High-fidelity sound-reproduction equipment

LOUDSPEAKERS

Dual-channel concentric and direct-radiator types

A MAJOR CONTRIBUTION to modern high-fidelity sound reproduction was made over thirty years ago when BTH introduced the RK moving-coil loudspeaker, which was to become world-famous and to be the prototype of the vast majority of loudspeakers in general use today.

Since that time, BTH has concentrated on the development of high-quality sound-reproduction equipment for cinema and industrial use, where quality and reliability rather than initial cost have been the main consideration. As the result of many years' experience in design and manufacture, it is now possible to offer a comprehensive range of high-fidelity loudspeakers. It must be emphasized that they are all designed with performance as the first essential; they have really adequate magnet systems and cone structures; and their reliability has been proved under far more arduous conditions than are likely to be encountered in the home of the 'hi-fi' enthusiast.

Magnetic materials of the latest types are used for the magnet systems, and the gap widths and lengths are comparatively large, making possible the considerable cone-movement required at low frequencies without risk of the voice-coil rubbing. For this reason, the magnet systems are larger than in the usual mass-produced speaker, but use of the latest manufacturing techniques has enabled BTH to offer these magnificent instruments at a reasonable price.

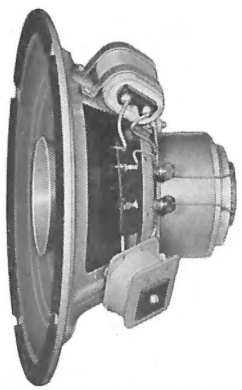


Fig. 1. 12″ dual-channel concentric loud-speaker, Type DC12.

DUAL-CHANNEL CONCENTRIC LOUDSPEAKERS

A 12-inch diameter dual-channel speaker, Type DC12, has been specially developed for 'hi-fi' reproduction in small and medium-sized rooms. A 'common' permanent-magnet system is employed, carefully designed to give an extremely low magnetic intermodulation between the H.F. and L.F. sections, and to deal with peak outputs up to 15 watts with very low distortion.

High gap flux-densities are used, which, in conjunction with the design of the moving coil and the diaphragm, provide a balanced output from the horn-type H.F. unit and the direct-radiator L.F. diaphragm.

The DC12 speaker is ideal for 'hi-fi' applications, and the convenient size of the required cabinet renders it particularly suitable for stereophonic reproduction in the average home.

High-frequency Horn. The H.F. metal-diaphragm electro-dynamic unit has been selected for its high stability, good power-handling capacity, and low distortion level. By extending the H.F. horn in front of the centre of the L.F. diaphragm, distortion due to intermodulation is reduced to a minimum. The good 'presence', characteristic of co-axial speakers, is especially noticeable, even when the listener is close to the speaker as must be the case in a small room.

As efforts are made constantly to improve both designs and methods of manufacture, the apparatus supplied may differ in details from the illustrations.

BTH SOUND EQUIPMENT LIMITED

Edition B
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The H.F. horn is circular in section and extends to the front face of the speaker; it is coupled to the H.F. pressure unit through a mechanically-stable and acoustically-effective phase equalizer. The arrangement minimizes the turbulence and phase interference that, at higher audio-frequencies, are caused by differences in path-length between the diaphragm and the horn-mouth.

Filter unit. The cross-over frequency selected is 1500 cycles, allowing the components used in the filter circuit to be small enough for attachment as fixed units to the speaker chassis.

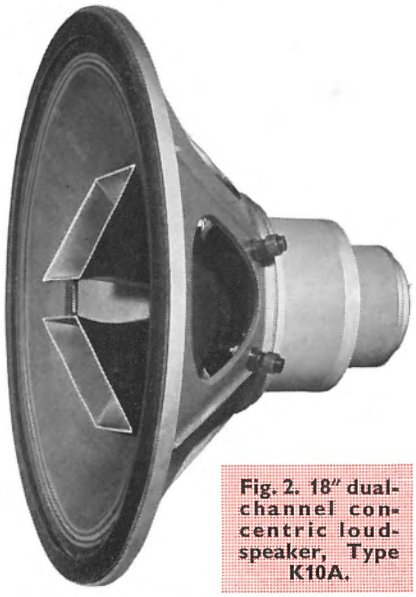


Fig. 2. 18" dual-channel concentric loudspeaker, Type K10A.

The K10A speaker is described in detail in List No. 7485-1. By virtue of its generous design, it provides sound-reproduction of outstanding quality; there is no magnetic intermodulation since completely-separate magnet systems are used for high and low frequencies. The L.F. portion is essentially similar to the 18-inch speakers described in a later section; the H.F. unit has a twin-mouth H.F. horn. This speaker is equally suitable for either single-channel or stereophonic reproduction, in medium-sized or large rooms and halls.

The DC12 loudspeaker is illustrated in Figs. 1 and 3, and the K10A in Figs. 2 and 4.

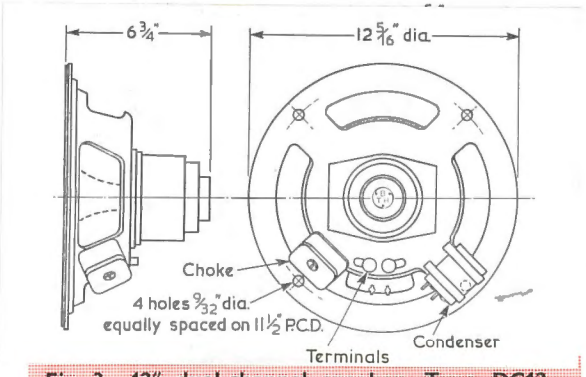
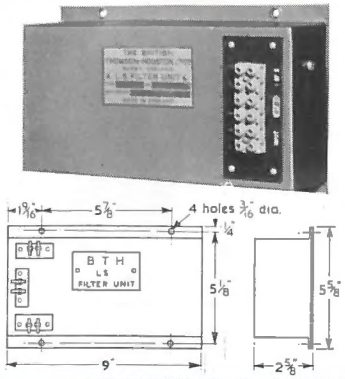


Fig. 3. 12" dual-channel speaker, Type DC12—outline.

Specification

	DC12	K10A
Overall diameter .. in. (mm.)	12 (305)	18 (457)
Magnet system	Common P.M.	Separate L.F. and H.F. P.M.
Matching impedance .. ohms	15	15
L.F. fundamental resonance, cycles/sec.	55	33
Gap flux-density .. (L.F.) gauss	10,000	14,300
(H.F.) gauss	13,000	16,700
Total flux .. (L.F.) maxwells	85,000	285,000
(H.F.) maxwells	49,000	63,000
Voice-coil diameter (L.F.) in. (mm.)	1·75 (44)	2·5 (64)
(H.F.) in. (mm.)	1·56 (39)	1·56 (39)
Cross-over frequency cycles/sec.	1500	1700
Filter	On speaker	Separate unit
Weight .. (Speaker) lb. (kg.)	11·5 (5·4)	34 (15·4)
(Filter) lb. (kg.)	—	4·25 (1·9)
Peak audio rating .. .. watts	15	25



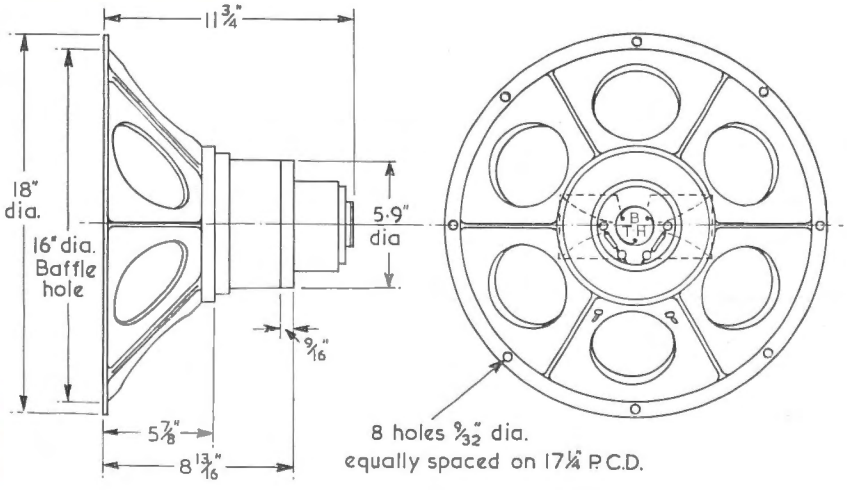


Fig. 4. 18" dual-channel speaker, Type K10A. (*Above*) **filter unit, appearance and outline.** (*Right*) **outline of speaker.**

12-inch DIRECT-RADIATOR LOUDSPEAKERS

12-inch speakers are available in two types, 12A and 12B. They have identical magnet systems and cone support frameworks, but dissimilar types and shapes of cones and surrounds, to give somewhat different values of fundamental resonance and overall response.

Type 12A has a straight-sided ribbed cone, while that of Type 12B is highly flared and has a fabric surround, giving a lower fundamental frequency and a relatively-level wide-range response. Type 12A has a slightly higher power-handling capacity. A 12A and a 12B, mounted in a suitable cabinet, give an extremely smooth overall response and performance ideal for the average-sized living-room.

The general appearance is shown in Fig. 5 and the overall dimensions and fixing details for both speakers are outlined in Fig. 6.



Fig. 5. 12" direct-radiator loudspeaker, Type 12A. Type 12B is of similar appearance.

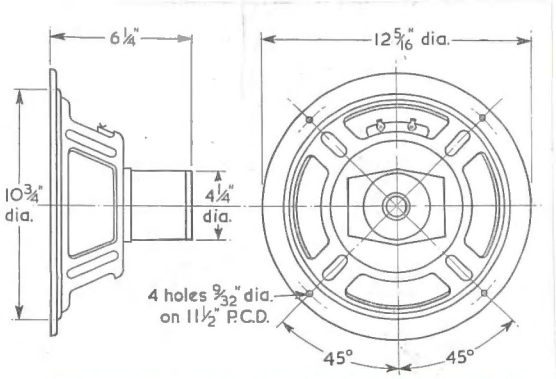


Fig. 6. 12A or 12B speaker—outline and fixing details.

Specification

	12A	12B
Overall diameter .. in. (mm.)	12 (305)	12 (305)
Magnet system	P.M.	P.M.
Matching impedance .. .. ohms	15	15
Fundamental resonance cycles/sec.	55	40
Gap flux-density .. .. gauss	14,400	14,400
Total flux .. .. maxwells	122,000	122,000
Voice-coil diameter .. in. (mm.)	1·75 (44)	1·75 (44)
Weight .. .. lb. (kg.)	9·75 (4·42)	9·75 (4·42)
Peak audio rating .. .. watts	18	12

18-inch DIRECT-RADIATOR LOUDSPEAKERS

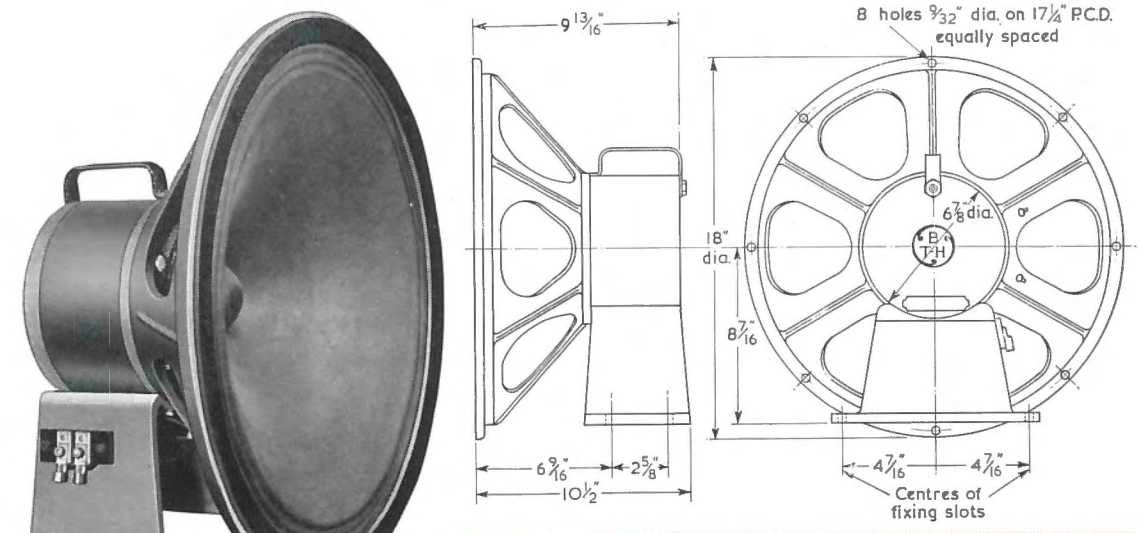


Fig. 7. 18" direct-radiator loudspeaker, Type 18A or 18B—general appearance, outline, and fixing details.

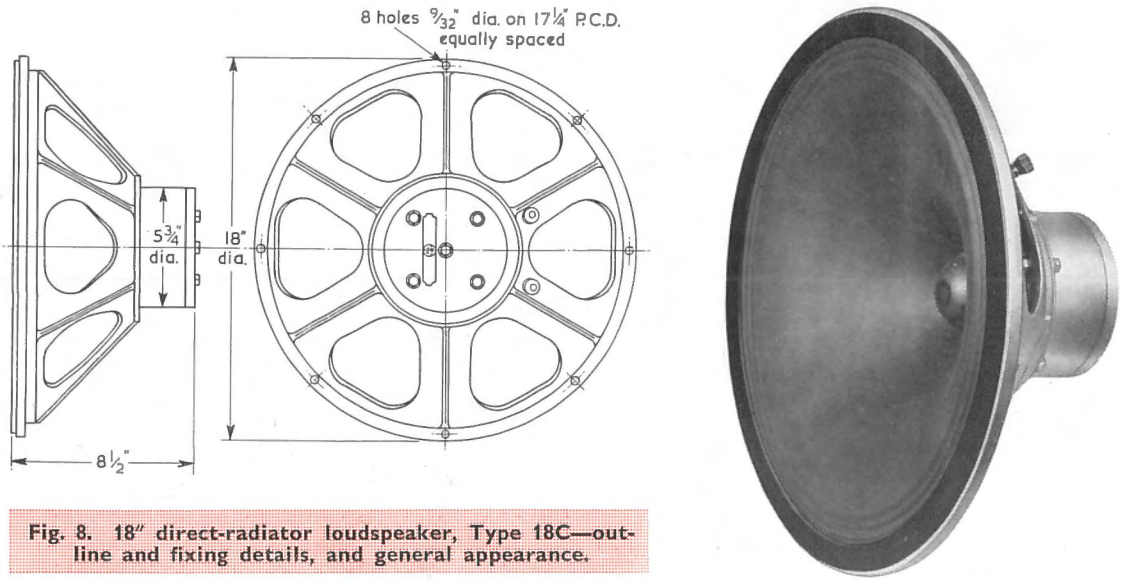


Fig. 8. 18" direct-radiator loudspeaker, Type 18C—outline and fixing details, and general appearance.

These larger speakers are designed for use as the 'bass' units in high-power high-fidelity equipment, but are equally suitable for low-power use. They are of two peak audio ratings, 30 watts (Type 18C) and 40 watts. The 40-watt speakers are available in two forms (18A and 18B), with dissimilar cones and cone-surrounds to provide different fundamental resonances for operating in parallel, the pair thus giving an extremely smooth output down to the lowest frequency characteristic of the cabinet or folded horn with which they are used.

The magnet systems have been specially designed to permit the large cone-excursions required by high power-outputs at low frequencies, and these speakers will give reliable trouble-free performance over many years.

Types 18A and 18B are illustrated in Fig. 7 and Type 18C in Fig. 8.

Specification

	18A	18B	18C
Overall diameter .. .. .. in. (mm.)	18 (457)	18 (457)	18 (457)
Magnet system	P.M.	P.M.	P.M.
Matching impedance .. .. ohms	10	10	10
Fundamental resonance .. .. cycles/sec.	33	25	33
Gap flux-density .. .. gauss	15,000	15,000	11,800
Total flux .. .. maxwells	376,000	376,000	215,000
Voice-coil diameter .. .. .. in. (mm.)	2·5 (64)	2·5 (64)	2·5 (64)
Weight .. .. lb. (kg.)	48 (22)	48 (22)	29·75 (13·5)
Peak audio rating .. .. watts	40	40	30

CABINETS

The diversity of users' requirements in the matter of style and external finish renders the supply of cabinets for these loudspeakers impracticable. For the best-possible performance, however, certain basic constructional features are essential, and BTH Sound Equipment Limited will be pleased to forward on request, to purchasers of these speakers, recommendations as to suitable acoustically-designed enclosures.

Suitable amplifying equipment for use with these loudspeakers is described in DL. 7485-5 (Mono) and DL. 7485-6 (Stereo), available on request.

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