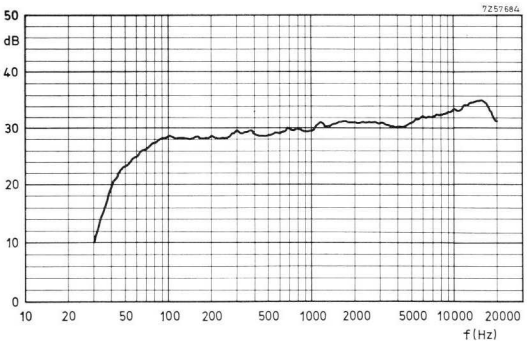
Woofer — AD 8065/W4
Squawker — AD 5060/W4
Tweeter — AD 0160/T4

Power Handling Capacity 20 W
Enclosure Volume 25 litres (0.88 cu ft)



Cross-over Frequencies
700 Hz and 3000 Hz.

Cross-over Filter Components:
$L_1 = 3.2$ mH $L_2 = 0.6$ mH
$L_3 = 0.25$ mH $L_4 = 0.18$ mH
$C_1 = 24$ μF $C_2 = 24$ μF
$C_3 = 16$ μF $C_4 = 6.6$ μF.



Frequency response curve for System 16 measured with speakers mounted in the enclosure.

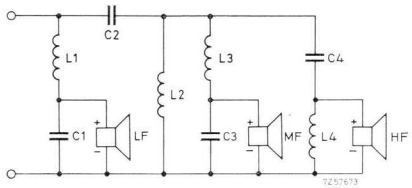
Resonance Frequency = 50 Hz.

SYSTEM 17 IMPEDANCE 8 Ω

10″ WOOFER + 5″ SQUAWKER + 1″ TWEETER

Woofer — AD 1055/W8
Squawker — AD 5060/W8
Tweeter — AD 0160/T8

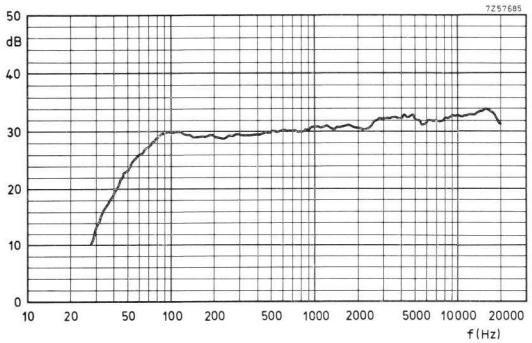
Power Handling Capacity 40 W
Enclosure Volume 35 litres (1.24 cu ft)



Cross-over Frequencies
700 Hz and 3000 Hz

Cross-over Filter Components:
$L_1 = 6.4$ mH $L_2 = 1.2$ mH
$L_3 = 0.5$ mH $L_4 = 0.35$ mH
$C_1 = 12\ \mu F$ $C_2 = 12\ \mu F$
$C_3 = 8\ \mu F$ $C_4 = 3.3\ \mu F$
Filter Cat.No. 4304 078 71971.

Frequency response curve for System 17 measured with speakers mounted in the enclosure.



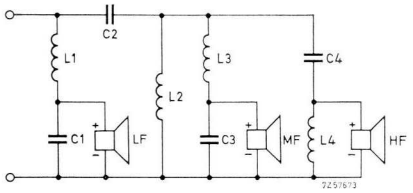
Resonance Frequency = 45 Hz.

SYSTEM 18 IMPEDANCE 4 Ω

10″ WOOFER + 5″ SQUAWKER + 1″ TWEETER

Woofer — AD 1055/W4
Squawker — AD 5060/W4
Tweeter — AD 0160/T4

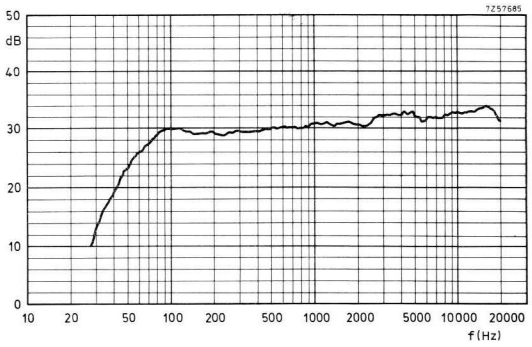
Power Handling Capacity 40 W
Enclosure Volume 35 litres (1.24 cu ft)



Cross-over Frequencies
700 Hz and 3000 Hz.

Cross-over Filter Components:

$L_1 = 3.2$ mH $L_2 = 0.6$ mH
$L_3 = 0.25$ mH $L_4 = 0.18$ mH
$C_1 = 24\ \mu F$ $C_2 = 24\ \mu F$
$C_3 = 16\ \mu F$ $C_4 = 6.6\ \mu F$.



Frequency response curve for System 18 measured with speakers mounted in the enclosure.

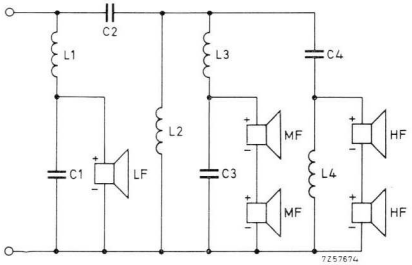
Resonance Frequency = 45 Hz.

SYSTEM 19 IMPEDANCE 8 Ω

10″ WOOFER + 2×5″ SQUAWKERS + 2×1″ TWEETERS

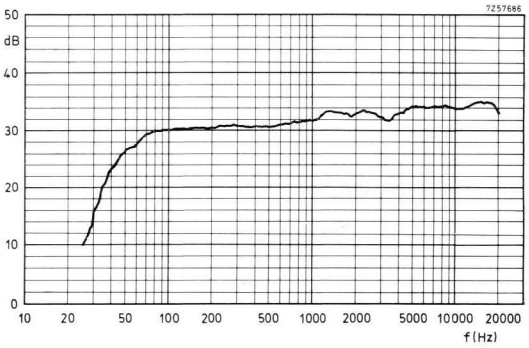
Woofer — AD 1055/W8
Squawker — 2×AD 5060/W4
Tweeter — 2×AD 0160/T4

Power Handling Capacity 40 W
Enclosure Volume 40 litres (1.4 cu ft)



Cross-over Frequencies
700 Hz and 3000 Hz.

Cross-over Filter Network as for System 15 showing the squawkers in series and the tweeters in series.
Filter Cat.No. 4304 078 71971.



Frequency response curve for System 19 measured with speakers mounted in the enclosure.

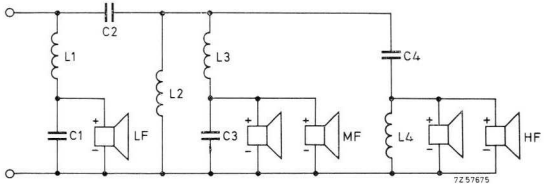
Resonance Frequency = 45 Hz.

SYSTEM 20 IMPEDANCE 4 Ω

10″ WOOFER + 2×5″ SQUAWKERS + 2×1″ TWEETERS

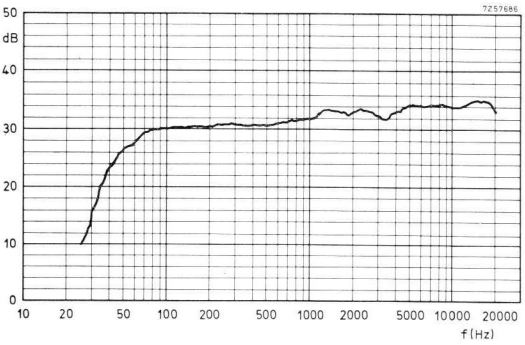
Woofer — AD 1055/W4
Squawker — 2×AD 5060/W8
Tweeter — 2×AD 0160/T8

Power Handling Capacity 40 W
Enclosure Volume 40 litres (1.4 cu ft)



Cross-over Frequencies 700 Hz and 3000 Hz.

Cross-over Filter Network as for System 16 showing the squawkers in parallel and the tweeters in parallel.



Frequency response curve for System 20 measured with speakers mounted in the enclosure.

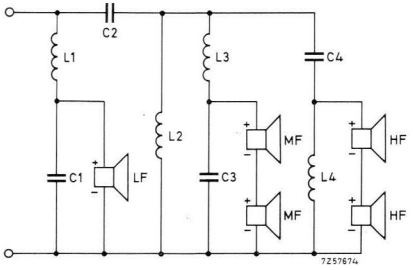
Resonance Frequency = 45 Hz.

SYSTEM 21 IMPEDANCE 8 Ω

12″ WOOFER + 2×5″ SQUAWKERS + 2×1″ TWEETERS

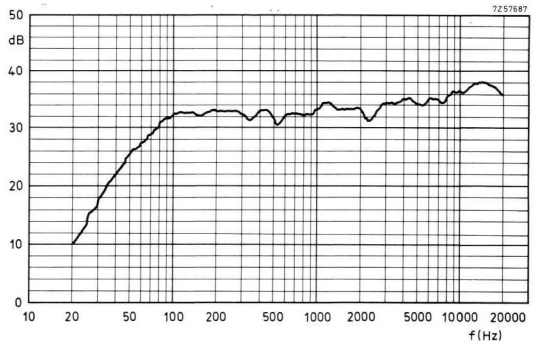
Woofer — AD 1256/W8
Squawker — 2×AD 5060/W4
Tweeter — 2×AD 0160/T4

Power Handling Capacity 40 W
Enclosure Volume 50 litres (1.77 cu ft)



Cross-over Frequencies
700 Hz and 3000 Hz.

Cross-over Filter Network as for System 15 showing the squawkers in series and the tweeters in series.
Filter Cat.No. 4304 078 71971.



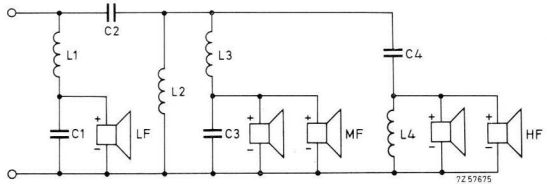
Frequency response curve for System 21 measured with speakers mounted in the enclosure.

Resonance Frequency = 44 Hz.

SYSTEM 22 IMPEDANCE 4 Ω

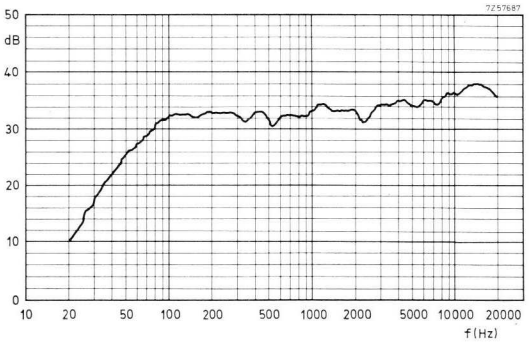
12″ WOOFER + 2×5″ SQUAWKERS + 2×1″ TWEETERS

Woofer — AD 1256/W4 Power Handling Capacity 40 W
Squawker — 2×AD 5060/W8 Enclosure Volume 50 litres (1.77 cu ft)
Tweeter — 2×AD 0160/T8



Cross-over Frequencies 700 Hz and 3000 Hz.

Cross-over Filter Network as for System 16 showing the squawkers in parallel and the tweeters in parallel.



Frequency response curve for System 22 measured with speakers mounted in the enclosure.

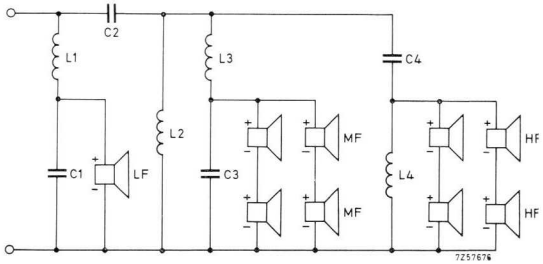
Resonance Frequency = 44 Hz.

SYSTEM 23 IMPEDANCE 8 Ω

12″ WOOFER + 4×5″ SQUAWKERS + 4×1″ TWEETERS

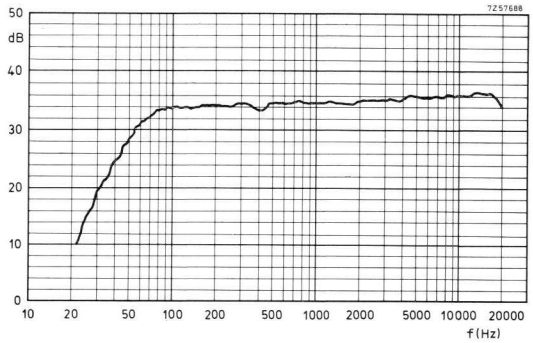
Woofer — AD 1256/W8
Squawker — 4×AD 5060/W8
Tweeter — 4×AD 0160/T8

Power Handling Capacity 40 W
Enclosure Volume 80 litres (2.83 cu ft)



Cross-over Frequencies 700 Hz and 3000 Hz.

Cross-over Filter Network as for System 15 showing the squawkers in series/parallel and the tweeters in series/parallel.
Filter Cat.No. 4304 078 71971.



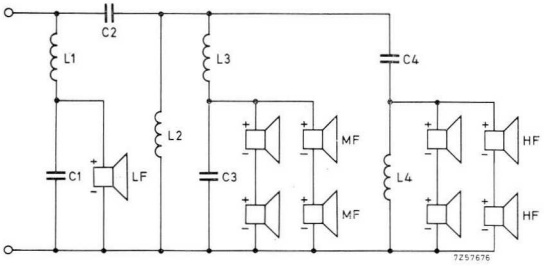
Frequency response curve for System 23 measured with speakers mounted in the enclosure.

Resonance Frequency = 40 Hz.

SYSTEM 24 IMPEDANCE 4 Ω

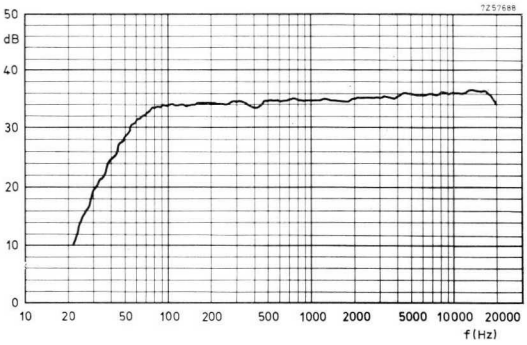
12″ WOOFER + 4×5″ SQUAWKERS + 4×1″ TWEETERS

Woofer — AD 1256/W4 Power Handling Capacity 40 W
Squawker — 4×AD 5060/W4 Enclosure Volume 80 litres (2.83 cu ft)
Tweeter — 4×AD 0160/T4



Cross-over Frequencies 700 Hz and 3000 Hz.

Cross-over Filter Network as for System 16 showing the squawkers in series/parallel and the tweeters in series/parallel.



Frequency response curve for System 24 measured with speakers mounted in the enclosure.

Resonance Frequency = 40 Hz.

3 Constructional Details of 24 Speaker Systems

This Chapter is devoted to constructional details and baffle board layouts are suggested which will produce enclosures with an aspect ratio of 5 : 3.

Fig. 2 gives the principal internal dimensions of the family of 11 enclosures which will house the 24 speaker systems. It should be noted that whilst the baffle board dimensions remain in the same proportion, this does not apply to the depths of the different enclosures. For example, compare the two 7-litre enclosures where the one for Systems 9 and 10 is not as deep as that for Systems 5, 6, 7 and 8. The reason is that for Systems 9 and 10 the one inch tweeter has been used and, since this is a sealed unit, no acoustic isolating box is necessary. To avoid the larger enclosures becoming unduly deep because the Ticonal magnet systems of the 10″ and 12″ woofers are longer, the full depth of the speaker has not been used, only the depth of the cone being taken into account in calculating the depth of the 35, 40, 50 and 80 litre enclosures.

The dimensions of the materials to make the enclosures, using the form of construction shown in Fig. 3, are given in Table 4. Baffle board layouts viewed from the rear, are shown in Figs. 4 to 14. The tweeter mounting hole, indicated only by a circle in the baffle board layouts, is given in full detail in Fig. 15. The orientation of the baffle boards within the enclosures is optional, since the performance is unaffected by whether the tweeter is mounted on the left, or right, of the enclosure.

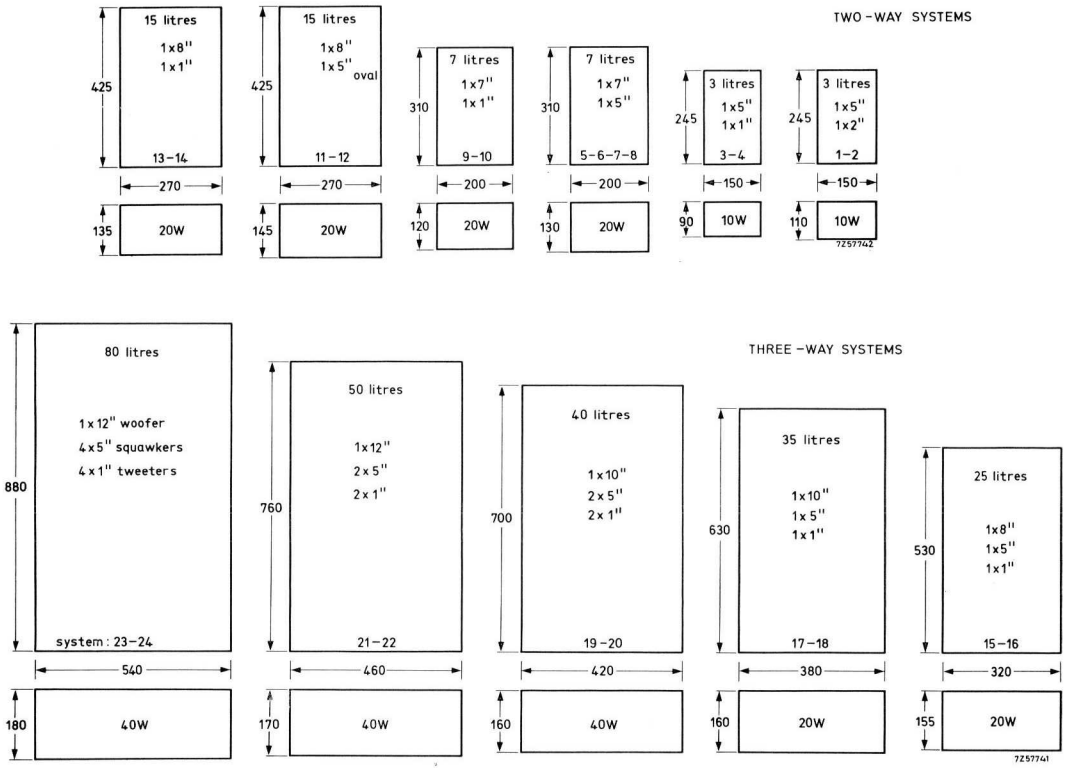


Fig. 2. Leading particulars of the 24 speaker systems. Sizes given are internal dimensions in millimetres.

Table 4. Dimensions for Materials to Build the Recommended Enclosures.

system number	baffle layout	dimensions for Fig. 3											
		A	B	C	D	E	F	G	H	J	K	L	M
1, 2	Fig. 4	10	245	150	110	10	140	150	265	110	245	10	20
3, 4	Fig. 5	10	245	150	90	10	120	150	265	110	245	10	20
5, 6, 7, 8	Fig. 6	15	310	200	130	15	170	200	340	160	310	15	20
9, 10	Fig. 7	15	310	200	120	15	160	200	340	160	310	15	20
11, 12	Fig. 8	20	425	270	145	20	195	270	465	230	425	20	20
13, 14	Fig. 9	20	425	270	135	20	185	270	465	230	425	20	20
15, 16	Fig. 10	20	530	320	155	20	205	320	570	280	530	20	20
17, 18	Fig. 11	25	630	380	160	25	220	380	680	340	630	25	20
19, 20	Fig. 12	25	700	420	160	25	220	420	750	380	700	25	20
21, 22	Fig. 13	25	760	460	170	25	230	460	810	420	760	25	20
23, 24	Fig. 14	25	880	540	180	25	240	540	930	500	880	25	20

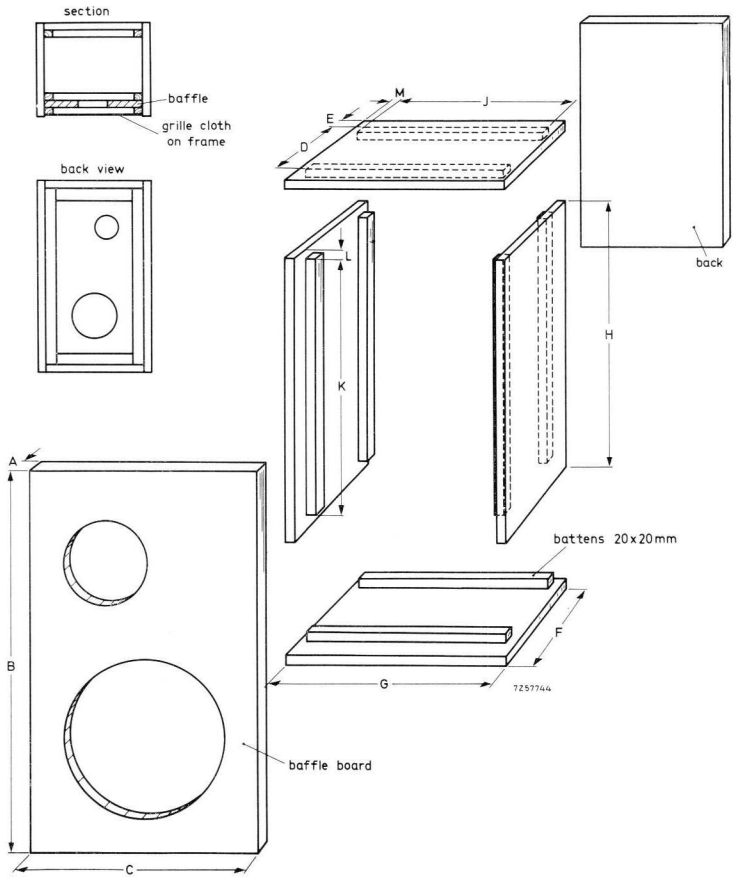


Fig. 3. Standard form of construction of the recommended enclosures. See Table 4 for dimensions. The thickness of the baffle board, shown as dimension A, applies to all the panels. Battens of 20 mm square timber are used on each enclosure. The grille cloth frame is made of 10 mm square timber in every case.

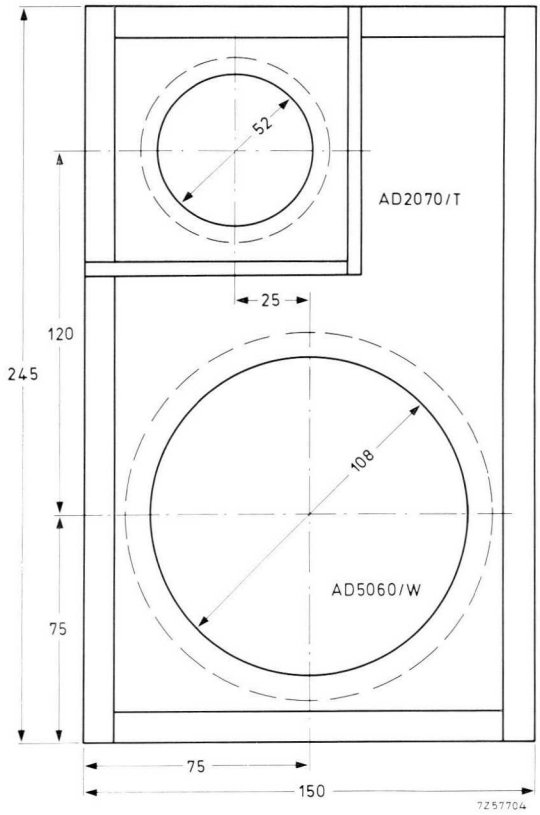


Fig. 4. Baffle board layout for Systems 1 and 2.

Enclosure volume = 3 litres; internal depth = 110 mm; tweeter box inside dimensions = 60×60×16 mm, with 5 mm walls.

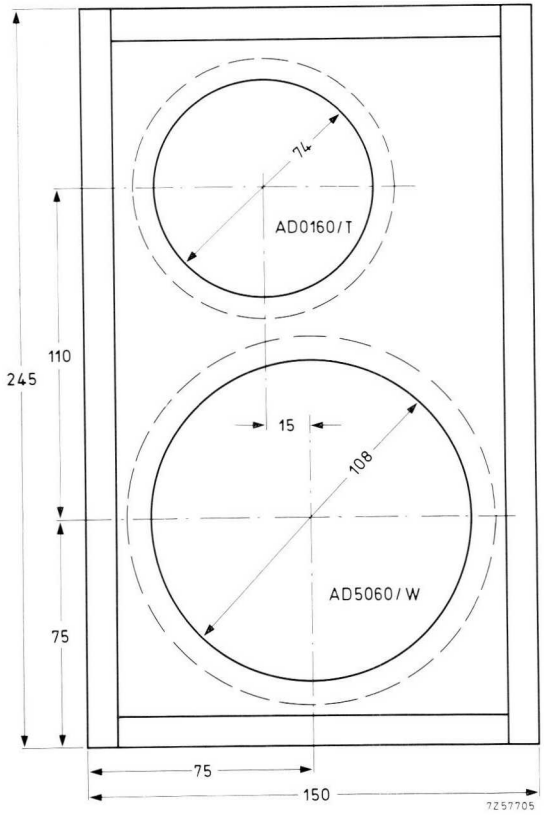


Fig. 5. Baffle board layout for Systems 3 and 4.

Enclosure volume = 3 litres; internal depth = 90 mm.

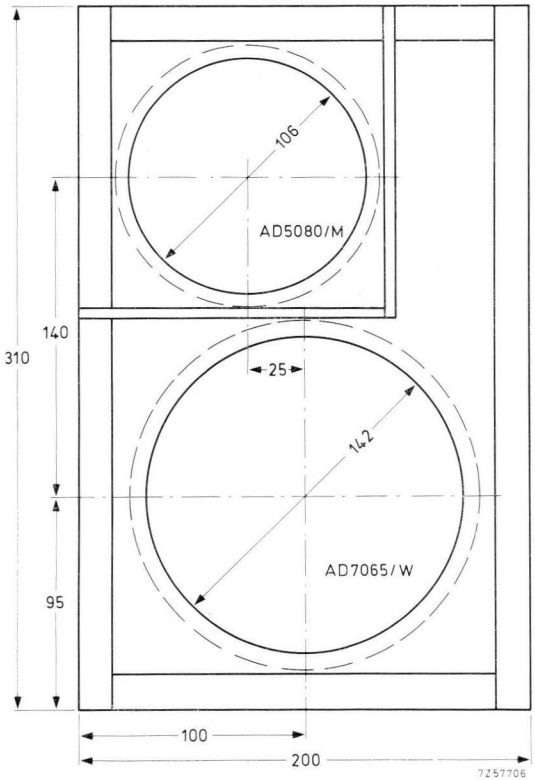


Fig. 6. Baffle board layout for Systems 5, 6, 7 and 8.

Enclosure volume = 7 litres; internal depth = 130 mm; tweeter box inside dimensions = 110×110×30 mm, with 5 mm walls.

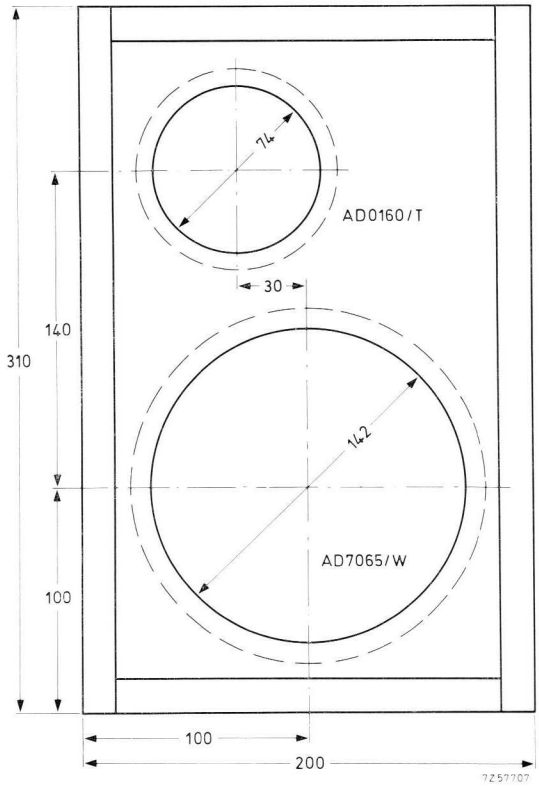


Fig. 7. Baffle board layout for Systems 9 and 10.

Enclosure volume = 7 litres; internal depth = 120 mm.

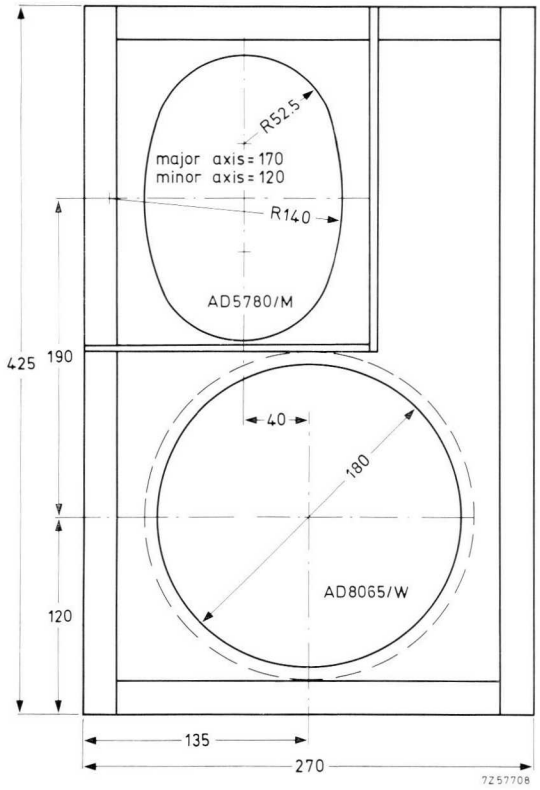


Fig. 8. Baffle board layout for Systems 11 and 12.

Enclosure volume = 15 litres; internal depth = 145 mm; tweeter box inside dimensions = 180 × 140 × 35 mm, with 5 mm walls.

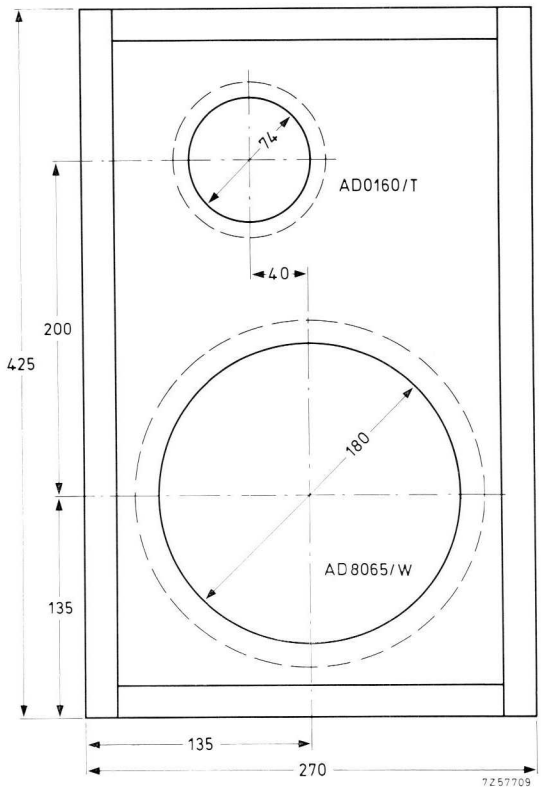


Fig. 9. Baffle board layout for Systems 13 and 14.

Enclosure volume = 15 litres; internal depth = 135 mm.

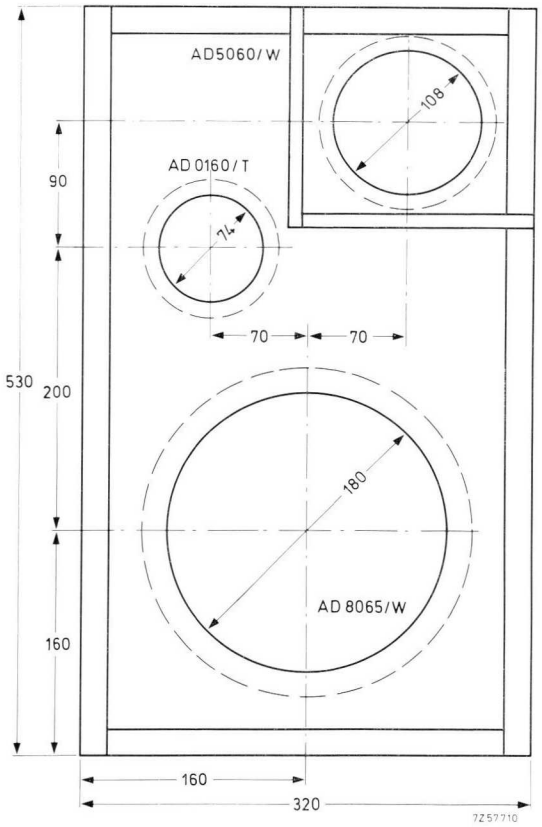


Fig. 10. Baffle board layout for Systems 15 and 16.

Enclosure volume = 25 litres; internal depth = 155 mm; squawker box inside dimensions = 155 × 120 × 60 mm, with 10 mm walls.

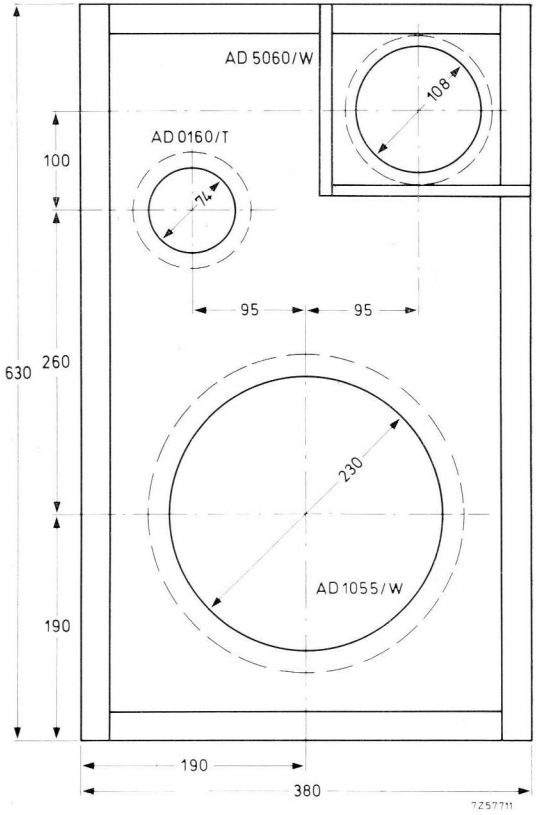


Fig. 11. Baffle board layout for Systems 17 and 18.

Enclosure volume = 35 litres; internal depth = 160 mm; squawker box inside dimensions = 185×120×60 mm, with 10 mm walls.

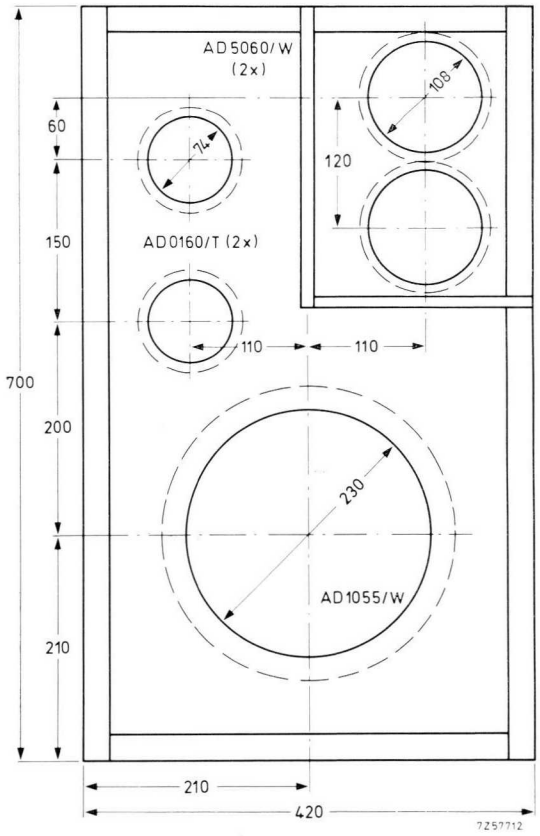


Fig. 12. Baffle board layout for Systems 19 and 20.

Enclosure volume = 40 litres; internal depth = 160 mm; squawker box inside dimensions = 240 × 205 × 60 mm, with 10 mm walls.

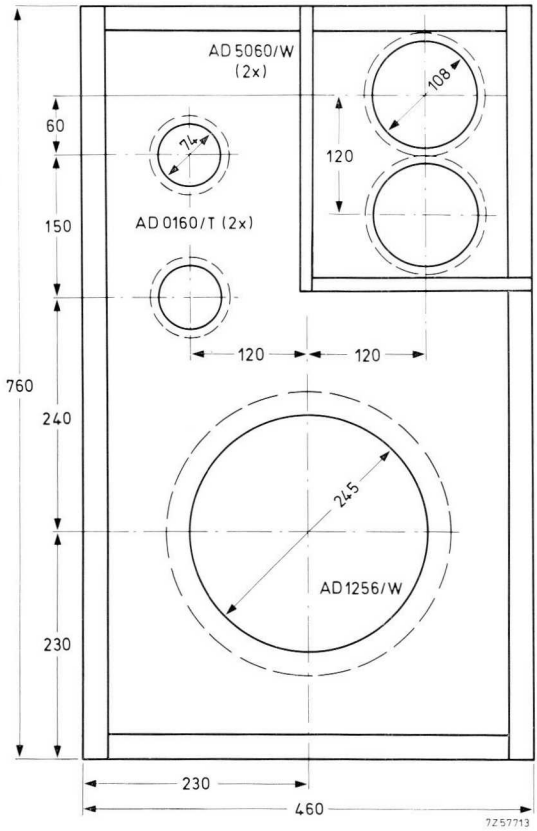


Fig. 13. Baffle board layout for Systems 21 and 22.

Enclosure volume = 50 litres; internal depth = 170 mm; squawker box inside dimensions = 240×222×60 mm, with 15 mm walls.

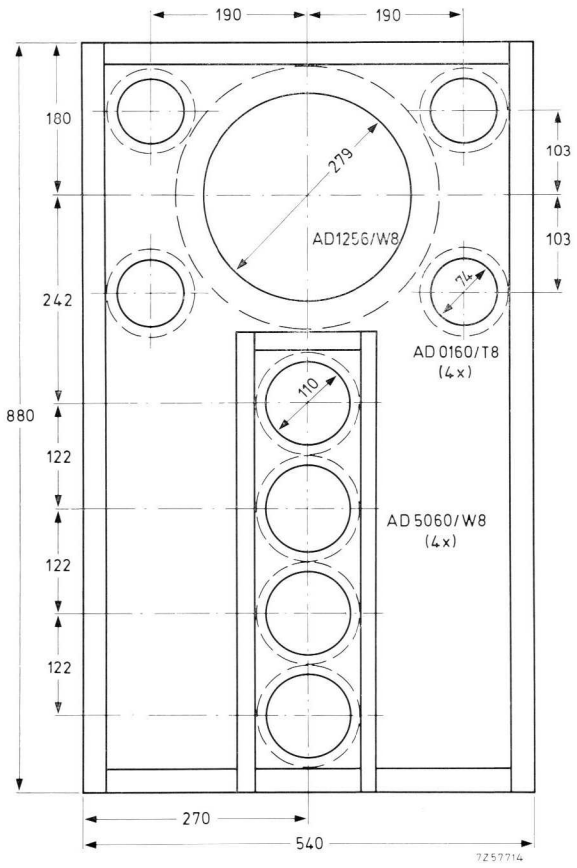


Fig. 14. Baffle board layout for Systems 23 and 24.

Enclosure volume = 80 litres; internal depth = 180 mm; squawker box inside dimensions = 480 × 120 × 60 mm, with 20 mm walls.

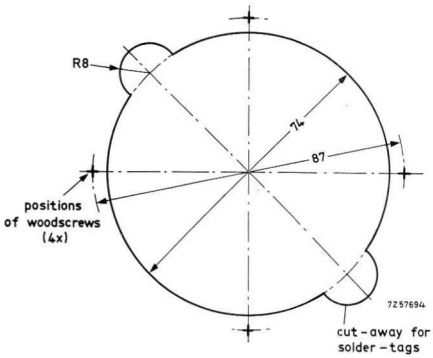
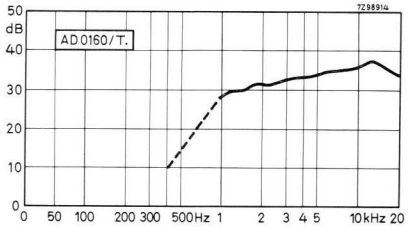


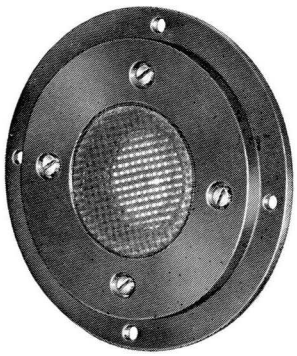
Fig. 15. Details of the baffle hole for the tweeter.

4 Speaker Dimensions and Response Curves

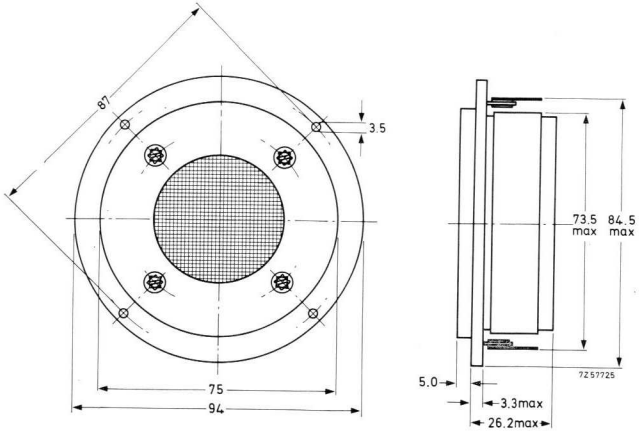
This Chapter gives the dimensions of the speakers recommended in this book. The response curves were measured with a constant voltage input in an anechoic chamber, without a baffle. Where a power level is quoted, this refers to the input power when the speaker is mounted in the recommended enclosure, otherwise the speaker would be permanently damaged.

AD 0160/T

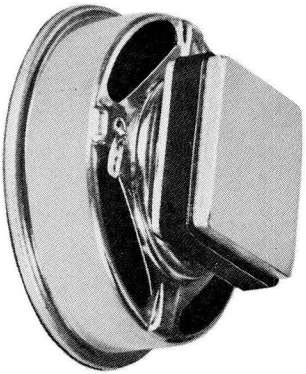


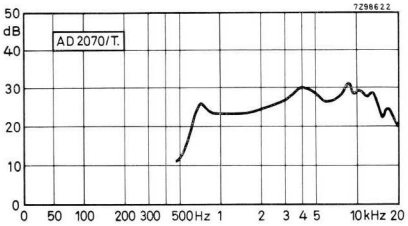


1″ High Fidelity Dome Tweeter

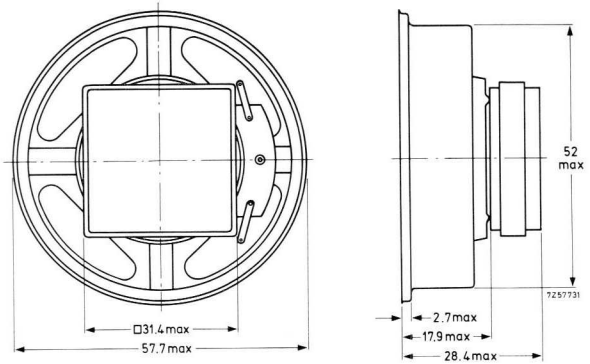


AD 2070/T



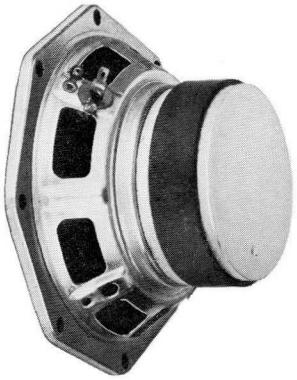


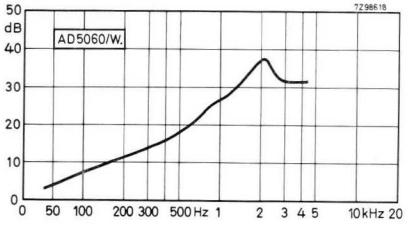
2″ High Fidelity Tweeter



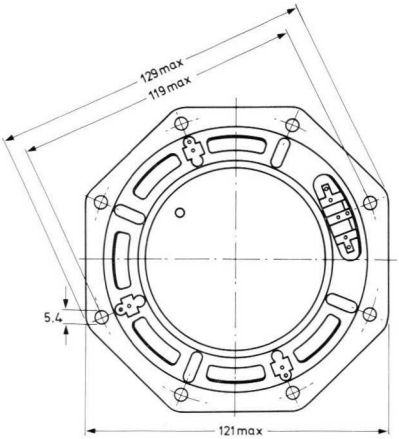
baffle hole front mounting 53

AD 5060/W





5″ High Fidelity Woofer



baffle hole front mounting 106
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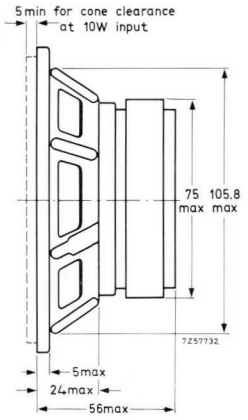
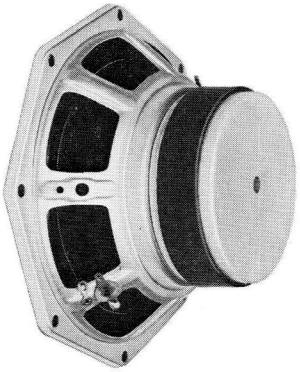
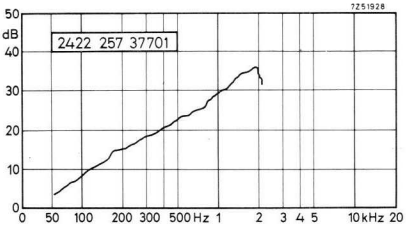
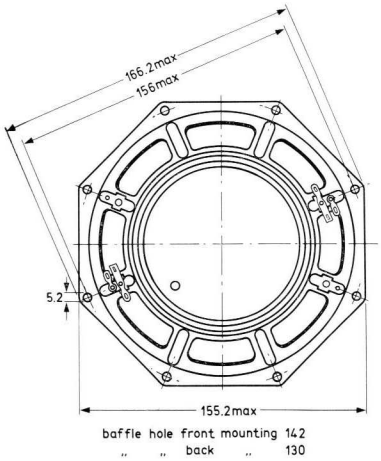


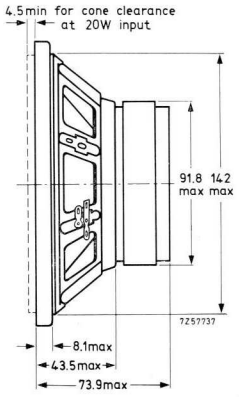
AD 7065/W



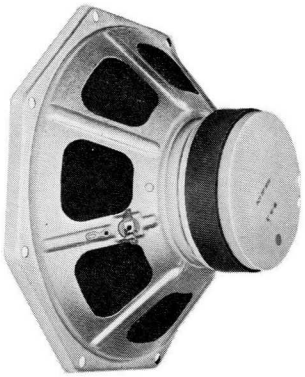


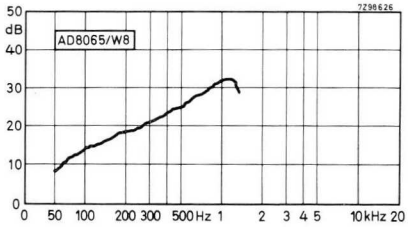
7″ High Fidelity Woofer





AD 8065/W





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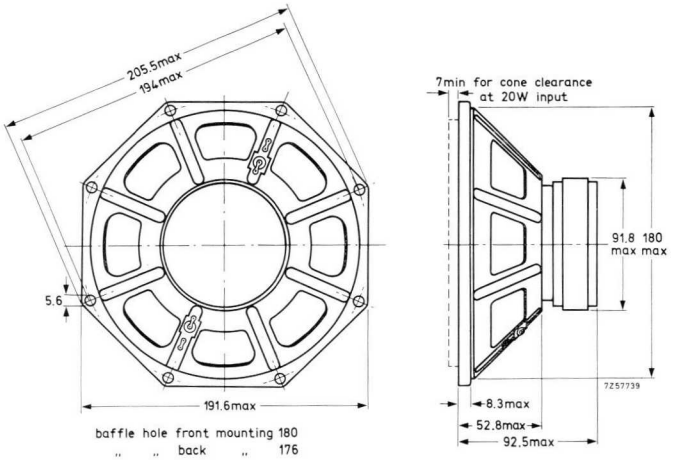

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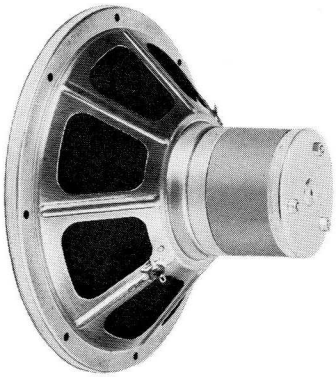

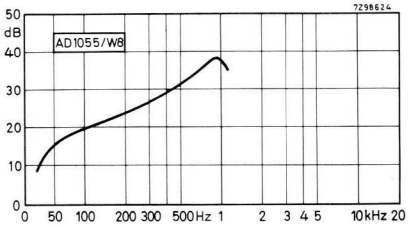

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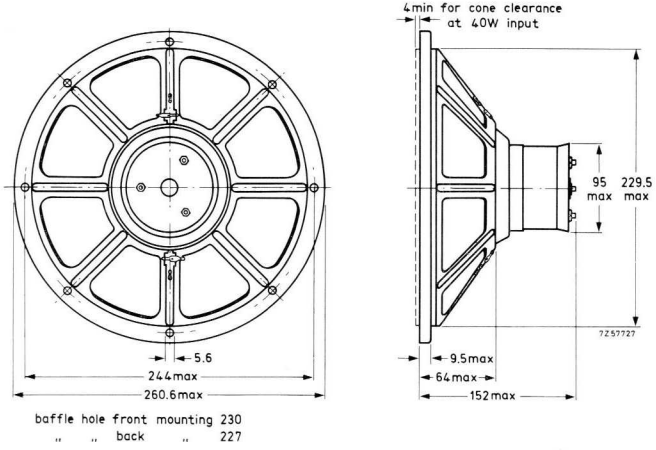

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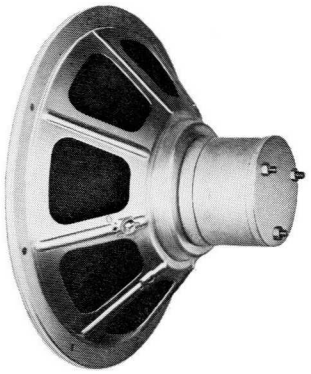

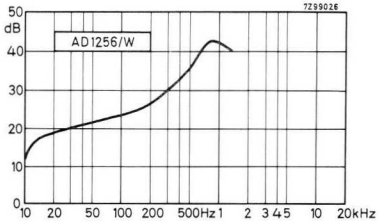

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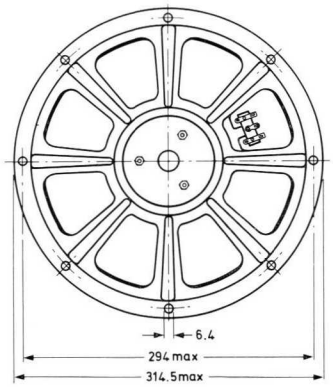
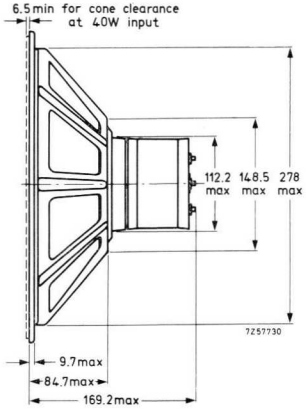
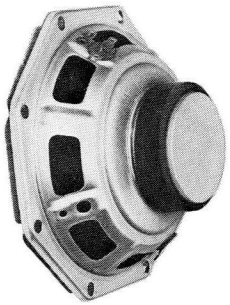


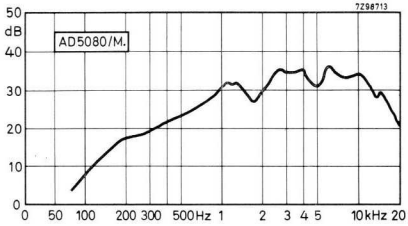


baffle hole front mounting 279
" " back " 276

Two Speakers from the Standard Range
Recommended for High Frequency Duty

AD 5080/M





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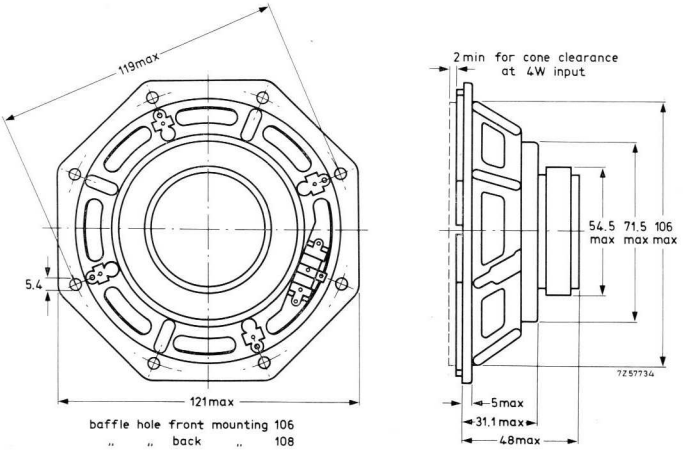

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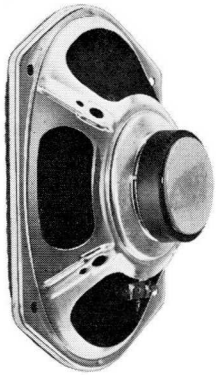
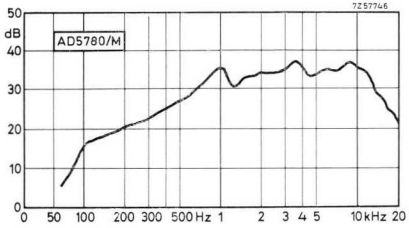
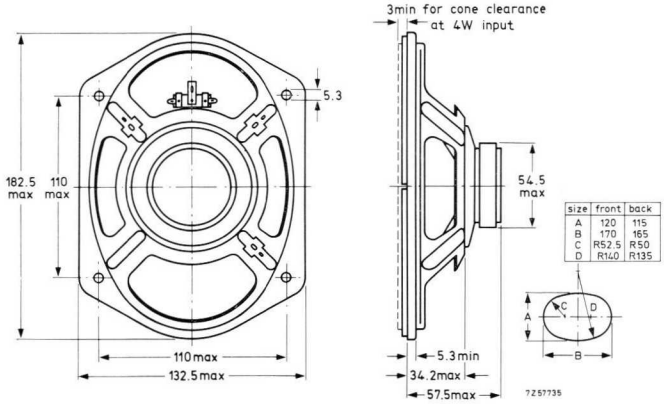




5″ × 7″ Standard Loudspeaker



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