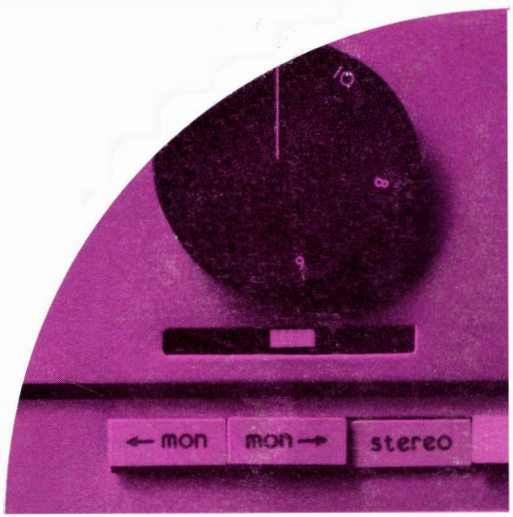
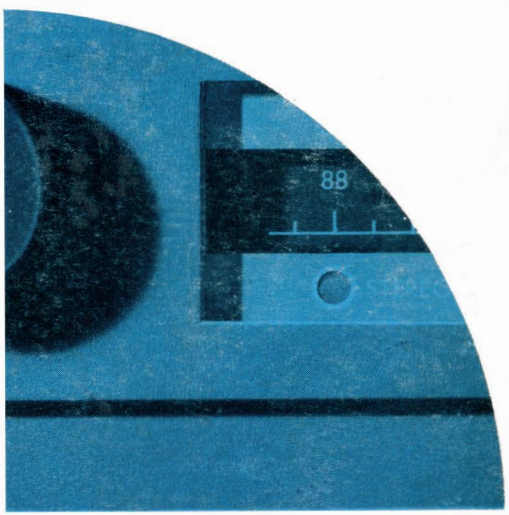
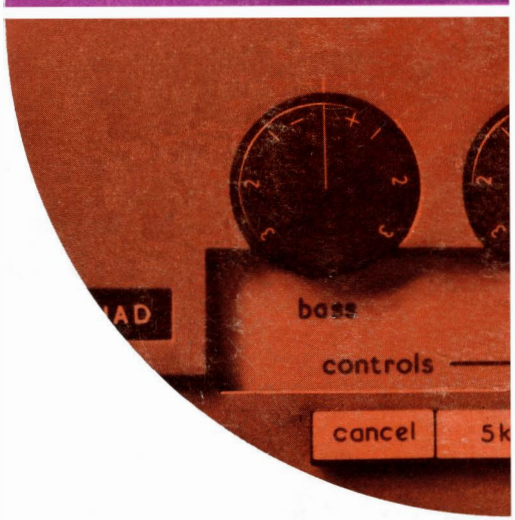
HI FI YEAR BOOK 1968/9

Pickups/Motors/Tuners
Amplifiers/Microphones
Recorders/Speakers

HI FI YEAR BOOK 1968/9







QUAD
For the closest approach to the original sound

HI-FI YEAR BOOK

1968-1969

EDITOR .... MILES HENSLOW

PUBLISHED BY MILES HENSLOW YEAR BOOKS LTD.
99 MORTIMER STREET, LONDON, W.1

PRINTED FOR THEM BY PORTIA PRESS LTD.,
WHITCHURCH, HANTS, ENGLAND

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INTRODUCTION

Compiling and assembling the *Hi-Fi Year Book* is a fascinating job, and if it appears basically the same each year its appearance is a good camouflage; for in spite of our annual determination to save time and labour by utilising chunks of text matter in the next volume, we have never yet been able to achieve this ideal. There are always so many alterations, additions and deletions that every one of the thirteen editions to date has had to be re-set in its entirety, literally down to the last full stop. This year, but for one important oversight, the experience gained over the past twelve years might have helped; but we had overlooked the honour due to Heinrich Herz and so, once more, a complete re-setting and revision had to be undertaken in order to convert c/s into H. And next year, no doubt, there will another reason for following the established pattern!

This year, however, *Hi-Fi Year Book* embodies two other big changes. The first—its outward appearance—gives it more of a "book-like" finish, and we hope that this face-lift beneath the new dust jacket will result in a more pleasing product for the bookshelf. The second—the internal surgery—will, we also hope, make it a more useful reference work for all readers whose main interests lie within the territory suggested by its title.

For several years now, as the range of hi-fi equipment in almost every section steadily increased, we postponed the inevitable step of pruning. It seemed logical to cut the sections dealing with tape recorders, accessories and ancilliary equipment, because the use of tape by hi-fi enthusiasts should demand standards beyond those possible with most of the domestic, general purpose recorders available in such profusion. Of course there are exceptions, and several well known makes of g.p. recorders do a far better job of work than might be expected of them, price-wise. But a Year Book such as this must be a catalogue-cum-guide, and dare not attempt to pick and choose. So, with tape recorders and decks, all are deleted except those which claim professional and semi-professional status. A small selection of accessories have been retained. Tape units, amplifiers, mixers, etc., with an obvious place in a hi-fi chain or set-up have been included.

In the field of microphones and accessories the same outline guide has dictated what to cut out and what to retain. Essentially it was assumed

that a buyer who will spend between £150 and £500 on a tape recording link is unlikely to consider, say, a ceramic microphone at fifty shillings.

We are well aware that many readers of *Hi-Fi Year Book* have bought the book in the past because of its comprehensive cataloguing of tape recorders and accessories; and, because of this fact, in the last edition we duplicated the domestic tape recorder content which had been transferred to the newly founded *Radio Year Book,* so as to avoid any disappointment to those readers whose interests lie in the world of tape, rather than in high fidelity sound reproduction. This fact was duly noted in this column last year. The primary aim of this Year Book must be to provide the best possible guide for enthusiasts and professional sound engineers who want as much information as possible about the equipment available. The range of products has now grown too big to permit the luxury of other material which may be of incidental interest.

Radio Year Book, now established as the counterpart of *Hi-Fi Year Book,* lists the complete catalogue of general purpose and portable recorders, and also the complete range of microphones and accessories which go hand-in-hand with them. Additionally, of course, the book covers the whole range of domestic and radio equipment. These products, which never claimed so much as a corner in *Hi-Fi Year Book,* are nevertheless a part of the daily scene in almost every household, and for the first time they are adequately catalogued and illustrated in this companion Year Book. The directory sections—almost identical in pattern to those of *Hi-Fi Year Book*—are TV, colour and monochrome: radiograms: record players: table radios: portables: car radios: communications equipment (1969 edition): tape recorders: microphones; accessories: tapes.

It is our sincere hope that the deletions from **Hi-Fi Year Book,** and the transfers to **Radio Year Book** will provide the most pleasing and convenient solution to everyone concerned. Considering the size of our readership (some 10,000 annually) we receive a remarkable small postbag; and though we could accept this as a sign of the book's usefulness we should be particularly grateful, this year, to receive criticisms and suggestions, to enable us to assess our successes and our mistakes in this period of transition. Finally, although every care has been taken in the compilation of this book, no responsibility can be accepted for errors or ommissions.

SECOND GENERATION HI-FI

By Gordon King

Even the most stalwart opponents of solidstate hi-fi have felt cause of late to flex somewhat from their previously and strongly held views that valves and valves alone constitute the only devices upon which true hi-fi can be based. Proved beyond doubt by the sparkling ads of hi-fi equipment makers, seen in the contemporary audio magazines and certainly by the exhibits at the recent Audio Fair, the industry as an almost-united-whole (there is still a very small minority of manufacturers creating new valved equipment) has accepted the transistor challenge, and within a relatively short period of time has nurtured some remarkably good items of second-generation hi-fi equipment.

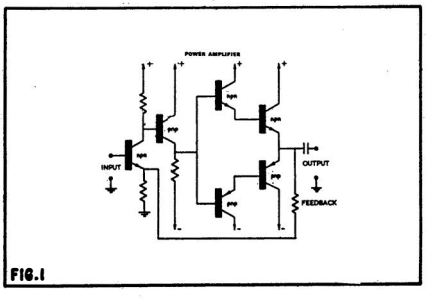
Both the material and aesthetic results of positive effort in clearing low-level, odd-numbered, high-order harmonics from class B amplifier designs are now being seen in circuits and heard from loudspeakers; and while class B is having most of its crossover distortion deleted—and with it the so-called "transistor sound"—completely new class A designs are emerging in which crossover distortion just cannot arise because both output transistors are arranged to conduct steadily over the whole of the signal cycle.

With class B, of course, the drive signal effectively alternates the on/off switching of the two output transistors, and because of the difficulty in achieving matched transfer characteristics the transition between one of the pair switching on and the other switching off tends to veer towards non-linearity, and it is this which gives the crossover distortion. Adjusting the output stage as a whole to burn a little quiescent current—thereby deviating from pure class B working—greatly assists in cutting the crossover distortion virtually to zero at all rated powers except, with some equipment, at very low powers (in the order of milliwatts) and at high frequencies.

One very recent design of a 30-watt amplifier combats the onset of low-level crossover distortion, while retaining class B conditions, by the use of a fully complementary output stage. Previously, the practice has been for the two output transistors to be of the same type (n-p-n or p-n-p) with their drivers alone being complementary—one n-p-n and the other p-n-p. This scheme tends to encourage unbalance of the transfer characteristics of the two halves of the circuit, so that at low signal levels at least the characteristic of one output transistor and its driver differs from that of the partnering output transistor and its driver. The trouble results from the difference in drive impedances of the top and bottom halves of the stage.

Distortion from this cause has been known for some while, but it has not been possible to do much about it—apart from using a driver *transformer* instead of transistors—simply because high-power complementary output transistors have not been available at economic prices. A matched complementary pair capable of high dissipation can now be obtained, however, and it is this partnership which is adopted by the new *Radford* SCA30 amplifier, the output stage of which is shown in **fig 1.** Notice here the n-p-n/p-n-p pairs all the way from the input to the output. Other features of this amplifier permit the full 30 watts of rms

Fig 1. *The fully-complementary output stage of the new* Radford *amplifier.*



signal to be accepted by any load—resistive or reactive—with a total distortion less than 0.1%.

It is difficult to say at the time of writing whether this sort of specialised class B design and that by *Quad*, using the transistor triples, or the concurrent class A design by *Richard Allan* (a *John Sugden* creation) will set the stage for future development. It is highly likely that both schemes will flourish in the contemporary solidstate hi-fi environment; but in any event one can expect the merits and demerits of the two to be the subject of heated debates for months (if not years) yet to come!

These two systems represent the pinnacle of transistored hi-fi amplifiers, and as such cost quite a lot of money. Intermediate systems—still within the hi-fi rating—constitute the more basic class B design of upwards to 30 watts rms power per channel—sometimes more. The more

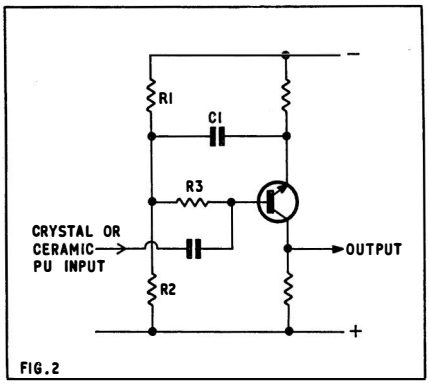


Fig 2. *The ceramic/crystal cartridge input circuit of the* Tripletone *8+8.*

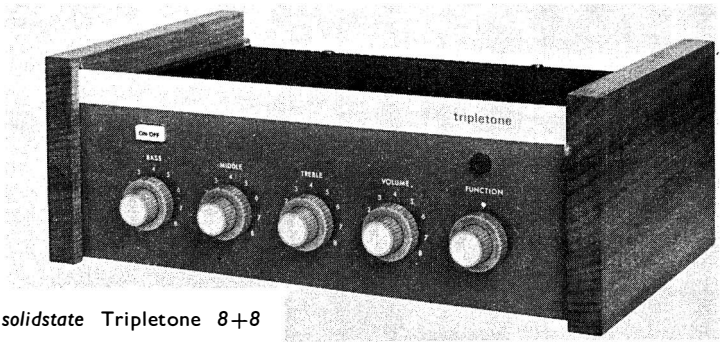


Fig 3. *The new solidstate* Tripletone *8+8 amplifier.*

inexpensive models start at about 10 watts per channel and cost in the region of £50 (the kit models, like *Heathkit* and *Knight Kit* in particular), rising almost to three figures at 30-watt-per-channel powers. While these are generally devoid of the more sophisticated artifices demanded for the hi-fi ultimate, they nevertheless produce very pleasant sounds, for designers are now finding ways and means of keeping the low-level crossover distortion within reasonable bounds.

The trend is towards extended power bandwidth—not uncommonly from 15 to 40,000 Hz—with the total harmonic distortion never exceeding 1%, and in practice it is often well below this figure. This is becoming progressively less difficult to achieve with the latest high dissipation, high-frequency silicon devices. However, in most of these designs the distortion tends to rise a little at the low power end of the range, then to rise very rapidly at the onset of waveform clipping at the high power end of the range, as distinct from a progressive rise from low power to full power, characteristic of class A and fully complementary class B designs.

All the models in the medium and high price catagories have inputs for low output magnetic pickups with suitable RIAA equalisation built in. Typical sensitivities range between 3 and 5 mV, adequate for the latest type of 1 mV per cm/sec cartridges. However, there is at least one budget-priced amplifier with an input circuit specially developed to cater for crystal and ceramic cartridges at high impedance. These cartridges are in fact, fundamentally designed for loading into an impedance in the order of 2 megohms, and because such a high impedance is in conflict with the general nature of transistor input circuits, the scheme has previously been to load a crystal or ceramic cartridge into about 100k, and then to equalise as with magnetic cartridges. While this technique yields a reasonably flat frequency characteristic, it fails to take full advantage of the inbuilt attributes of the cartridge and not all types take favourably to RIAA equalisation when loaded low. An alter-

native has been to increase the impedance as "seen" by the cartridge by adding series resistance, but this severely impairs the signal/noise performance of the stage.

The special circuit just mentioned is adopted by the *Tripletone* stereo 8+8 amplifier, and is revealed in **fig 2.** Feedback from the emitter to the base of the transistor occurs through C1, and the component values are arranged so that the signal appearing at the junction of R1 and R2 has virtually the same amplitude as the signal at the base, meaning that the signal strength is the same either side of R3, and as a result of which zero signal current flows in R3. This, being tantamount to an infinite impedance, fools the cartridge into believing that it is "looking" into a very high impedance—2 megohms, in fact!

The circuit is very neat, effective and inexpensive, and is ideally suited to an amplifier in the budget price group, as the *Tripletone* 8+8, shown in **fig 3.**

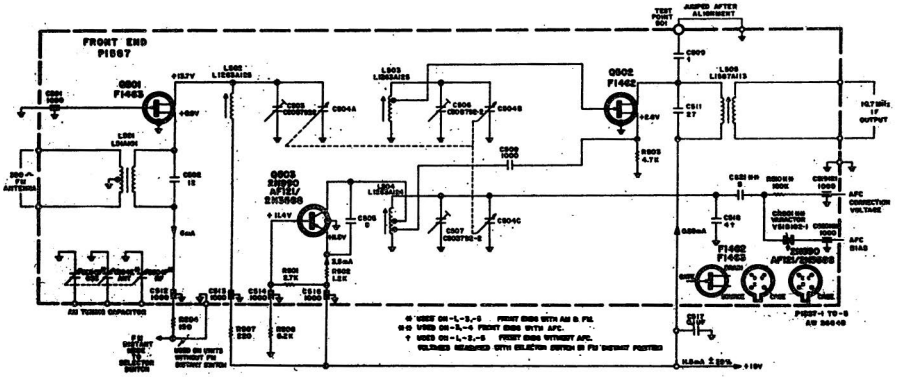
There is at least one recently-introduced amplifier sporting valves (also a valved tuner-amplifier, mentioned later), which is model SA170 by *Richardson Electronics*—a newcomer to domestic hi-fi. This produces 30 watts of rms power at 0.1% distortion and outputs are provided for 4, 8 and 16-ohm speakers. This is possibly one of the more subtle advantages of valved amplifiers, for the majority of transistored models have but a single speaker outlet (one for each channel, of course) which delivers maximum output at one impedance (usually the lowest) only. Thus, although a transistored amplifier might be specified as having an output of, say, 20 watts at 4 ohms, the power could well be down to 7 watts at 15 ohms! This problem is somewhat countered by the new class A designs, but there is still usually one impedance of load which extracts the maximum power from the output stage.

The latest valved equipment appears to feature more pre-set controls for optimising the performance of the output stage than earlier-designed counterparts. The *Richardson,* for example, has a pre-set for balancing the drive to the push-pull output valves and a pair of pre-sets for balancing the standing current in the valves. Moreover, it is becoming more common to bias the output valves—either wholly or partly—from a fixed bias power supply rather than from resistors in the cathode circuits. The *Richardson* uses both cathode bias and a fixed bias source from which the output stage current balancing is achieved.

Valved amplifiers, like the *Richardson,* to some extent still favour the two-unit design, the power amplifier and a separate control unit, while the vast majority of transistored models adopt the totally integrated design, where the complete piece of equipment is not all that much larger than just the control unit of valved systems—even with two-channel rms power as high as 30 watts. A few of the higher power transistored models, especially when class A is employed, however, opt for the two-unit idea—the *Quad* for example.

An even further integration in the new-generation scene is represented by the tuner-amplifier—a stereo amplifier in partnership with an AM/FM or FM-only tuner carrying a stereo decoder, all solidstate. This sort of equipment, again, is not much larger than the older-style valved control unit alone, yet the audio section is often capable of yielding 20 watts rms or more per channel at a nominal in-band distortion of little more than 0.5%. Moreover, the FM tuner sensitivity, with American and European designs especially, is incredibly high, full limiting not uncommonly

Fig 4. *The FET FM tuner of the new* Fisher *200-T.*



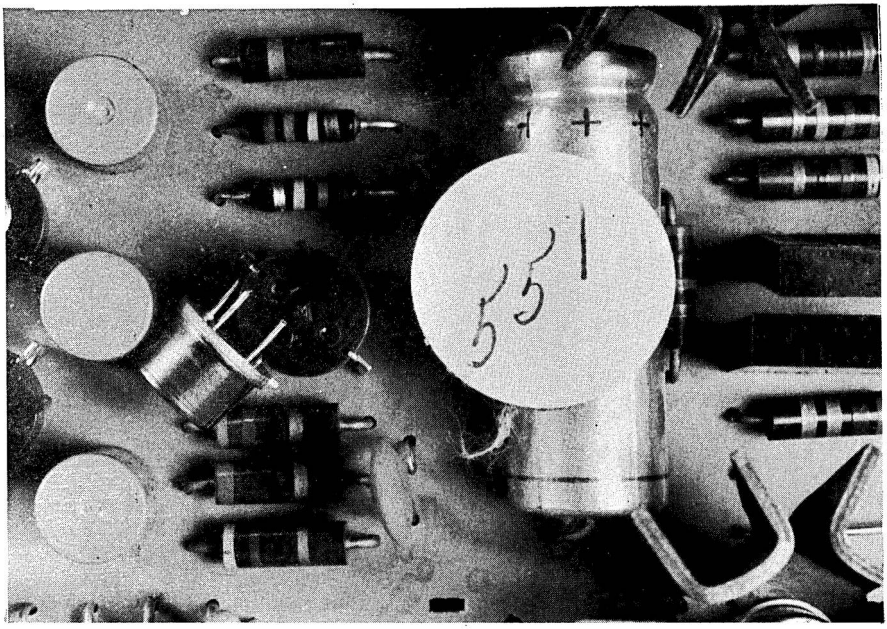
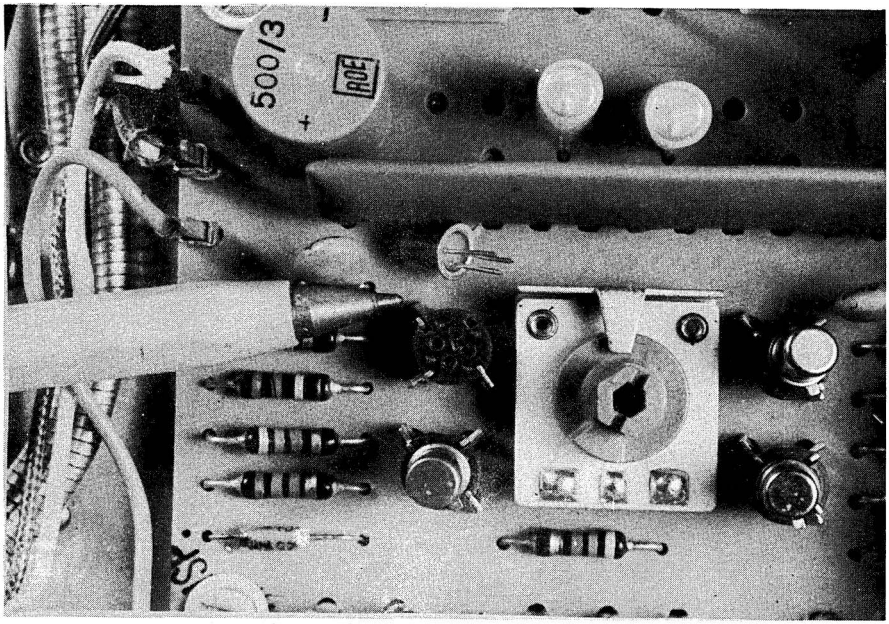


Fig 5. *Close-up of plug-in transistor (a) and group of plug-in transistors (b) in the* Fisher *200-T tuner-amplifier.*



occurring with an aerial signal as low as 2 μV—which is, indeed, a mighty small signal, such as obtained from a mere 5 ft length of wire some 30 miles from a main vhf station. The best of these models, too, are capable of providing acceptable stereo with an aerial signal of little more than 50 μV, making it possible to secure stereo-by-radio under ideal conditions over signal paths extending to some 70 or 80 miles.

One of the highlights in the category of equipment is the American *Fisher* Model 200-T. The high FM sensitivity of this model (nominally 2 μV) is in no small measure due to the use of a very sophisticated front-end carrying two field-effect transistors (FETs), one serving as the vhf amplifier and the other as the mixer, with a conventional p-n-p device operating as the vhf local oscillator, the full circuit of which is given in **fig 4.** This model also possesses other unique characteristics, including plug-in integrated circuits for the i.f stages and for the metering and muting sections and plug-in transistors **(Fig 5)**. The ICs are encapsulated rather like ordinary transistors, yet contain all the active and passive components required by the particular stage, excepting the tuned circuits, of course.

FETs operate with less noise than conventional transistors and are also less prone to overloading. A very strong input signal can quickly push an n-p-n or p-n-p transistor into its non-linear regions, thereby giving rise to intermodulation and crossmodulation complications, especially when the stage is operated under "starved conditions" to obtain the best possible noise performance. FETs can thus handle a greater dynamic range of signal without getting into these sort of troubles, even when working under starved conditions in an amplifier geared essentially towards the optimum signal/ noise ratio.

FETs are also desirable from these points of view in audio input circuits, and they are now being found as tape head and programme signal amplifiers in all types of equipment, including tape recorders. The FETs employed in the input stages of the *Vortexion* CBL/7T tape recorder, for example, cut intermodulation distortion to 0.1 % at 10 watts and endow the inputs with a noise figure in the order of 0.1dB—which is, indeed, quite a big step forward from the near-optimum 2dB noise figure possible with low-noise n-p-n devices.

As with straight amplifiers, there is at least one valved tuner-amplifier, the *Sansui* Model 250, distributed in the UK by *Technical Ceramics* of Swindon. This is rather amazing in that it employs a couple of old-style triode-pentode valves in the output stage of each of its two stereo channels—ECL82 equivalents, which are valves that almost a decade ago featured predominantly in the timebase stages of TV sets. The *Sansui* engineers have very cleverly designed their circuits around this type of valve to produce 10 watts of rms audio in each channel, with the total harmonic distortion at 8 watts remaining below the 1 % mark. A great deal of the technical success of this tuner-amplifier lies in the nature of the audio output transformers, specially designed by *Sansui*, which was formerly a transformer-making company of no mean reputation in Japan. The firm still makes transformers of equal exactitude, but now in integration with its greatly expanded field of electronic activities.

Something like the valved amplifier earlier referred to, the *Sansui* 250 uses a fixed bias source for its output pentodes and an abundance of pre-sets which allow the working points of the output stages to be accurately adjusted for maximum power output coupled with the least distortion. The tuner side caters for both FM (with a stereo decoder) and medium-frequency AM, with a ferrite rod aerial for the latter which is not uncommon practice with tuner-amplifiers when the tuner covers the AM bands as well as FM.

Tuners with stereo decoders mostly feature a so-called "stereo beacon" which lights when a stereo-encoded transmission is tuned in. This invariably takes the form of a small, low voltage and current pilot bulb which has energising current passed to it through the emitter/collector circuit of a transistor when the device is switched on by the application of a suitable bias voltage at its base. The base bias is derived from amplified pilot carrier (or from re-generated sub-carrier, depending on the circuit design) in the decoder, so that immediately a transmission carrying a pilot carrier is tuned in, the transistor switches on and the lamp lights, often illuminating a small panel upon which is printed the word "stereo".

The *Sansui* 250 adopts a different arrangement, whereby a magic eye type of tuning indicator with *two pairs* of glowing segments is employed for both tuning and stereo indication. One pair of segments closes in the usual manner when any transmission is tuned in, while the other pair closes only when the transmission is stereo-encoded.

Some of the latest solidstate FM tuners are designed in such a way that a stereo decoder can easily be fitted when the area in which they are used is favoured with stereo-encoded transmissions from the local Band II, FM station. This is a good idea for it avoids the purchaser having to pay out for a slice of circuit that he will probably not have call for for some years

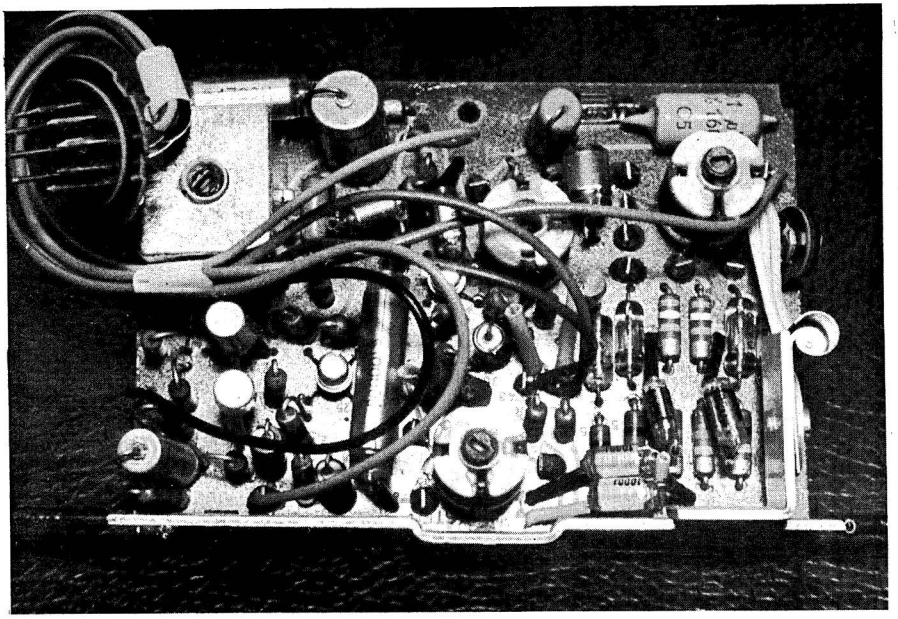


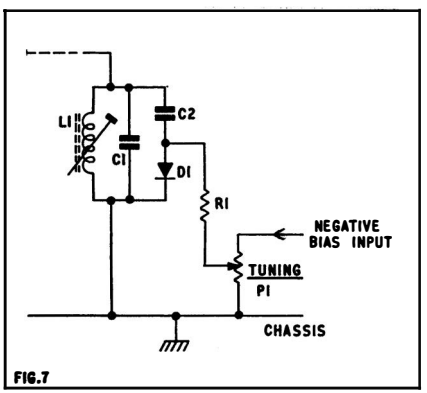
Fig 6. *Stereo decoder plug-in module of the* Bang and Olufsen *Beomaster 1000.*

yet to come, depending upon the rate of development of the stereo-by-radio system in the UK.

Such a "module" used in the *Bang and Olufsen* Beomaster 1000, is depicted in **fig 6.** When stereo facilities are required in the tuner, this is simply plugged into the main circuit. The tuner works normally on mono without it.

Still a further development in the second-generation hi-fi scene is the abandonment of the ganged tuning capacitors in some FM tuners in favour of capacitor-diode tuning. This scheme is based upon the fact that the capacitance of an ordinary semiconductor diode (between one terminating wire and the other) increases as the *reverse bias* across the diode is decreased, and diodes specially developed for this purpose exhibit substantial swings of capacitance with change in reverse bias.

Fig 7. *Basic principle of capacitor-diode tuning.*



The basic idea is revealed in **fig 7,** where L1, C1, C2 and D1 constitute a tuned circuit. Now, normally C1 would be a variable capacitor and C2 and D1 would not be present, the circuit being tuned over the required band simply by C1. In **fig 7,** however, the capacitance of D1 is across the tuned circuit (C2 here is a fairly high value capacitance, used essentially for DC isolation rather than tuning), so the frequency to which it resonates is directly governed by the capacitance of D1. D1 is biased from a negative potential applied across P1, via the hold-off resistor R1. Thus, depending on the setting of P1, the tuned frequency can be swung in the same way as it is normally by a variable capacitor. The capacitor-diode tuning arrangement, though, makes it easily possible to tune circuits by remote control, so to speak, for the "tuning potentiometer" (P1 in **fig 7**) is concerned only with DC and not with signal frequency.

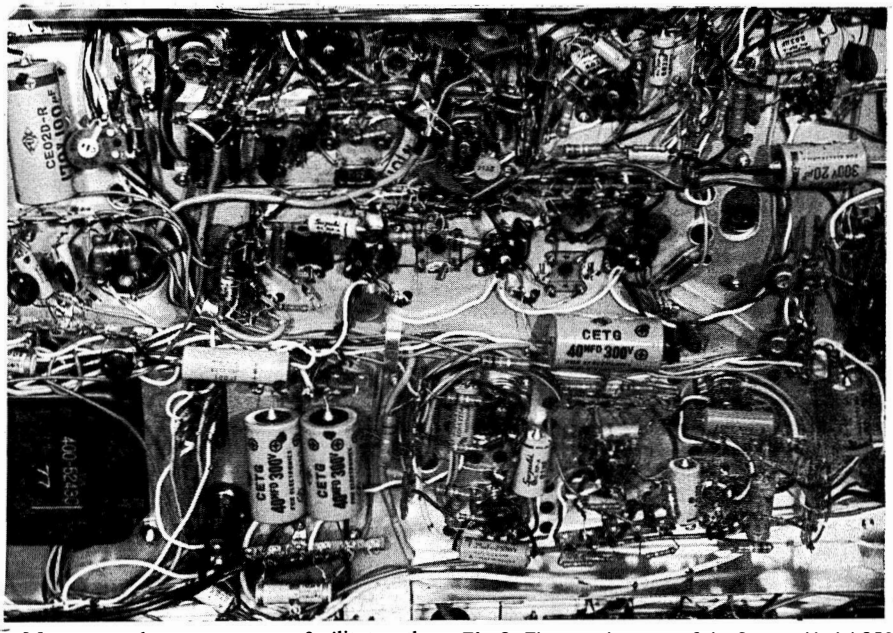


Fig 9. *The wired circuit of the* Sansui *Model 250 tuner-amplifier.*

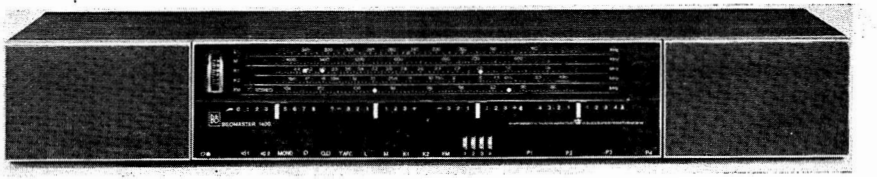
Moreover, the arrangement facilitates the introduction of automatic frequency correction in FM tuners, for in this application the capacitor-diode is connected across the local oscillator tuned circuit and the controlling bias derived from the FM detector. When the tuning is correct a properly aligned FM detector will yield no control bias, but if there is a tuning error, the correction voltage will be plus or minus, depending on whether the tuning is above or below the correct point, and is arranged to bias the diode so that the correct tuning is automatically restored. In fact, capacitor-diodes are used extensively for this purpose nowadays, even when capacitors are adopted for the main, manual tuning.

The capacitor-tuning scheme is employed in the *Bang and Olufsen* Beomaster 1400 series tuner-amplifiers (**Fig 8**) in three ways: (i) for main tuning, (ii) for preset tuning (a potentiometer being used for each preset position) and (iii) for AFC.

Fig 8. Band and Olufsen *Beomaster Model 1400K (with side speakers).*

All solidstate amplifiers incorporate some means for protecting the output transistors in the event of an overload. The simplest arrangement consists merely of a low-rated fuse in the supply feeding the transistors, while more sophisticated methods are based on automatic circuit cutouts and diodes in the signal drive circuits which reduce the signal amplitude when the amplifier is being driven into a short-circuit or very low value load. Additional protection is sometimes given against excess temperature in the form of a switch which disconnects the channel when the load exceeds the maximum permissible value. This kind of protection is found in the latest *Grundig* RTV600 tuner-amplifier, a feature of which is that normal operation is automatically restored when the cause of the incorrect load has been remedied.

The vast majority of systems are based on the printed circuit technique. where specially-engineered printed circuit boards (and/or circuit



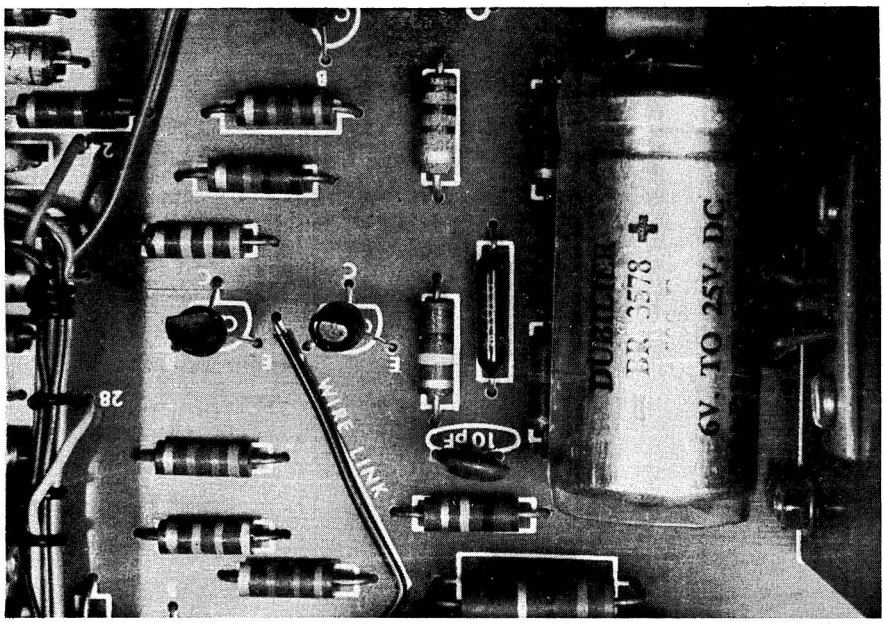
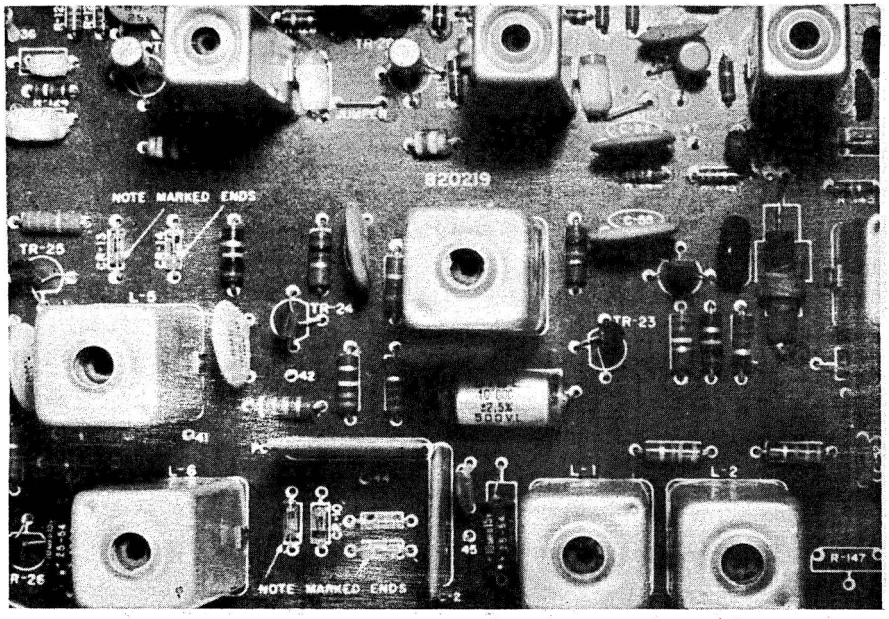


Fig 10. *Printed circuit boards used in kit amplifiers: (a) Heathkit and (b) Knight Kit.*



"modules") are used for each main section and sub-section. One notable exception, however, is the *Sansui* 250 tuner-amplifier, already referred to, in which a wired circuit is adopted exclusively (**Fig 9**).

Make-it-at-home equipment is still gaining popularity with the name of *Knight Kit*—an American firm whose equipment is handled in the UK by *Electroniques,* a "hobbies" section of the giant *Standard Telephones and Cables* company—added to the very well known and respected name of *Heathkit* by *Daystrom* of Gloucester. Such electronically-based kits can be assembled without a great deal of difficulty by most enthusiasts with a technical bent. Very well written and set-out instructions, with the extensive use of printed circuit boards bearing the numbers of the components which have to be fitted and soldered to the printed circuits, make it possible to assemble an item of no mean electronic complexity with a mere sprinkling of soldering and "nut-and-bolt" knowledge. Many enthusiasts secure considerable enjoyment from putting things like this together—being able to tell their friends "I made this"!—and a bonus for doing it is reflected in the significant saving in cost—with a kit item of equipment often being £20 or more below the cost of a factory-assembled similar item.

Kit equipment is certainly no small part of the second-generation hi-fi scene, though home-made equipment did predominate more in the first-generation. **fig 10.** gives some idea of the printed circuit boards used by the kit firms, that at (a) of *Heathkit* and (b) *Knight Kit.*

Loudspeaker systems, too, are available in kit form, and a recent addition to this market is the Unit 3 hi-fi speaker kit by *Rank-Wharfedale.*

Turning now to loudspeaker systems, we find that these have diminished incredibly in size in this generation, and we are now in the era of the so-called book-shelf loudspeaker—and, indeed, hi-fi system as a whole. The small, control-unit-size stereo amplifiers and tuner-amplifiers are ideally suited to book-shelf and wall-furniture placement and, of course, speaker systems have been designed to fit in with the modern, domestic environment of relatively small rooms and off-the-floor furniture.

A decade back one would have made rude noises to suggestions that hi-fi speaker systems could be scaled down to little more the size of a large book; but this is what is happening now—and very successfully, too. We even find that the *Leak* Sandwich system has been miniaturised and still retains its high quality output with just a fall in output in the octave at the low-frequency end of the spectrum. In fact, it does not need saying that the trend is accelerating in terms of

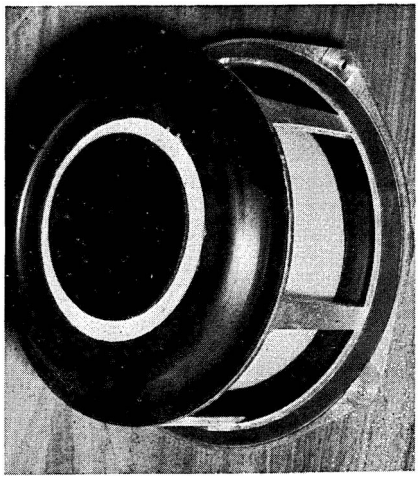
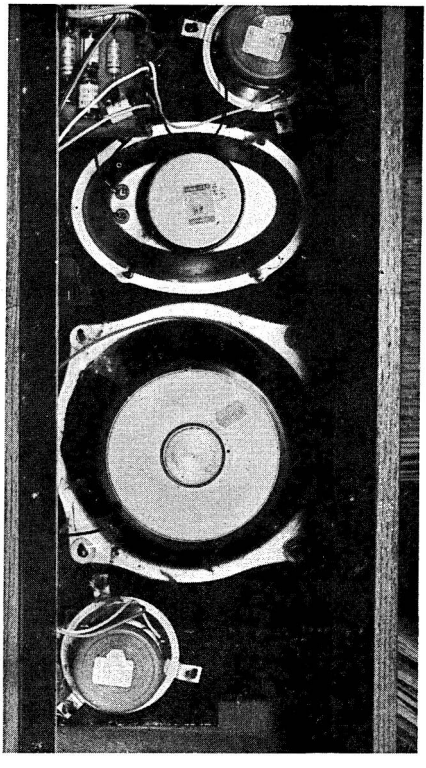


Fig 11. *Auxiliary Bass Radiator of the* Ditton *loudspeakers.*

Fig 12. *Inside view of* Grundig *loudspeaker system.*



small speaker systems, with virtually all the speaker boffins having a go.

Just how well a small speaker system sounds depends on a collection of factors, including the design of the bass driver unit, the nature of the cone, whether a high-frequency unit is used in addition to the bass unit, the parameters of the crossover unit if used and, of course, on the design of the enclosure itself. Broadly speaking, it can be stated that the small systems work because of the reserve power available with the latest solidstate amplifiers. The bass output is achieved in the small enclosure volume by sealing it against the ingress of air, so that the bass driver cone works against this trapped air. This is called the infinite-baffle system, and the bass output is exchanged for sensitivity, meaning that a greater power needs to be fed into the bass driver for a given acoustic output, compared with loudspeakers based on a larger enclosure volume and different loading techniques, like reflex, pipe, horn and so forth—with horn loading yielding the best electric-to-acoustic efficiency.

At best, however, bass roll-off tends to occur an octave or so in advance of systems of larger enclosure volume and more efficient loading, but some degree of bass magnification (pseudo bass) can be achieved by placing a small system in the corner of the room—and there have been other ideas for keeping up the bass, referred to in a minute.

Treble response is less influenced by the nature of the enclosure, but for non-muddled middle the enclosure walls are usually lined with a material possessing a factor of high acoustic resistance. Real treble is determined essentially by the type and quality of the high-frequency unit or of the h.f performance of the solitary unit when this is a full-range device.

A full-range unit, of course, avoids the need for a crossover filter, the components of which have been known to reflect reactance across the amplifier output terminals. Some transistored models are not at all happy with this sort of loading—hence the need to check whether such an amplifier is suitable for use with an electrostatic speaker before making this sort of investment, since this type reflects quite a bit of capacitive reactance into the amplifier, sometimes encouraging it to "ring".

A well known full-range unit is the *Jordan-Watts* 4 inch module with an aluminium cone specially designed so that the effective diameter decreases with ascending frequency. This module is used in a wide range of loudspeakers created by the firm, including both infinite-baffle and reflex loadings.

Since the advent of the small enclosure a great deal of thought has been focused on the problems of extending the bass response and increasing the sensitivity without unduly increasing the volume of the enclosure. One of the smaller *Jordan-Watts* systems uses the reflex principle with the vent extended into the enclosure by means of a tube. This allows the enclosure of limited volume to be "tuned" vent-wise, thereby improving the bass output.

Another remarkably good idea is seen in the Ditton 15 and the more recent Ditton 25 by *Rola Celestion*. These are basically infinite-baffle systems in which the bass response *and* sensitivity are maintained by means of a so-called *auxiliary bass radiator*, which is a non-driven unit operated essentially by air pressure within the enclosure **(Fig 11).** It is rather like a large-diameter piston whose physical characteristics are tailored so that its surface phases-up with the cone of the bass driver at low frequencies, thereby producing a greater movement of air within the enclosure and consequently a greater bass coupling to the air within the room. The secret of the system lies in the fact that the ABR and the bass driver are working in phase—in step—with each other at the bass end of the spectrum, the former thus aiding the latter in terms of sound radiation into the room. The smaller Ditton 15 uses a single h.f driver in addition, coupled via a crossover network, while the larger Ditton 25 uses an h.f driver *plus* two mid-frequency drivers.

A rather elaborate *Grundig* system of small size uses a pair of h.f units, a mid-range unit and a bass or "woofer" unit all coupled to a common circuit through a well designed crossover filter **(Fig 12).** In fact, there is a number of *Grundig* small and large loudspeakers of very recent design capable of producing very good quality sounds of large power with relatively small electrical input.

It is worth noting, too, that recent speakers are being made with lower impedances than hitherto so as to allow them to extract the maximum power from transistored amplifiers. An impedance of 15 ohms was common with valved amplifiers, but this is no longer true with transistored models, which often work best when loaded to 8 ohms or less. A good quality matching transformer can be used to match, say, a 15-ohm speaker to a 4-ohm transistored amplifier, but if the losses are great at very low bass frequencies (below 20 Hz) the protective device in the amplifier will persist in blowing or tripping (probably putting undue strain upon the output transistors) if the programme signal contains sub-bass components, like rumble signal!

Finally, a few words about the latest cartridges. These have followed a normal growing-up process over the years and, apart from mechanical dynamics, have altered very little in principle, excepting the strain gauge type, where the vibrating stylus varies the resistivity of a semiconductor in sympathy, thereby modulating a current in the input load and producing a signal voltage across it. This appears not to have developed very rapidly so far.

A recent model is the magnetic so-called Free Field by *Goldring*. Model 800, with spherical stylus and 800E with elliptical stylus **(Fig 13).** The term "Free Field" implies that the magnetic field is induced into the active pole pieces and armature without the magnet actually being in contact with these items. The cartridge works on the variable reluctance principle, where the reluctance of the magnetic circuit is varied by the armature-coupled stylus in pattern with the groove modulation. This changing reluctance induces a signal emf into the windings, which has a value of about 1 mV for each 1 cm/sec. of recorded velocity.

Another recent model is the 4RC by *Decca.* This is based on the original Mark IV system with the three coils—one responding to the lateral wriggles and two responding to the vertical wriggles of a stereo recorded groove—providing the "sum and difference" principle. The signal in one channel is due to the emf of two coils added together while that in the other channel is due to the difference in the emf of two coils, and vice versa. The cartridge works well on mono discs direct from the lateral coil alone.

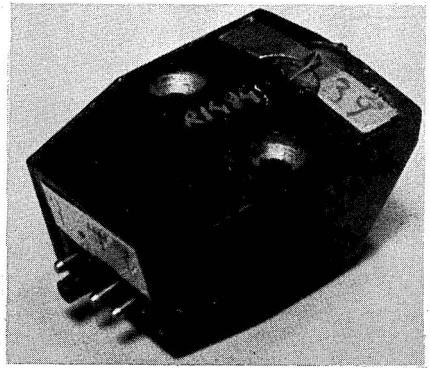


Fig 14. *New* Decca *4RC cartridge, which is an inexpensive, more robust version with spherical stylus in the ffss, Mark IV range.*

The 4RC is interesting in that it has a spherical stylus and is less costly than the others in the series. It is more robust, having a somewhat smaller vertical and lateral compliance, and gives a greater output voltage. It is thus more suitable for the less exacting arms and systems of budget hi-fi, though retaining all the very desirable attributes of the *Decca ffss* system.

This, then, ends our survey of the second-generation hi-fi picture for this year . . . Who said there is not a lot new in hi-fi now? If things look the same outside they are certainly altering and becoming more sophisticated inside! Until next year . . .

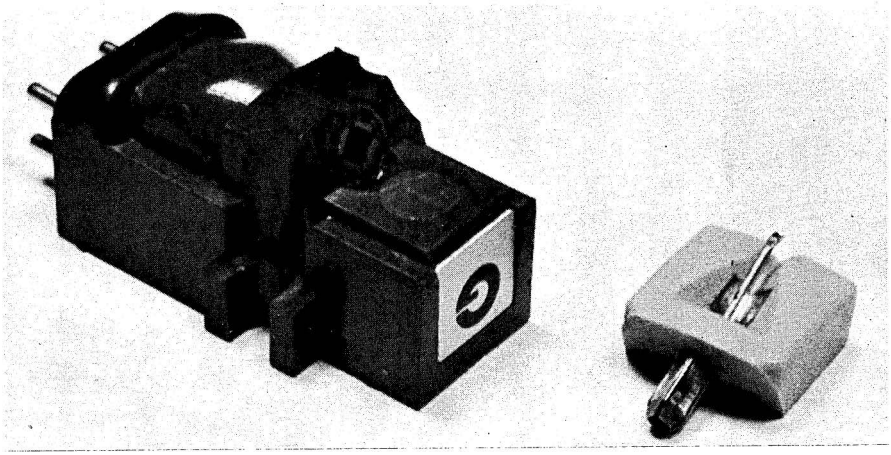


Fig 13. Goldring *800E Free Field magnetic stereo cartridge, showing how the stylus assembly is slid off for replacement.*

AUDIO ASSESSMENT

By Rex Baldock

A Survey of the Principal Factors Influencing Aural Appraisal

Before actually purchasing a particular set of audio playback equipment which he favours, the discerning buyer naturally prefers to hear first how it will perform, either in a hi-fi dealer's showroom or at one of the annual audio exhibitions. If he is fortunate then the demonstration will provide him with results similar to the best that he may subsequently achieve in his home, but all too often the outcome is one of confusion or disappointment. Quite frequently the impressions obtained are fallacious, the good qualities of the equipment being eclipsed by unsuitable settings of the controls, mediocre programme material, unsatisfactory loudspeaker and listener positioning, defective acoustics or the immature judgement faculties of the listener himself.

It takes time to become fully conversant with the many factors that may mar the quality of reproduced sound; unfortunately the presence of one imperfection may mask the contributions of another. Even skilled listeners cannot always pinpoint the exact region where deviations are being introduced and it then becomes necessary to make a few experiments. However, quite a deal can be gleaned by straightforward listening tests in conjunction with a knowledge of the possible defects that may feasibly arise in each section. The table lists the principal elements in a typical domestic disc playback chain with their most important features. Against these are indicated the possibility of introducing or emphasising the "seven deadly sins," viz:

1. Tonal Unbalance; modification of the power ratio between different parts of the audible spectrum.

2. Amplitude Distortion; the addition of signals, both simultaneous and delayed, related to those present in the programme.

3. Reduced Dynamics; restriction of the maximum ratio of power levels available from the original programme source.

4. L.F. Noise; signals, steady or random, in the range up to approx. 1 kHz, added to but unrelated to the programme material.

5. H.F. Noise; signals, steady or random, in the range above approx. 1 kHz, added to but unrelated to the programme material.

6. Impaired Stereo; degradation, compression of spurious shift of the stereo image.

7. Wow and Flutter; modulations of pitch occurring resp. below and above a rate of approx. 10 Hz.

These imperfections are obvious to the average listener is severe, but there are other "sins" only apparent to a small proportion of musically sensitive ears. An example of this is the gift of "absolute pitch." Some people have an acute pitch memory and if a playback turntable is used with even 1 per cent rotational speed difference from the recording rate they can detect it. Most modern turntables can be set to give exact pitch if required, and this together with a few other more subtle aspects have been ignored in the following basic examination of the playback chain. The crosses in the table suggest where a feature may either introduce or reveal one of the "sins"; in some cases the imperfection may arise through indirect modulation or non-linear processes.

Starting with the disc record itself, it immediately imposes certain difficulties of assessment unless the listener is already familiar with its inherent qualities on high grade playback equipment. In some cases the recorded balance is quite remote from what would be experienced at a live perf•rmance, due to microphone or mixing techniques, and although possibly superficially impressive it can become repellent after an extended listening period. This type of recording is more likely to be found on "pop" music records, the object being to give the best (or maybe, most impressive) effect on inferior record players. When reproduced via high quality systems results may be quite intolerable because of clipping, overload and incidental noises not revealed on lesser equipment because of its narrow frequency coverage and gross masking distortion. Some "pop" records are excellent, but for realistic tests on a hi-fi system a wide range orchestral record which has been recommended by a majority of reviewers is a safer choice.

Recording equipment used by major companies is generally of higher quality than that used for domestic playback, and with skilled recording engineers the only slight imperfections remaining may be a little tape noise and traffic rumble, the latter often unavoidable because of the studio or concert hall situation. But in a poor recording all seven of the major imperfections may be in evidence. If the recording itself is technically inferior, then no subsequent processing can really restore the music's original qualities in every respect. It cannot be

IMPERFECTIONS WHICH MAY BE INTRODUCED EITHER DIRECTLY OR INDIRECTLY BY ELEMENTS OF AN AUDIO CHAIN

Element	Feature	Tonal Unbalance	Amplitude Distortion	Reduced Dynamics	L.F. Noise	H.F. Noise	Impaired Stereo	Wow or Flutter
Recorded Signal	Original Balancing	X		X	X	X	X	
	Recording Process	X	X	X	X	X	X	X
Pressed Disc	Pressing Process		X		X	X		
	Flatness		X		X	X		X
	Centre Hole Size							X
	Centre Hole Position							X
	Electrostatic Charge					X		
	Acquired Dust		X			X		

too strongly emphasised that second-rate signals, arising because of deficient equipment *anywhere* in the audio chain, are the most common cause of disappointment with hi-fi sound reproduction. Even the cheapest hi-fi system will benefit from being provided with a clean and well-balanced signal.

So much for the signals cut into the master disc. After several electro-chemical processes they appear finally as duplicated plastic pressings. To a small extent imperfections in groove form can arise in production, but generally speaking the discs sold in record shops are a remarkably faithful product. Apart from a modest loss of dynamic range, the groove modulations represent a close copy of the original sound field at the microphone, even with recordings of complex orchestral works. Certainly some wow can arise because of centre hole tolerances and surface dust may accrue because

Element	Feature	Tonal Unbalance	Amplitude Distortion	Reduced Dynamics	L.F. Noise	H.F. Noise	Impaired Stereo	Wow or Flutter
Turntable and Motor	Rotational Evenness							X
	Centre Spindle Size							X
	Centre Spindle Position							X
	Vertical Trueness of Turntable		X		X	X		X
	Accuracy of Driving System				X			X
	Accuracy of Centre Spindle Bearing				X			X
	Levelling of Turntable		X				X	
Pick-up Arm	Horizontal Bearing Friction		X		X		X	
	Vertical Bearing Friction		X		X		X	
	Lead out wire stiffness		X				X	
	Bias force compensation		X				X	
	Horizontal Tracking Error		X				X	
	Vertical Tracking Error		X				X	X

of mishandling or the presence of electrostatic charges, but these difficulties may be overcome and are not basic faults of the recording system.

The first item in the domestic playback chain, the turntable, is now usually very satisfactory. Unless very poorly designed and constructed it is unlikely to induce audible wow or flutter; the latter could arise, however, if the driving system picked up a particle of grit. Obviously, any off-centring of the record locating spindle, or undue reduction of its diameter, could, in conjunction with the tolerance, lead to observable wow effects. Nature being what it is, the worst combination seems to arrive more frequently in practice than might be expected! Vertical trueness of the turntable will virtually always be many times better than the average disc, but the quality of bearings does vary markedly. Poorly

Element	Feature	Tonal Unbalance	Amplitude Distortion	Reduced Dynamics	L.F. Noise	H.F. Noise	Impaired Stereo	Wow or Flutter
Pick-up Head	Stylus Size		X			X	X	
	Stylus Condition		X			X	X	
	Acquired Dust		X			X	X	
	Tracking Force		X			X	X	
	Horizontal Alignment		X				X	
	Vertical Alignment		X				X	
	Transducer Principle	X	X		X	X	X	
	Operating Temperature	X	X		X	X	X	
Pre-Amplifier	Input Impedance	X		X	X	X		
	Sensitivity	X	X	X	X			
	Characteristic Equalisation	X	X	X	X	X		
	Volume Control		X	X	X	X	X	
	Principle of Volume Control	X	X	X			X	
	Bass Control	X	X	X	X			
	Treble Control	X	X	X		X	X	
	Rumble Filter	X		X				
	H.F. Filter		X			X		
	Stereo Balance Control						X	
	Output Impedance	X		X	X	X		

Element	Feature	Tonal Unbalance	Amplitude Distortion	Reduced Dynamics	L.F. Noise	H.F. Noise	Impaired Stereo	Wow or Flutter
Power Amplifiers	Input Impedance	X	X	X	X	X		
	Principles of Design		X		X	X		
	Power Output		X	X				
	Output Impedance	X		X				
Loudspeaker and Enclosure	Principles of Design	X	X		X	X	X	
	Electrical Impedance	X	X					
	Siting with respect to walls	X	X		X	X	X	
Listening Room	Size	X			X	X	X	
	Proportions	X			X		X	X
	Construction	X	X		X	X		X
	Furnishing	X			X	X	X	
	Accoustic Feedback to Pick-up	X	X	X	X		X	
	Background Noise			X				
Listener	Position with respect to the loudspeakers	X			X		X	
	Position with respect to the room	X			X		X	
	Condition of hearing system	X	X	X	X	X	X	
	Discrimination and experience	X	X		X	X	X	X

designed or adjusted centre bearings can give rise to rumble or allow motor vibration to be transmitted to the pickup head. Depending on the design of the pickup head and arm to be used. the levelling of the turntable surface may or may not be a significant factor. With a pickup system sensitive to levelling some distortion and unbalance in the stereo image may arise, but with most designs the turntable would have to be quite visibly tilted to produce any audible anomalies.

Turning to the pickup arm, this can induce distortion, LF noise, impairment of the stereo image and even exaggerate wow from warped discs. This may be surprising to the naive, to whom its only role seems to be merely that of preventing the head running around with the disc! Unfortunately it is not as simple as that, and over the last forty and more years various ingenious improvements (and some retrograde ideas) have been proposed. Some are now usually incorporated, particularly those concerning bearing friction reduction, minimisation of lead out wire torque, lowering of tracking error and compensation of side biassing forces. With current pickup heads capable of tracking at downward forces of about 1 gram weight, most high grade arms are quite satisfactory, although the compensation of side forces is somewhat arbitrary because of unpredictable variations in stylus/groove friction. The effective mass of the arm as "seen" from the region of the head may sometimes be incompatible with the compliance (reciprocal of stiffness) between stylus and head, and give rise to mistracking on warped discs—especially if adequate damping arrangements are not incorporated in head or arm—but again this should now rarely give trouble. Lastly, and having some connection with the compliance/mass consideration, the turntable springing must be carefully arranged, otherwise groove jumping due to external shocks may be aggravated rather than alleviated.

Perhaps the most likely area where distortion and unbalanced frequency response may arise is the pickup head mechanism. It is presented with a difficult task following the groove undulations, both horizontally and vertically. Satisfactory tracing is dependent on continuous contact between the stylus tip and both walls of the groove, and is influenced by the amplitude, velocity and accelcration demanded, the latter reaching peak levels of 1,000 g (g= acceleration due to gravity =32 ft/sec/sec approx.) or more during loud passages.

Currently, even the very best and most expensive pickups are not really following the groove movements entirely "at ease" at all times, although fortunately the audible impact of this behaviour is slight. The most common reason for excessive pickup distortion lies with a desire to impress the customer by reducing the tracking force below that recommended as a minimum by the manufacturer. Although at first this might seem a way of reducing record wear, in fact the opposite is more likely to occur through the stylus losing momentary contact and battering the groove walls on its return. Lightly modulated discs may permit lowered tracking forces, but it is safer with normal records to err on the high side by, say, 20 per cent to cope with the occasional high modulation level and other contingencies. Too little downward force may also result in groove jumping if the arm design is not optimum.

Although not so serious, misalignment of the head relative to the disc surface may provoke the onset of audible distortion and channel unbalance. All these difficulties may be heightened if the stylus dimensions and condition are unsatisfactory. Fortunately, most demonstrations involve new or little used equipment and the likelihood of stylus wear should be very remote. On the other hand it is difficult to keep the stylus tip really clean without regular attention and the presence of dust may give rise to audible deterioration similar to that heard from a worn stylus. Although it should not happen in hi-fi circles, the writer once traced severe distortion in one demonstration to the accumulation of a small pad of fluff between head and disc; there was sufficient actually to spring the head away from the disc slightly!

There are several principles of transduction that may be employed in a pickup head and with good design the majority can yield first-class results. Distortion of various types is more prone to arise in the transmission of energy between the stylus tip and the "innards" than in the final mechanical to electrical transformation. But since some systems are more prone to emphasise distortion, hum pickup from the motor field, noise or channel unbalance than others their performance may be obscured if used with unsuitable pickup arms or motors.

Some disappointment may be experienced on buying a pickup because of the inevitable production tolerances that must be accepted unless each device is hand selected from a batch. If the demonstration pickup head is a "middle run" sample then, provided tolerance limits are reasonable. results with another head should be similar. But if the demonstration head has been specially chosen, the "typical" head purchased later may appear a little dull or unbalanced in response. These discrepancies may be worsened

by the fact that certain types of pickup construction display a response that varies very noticibly with temperature, even a few degrees Fahrenheit causing an audible change in overall balance. Since the response is often more level at the higher temperatures generally experienced at exhibitions or centrally-heated buildings, use in a colder environment can lead to a modified characteristic.

Before considering the amplifier section, it is worth bearing in mind that the connecting leads between the pickup and amplifier input can introduce both hum and loss of high frequencies if not properly disposed and of suitable type. Usually the pickup manufacturer supplies sufficient length for most installations, but any appreciable modifications may unnecessarily limit the attainable results.

Whether it uses valves or transistors, the amplifying section of a domestic playback system is the most perfect part of the chain if properly designed and constructed. But although it may be an order or more better in some respects than the transducers (i.e. pickups and loudspeakers) it is the only section in which the listener is allowed to modify level and frequency balance. Depending on the user this may enhance or degrade results.

But first a look at the early parts of the preamplifier. It presents a certain impedance to the pickup which can seriously modify performance with some types of head if not near optimum value. Looking from the other direction, a high output pickup may easily overdrive the first stage if the sensitivity is too great and give alarming amplitude distortion. Such matters are well taken care of in the best equipment, but mis-setting of pre-set gain controls still causes poor performance in some installations. Equalisation of the recording characteristic is usually carried out early in the pre-amplifier; this is quite accurate in the high grade range, but some cheaper equipment has been known to give errors of 5 and even 10 dB.

And so to the controls. One day it is conceivable that they could be rendered unnecessary, but in the meantime, and certainly for a very long time yet, the volume control at least will remain vital. Not only is this required to set programmes from various sources to their correct nominal level, but it also allows for the particular sensitivity of the later parts of the system when combined. Aside from these considerations there is the element of preferred levels on the part of the listener. These are the subject of much argument, but even ignoring all the more subtle facets, it is well known that the apparent tonal balance of the programme varies with reproduced level, being adversely affected if substantially different from the original. Attempts to compensate for this in the design of the volume control circuit are fairly popular, but unless related to the mean programme level they can make the overall balance worse rather than better. Where provision is made for switching out volume compensation the buyer is advised to do so to avoid confusion.

The volume control can be a useful test facility when trying to decide where distortion arises. If results are poor at any level then the blame may be directed at disc, pickup, input matching or early pre-amplifier stages, but if distortion appears only at high levels then the trouble will almost certainly lie in the power amplifiers or speakers. Incidentally, if a volume control is used at too low a setting, possibly through connection of a high output pickup, the stereo image may be shifted badly. Ganged volume controls for stereo purposes are not easy to match over the whole range and are more likely to be accurate around mid-setting or higher.

Excessive lift settings of both bass and treble tone controls may either reveal or provoke distortion in amplifiers and loudspeakers. Such measures are also prone to unduly emphasise hum, rumble or spurious noise. Conversely, insistence on leaving all controls set "flat" throughout a demonstration may lead to disappointment if programme or loudspeakers need a moderate equalisation. By all means try the system "flat," but also experiment with different tone control settings to find out the attainable performance. Of course, excessive settings can make nonsense of the system's inherent capabilities and produce either very "thick" or "thin" speech and music.

Rather more subtle in their effects, the filters frequently provided will rarely ruin the performance, but their inclusion may prevent the appreciation of some of its qualities. Excessive application of HF filtering will remove a sizeable amount of "life" from a wide range programme, whilst a severe rumble filter will remove much of the warmth from the bass end. But if there is any doubt it is usually possible to switch filters out of circuit.

The remaining control generally provided is that for stereo balance. The setting of this should not be too critical and barely affect the overall tonal balance, but if carelessly adjusted the stereo image may be one-sided and cramped. If in doubt the situation is easily rectified.

In general the controls should be set as required, but the demonstrator is swayed between improving reproduction by using them judi-

ciously and the fear that anything other than "flat" may raise suspicion regarding pickup and loudspeaker response. Certainly gross permanent tonal corrections should be viewed with disfavour, since some programme sources may require more compensation than is available.

If pre-amplifier and power amplifier stem from one manufacturer then they may be connected without any difficulties arising. But connecting units from different sources can lead to frequency unbalance, distortion or noise if the input and output impedances are incompatible. This sort of error is easily avoided if the manufacturer's literature is consulted, but once again the necessary measures are not always followed with care.

Over the last few years the design of the power amplifier has been the subject of discussion because of the advent of transistorised units. Although all first-class power amplifiers have for a long time been much better than any other element in the audio chain, the term "transistor sound" became synonymous with improved results in some quarters. Experienced listeners, however, didn't like it at all. The term is now avoided and the best transistorised power amplifiers seem to sound remarkably like the best valve-operated ones always did; which goes to show how good they always were. Just how excellent most power amplifiers are is not easily appreciated until they are fed with very clean signals. In fact, until driven "over the top," when distortion is obvious, particularly on piano and choral sounds, all first-rate amplifiers sound the same (or perhaps, don't have any sound of their own), the only differences being in power output and damping factor. Some speakers are affected by the latter parameter and of course the onset of audible distortion will occur at a lower level if the loudspeaker impedance is well removed from optimum load value.

The final transducer is the loudspeaker, doubled up for stereo, and said by some to be the worst link in the chain. It certainly has its faults, but tends to be more maligned than it deserves. In any case, what may seem to be a serious defect on measurement may pass unnoticed on programme material. In contrast, certain features that give audible deterioration are virtually impossible to detect with even the most sophisticated test equipment. Although measurements can certainly help to isolate and cure faults, the final judgement of a loudspeaker's audible merits must rest on careful listening tests.

There are so many types of loudspeaker design that even a summary of their features would be quite lengthy. Performance is not always up to price, but generally the bigger the better. That is not to say that very satisfactory results are not possible with quite small enclosures, but the very high quality unit allowing realistic reproduction over the whole frequency range tends to be rather bulky.

Loudspeakers do not reduce the dynamic range of a programme or introduce wow or flutter, but they can upset tonal balance, generate distortion, emphasise hum, rumble and HF noise, or spoil the stero effect. Tonal balance may be affected by the design of the unit or units used within the enclosure and is indirectly influenced by their directional properties. The enclosure itself may assist at low frequencies, but be a liability at middle frequencies, adding colouration to that which may already be present in the units themselves. The detail design of the whole loudspeaker system including crossover networks can, if inadequate, result in the emphasis of background noises of various types, whilst the directional behaviour may degrade or even practically eliminate the possibility of securing satisfactory stereo results over a reasonable listening area.

Some of the faults of loudspeakers are not readily apparent during a short listening test, but may become increasingly noticeable over a longer period after installation in the buyer's own home. This sort of effect is most common if the loudspeaker, on demonstration, seems bright and lively on all the programme material. High quality loudspeakers only sound bright when there is brightness in the programme; if the programme material is dull, then results will also be dull. The loudspeaker is not gifted with intelligence!

The bass performance, and in some cases treble balance, will be affected by the positioning of the loudspeaker with respect to the walls of the room. With some designs it is practically vital that they are used as *close as possible to a* wall or corner, whilst others may not be satisfactory unless used *well separated* from any rigid surfaces. Disregard of the manufacturer's recommendations may well lead to bad balance and inferior stereo performance.

Strictly, the characteristics of the listening room are closely bound up with those of the loudspeaker, although this is rarely fully appreciated. First, its size will determine the degree to which bass response is easily maintained. If very large the obtrusiveness of rumble and noise will probably be reduced, but stereo may well be less effective. The proportions are important, particularly in small domestic rooms, regarding

low frequency smoothness and similar dimensions in length, width and height are to be avoided. Springy floors or flimsy walls can easily provoke a boomy bass response, whilst heavy drapings may absorb the high frequencies too readily. The construction of some rooms is also liable to aggravate acoustic feedback from the loudspeakers to the pickup. If severe this is quite obvious and may even result in groove jumping, but in milder cases the tonal balance and bass damping may suffer at high playback levels.

At public demonstrations and in showrooms there is likely to be more ambient background noise of various sorts, due to conversations, closing doors, or passing traffic. Under these conditions certain minor reproduction defects may pass unnoticed. Slight residual noise or hum might be missed at a demonstration, but be found irritating in the quieter surrounding of the home.

The last link in the system is one whose influence can be overwhelming, but which is often forgotten—the listener himself. Unless he places himself in a reasonably symmetrical position with respect to the loudspeakers—also not too near or far away—he cannot expect to hear them at their best, both in respect of tonal balance and stereo image placement. If the loudspeaker design is such that it is fairly directional in the vertical plane, it is up to him to seat himself appropriately; standing up may result in a noticible loss of treble energy. Commensurate with the above requirements it is desirable that the listener should not seat himself exactly at the room centre, for, if it is less than about 25 feet long, he will lose up to an octave of bass reproduction.

It goes without saying that unless the listener has normal hearing faculties defects in reproduced sound may seem exaggerated, especially as it cannot basically be an improvement on the original. But even normal eared people sometimes find accurate sound reproduction a little disappointing. It often turns out on closer enquiry that they seldom, if ever, attend live concerts and have become more accustomed to "second-hand" music via the average radio set. Maybe they are happier as they are.

Finally, a warning to those who "know what they like". Many of them do in a rather superficial way, but any hasty judgements on audio equipment should be avoided. Unsuitable choice of items may backfire much later in the comfort of their homes, where they can only repent at leisure!

GETTING THE BEST FROM YOUR HI-FI

By John Earl

The system of electronics and transducers comprising a hi-fi outfit can only operate completely within its integrated specifications when all the items are individually optimised and accurately matched. It is necessary, too, for the various items to match performance-wise. For instance, the subtleties of disc reproduction rendered potentially possible by, say, a £44 super cartridge will never properly be realised when it is partnered with an arm, turntable unit, amplifier and loudspeaker of "budget" quality. The maximum yield in this instance would be less disc wear. Similarly, the full excellence of a costly amplifier of high power, wide frequency response and very low distortion will be lost when driving into loudspeakers of mediocre specifications and power handling capabilities. Indeed, the converse can follow: that is, a super quality loudspeaker system can highlight the shortcomings of an amplifier of lesser exactitude more than a loudspeaker of poorer quality—meaning that the cheaper loudspeaker tied to such an outfit is likely to give greater listening pleasure—and less fatigue—than the more expensive one.

This article is concerned mostly with specifications matching and with informing the hi-fi system user how he can best ensure that each item of equipment is fully contributing to the overall sound quality as defined by the specifications.

We often hear talk about the "weakest link in the hi-fi chain". Some say it is the loudspeaker: others the pickup cartridge. In practice, any item of the system can represent the *weak link* if it is failing to work as the designer intended. The weakest link in the *ultimate* of hi-fi reproduction might well be the loudspeaker or, indeed, the cartridge; but this is another story outside the scope of this article.

The heart of the hi-fi outfit is the amplifier. This receives the selected programme signal at very low level, applies necessary equalisation and then eventually translates the signal into power for working the loudspeaker. All amplifiers are very sensitive, especially from the input for the magnetic pickup, for here a signal as low as 3 mV (three-thousandths of a volt) can evoke an audio power as high as 25 or 30 watts, depending on the full power of the amplifier, at the loudspeaker terminals. This makes it absolutely essential to avoid spurious signals reaching the programme input circuits, and the biggest bugbear in this connection is "hum".

Power for the amplifier circuits is obtained initially from the mains supply, as is well understood, and since the mains current is alternating (ac) it possesses all the characteristics of a programme signal at the low end of the audio spectrum—50 Hz, this being the mains frequency in the UK. As the mains power is infinite—or almost so!—it has to be tamed and very much controlled in the power stages of the amplifier to avoid any spilling over, so to speak, and being mistaken by the amplifier as programme signal. The ac is, in fact, converted to direct current (dc) by the mains section, and even the slightest of 50 Hz ripple has to be filtered out by large value electrolytic capacitors to ensure that the output at the speaker terminals is virtually hum free.

Instead, with contemporary hi-fi amplifiers the mains hum contribution to the real audio output signal from the power point of view is rarely greater than one-millionth of the amplifier's full output power. This hum signal power is so small that it is indiscernible even when an ear is held close to the loudspeaker. More likely to be heard is the very slight "hiss" or "rushing" noise, which is the electrical noise generated by the amplifier circuits themselves; but even this should be at a very low level.

The major problem is not so much mains hum as hum signal finding its way to the inputs of the amplifier by some route or other. This can really produce big hum noises. One of the best ways of checking whether the hum is power supply or input kind is to short out the input socket of the selected programme—gram, tape, pickup, radio and etc. If this cuts the hum almost completely, then it would certainly not be power supply hum. On the other hand, if the hum level remains unchanged by this action, the amplifier should be taken to a dealer for attention to its mains smoothing circuit—possibly an electrolytic capacitor or rectifier will be in need of replacement.

Now, there is a distinction between mains supply hum and mains hum getting into the input circuits, for although the fundamental mains frequency is 50 Hz, the action of a full-wave power supply rectifier steps it up to 100 Hz —and all hi-fi amplifiers are endowed with full-wave rectification. Thus, power supply hum is 100 Hz and mains hum resulting from mains "signal" pick up is 50 Hz. Some small-speaker hi-fi systems might not give much response to 50 Hz hum, but the presence of this hum is usually discernible because the nature of the mains supply system tends to distort the 50 Hz sine-wave, thereby creating harmonic components which often rise well above the fundamental 50 Hz.
The harmonics on the mains waveform add a kind of "roughness" to the hum, giving a "tizzly" treble effect.

While power supply hum generally arises from an actual fault condition in the amplifier —it being present, at 100 Hz remember, *even with the volume control turned right down*—hum pick up mostly results from trouble or incorrect operation at the front-end of the amplifier. A typical cause of a loud 50 Hz (with harmonics) hum from one stereo channel when the amplifier is switched to magnetic pickup, for instance, is a break in the "live" signal lead of the afflicted channel at the cartridge end of the pickup arm. This sort of hum arises from capacitive and/or inductive coupling from the "live" circuit to the mains supply, and it can be very loud with the volume control fully advanced, but will drop to zero when the control is turned right down—in which way it differs from mains hum. An open-circuit "live" signal lead will, of course, also interrupt the signal.

In a like manner hum can be picked up by the cartridge, its wiring and the early stages of the amplifier, even when the signal leads are intact, but in this case the hum is generally much less powerful. This is because a "loaded" signal lead or circuit is less susceptible to hum pick up than an unloaded (open-circuit) one, which leads us right to the heart of the majority of hum troubles—namely, hum pick up at the low-level input stages.

Early valved and non-integrated amplifiers with their large mains transformers, smoothing chokes and heater lines were very prone to this nature of hum, but hum in this respect has been significantly suppressed by the lack of heater lines in the new designs based on transistors, generally demanding smaller mains transformers —with reduced mains fields—than valved counterparts. Hum loops and things like that which used to plague some of the early amplifiers and hi-fi systems certainly cause fewer headaches these days, but the best is not always achieved due to the presence of background hum—albeit, weak.

The output from even the most super of hi-fi amplifiers is not hi-fi if the weakest hum can be *heard* on the reproduction. As already told, the magnetic pickup input is the most sensitive to hum disturbances due to its very high sensitivity, so extra special precautions have to be taken here to keep the hum power at the speaker some million times below the full power of the amplifier. If hum is troublesome, check through the following list with the system switched to gram and with the volume control towards maximum.

1. Check that the amplifier is adequately earthed either to the mains socket "earth"—the third pin—where the amplifier features a third conductor in the mains cable (this is often—though *not* always—green, but check with the instruction book) or to a good earth point where the amplifier is equipped with an earth terminal.

2. Check that the gram unit is "earthed" to the amplifier. If the amplifier fails to carry a suitable earthing terminal, connect the gram unit earth wire to a rear panel fixing screw—often a PK type in electrical contact with the "earthy" parts of the amplifier.

3. If the gram unit is, in fact, earthed to the amplifier try *removing* the earth, for with some combinations of equipment it is better *not* to have the gram unit earthed!

4. With stereo cartridges carrying *four*-pin terminals—two earths and two "lives"—try interchanging the two earths. A hum-loop can develop if the two earths are mixed up.

5. Make sure that the pickup arm comes within the earth connection of the gram unit—see 2 above.

6. Try reorientating the amplifier as a whole (or the control unit where this is separate from the power amplifier), for it has been known for hum fields surrounding a main cable—in a wall or beneath a floor—to be picked up by the front-end of the amplifier when critically positioned with respect to the mains cables.

7. Make sure that the pickup leads are as short as possible and properly shielded.

8. If the hum arises only when the pickup arm is moved towards the centre of the turntable, a non-magnetic type of turntable or specially mu-metal-shielded cartridge might be needed for the least possible hum pick up.

9. When an external transformer module is used with the pickup, this must be orientated well clear of mains fields from wiring or transformers.

10. Make sure that all pick-up-signal-carrying leads and cables are well clear of the mains input side of the amplifier and gram unit, etc.

Somewhere amongst the foregoing will almost certainly be found the cause of hum on gram, especially when the cartridge is a magnetic one of some kind.

Magnetic cartridges need generally to be loaded across 47k ohms or thereabouts, and the design of the amplifier at this input automatically caters for this matching. Moreover, RIAA equalisation has to be incorporated, and this, too, is a subject of amplifier design. Most modern magnetic cartridges yield in the order of 5 mV of "average" signal (approximately 1 mV per cm/sec. of recorded velocity), so if the amplifier sensitivity *voltage* is significantly above this value—meaning an insufficiently sensitive amplifier for the cartridge—the volume control will have to be set towards maximum, and even then the amplifier might not be fully driven. Running at full volume control setting is not a particularly good thing to do for it can aggravate hum troubles and sometimes add noise to the programme signal. One way out of the problem —apart from purchasing a cartridge of greater output voltage—is to employ a pickup booster amplifier—mono or stereo, as the case may be. Several are available as these pages show, and one that is quite useful for stereo outfits is that by *Shure,* available with either a mains- or battery-powered pack as a separate plug-in item. Each channel is equalised to RIAA for discs, with switch positions for "flat" microphone, for instance, and for NAB equalisation. The output per channel from a pickup signal, for example, is sufficient for connecting to a "flat", relatively high sensitivity *voltage* input on the amplifier. It is thus a good device for running a magnetic pickup with an amplifier not carrying RIAA equalisation.

Crystal and ceramic cartridges call for a load impedance between 1 and 2 megohms without RIAA equalisation—equalisation being an automatic function of the cartridge when so loaded —and since the output signal is considerably higher than that from magnetic cartridges, an input of lesser sensitivity (greater sensitivity *voltage*) is necessary to avoid overloading. Sadly, not all amplifiers have correct provision for this type of cartridge—an exception being the 8+8 Tripletone, which is designed specifically for a 2-megohm input in spite of the use of transistors (a later model, it is understood, is likely to carry a FET/bipolar combination for the same purpose)—and if this type of cartridge is connected across a lower value input load, there is far too much treble and a serious lack of bass.

Actually, this change in characteristic across a low-value load makes it possible to connect the cartridge to an RIAA-equalised input with quite reasonable results, since it translates the output towards so-called "velocity" characteristics as possessed by magnetic cartridges; but in practice, the use of a resistor/capacitor filter network imposed between the cartridge and the amplifier is generally recommended in the maker's leaflet for the best results.

It is noteworthy that while the bass diminishes with a low-value load across a crystal or ceramic cartridge, the opposite occurs with some magnetic cartridges—and vice versa, of course.

Owing to the greater output from crystal and ceramic cartridges, leading to a lower amplifier input sensitivity, hum problems with such cartridges are rarely as severe as with magnetics, where induced hum into the windings is also a possibility—not existing with the other type.

While we are on the subject of the "gram" side of the hi-fi system, a word or two about the *gram motor* and *tracking force* will not be amiss. Variations in pitch of a sustained note—fast or slow, giving flutter or wow—should lead to a check of the mechanical drive actually engaged to the turntable—a rubber jockey wheel may be worn or slightly flattened around its periphery, or there may be undue mechanical friction due to lack of lubrication—and if oiling is deemed necessary this must be applied very sparingly, taking great pains to avoid any spilling on to the rubber wheels or belts or, indeed, to the turntable friction surface, where its presence will make matters much worse. Attention, too, must be directed to the turntable main bearing. Special grease is often supplied by turntable makers for application to this very important bearing. If the motor is running unduly hot, check the fan and/or any cooling scheme adopted. If very hot and wow or flutter (or both) is really troublesome, there could be shorting turns in the motor coil windings.

The tracking force required for the optimum results is determined by several—not just one—factors. The main one, of course, is the type of cartridge used. At least one very expensive version—the *Empire* 999*VE*—is capable of tracking very successfully at the incredibly low force of $\frac{1}{2}$ gramme! The majority of better-class magnetics, however, track well between 1 and 3 grammes provided they are mounted in arms of matching exactitude—which is the second factor. The third is the type of stylus used, and whether spherical or biradial—the latter tending to track a little under that of the former. The fourth factor relates to the nature of the recorded material and on how heavily it is recorded in the groove at various frequencies.

Of recent months a new parameter—called "trackability"—has assumed a greater practical importance than hitherto in the study and

design of cartridges. This relates to the minimum tracking force required for the stylus to trace without error—and within the capabilities of the pickup system—a groove modulated over the spectrum at ascending recording levels. The best cartridge in this particular respect is that whose stylus traces the groove modulations flawlessly right up to the highest recording level and at all frequencies within the spectrum *at the minimum tracking force.*

This parameter lumps together such parameters as compliance, mechanical impedance of the tip, tip mass, and so forth, for only cartridges that excel in these connections can hope to possess an outstanding trackability performance. It is expected that eventually cartridges will be acclaimed (or otherwise) by a "trackability curve"—like a frequency response curve and curve of crosstalk performance—but this will call for a "standard" test disc and test procedures, which at the time of writing have not fully been evolved.

One disc which does give quite a fair picture of trackability—subjectively at least—is the *Shure Audio Obstacle Course TTR*101. This is recorded with complex waveforms derived from musical instruments at four levels, the fourth being 400 per cent higher than the first. The idea is to adjust the tracking force until no further improvement in trackability can be achieved—but, of course, not exceeding the maximum force recommended by the cartridge maker. Mistracking is clearly heard by the "rough" nature of certain sounds at high modulation levels; full instructions for such listening tests are given with the disc.

Another useful test disc—also having bands for trackability appraisal—is the *Hi-Fi/Stereo Review* 211. This disc also carries music test material straight from the microphone to the master disc, leaving out the tape recording part of the exercise.

As mentioned, the tracking force should never exceed the maximum for the cartridge, even though at the maximum force trackability is below expectations. The solution here is either to use a better arm, if this happens to be the limiting factor, or to use a better cartridge—or both. Generally speaking, the maximum tracking force for any cartridge carrying a biradial stylus should not exceed 1½ grammes for fear of damaging the record!

When running at very low tracking forces—between 1 gramme (or less) and 3 grammes—very poor reproduction will result if the stylus gathers too much dirt from the groove or if a hair gets tangled round the stylus—which is not an uncommon occurrence, incidentally. At these low forces it is easily possible to blow the pickup across the disc, so even the thinnest of hairs can play havoc with the tracking, causing a very disconcerting distortion. The stylus should be regularly cleaned with a special brush and cleaning liquid, for it should be remembered that it covers a distance approaching one-fifth of a mile in the groove of a single 12-inch LP, so it can pick up quite a bit of muck on the way, even if the disc is apparently clean. A useful device for clearing all foreign matter from the stylus after each disc playing is the *Decca Stylus Cleaner,* designed for screwing on the motor board at the pickup touch-down position.

Discs, too, should be cleaned regularly, but excessive liquid for cleaning them must be avoided, for this turns the dust, etc., in the groove into mud which hardens and becomes completely irremovable, ruining the disc for future hi-fi applications. Disc cleaning fluids are available which fail to harden foreign matter or leave sticky deposits, and these should be employed rather than ordinary tap water; but in any event, only the slightest trace of fluid should be applied—and then by a special applicator—both for cleaning and for rendering discs anti-static. More of a "humidity" factor rather than a definite "wet" state is required for the best results.

A good anti-static liquid is available from *Colton and Company (Lapidaries) Ltd.,* while *Metrosound* does a very neat *Hi-Fi Maintenance Kit* (and also one for tape recorders), which includes items such as stylus cleaner (with brush), tracking force measuring set, disc anti-static applicator, turntable unit grease, and so forth (see **fig 3**).

Dust is attracted to discs due to the formation of static charges, especially when they are taken from their sleeves. Such charges can also develop while the disc is being traced by the stylus (especially if the cartridge carries a small groove cleaning brush), and one way that this can be neutralised on the turntable is by the use of an anti-static mat to replace the existing rubber one. An anti-static mat possesses "conductive" characteristics, which discharge the static; and such, too, is available from *Metrosound* (also shown in **fig 3**).

Dirty and static-charged discs can add considerably to the general background noises—and can be almost as bad as hum with the resulting pops, clicks and sizzles—while mistracking, especially at about 400 Hz (which is a good test frequency for this trouble), can be aggravated by pickup tracking error, which can arise from misplacement of the cartridge in the shell. Some shells possess two cartridge fixing positions to assist with the adjustment of the amount by which the stylus tip overhangs the centre of the

turntable. Minimum tracking error occurs when the cartridge, shell or arm—depending on the design of the overall system—is carefully positioned in the manner recommended by the maker. This adjustment is worth checking on in cases of persistent mistracking and mid-frequency harmonic distortion.

It is very important, too, for the cartridge to be level in the shell and for the shell to fit firmly and accurately on the arm so that the stylus is truly vertical on the disc when viewed from the front. The tracking angle at the side of the stylus is now standardised at 15 deg.

Mistracking at low frequencies is encouraged by l.f. resonances in the pickup system. At low bass frequencies the symptom could mean that a cartridge of not-particularly-high compliance is being partnered with a hi-fi arm of low mass. The use of a cartridge of higher compliance (less stylus stiffness) would cause the resonance to drop to a sub-bass frequency, but then a resonance here can be incited by disc ripple! Correct partnership of cartridge and arm, however, avoids difficult problems such as these.

Acoustic feedback is another plague of hi-fi outfits, especially these days of small speakers located fairly close to the turntable unit or, indeed, on the same shelf or table. Vibrations from the speaker are received by the pickup and translated into electrical signal which then emanates as an ever-increasing howl from the speaker, rising to an intensity equal to the full power of the amplifier. A simple check for the trouble is to place the stylus on a stationary disc and slowly advance the volume control beyond the position for normal listening, being ready quickly to retard it should the tell-tale howl commence. See point 7 below. Poor disc reproduction should thus lead to a check of the following points.

1. Volume control needs to be set at, or towards, maximum. Employ preamplification or a cartridge of greater output to suit the amplifier.

2. Too little bass with crystal or ceramic cartridge (treble apparently excessive). Check the matching across the cartridge, making sure that the load is not less than 1 megohm.

3. Wow and flutter symptoms. Check gram motor drive wheels and bearings for lubrication, and ensure that all friction surfaces are free of grease and oil. A wow and flutter masking test is given in the 211 test disc, previously referred to.

4. Excessive tracking force required for the type of cartridge used. Check arm for bearing freeness. Check stylus for dirt and wear. Check tracking error. Remember that the very low tracking forces are possible only when the cartridge is partnered with an arm of matching quality; also that too little tracking force can be as bad—if not worse—than too much from the disc wear point of view.

5. Excessive record noise. Check stylus for dirt and hairs and disc for groove clogging. Try careful cleaning with proprietary aids.

6. Mistracking at low frequencies. Make sure that the arm is suitable for the cartridge employed. Check tracking error.

7. Acoustic feedback. Separate speaker from turntable unit as far as possible and avoid common shelf or table mounting. Employ damping of the motor unit or turntable system as a whole by springs and/or rubber buffers.

Hi-fi by radio is possible through the medium of the frequency-modulation system only, and there is usually no great problem in connecting a good FM tuner to the "radio" input of a hi-fi amplifier. However, serious overloading from the tuner into the amplifier can occur if, for instance, the tuner yields about 1V of signal while the "radio" input of the amplifier requires only about 20 mV! Most tuners, though, have either a manual or preset audio output control, making it possible to set the level accurately to suit the amplifier. The plan is to adjust the amplifier's volume control to the position used normally for playing discs and then adjust the tuner's preset (or manual) until the radio output equals that of discs. This will completely avoid overloading troubles.

Excessive lead between the tuner and amplifier should be avoided since this can put undue capacitance in parallel with the signal and thus upset the normal de-emphasis, resulting in an apparent increase in bass or reduction in treble.

Many tuners, especially some of the American and European ones, can produce remarkably good results with an aerial signal as low as 5 μV —which is next to nothing! Nevertheless, it pays always to employ the best possible aerial system, except, possibly, where reception only of nearby local BBC stations is required; but even under this condition a good, directional aerial may be necessary in hilly districts and in towns of tall buildings to avoid distortion due to the signals bouncing from the obstructions and arriving at the tuner a very small fraction of a second after the direct signal. This is called "multipath interference", the symptom of which is not unlike that produced by a faulty loudspeaker, where the speech coil is foiling the magnet poles.

If this trouble is suspected—disc and other programme inputs not giving the distortion effects—the tuner should be tested, preferably on an aerial system in a different area, and if reception is then free from the trouble, the home aerial system should come under close scrutiny —especially if it is a simple indoor arrangement! In some instances repositioning and/or re-

orientation will clear the symptom, but in really bad signal-reflecting areas a multi-element array might be required, beamed in such a manner as to achieve the maximum discrimination against the unwanted, reflected signals, even though this might result in a significant fall off in direct signal pick up. In extreme cases, a low-noise transistor aerial booster (for Band II) can be interposed in the aerial lead to restore the strength of the direct signal to the tuner.

Multipath interference can really play havoc with stereo reception, and it is essential in such cases to adopt the very best of aerial systems. Stereo, too, calls for a greater signal input than mono for a given signal/noise performance, and a signal at the tuner some ten times that of the minimum required for mono is essential. Thus, while good mono reception can be obtained with, say, 50 μV, something like 500 μV will be needed for the best stereo, other things being equal. A transistor aerial booster can also help in this respect, such devices being available from such firms as *Holdings of Blackburn* and *Transistor Devices Ltd. of Newton Abbot.*

Aerial matching is also important, and British coaxial-cable-fed aerials should be coupled to American and European tuners with 300-ohm aerial inputs (or thereabouts) so that the inner conductor of the coax connects to *one* terminal and the outer braid to the metal chassis or to an earth terminal in the event of the tuner not carrying proper facilities for 75-ohm unbalanced coax. This leaves one of the 300-ohm terminals vacant, which is almost as good as using a balun (balanced-to-unbalanced) 300-ohm-to-75-ohm transformer. However, for the optimum results, especially when attempting stereo reception from a distant station or when using a booster amplifier, a balun transformer is desirable, and these are also available from *Holdings of Blackburn.*

Finally, a word or two about loudspeakers. Although the trend is now towards smaller systems of wall-furniture or bookshelf mounting size, it must be remembered that these can be overloaded on signal peaks when connected to amplifiers capable of delivering a greater electrical power than they are designed to accommodate. Some of the smaller treble units can burn out when grossly overloaded, while the bass units are likely to generate very disconcerting spurious low-frequency sounds when pushed hard in an endeavour to improve the bass performance. This, of course, is in opposition to Nature, for the lowest octave just cannot be reproduced through the medium of these small devices, no matter how much bass lift is applied at the amplifier. Indeed, the more the bass is here lifted, the greater will be the bass overload distortion, composed of harmonics of the real bass frequency!

Nevertheless, quite fair results can be attained with these small speakers, especially with some of the latest kind incorporating improved bass units and "auxiliary bass radiators"—such as in the *Dittons* and (somewhat similar principle) *Lowthers.* A rough guide to determine the minimum loudspeaker enclosure dimensions relative to the listening room equates the enclosure volume in inches with the room's volume in feet; this, of course, is by no means an immutable law, but it does, at least, provide some basis upon which to work.

The apparent bass can be increased by mounting the small speakers in corners of the room—thus evolving a corner-bass-loading effect—and it is surprising how well this works in practice.

The smaller systems, too, are significantly less sensitive than their bigger brothers, meaning that to yield the same acoustic power as the larger systems a greater electrical power has to be fed to them. This, however, is of little moment nowadays with the remarkably high powers provided by even the smallest of transistorised amplifiers.

Maximum electrical power is transferred to the drivers only when the impedance they present to the amplifier output is equal to that required for maximum power output. Many transistored amplifiers develop maximum power at between 4 and 8 ohms loading, which implies that the power is restricted at higher impedances. This is, in fact, true, and many amplifiers barely deliver half of their full power when connected to 15-ohm speakers, which may have passed over from the earlier valved amplifier!

A matching transformer can be used to ensure that all the power gets into the speaker, but unless the transformer has a very low loss at very low frequencies—around the 20 Hz mark, or even below—the amplifier is likely to "see" an impedance, reflected from the losses in the transformer, considerably below 4 ohms or whatever the value may be, and this could incite failure of the fuse or safety trip or even apply a damaging load to the output transistors. Generally speaking, therefore, it is always best to avoid the use of matching transformers in the speaker circuits wherever possible.

By the same token of power reduction, the speaker feed cables should possess the lowest possible resistance—otherwise they (the cables) will consume power!—and nothing below 5-ampere mains cable should be used for medium runs. Where the runs are particularly extended, however, 15-ampere cable would be a better bet, even though it is more obtrusive and difficult to hide.

ELECTRONICS THE VEROBOARD WAY

By Peter Knight

Way back in 1957 a company called *Vero Precision Engineering Ltd.*, based at Southhampton, made a decision to develop a sophisticated item of mechanics given the name "numerically-controlled, multi-spindle, drilling, tapping and reaming machine". It was considered that such a machine would possess a high future potential—since justifiably confirmed—and that the project would gather into maximum employment the whole of the company's manpower and plant. Concurrently, an electronics division was formed to handle the design and manufacture of a compatible electronic positioning system for controlling the machine.

About a couple of years later two model Vero "auto" drills were ready for production, the prototype electronic positioning system was completed in development and, indeed, manufactured—and subsequently purchased by the UK Atomic Energy Authority at Aldermaston—and a by-product of the electronic positioning system gave birth to a universal electronic wiring board, since registered as a trade mark under the name *Veroboard,* and the subject of Patent No. 883.870. At this stage the company decided to discontinue work on the electronic control system for the auto drills and instead adopt an electro-mechanical positioning system which was the subject of a design by *Airmec* of High Wycombe, and concentrate activities in the Electronics Division on the newly-discovered Veroboard, which was seen to have a very useful future, especially with the gathering momentum of solid-state electronics—transistors and semiconductors—in all areas of industry.

As was expected, there was a world-wide call for this new and simple method of physical circuit design, construction and assembly—for production items as well as prototypes—and the swiftly accelerating demand for Veroboard soon outgrew the then existing capabilities of the Electronics Division which, towards the end of 1961, was translated into the present Veroboard company—called *Vero Electronics Ltd.*

To keep apace of requirements, more sophisticated production plant was designed and installed for the creation of the basic Veroboard and all the associated electronic "building-brick" assemblies stemming from it. The Electronics company is now accommodated in a

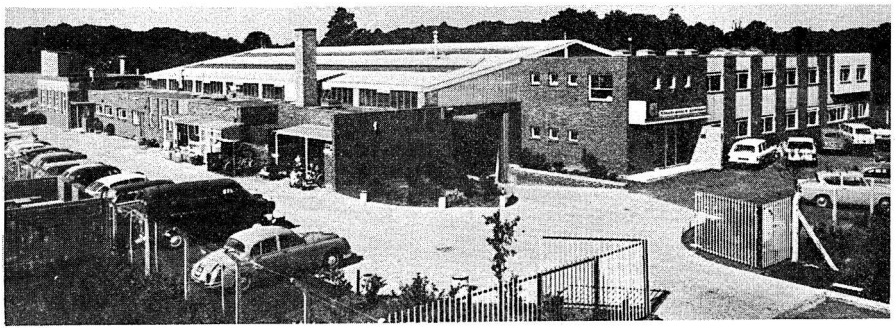


Fig 1. Vero Electronics Ltd. new and up-to-date factory at Industrial Estate, Chandler's Ford, Eastleigh, Hants.

new and superbly-equipped factory located just outside Southampton, incorporating a large staff of experienced design engineers who are always pleased to advise customers—large and small—on how Veroboard and its accessories can be tailored to suit their individual requirements.

Overseas demand is catered for by 15 main agents, and these are assisted by a growing team of sales engineers based on three wholly-owned subsidiary companies in West Germany, France and the USA.

Although Veroboard was launched essentially as a commercial product—rather than a product for the do-it-yourself type and audio and electronic enthusiast—it has since its initial launching at the start of 1961 been acclaimed as a very sophisticated and simple scheme of circuit construction by the amateur fraternity, and many designs based on Veroboard construction have been published in the popular technical press, in the radio, TV and audio magazines. Its popularity in this connection has risen in step with the increasing use of transistors and semiconductors generally—and the deviation away from old-style valved circuit designs, which in the past have demanded the use of metal chassis or "breadboard" configurations, even for portotypes, thereby rendering controlled reproduction virtually impossible.

Not so with Veroboard, for a circuit designed upon this material is endowed with the same consistency of circuit reproduction as any fully-fledged printed circuit design. It is thus ideal material upon which the professional prototype engineer—and, indeed, the home constructor (with the additional bonus of giving his efforts a real professional look!)—can base his new solidstate circuit design.

As one will now have gathered, Veroboard is very much of a printed circuit board nature. In its basic form it is, in fact, a synthetic resin-bonded paper laminate with a thickness dimension of 0·062 in. upon which are bonded a number of copper strips 0·0015 in. in thickness running the full length of the board. These are pierced with a regular matrix of holes for accommodating the leadout wires of the circuit components.

Ordinary printed circuit board might also consist of a similar laminate upon one side of which is bonded a sheet of thin copper. It is the job of the prototype or design engineer to work out the circuit conductors required, the placement of the components to coincide with these conductors, and then arrange for the copper sheet to be "etched" in such a manner that all the copper except that required for the conductors is dissolved. Holes are then drilled through the laminate and the remaining copper to accommodate the component leadout wires. The components are usually mounted on the blank side of the board and their wires soldered to the conductors on the other side. The majority of electronic domestic devices in particular now use printed circuit boards, including transistor radios, TV sets and audio equipment of all kinds.

While it is not impossible for the prototype engineer and the more skilled home constructor to tailor individual printed circuit boards, the process is time-consuming and messy, and once the copper has been etched there is not much that can be done to change the configuration of printed conductors without altering the circuit parameters; so unless the finally developed prototype board is likely to lead to fairly large quantity reproductions—which is where the printed circuit board as such scores—not much advantage is gained by going to all this trouble, expecially now that Veroboard is readily available to the home constructor as well as to the professional prototype engineer.

Similar reasoning applies, too, to items of limited production runs, for a complex printed circuit board only really pays its way when it can be reproduced in the thousands. A small run of a special instrument, amplifier or like device, can be based on Veroboard much more economically, and with the satisfaction of knowing that the specifications over the run will remain constant, at least, as far as the parameters of the board itself are concerned. Moreover, it is a relatively simple matter to arrange the printed copper strips of Veroboard to give the best physical circuit configuration, in many cases almost equal to the theoretical layout of the circuit on paper!

The idea is to utilise the conductor strips as circuit wires, and to inter-connect and break the strips where necessary in relation to the components to provide the most logical pattern on the board. The component wires are passed through the holes from the blank side of the board, cut to the required length at the copper strip side and then soldered to the conductors, exactly the same as with printed circuit boards.

Each copper strip on the Veroboard can be regarded as a potential circuit wire, and in practice it is not at all difficult to juggle with the components on the board so as to yield the most technically desirable layout, having in mind such things as unwanted couplings—avoided by keeping the input and output sections of, say, a high gain amplifier as far as possible away from each other—and common impedance

connections. These factors, of course, exist whatever type of wiring is used, but with the Veroboard technique they are generally less troublesome than when a circuit is wired in the old-style convention.

Moreover, it is possible to use a number of the strips as "earthy" or low impedance and low signal connections, arranged to interpose between strips of higher impedance carrying high and low signal levels, thereby even further reducing the possibility of unwanted feedback. It is also feasible to solder on to the "earthy" strips short, tin-plated shields when extra screening between one section of the circuit and another is desirable, and it is not unduly difficult to extend this sort of screening to the top of the board, between components.

To aid with the layout and assembly of circuits, the manufacturers of Veroboard have produced a number of specially designed accessories. One of these is a very useful Design Sheet, which consists of two diagrammatic drawings of a piece of Veroboard on high quality tracing paper—one of the blank or plain side and the other of the copper strip side. On both drawings the holes in the board are indicated by dots, and each row of holes is numbered or lettered so as to facilitate speedy subsequent reference to any hole.

When designing a layout, it is best to obtain several prints, and on the top drawing—representing the plain side of the Veroboard—lay out the circuit, while simultaneously marking on the lower drawing (representing the copper strip side of the board) the points where the copper strips need to be severed to suit the design of the circuit. When laying out the components on the top circuit, their physical size and the minimum number of holes they will span are key factors to keep in mind.

An example of a simple Veroboard circuit is given in **fig 2.** Notice how the Veroboard lay-out at (*b*) corresponds very closely to the theoretical circuit at (*a*); notice, too, the locations of the breaks in the copper strips and see how these tie in with the circuit.

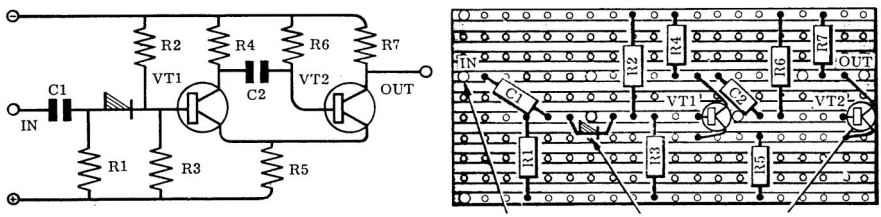
More complex circuits—and even the most complex can be based on Veroboard—have very much higher component densities, of course, but the principles of circuit build-up remains the same. It is often possible to arrange for a central copper strip to act as the main bias or h.t. rail, and two outer strips as "earth" rails, the circuit then being balanced either side of the main bias or h.t. rail, especially where wide 24- or 32-strip Veroboard is adopted for one reason or another. Sometimes it may be necessary in a specific circuit design to link one copper strip to another, and this is simply achieved by soldering a wire link between the two strips at convenient holes, so that the link appears at the component side of the board. It may be necessary to put an insulated sleeve on the link wire to prevent it shorting to components; but it can generally be left uninsulated, and in some circuits can act as a test point.

The number of drawings that will have to be made before a satisfactory final drawing results will depend on the complexity of the circuit and on how well the circuit designer is versed in the art of logic, for the creation of a circuit of this kind (or, indeed, any printed circuit) is more an exercise in logic than anything else—based on the rules of electronics, of course! A relatively simple circuit for home construction will probably call for no more than a single drawing, any slight alterations necessary being made on the one Design Sheet. However, a more complicated circuit intended for production runs will usually call for several trial layouts before the final, proved layout is achieved. It is also advantageous in production run projects to have the component positions silk-screen printed on the boards, and this is something else that can be handled by Vero.

Design Sheets are available in a number of overall dimensions and pitch sizes to suit the type of Veroboard in use, and there is also a Spot Face Cutter which can either be used by hand or with the handle removed in a bench drill. This is designed to remove copper from the strips locally around a hole to form the breaks.

Another useful accessory for the professional

Fig 2. A simple circuit (a) laid out on Veroboard (b).



user is an Assembly Stand which is adjustable to take any size of board. The arms are spring-loaded for easy removal and replacement of the boards, and the stand allows the operator quickly to reverse the board for component placement and soldering.

The first Veroboard was of a single panel size with holes and copper strips on 0·2-inch pitch, but by the end of 1961 the company had produced a range of 0·2-inch board and also boards based on 0·15-inch pitch and for plug-in applications (see later). The next move was to

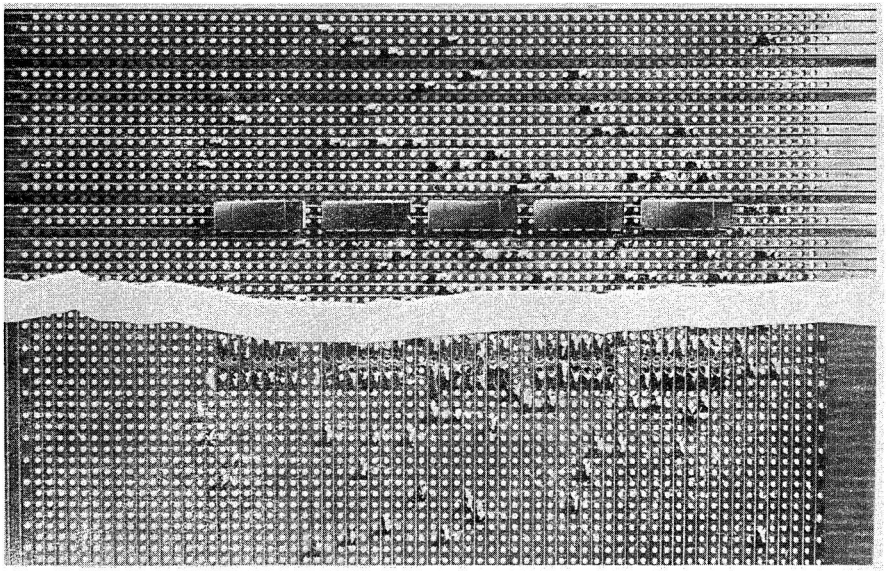


Fig 3. Double-sided Veroboard.

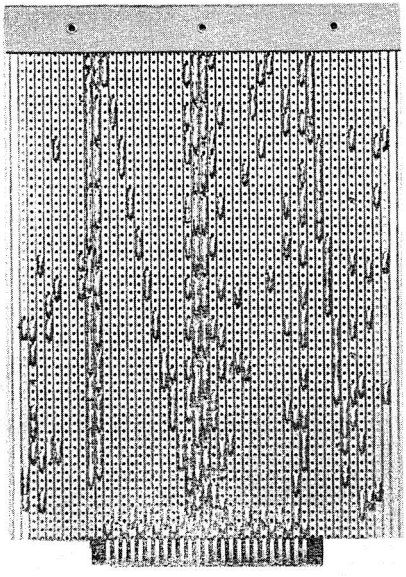
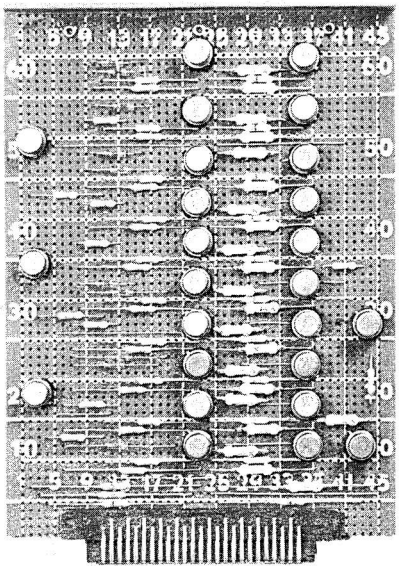


Fig 4. Plug-in Veroboard.



produce board on 0·1-inch pitch, which involved the development of new tooling, but owing to the nature of the problems concerned with this smaller pitch—the copper strips had to be no more than 0·075 inch wide and the centres pierced accurately with holes of the largest practical diameter, which worked out to be 0·04 inch. This tooling development extended over some eighteen months.

Veroboard is now readily available in four pitch values—0·2, 0·15, 0·156, and 0·1 inch—while the matrix can consist of holes pitched equally along both axes, or pitched at one value along one axis and at a different value along the other axis, yielding matrices of $0{\cdot}2 \times 0{\cdot}2$ inch, $0{\cdot}2 \times 0{\cdot}1$ inch, $0{\cdot}15 \times 0{\cdot}15$ inch, $0{\cdot}156 \times 0{\cdot}1$ inch and $0{\cdot}1 \times 0{\cdot}1$ inch. Such matrices related to a wide range of overall board dimensions—based on rows of holes and numbers of copper strips—give rise to in excess of 200 ex-stock Veroboard configurations.

Veroboard is also available on an Epoxy Glass laminate of 0·062 inch thickness; and it is possible, too, to have the copper strips finished with a roller-tinned coating of solder (by special order) thereby making it possible to solder the component leadout wires to them more easily. There is also a wide selection of double-sided boards, having copper strips on one side running at right-angles to those on the reverse side **(Fig 3).**

Plain (copper-less) boards with matrices of $0{\cdot}1 \times 0{\cdot}1$ inch, $0{\cdot}15 \times 0{\cdot}15$ inch, $0{\cdot}2 \times 0{\cdot}1$ inch and $0{\cdot}2 \times 0{\cdot}2$ inch are also available in a range of length/width dimensions, and with hole diameters of 0·052 inch (except with the $0{\cdot}1 \times 0{\cdot}1$ inch matrix whose holes are 0·04 inch diameter), suitable for taking Vero Terminal Pins (see later).

The Vero technique is based on a systemised range of products geared into a distinct pattern of compatibility, where new items are added only where they are compatible one way or another with the existing system and, in some cases, where they are compatible with other manufacturers' systems, leading to easy system integration and unit interchange.

This logical Vero approach is highlighted by the plug-in Veroboards **(Fig 4)** and their partnering edge connectors, designed for boards of all pitches and carrying 15, 16, 18, 22, 24, 27, 32 or 40 contacts. These plug-in Veroboards make it possible now for the enthusiastic amateur as well as the professional engineer to design in record time—avoiding the delay in acquiring printed circuit board prototypes—sophisticiated electronic systems based on plug-in circuit modules from immediately available items; the Vero repertoire also includes a variety of racks and cases of all kinds, including instrument cases, specially tailored to accommodate the plug-in boards, finger boards (see later) and standard Veroboard, engineered for considerable rigidity and aesthetic appeal.

Indeed, there is adequate Vero hardware available for the production of audio amplifiers—based on the module conception—multi-channel mixers, plug-in equalisers, preamplifiers, audio instruments. In fact, you name it and Vero equipment can almost certainly handle it! There would seem, too, to be considerable scope here for the production of the sound reinforcement type of amplifier—as distinct from the true hi-fi amplifier—based on the plug-in module system, whereby spare circuit section modules could be taken on a protracted field exercise for immediate replacement in the event of breakdown!

Another system of Veroboard connecting makes use of Varicon *Contacts,* designed to suit Veroboard matrix pitch, and in one application these can be inserted through the holes from the plain side of the board and retained by soldering to the copper strips, or staking to plain boards. They can be used either individually as single point contacts, or in rows to form connectors for plug-in cards. Partnering Vericon *Connectors* are also available for use with the contacts.

Users of integrated circuits (i.c's.) have not been forgotten, and special double-sided Veroboards designed for dual-in-line and TO 5 packages are available in standard forms. These boards are based on the 0·1-inch matrix, and to ensure that the pitch between the terminations of TO 5 packages is compatible with the hole matrix, "spreaders" are employed between the packages and the board. With the dual-in-line configuration, the copper strip is removed from round the holes into which the device terminations are inserted, and the terminations are then soldered to the copper strips on the reverse side of the board. To secure connection between copper strips on one side of the board and the other, as might be required by the build-up of the circuit, terminal pins are inserted into convenient holes and soldered to the copper strips on both sides of the board. Two types of pin suitable for 0·04-inch-diameter holes (of the 0·1-inch matrix) are available—with and without self-cutting serrations. These i.c. boards, too, are made in plug-in versions with gold-plated side contacts, giving very low contact resistance, and in a special version for dual-in-line i.c's. only, having been pre-milled to facilitate the direct mounting of the packages.

Another type of board without copper strips, but carrying a row of gold-plated copper contact fingers at one end (suitable for use with

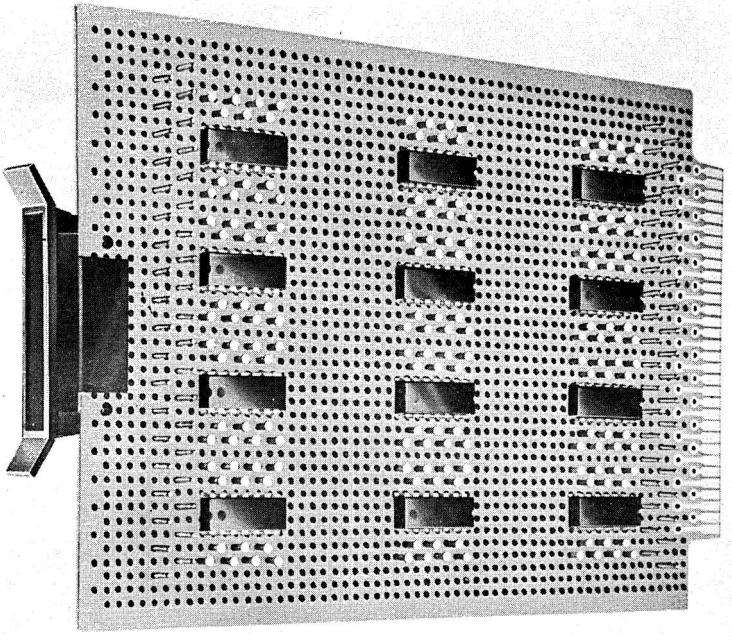
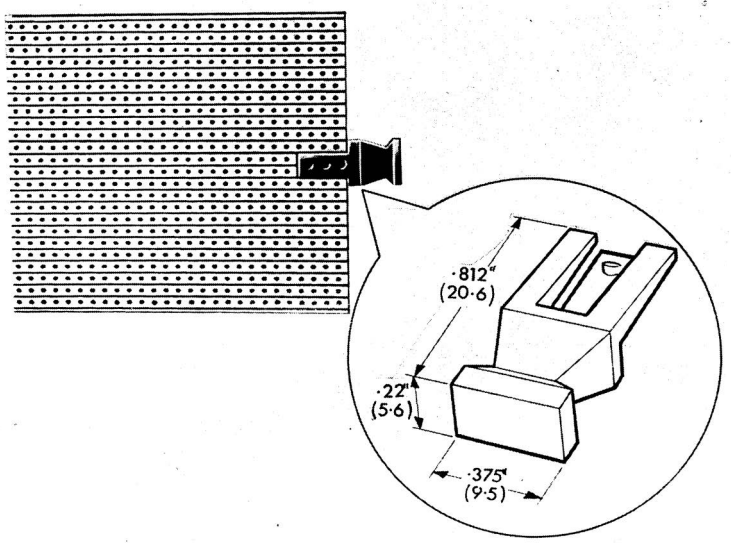


Fig 5. Finger Board with i.c's. mounted, showing one style of Vero Handle.

Fig 6. A smaller type of card handle.



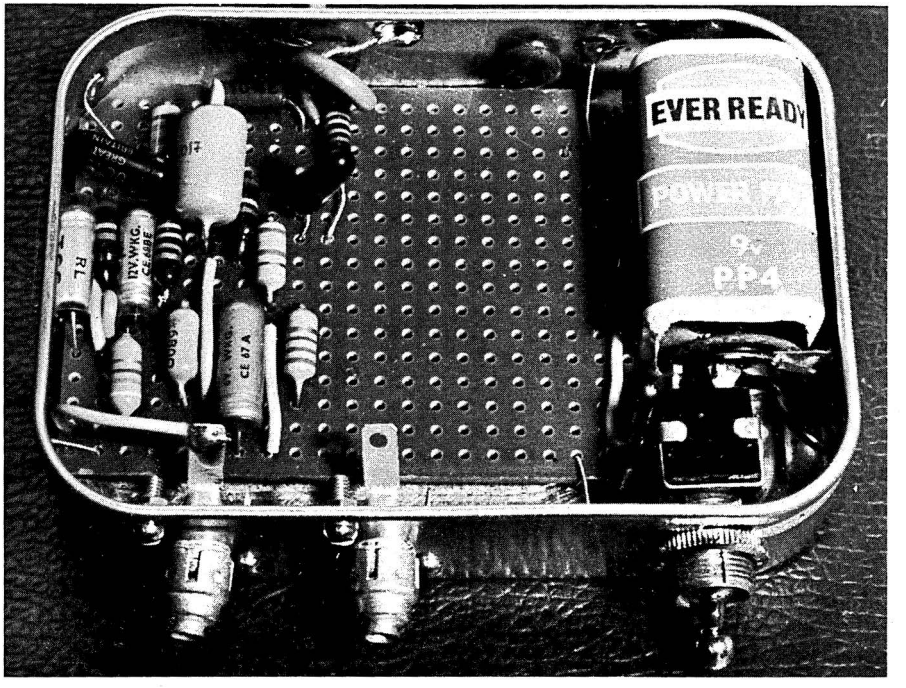
0·1-inch pitch edge connectors) is known as *Vero Finger Board*. These boards or "cards", as they are sometimes called, are pre-pierced with 0·052-inch-diameter holes on an 0·1 × 0·1-inch matrix **(Fig 5).** By using Vero terminal pins designed for 0·052-inch-diameter hole mounting, spaced to suit the dimensions of the components, circuits can speedily be assembled on the boards. If double-sided terminal pins are employed, then the point-to-point wiring can be processed on the side of the board free of components. The 0·1-inch hole matrix facilitates the mounting of TO 5 and dual-in-line i.c's., and **fig 5** depicts twelve of the latter devices mounted in three stages of four. The handle seen on this board, incidentally, is from a range of three basically black, Polycarbonate, easy-to-fit Vero Card Handles, each style having provision for card identification. A smaller version is shown in **fig 6.**

For the various kinds of single- and double-sided Veroboards, and for plain boards and Finger Boards, there are six different-style Terminal Pins, some of which have already been mentioned, designed for 0·025, 0·04 and 0·052 inch diameter holes. A hand tool for Terminal Pin insertion has also been developed which, in spite of its very simple design and application, is capable of a pin insertion rate in excess of 1,000 per hour.

When a Veroboard circuit has been developed some means must be found for mounting or housing it, depending on its nature, and with a simple home-constructor's design this is not at all difficult, as shown in **fig 7.** Here the Veroboard circuit is one channel of a stereo pickup booster (the vacant half of the board being available for the other channel), and the size of the board has been arranged so that it just fits into a 2-oz tobacco tin, with room to spare for the on/off switch and battery. To avoid the copper strip side of the board from shorting to the tin, the board is held off by four small rubber grommets.

A Veroboard design for a tape head amplifier is shown in **fig 8,** which could also be mounted in a simple metal box—metal being best for audio amplifiers to allow for "earthing" and hum reduction. The rear of this board is shown in **fig 9,** which clearly reveals the breaks in the copper strips and the nature of the soldering to the component leadout wires.

Fig 7. Home Constructor's project of stereo pickup booster based on Veroboard, showing a simple method of housing.



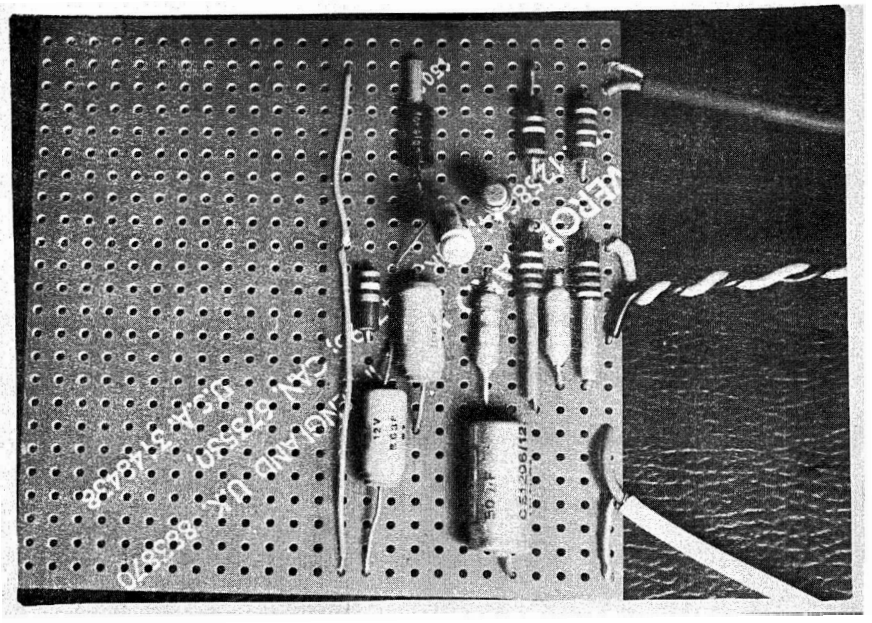
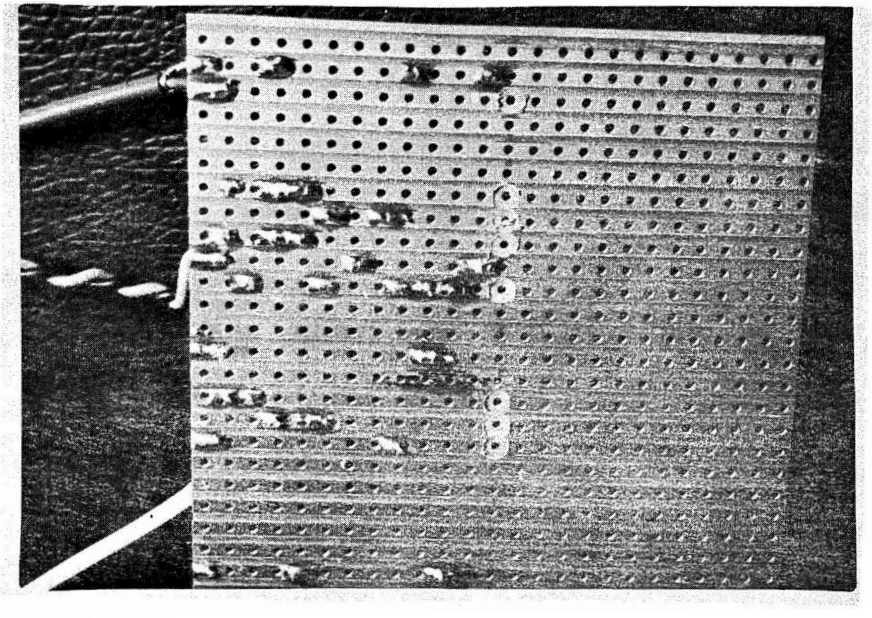


Fig 8. A simple tape head amplifier on Veroboard.

Fig 9. Showing the underside of the circuit at **fig 8.** Note the copper breaks and soldering.



Two more home-constructor projects based on Veroboard are illustrated in **fig 10.** That at (*a*) is a light-operated switch, having the light-sensitive cell located in the near left-hand of the Veroboard, while that at (*b*) is a temperature-sensitive switch, worked by the "thermistor" shown connected at the end of a length of wire. These signal-less devices can be housed quite satisfactorily in small wooden boxes, for screening in these sorts of applications is generally less critical than in signal-carrying circuits. To facilitate fixing, some types of Veroboard carry border holes.

For professional applications and for the more sophisticated electronic systems it is obvious that the mounting or housing of the boards must be compatible with the application in all aspects, and this is where the systemised range of Vero Card Frames, Racks and Cases makes life easy for both the more advanced enthusiast and the professional user of Veroboards. There is a great diversity of such items in the Vero range, and space does not permit a detailed study of them all, but some idea of the type of housing equipment available can be gleaned from the following notes and accompanying pictures.

Various styles of Card Frames are shown in **figs 11, 12, 13,** and **14,** and the basic principle

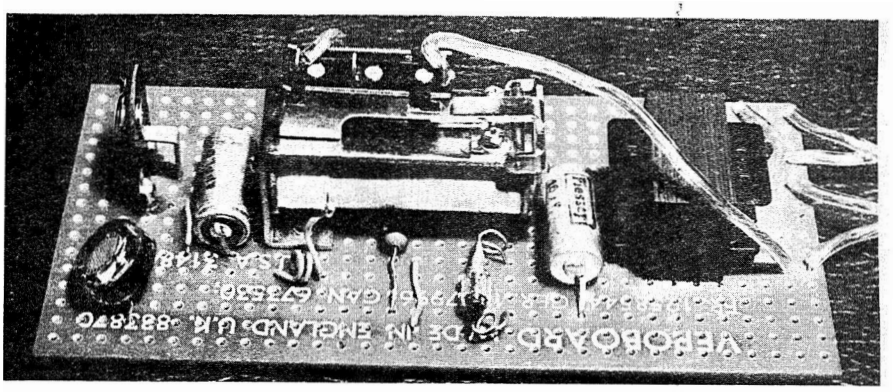
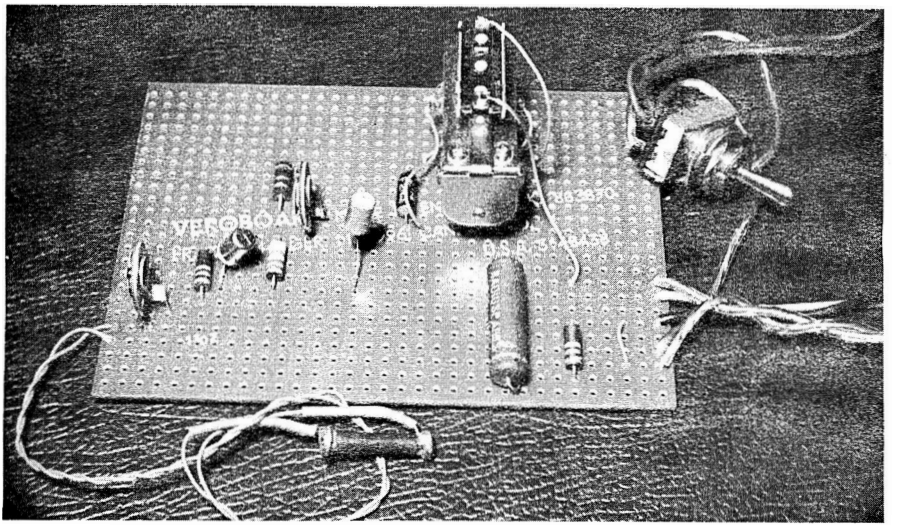


Fig 10. Two Veroboard projects. (a) Light-Sensitive Switch and (b) Temperature-Sensitive Switch.



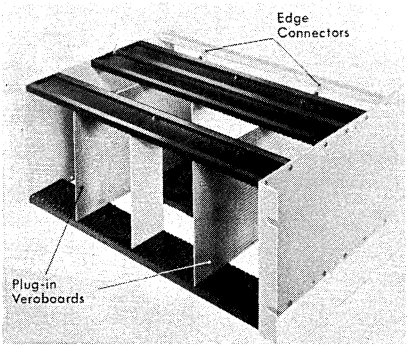


Fig 11. Vero Card Frame System 1. This houses 52 cards on a 3 inch pitch yet consists of only four basic components.

Fig 12. Vero Card Frame System 2. These are available in 7-inch single-tier, double-tier and mixed units and 3½inch single-tier units.

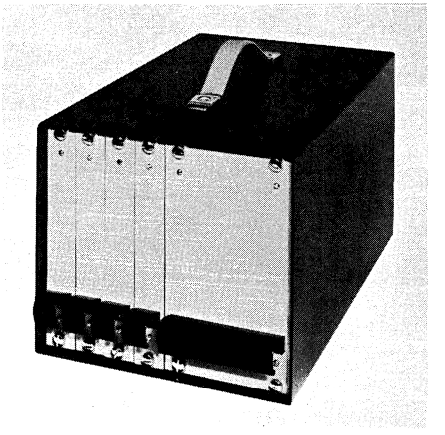


Fig 15. Vero Modules fitted in a Chilworth Case.

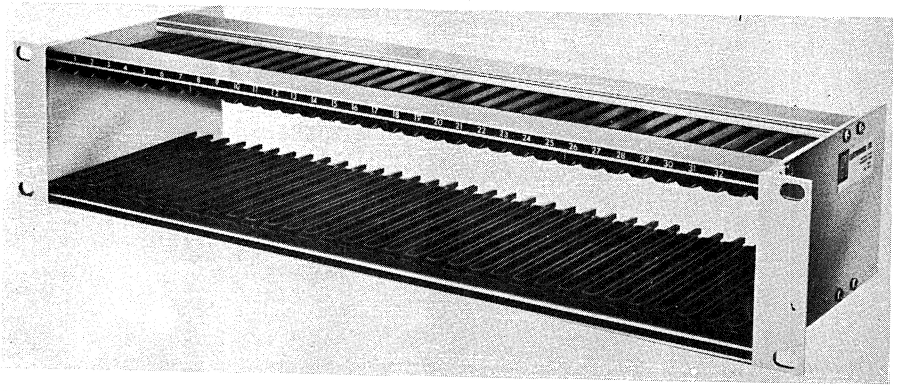
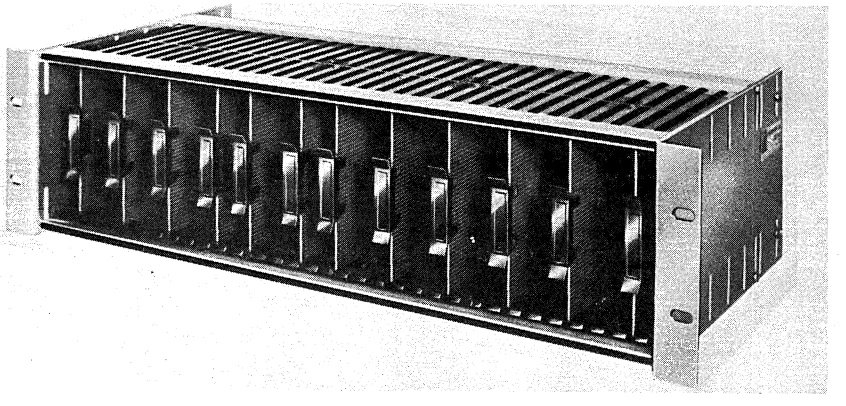


Fig 13. Vero Card System 3a is provided with slotted end plates so that a range of card widths can be accommodated within each standard end plate height. Variation in card depth is achieved by three guide-moulding lengths, while card pitch is variable from 0·4 inch upwards



upon which they are worked is that the cards (Veroboards and/or Finger Boards) are slid in along runners until their plug-in ends enter the corresponding edge connectors mounted in lines at the rear of the Frame. The Polycarbonate handles, previously referred to, facilitate insertion and removal of the boards (see **fig 13).** Some of the Frames are available in double tier configurations, and that shown in **fig 14** can be obtained with or without the front panel.

The Vero Module Rack systems provide for over 1,000 possible combinations of design. The Module consists basically of a front panel and a rear panel with guide rails for the boards fitted between them. **Fig 15** shows how these Modules are installed in a Vero Modula Case from the *Chilworth* Range, while **fig 16** depicts a different type of case from the *Alton* Range. It will, of course, be appreciated that the Module front panels can be drilled to accommodate controls, switches, jack sockets, meter movements and so forth, thereby making it possible to evolve virtually any type and complexity of electronic system with the minimum of effort.

Here, then, we have almost the complete Vero story. However, in parallel with its philosophy of introducing new items in a controlled manner, and then only where they can fit logically into the Vero system as a whole, it has been the company's aim right from its inception to generate a second-to-none service to the research and development sectors of the industry. The company's sensitivity to the fact that such customers would be considerably more concerned with a speedy turnaround or orders, rather than with large quantity purchases, has, too, played a very important part in its growth. From the start strenous efforts were made to turn round orders within 24 hours—and many were, in fact, dispatched within hours!

The range of Vero items has expanded rapidly since the basic Veroboard was marketed in 1961. 1963 saw the advent of the Verorack Card Frame System, 1964 the Vero Modular Rack System and other products as as terminal pins, semiconductor holders, edge connectors, assembly stands, small cases, PC card handles, while as recently as 1968 the completely new and comprehensive range of System 3 PC Card Frame was introduced . . . and the company's range of items is still expanding.

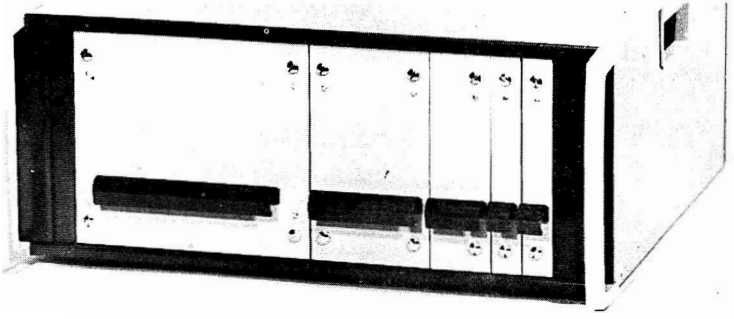
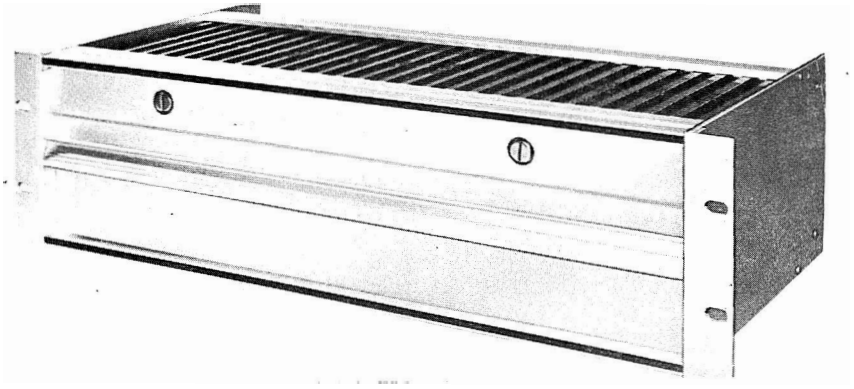


Fig 16. Vero Module Rack Unit fitted in an Alton Case.

Fig 14. Vero Card Frame System 3c, available with and without front panel.



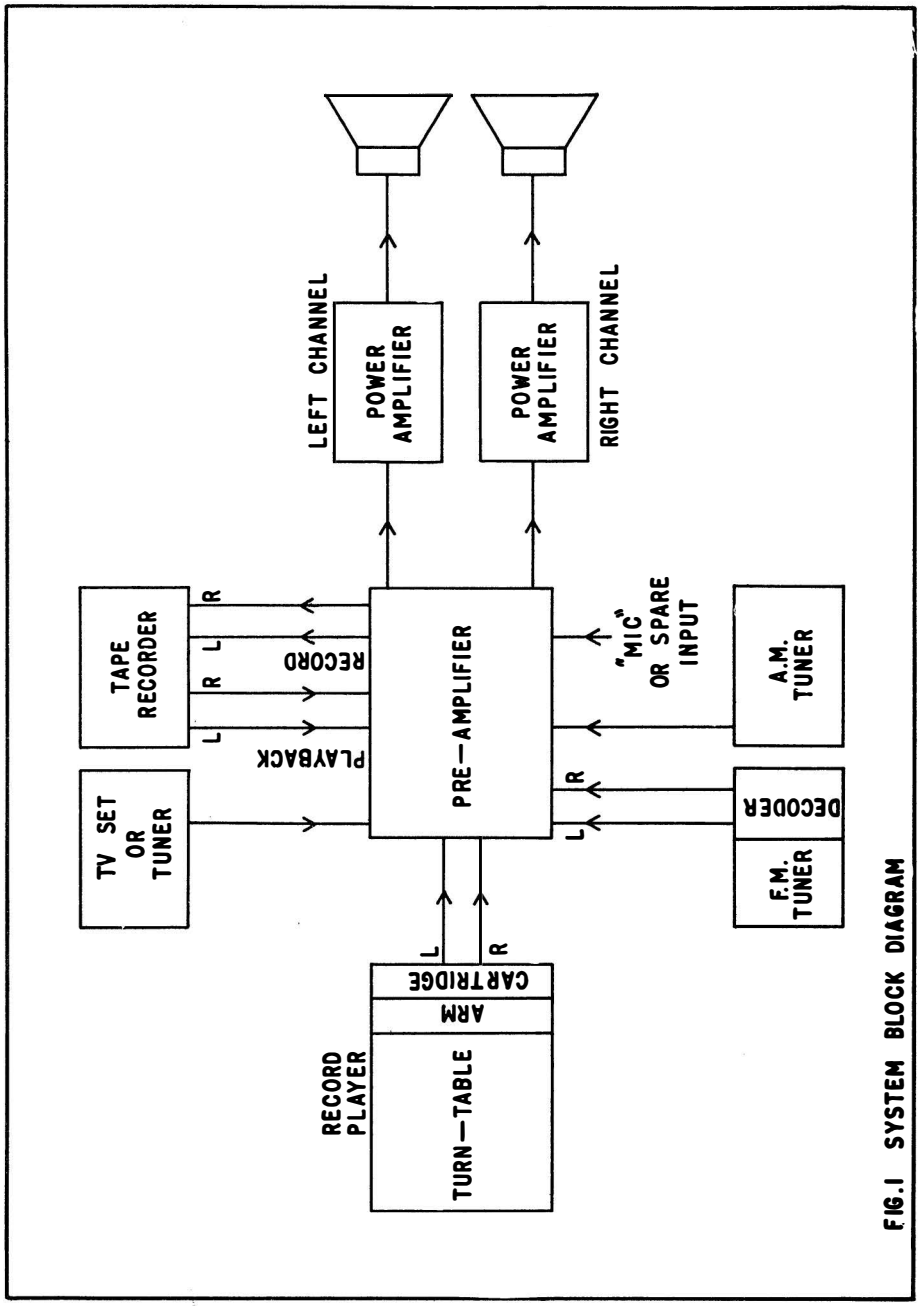


FIG.1 SYSTEM BLOCK DIAGRAM

HI-FI GROWING PAINS

By Trevor Attewell

The widely-known variety of growing pain takes the form of sharp stabs in the general region of the ribs. It is indigenous to the young, unavoidable, and doctors are sure to have a long name for it (if it's only "psychosomatic"). When a hi-fi system is growing, however, the sharp stabs move out an inch or so into the middle of the wallet, and are accompanied by feelings of guilt and annoyance, leading to depression. The disease is known in folk of all ages, and is often described in long and unprintable phrases of basic Anglo-Saxon. It is entirely predictable, and avoidable.

Let us consider that remarkable figure of fiction, the average hi-fi man. He has an outfit of sorts (sometimes out-of-sorts!) which he wants to improve. He's not made of money—the stuff vanishes like magic in the general direction of his wife and 2½ children—and hi-fi improvements must be made in slow stages. He cannot afford mistakes, so each improvement must be worthwhile and based on sensible economics. In this situation, each new item bought should be:— **(1)** The best than can possibly be afforded at the time. **(2)** The one which gives the maximum audible improvement for the minimum nett cost. **(3)** Electrically and (where appropriate) mechanically compatible with those in use, *and with those which are likely to be bought in the future.*

All these principles must be applied simultaneously. To do this properly requires gifts of prophecy and wisdom denied to most mortals—however, a surprising amount can be done by common sense and the avoidance of various pitfalls, some not-so-obvious. It is by pinpointing some of these pitfalls, and attempting to rationalise the scheme of improvement that this article seeks to help. Little advice can be offered on applying the first principle, except to be careful who you choose as Loan Club Treasurer!

Before going any further let us define what is meant by a system. **Fig 1** is a block diagram of the various components of a fairly comprehensive arrangement. Each piece of equipment which can be bought as a physically separate item is shown as a block, although many of these can be, and often are bought in various combinations. From this point onwards there will be no need to constantly repeat the adjective "hi-fi", since it will be assumed that anything less is scarcely worth all the trouble and planning anyway.

Assuming that we intend to reach a complete system such as that in **fig 1** by a gradual extension and replacement, then the second principle demands that we start with the link capable of greatest improvement per unit cost. Since every existing system is different, generalisations are difficult, but we must begin somewhere, and it is a fact that the loudspeakers are frequently the weakest link in practice. If you have just raised a second mortgage on your house to buy some utterly fabulous reproducers, you are asked to spare a thought for the less fortunate as you skip the next few paragraphs.

That it is not easy to decide on a loudspeaker system which will give lasting satisfaction is probably the understatement of the year. The most intimidating difficulty is in finding out just what any of the possible alternatives are going to sound like in your own living room, when fed with undistorted signals from equipment you haven't yet got. As if that were not enough, there is also a distinct "ear education factor" to be considered. This factor expresses the increasing criticality of the ear to improved standards of sound reproduction—as each defect is eliminated, the next largest, hardly noticed before, becomes obtrusive. As the system improves, the scale of these faults diminishes, but their noticeability is not reduced proportionally.

How can one hope to choose a loudspeaker against this kind of background? Of a number of possibilities, here is one method which has been found useful. First buy a good all-round speaker of reasonable price, making particularly certain that it is smooth and resonance-free in the mid-range from (say) 200—5000 Hz. It should go smoothly down to below 50 Hz and up to well over 10kHz, but the emphasis should

be more on smoothness of roll-off than on the nominal range covered. Such a speaker will greatly improve results from many systems, and later, when the system itself is improved, the same speaker should still give a good account of itself, perhaps with the aid of a little bass and treble lift. At worst, it will be a good midrange unit, to be backed up later by tweeters and woofers to taste.

The next problem is to select this speaker. The choice and placement of speakers is a complex subject which cannot be covered in this article. It is well worth a bit of study, and one readable, non-mathematical source of information is Ralph West's little book *Loudspeakers in your home*. For the D-I-Y man there is also *Five Speakers*—both are published by Miles Henslow. One thing is certain, the choice can only be finalised in your own home. Comparing different loudspeakers which are scattered over the length and breadth of a plush demonstration room, sometimes not even fed from a common source, and with non-exacting programme material, may tell you a good deal about the vendors but little, unhappily, about the loudspeakers. The remedy is to insist on A-B comparisons between only two speakers at a time, placed as close as possible to one another, bearing in mind any special requirements such as making sure that corner horns are in corners while electrostatic doublets are not.

Having narrowed down the choice to one or two possibles, ask for a home demonstration of these, doing your best to borrow a good, clean source and amplifier for the purpose—the dealer may be able to help here, though it *is* asking rather a lot! It is also worth trying to persuade any friend with good (and portable) speakers to come and try them in your home. One final point: it is very tempting to take advantage of the very small size of the latest I.B. speakers, and if space is really at a premium, why not? But if you like the full sonority of a double-bass or the sheer weight of organ pedal stops, it is worth remembering that, good though the I.B's undoubtedly are, a good big 'un still beats a good little 'un, and this must always be set against the size advantage.

With the loudspeakers duly installed, the next step will probably be preceded by a conference with your wife, not necessarily about finance, but more about the physical shape of the system. There is now a choice between two forms, individual free-standing units, or a cabinet in which can be fixed units which are unsuitable for display.

Clearly, appearance and space occupation are important factors in this choice, but there are other considerations too. Free-standing units are dearer than their counterparts, since they must be better finished all round, often with special decorative casework, and must be electrically safe. Against this must be set the cost of a separate cabinet, so that the total cost difference between the types may not be significant. Free-standing units have the advantage of versatility of positioning, need little or no floor space, and can often be tucked away in otherwise useless corners. They are easily removed for exchange or service. Against this must be set the difficulty of providing really neat inter-unit cabling, the extra dusting, and the scope for tiny inquisitive fingers. Further, free-standing units from different manufacturers may not match one another, and a manufacturer may change his styles between the purchase of one unit and another. This can result in conflict between technical and aesthetic considerations. The one unit which can gain a great deal by being free-standing, in the right circumstances, is the turntable, as we shall see later.

A cabinet keeps everything nice and tidy, conceals wiring and all but the more glaring stylistic differences between units, and keeps out dust. It may also contain record storage, and it is usually easy to fix it up with extra circuit switching facilities to your own requirements. It is a piece of furniture, and occupies floor space which may or may not be a good idea, depending on the room available. Once installed, it is not easily moved. Some manufacturers do make units suitable for cabinet or free-standing use, and one wishes that all would either do this, or provide optional free-standing trim for cabinet-mounting equipment.

If you finally decide on a cabinet, there are one or two points to watch. First—you wouldn't try to build a loudspeaker into it, would you? Of course not—*you* know better than that! Next comes the choice of cabinet size. There are four known sizes: Too Big, Just Right, Goes-at-a-Pinch, and Too Small, and the rule is that every cabinet is one category smaller than it appears to be. Thus no cabinet can ever be Too Big—a simple fact which any practitioner will be glad to confirm. Thirdly comes cabinet style. Remember that each replacement of one unit by another, or even the simple installation of a new unit, requires some wood-botching (experts call it carpentry). The results can be visible. So, unless you are a fully paid-up cabinet-maker, go for the style in which lids and doors cover the unit panels, and see that the latter are replaceable. This makes installation easier, and new panels can easily be fitted if the old ones begin to look too tatty. Check for good

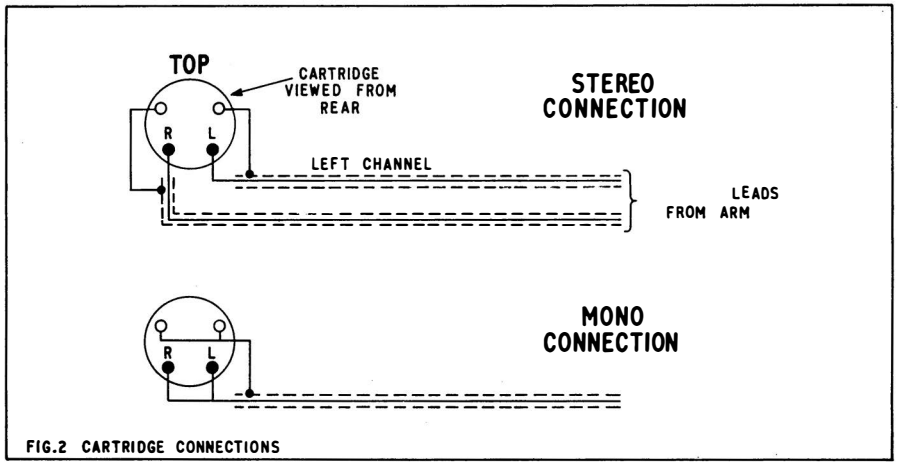


FIG.2 CARTRIDGE CONNECTIONS

clearance between panels and outer casework, of course.

Fourthly, make sure that the cabinet is adequately ventilated Pegboard backs can usually be thrown away—they are seldom visible anyway, and have a nasty habit of admitting dust freely while greatly restricting the airflow (how this happens is a mystery). Keep the cabinet a few inches from the wall. Fifthly, check that you will have adequate access to all units when installed and cabled. Connections which can be reached only by the proverbial trained and half-starved ferret are a perpetual source of annoyance.

When planning out a cabinet, remember that future acquisitions may be larger than their current counterparts, or may have different fixing arrangements, so allow plenty of space wherever possible. This is particularly necessary around turntables, where longer arms, deeper motors or higher turntables may be fitted later, and where plenty of space makes daily use much more pleasant. Record players sunk below the general deck level also tend to be awkward to use.

Finally, when to buy the cabinet? It can give no audible improvement, so our order of priority can't include it, and this must be a purely personal decision. There is a lot to be said for putting it next after the loudspeakers, since it keeps things tidy, avoids some of those situations aptly called "*potentially* dangerous" by "Which", and can help in choosing units.

With the type of system firmly in mind we can now choose the next item for replacement. It is usual to find that signal sources need improvement more than the straightforward amplifying parts of the chain, and we will therefore take as our candidate the source that often needs attention most—the record player, or if you prefer the term, record transcription unit This can be conveniently divided into two parts, the turntable, which rotates the record at the correct speed, and the arm/cartridge combination which enables the information in the groove to be extracted. The latter part is the more important since it is the one that can write off expensive L.P.s if it has certain faults, whereas turning the disc at a wrong or variable speed hurts nothing except one's sensibilities. First priority, then, is a good arm and cartridge.

The choice now lies between an integrated system and an independent arm and cartridge. The former has the advantage that the manufacturer can design the whole for optimum performance, with special attention to placing the l.f. resonance safely between rumble and lower audio frequencies, and clear of any slip frequency component in the drive motor—often at 22½ Hz. Against this must be set the cost of buying the whole thing at one go, and the snag that the arm will not usually be useable with any other cartridge, so that any future change of cartridge may involve you in buying a new arm as well. There are some integrated types in which the cartridge is removable, and can be fitted by suitable adaptors to other arms. If you contemplate such a type, ensure that its cartridge is compatible with any separate arm you have in mind, in respect of fixing arrangements, mass, and electrical connections.

For the separate arm/cartridge buyer, the cartridge should have priority in that, as far as it is possible to dissociate it from its arm, it is the component which can cause most wear and unfaithful reproduction. If the cash will not stretch too far, there is some point in buying really good cartridge and fitting it to a cheaper,

but respectable arm. The same cartridge can later be transferred to a more expensive arm.

What are the main pitfalls to avoid in buying a cartridge? Perhaps the most obvious is not to buy a mono one. The choice in mono records is narrowing, and soon, perhaps, no more will be made. You pay little or nothing extra for a stereo cartridge, and it can be connected for use with a mono system, usually by connecting the two outputs in parallel.

If your present pickup is an inexpensive crystal type, it probably has a high output and feeds an amplifier with little or no frequency correction. Your new and better one may still be crystal (or ceramic), but will probably have a lower output. If you buy a moving iron or moving coil type, output will be very much reduced, and frequency correction to the usual RIAA standard will be needed. If your present set-up has no suitable pre-amplifiers, and cannot provide the needful gain and/or correction, and you are not replacing it yet, an extra stage may have to be added. If this is done only as an interim measure, it should cost as little as practicable.

This Yearbook contains details of some simple and inexpensive pre-amplifiers for this purpose, while the D.I.Y man will find plenty of simple circuits in the popular journals. Make sure that this or any future pre-amplifier presents the right impedance to the cartridge. Most pre-amplifiers have input provision for a wide range of cartridges, but a check is always worthwhile, and could save endless trouble later. Remember, also, that magnetic cartridges cannot, in general, be used with a ferrous turntable. If you intend to fit a new cartridge to an existing arm, check for mechanical compatibility, including the availability of enough adjustment of the pivot point to permit setting up for optimum tracking. Also check that the arm is suitably wired for the cartridge. **Fig 2** shows the standard corrections to a modern stereo cartridge, and how these can usually be wired for mono use (but check with the supplier!) The usual stereo wiring is also shown. It is not recommended that extra wires should be fitted to an existing arm—it is very difficult to do this without introducing undesirable rotational stiffness into the arm movement.

As far as a new arm is concerned, the chief snags are nearly always mechanical. Will it fit the existing motor board, is the arm height adjustable to accommodate the present turntable, will the counterweight (at maximum extension) clear the cabinet, will it take the present cartridge or is the necessary adaptor available, are essential adjustments (playing weight, bias compensation, lifting device, etc.) accessible after mounting? These are the details to be considered.

With a new arm and cartridge installed, there can still be disappointment with the results, since previously unsuspected faults in the turntable may now show up, especially rumble and hum. If the turntable awaits pensioning off, it's not worth doing anything drastic at this stage, but one or two simple "bodges" may prove useful. If hum is the worry, and it occurs wherever the arm is placed, first check for earth loops (see later). Next, if the hum appears with the arm just off the record, but only when the motor is on, suspect induced hum, especially in magnetic cartridges. This can sometimes be reduced by putting a resistor in series with the motor, of value such that the motor can only just run at the correct speed with the stylus in the groove and Dust Bug (etc.) in place. Direct screening of the motor, unless very well designed, won't help much and can even make things worse. Lifting the disc above the turntable on extra mats or a wood disc can sometimes help.

If the hum is structure-borne, and mechanically applied to the stylus, examine the motor mountings, replacing hardened rubbers, and lubricate all moving parts. Here, too, a series resistor may help.

Rumble is usually a sign of mechanical wear, frequently in the main bearing, and is often difficult to cure. It is worth cleaning the bearing and re-assembling with thicker oil, and standing the arm mounting board off the chassis on thinnish rubber strips. Failing these, switch in the rumble filter!

When you do replace the turntable itself, most of the possible snags will be similar to those already dealt with. Assuming a good basic design, the only facilities you will be concerned with will be the normal controls and their convenience, the speeds available and their accuracy, or the possibility of adjusting them. If you have some irreplaceable 78's, you may be one of the few who really need this speed—and don't forget that you will need a separate cartridge as well! With few 78's, and perhaps none of special value, you may not worry about this speed, while there is little sign at present of any great use of 16 rpm except for special purposes, such as talking books for the blind.

Speed adjustment is desirable if you have the gift of absolute pitch, or should you wish to make limited transpositions for any purpose. Apart from this the usual interface problems will have to be considered, such as the availability arm mounting board (most good turntables can accept most good arms), and the general dimensions in relation to the space in

which it is to be fitted. Ensure particularly that it can be fitted with the motor as far as possible from a magnetic cartridge.

When the assembly (turntable, arm and cartridge) is complete, an occassional headache is groove-jumping due to vibration or, sometimes, acoustic feedback. The vibration required may vary, in different installations, from a slight cough or the turning of a control knob, to leaping up and down in the middle of the floor. In the latter case the cure is at least straightforward—not dropping things on your toes helps, so does bromide in your tea. In the former case the best, and most certain, cure is to mount the turntable solidly, and preferably on an outside wall of the house. **Figs 3** and **4** show possible ways of doing this for free-standing and cabinet arrangements respectively. Supports taken down to the foundations through clearance holes in the floor are also good, but rarely convenient.

If such methods are not practicable, the last resort is spring mounting, but not by means of the three or four stiff springs sometimes provided, which give the whole plinth a natural resonance at just about the frequency of floor vibrations (several Hz). We need a resonant frequency not above $2\frac{1}{2}$ Hz, and preferably lower. Now it is easy to find the resonant frequency of a spring-mounted system, since it depends only on the extension (or compression) of the springs used, provided they are all of equal length and compliance.

Fig 5 shows a suspension of this type, x being the distance by which each spring stretches when loaded. If the springs are not pre-tensioned, i.e. the coils only just touch one another when the load is removed, then it can be shown that the natural resonant frequency of the system is given by $f=\frac{1}{2\pi}\sqrt{\frac{g}{x}}$ where g is the acceleration due to gravity (32 ft/s ^{2} in British units). Transposing, and putting in values where known, the extension required to give a resonant frequency f is found from the formula: x (in inches) $= 10/f^2$ with less than 3% error. For a resonant frequency of 2 Hz, therefore, x must be about $2\frac{1}{2}$ inches for each spring—quite a stretch! Compare it with some ready-made suspensions in which x can be as little as $\frac{1}{4}$ inch, giving $f=6\frac{1}{2}$ Hz!

If pre-tensioned springs are to be used, proceed as follows. Hang weights on the spring until the coils just begin to open up. Let the weight needed for this be W_0. Increase the load to any convenient higher weight W_1 at which the measured spring extension is a distance y. Calculate $x_0=W_0.y/W_1-W_0)$ Then this value

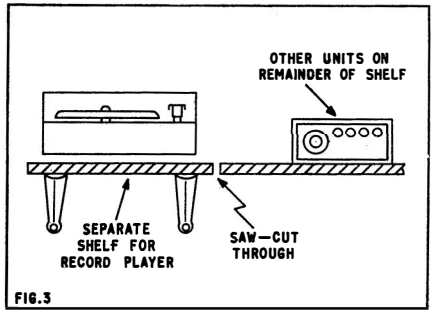


FIG.3

of x_0 is a "built-in" extension which must be subtracted from the calculated value of x to find the actual extension needed.

The simplest way to adjust the extension is to select springs which are rather too stiff, and then add loads as indicated in **fig 5** to get the right extension. The loads can be shifted about on their platform to aid in levelling the turntable. To avoid exceeding the elastic limit of the springs, their unstretched length should be not less than 3 or 4 inches. Shorter springs, if similar, can be used in series if necessary.

There are arguments against this system, not least that of inconvenience in use. Lowering a PU on a spring-mounted plinth is rather like trying to clamber into a small rowing boat in a choppy sea, though pressing the deck down firmly against the panel below helps a good deal. Ideally the suspended mass ought to be damped, but in practise it is difficult to devise a not-too-elaborate damping which is effective

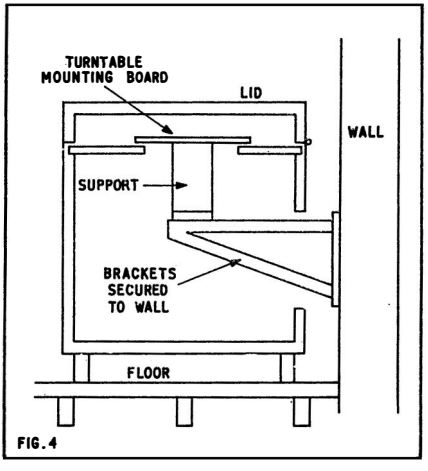


FIG.4

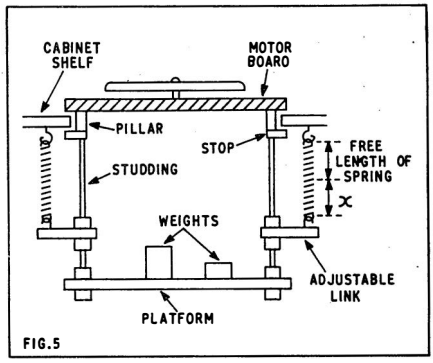


FIG.5

without acting as a short-circuit to the offending vibration. No, it's not a pretty solution in some ways, but it has got a number of people out of trouble, and is certainly better than having to sit as if rigor mortis had set in while you listen to records.

The next programme source for refurbishing could well be the radio tuner, and for hi-fi this means f.m., with a.m. facilities if these are also required. There are possibly less compatibility problems with this unit than with any other, but there are still one or two points to watch. Most important—buy a stereo tuner, or one suitable for stereo with the addition of a decoder. Sooner or later we shall get more stereo programmes (optimist!) and you won't be pleased if you have to scrap a tuner because it is limited by noise performance bandwidth, choice of i.f. etc., to mono working. If the decoder is separate, and you don't buy it with the tuner, make quite sure that it will be available when wanted.

Check also that your stereo tuner or decoder, if separate, is fitted with a low-pass filter to remove residual pilot-tone or switching frequencies from the audio outputs. These can play havoc in tape recorders, their harmonies beating with the bias frequency and its harmonics to produce audible difference tones. Some recorders have input multiplex filters, but the logical (and often the easiest) place to suppress unwanted signals is near their source.

The output level from the tuner must suit your amplifiers—this is seldom any problem. If the output is such that a low gain setting is needed in the following chain, trouble can arise, often in the form of overloading of early stages, and an attenuator should be fitted. It should be at the amplifier end to avoid any top loss in the cable.

On the question of sensitivity—go for all you can get within reason. Perhaps you *can* light a lamp by connecting it to a simple dipole in your present home, but how do you know that in two years time you won't have moved to a different district 50 miles from the nearest transmitter and on the wrong side of a ruddy great hill?

Another programme source is television sound. The execrable noises issuing from the miserable 3 in speaker in the average

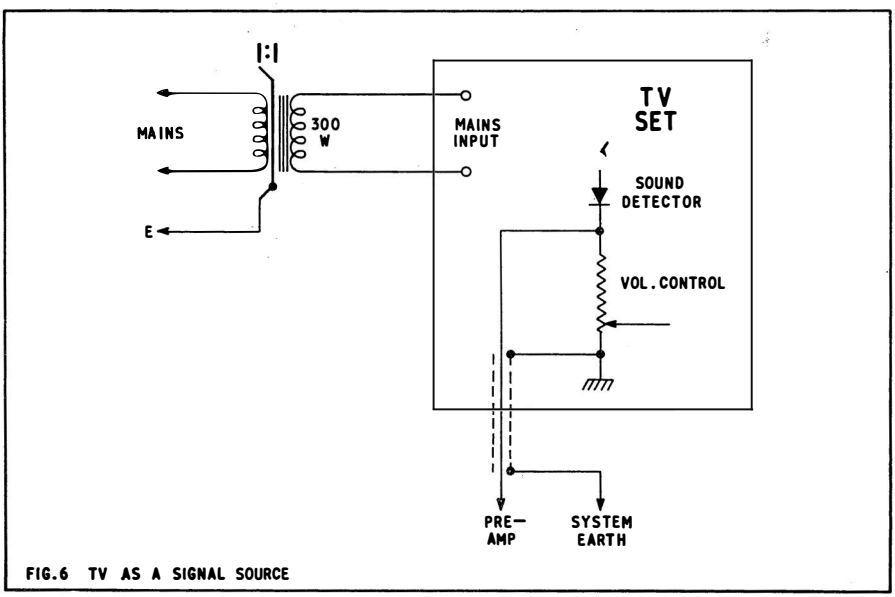


FIG.6 TV AS A SIGNAL SOURCE

domestic TV set are an abomination to anyone who is not totally aurally insensitive. What to do about it? There are two main lines of attack, one being the use of a separate tuner, the choice here being limited, to say the least. The alternative to extract a signal from the TV set at some point in the circuit where it has not yet been too butchered by the cut-price electronics. As the whole contraption is connected to one side (just guess which) of the mains, this is *dangerous*, unless you really know what you are doing. The safest procedure is to isolate the whole set by a double-wound transformer with an earthed interwinding screen, and then make use of the detector output at the volume control **(Fig 6).** The results will be bearable rather than exciting. Some signal butchering has been done before you can take over, and the transmitted sound is often inferior. This is partly due to the special difficulty of TV production, and partly, no doubt, some acceptance of public apathy. (M.A.C. Electronics now make a unit.*ED*)

Our last source is a tape recorder, the choice of which demands a good deal of foresight. What will it *really* be used for? Forget all the party tricks, like recording people unawares—this soon palls. But for use with pre-recorded tapes, or material from the radio, as a background source, or for light entertainment, then a simple cassette machine is worth considering, and need not cost too much. It should be possible to replay via the hi-fi system with a distinct gain in quality.

For really serious work, especially live recordings, a spool machine would usually be chosen, and a number of further choices arise. The most important are tape speed, number of tracks, and mono/stereo. For machines of otherwise, comparable quality the following statements should apply: (*i*) Signal/noise ratio improves with increasing track widths and tape speeds. (*ii*) Frequency response improves with increasing tape speed. (*iii*) Some stereo, two-track machines can separately record each track in the same direction, avoiding spool turnover and increasing accessibility of material.

In **fig 7** speeds are shown vertically and number of tracks horizontally, to give a diagram in which "quality" increases diagonally from $1\frac{7}{8}$ ips and four tracks in the bottom left corner, suitable only for speech or light entertainment, to the 30 ips single track machine normally confined to studios. Semi-professional use, with possible interchange of material with professional sources demands two tracks with $7\frac{1}{2}$ ips minimum and 15 ips available if possible. Serious live recordings for private use and interchange with other enthusiasts can certainly be made on two tracks (stereo, of course) at $7\frac{1}{2}$ ips. Other combinations may well suit individuals, but machines of comparable quality will show an increasingly noticeable deterioration in results at lower speeds or narrower tracks. The "education factor" mentioned earlier is an important one in this field also—what seemed so good in the shop is a pain in the ear after a month's use. A-B tests in your own home are a help, of course.

Another tape recorder feature often ignored by buyers is the spool size accommodated and its influence on the use of multi-play tapes. Not for nothing do the professionals use standard play (rarely even long play) tape on spools at least 10 in. in diameter. It is not always

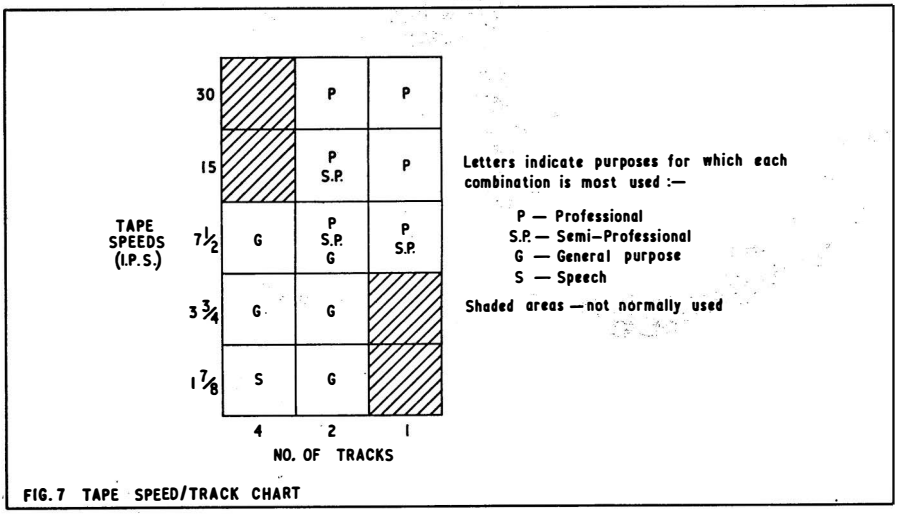


FIG. 7 TAPE SPEED/TRACK CHART

realised that the longer the play (i.e. the thinner the tape) the more expensive it is per unit replay time—or per foot length, if you like—and the more likely is "print-through" at the peak recording levels needed for the best signal/noise ratio. Moreover, the greater the ratio of outer/inner diameter of the feed spool, the more change in wow and flutter is likely to occur between beginning and end of the reel. In fact, about the only advantages of small reels of multi-play tape are their smaller storage space requirements and the fact that they make portable recorders more practicable. For semi-professional work a 10 in. capacity is desirable, with the facility for fitting NAB hub adaptors. For other serious work, an $8\frac{1}{4}$ in. or at least 7 in. diameter is to be preferred. Spool clamps are also desirable.

No tape machine worth the name lacks inputs and outputs for use with hi-fi systems, and the same considerations apply here as in connecting any pair of units—cable lengths and input and output impedances must be compatible.

At last we come to the amplifiers. There are two basic blocks to consider, the pre-amplifier, with provision for source selection and frequency equalisation (where required), and including volume, stereo balance and tone controls and any filters, and the main amplifiers, which provide the power to drive the speakers. There is an increasing tendency to build both blocks into a single unit with stereo outputs, and many system builders will find this convenient, especially with free-standing arrangements. If you wish to replace existing units piecemeal, however, there is still a very wide range of available "separates". For maximum improvement, if only in convenience, the pre-amplifier usually merits priority, and the chief points needing attention are as follows.

First, and most obvious, the output level and permissible load impedance must be suitable for both present and future power amplifiers. Next, there must be stereo inputs for all sources (mono will do for an a.m. tuner or a TV hook-up). These must be of the right impedance, and include the appropriate equalisations—thanks to a measure of standardisation this is unlikely to present difficulty with future additions. An extra auxiliary input can be useful for use with a microphone, a test oscillator, for A-B tests with external units, or merely to take care of that extra item you didn't forsee!

Next, the pre-amplifier switching should either control the supplies to the input units and/or mute those not in use, to prevent cross-talk. The former avoids the need to turn individual units on separately.

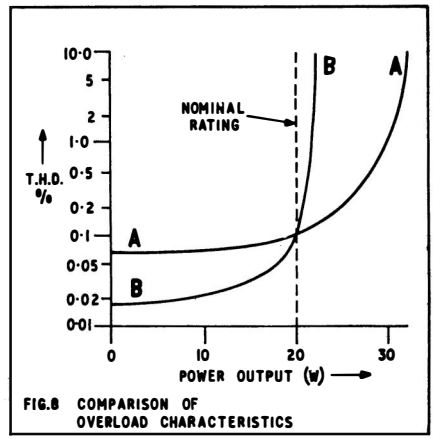


FIG.8 COMPARISON OF OVERLOAD CHARACTERISTICS

Tone and volume controls and filters call for little comment except that those with some sort of calibration, however arbitrary, can at least be re-set easily to pre-determined positions. The "flat" positions should also be marked to facilitate testing. Of filters, the variable slope/variable cut-off type is the most useful. Rumble filters have their uses, as we have seen, but should be switchable—with your new turntable they should not be needed, and may attenuate low audio frequencies.

Our last units for replacement are the main amplifiers. Plenty of valve and transistor amplifiers of impressive specifications are available, and many are first class. But specifications may need interpretation, and we also have to decide what specification is adequate—herein lie one or two more pitfalls.

The input and output impedances are no problem as long as they are suited to the pre-amplifier and speaker respectively. The most usual speaker impedances are 15Ω and 8Ω (nominal), but it may be convenient to have an amplifier with adjustable matching, so that future paralleling or rearrangement of speakers can be carried out without power loss.

The available power output is the next concern. How much is needed? This depends on many factors, including the loudspeaker efficiencies, the listening room acoustics, the sound pressure levels to be set up, the overload capacity wanted, and so on. With the tendency to use smaller "I.B." speakers of lower efficiency, electrical power levels are rising, and yesterday's adequate amplifier may be running out of watts tomorrow. Some criterion must be adopted however, and a few facts may help to give some perspective.

The sound intensity in a concert hall when a large orchestra or organ is playing *molto*

fortissimo frequently reaches peak levels exceeding 100 dB (ref. 10^{-6}W cm^{-2}). To produce these levels in an "average" domestic room of about 1,500 cubic feet the acoustic power at the loudspeaker must be of the order of 0·05 watt. For a speaker efficiency of 1% (not uncommon in smaller units) this means an amplifier output of 5 watts. However, in speech and music there occur large amplitude transients, and these may exceed the "normal" peak levels by as much as 20 dB. Clipping these will produce distortion which becomes increasingly noticeable as the clipping level is lowered, and which may be considerably emphasised by d.c. blocking effects in the amplifier resulting from signal rectification. In practice a reserve of about 10 dB usually gives acceptable results (to all but the most fastidious) so that the available output power must be about 15 watts. This power level must not introduce noticeable distortion, so we need 15 watts at less than (say) 1% distortion. Moreover, in stereo it is possible to have separate peaks in either channel, so we need this reserve in both. If the room is much larger, or is acoustically dead, the power level will have to be raised further.

Armed with this information let us look at one method, used too often, of rating amplifiers for advertisement purposes. "Generous 30W of output power" a banner headline may declare. When we look further (not always easy to do) we discover that this is the total power for both channels, so we have 15W per channel. But is this the normal sine wave rating, or has an arbitrary factor of 2 already been allowed for the lower *average* power in speech and music? If so, the power rating for our purposes is only $7\frac{1}{2}$ watts per channel. Still just about enough? Wait a minute—into what load are these $7\frac{1}{2}$ watts delivered? Some advertisers quote outputs into 8 ohms even when they claim 15 ohms as a normal load. Now amplifiers behave like constant-voltage generators, so the power into 8 ohms will be less than that into 15 ohms, and we are now down to about 4 watts per channel! Caveat emptor, again!

On distortion it can be said that no self-respecting amplifier should give audible distortion at full power. The behaviour beyond full power is important, though, and a smooth and relatively slow rise in distortion is preferable to a sharp one. In **fig 8,** amplifier B is superior up

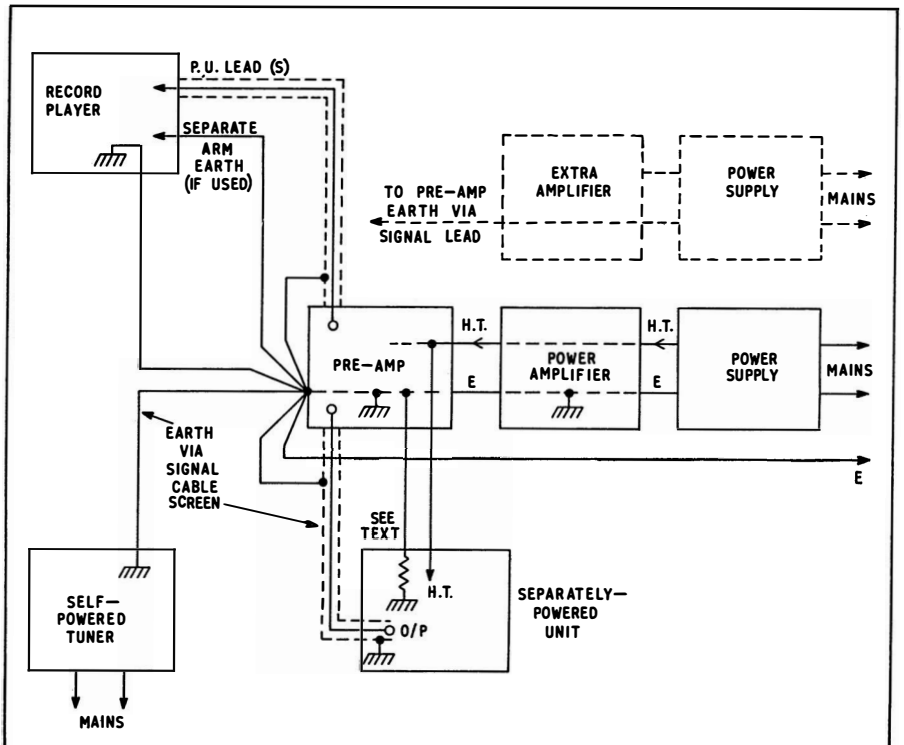


FIG.9 AVOIDING EARTH-LOOPS

to the rated output power (20W in each case), but the difference is unlikely to be audible, whereas amplifier A will be much superior on overload. Some inferior power amplifiers have crossover distortion products whose amplitude remains about constant down to low signal levels, where they are most noticeable. For transistor amplifiers, therefore, check on the distortion claimed at low levels as well as at full rating.

All units have now been replaced, and you can start on the next round as soon as you like! Before getting this far, however, you have had some wiring to do, and this may have raised more problems.

The most universal bug-bear is hum due to earth loops. The rules for avoiding this are simple, and are incorporated schematically in **fig 9.** Only one point in the whole system must be earthed and the best and most convenient one is nearly always the pre-amplifier chassis. All other earths, including those for power supplies, must be returned to this point. It is common practise to use the screens of signal-carrying cables for this purpose, but this can introduce a serious hazard to health. Consider **fig 10,** which shows power being supplied by an amplifier to another unit, the earth return being via the screen of the signal lead. If the latter is now disconnected, the full supply potential can appear across the opened connection! To avoid this danger a separate earth lead is included in the power supply cable **(Fig 11),** and connected to chassis in the unit through a resistor of 50-100 ohms. This is large enough to make any circulating earth currents negligible, but small enough to shunt your body resistance. A really good quality component of adequate rating for the ht current should be used—your life may depend on it one day, perhaps long after you have forgotten its existence. Needless to say, mains returns should **NEVER** be made through cable screens even if they are insulated, and connectors should be so arranged that the neutral cannot be broken without also breaking the live. In all connectors, pins exposed on disconnection should be dead, only shrouded sockets remaining live if a switch has accidentally been left on. All sheer kid stuff? Take a *good* look at that "temporary" lash-up you haven't touched for the last three years!

Lastly, a few words about the major topic of the day—economic policy. As you buy new

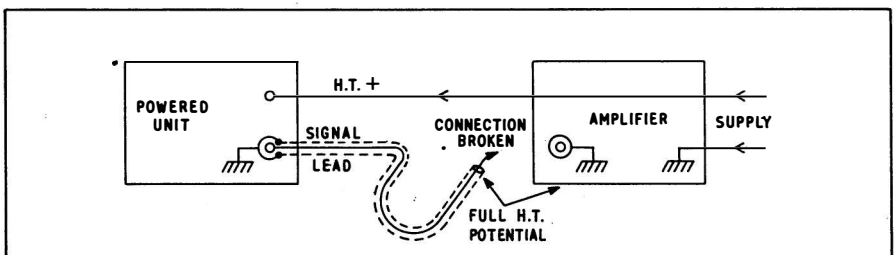


FIG.10 RETURNING SUPPLIES THROUGH SIGNAL CABLE SCREENS IS HAZARDOUS

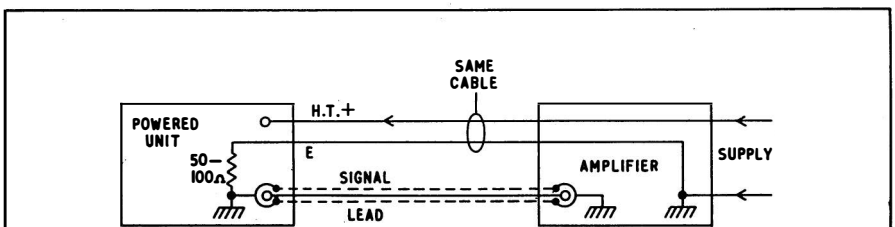


FIG.11 A SAFER EARTHING SYSTEM WHICH STILL MINIMISES HUM

blocks for your ultimate deterrent you may be able to sell off the old ones to those not so advanced—for a cash advantage. Things are complicated by the steadily rising cost of new equipment, but **fig 12** attempts to show that there is an optimum for "swopping". The curve A shows the rising cost of the item you originally purchased, based on unit price, while curve B shows the same thing for the better model you couldn't afford then, but covet later. These curves assume a doubling of costs per decade.

Curve C shows how the value of your purchase is depreciating. There is a sharp drop as you leave the shop—it is now secondhand and you have lost at least the purchase tax. Then the fall continues, slowly at first while the item is still in "mint" condition, then faster, finally slowing up again as scrap value is approached.

If you want to swop item B in region I, then it is almost certain that you should not have bought A in the first place! Region II is about optimum—you haven't lost too much on your outlay, and perhaps you can raise the extra cash (or credit) to acquire B. By region III you have waited too long—your current model is worth little, and may be better kept as a spare, or given to someone as a goodwill offering. In region IV, the cost of advertising alone is more than the market value. Curve D, shows the probable cost of B if you don't mind a secondhand one.

All a bit tongue-in-cheek of course, but it does illustrate some valid points, including the fact that shortage of initial capital means greater total expenditure for the same objective. No, Sir, the diagram does *not* allow for any increase in your income. Surely you have heard of the Finance Bill . . ? Happy Growing!

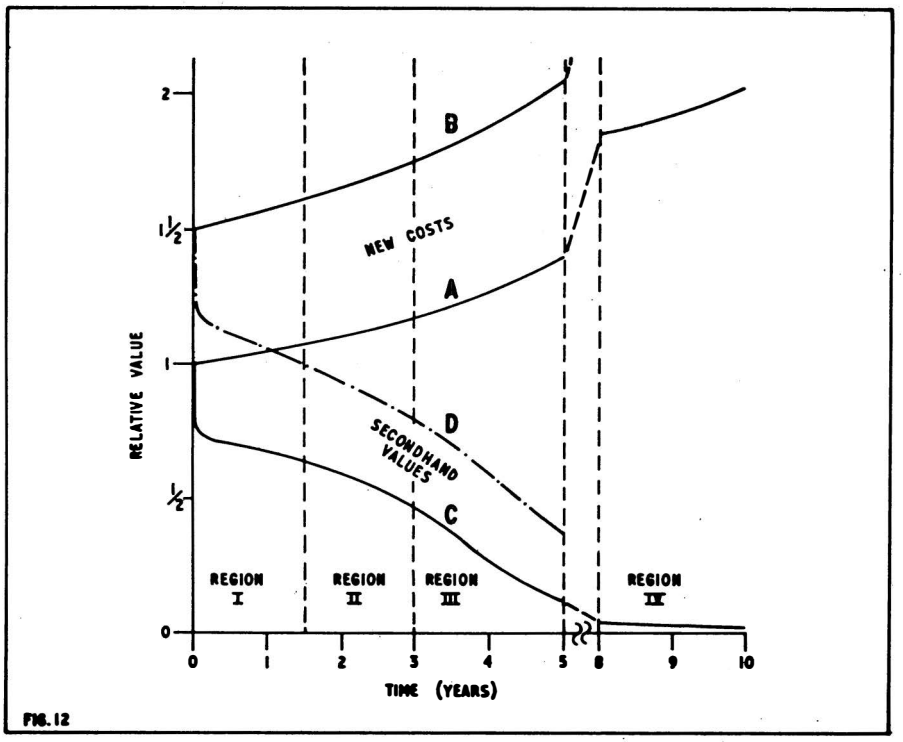
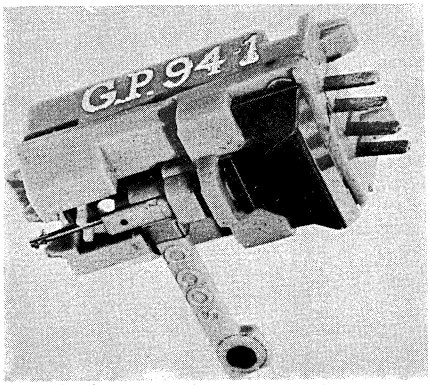
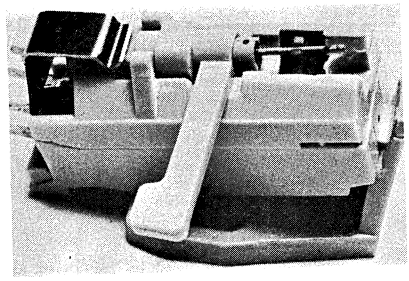


FIG. 12

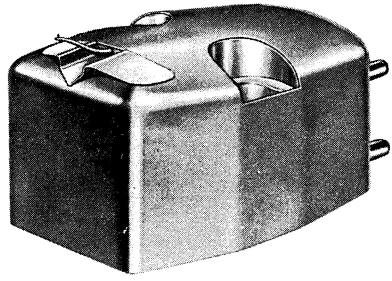


Acos GP.94-1 cartridge

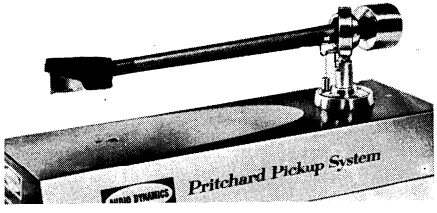


Acos GP93 crystal stereo

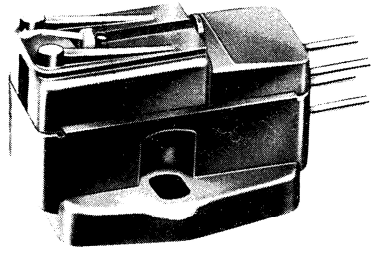
Acos GP91-ISC



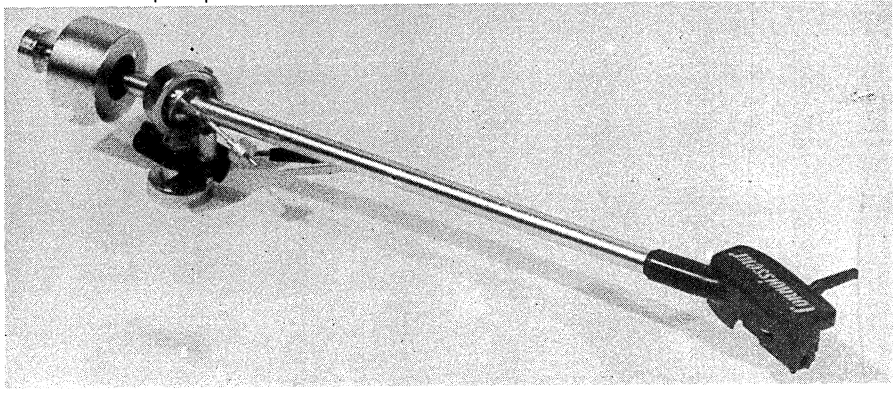
ADC professional cartridge



ADC Pritchard pickup arm



Connoisseur stereo ceramic cartridge



Connoisseur SAU II pickup arm

DIRECTORY OF PICKUPS AND ARMS

★ In the abridged specifications of this directory, the following abbreviations are used for economy of space: **Pw**=recommended playing weight; **mg**=milligram; **gm**=gram; **Rec load**=recommended resistive load; **mV**=millivolt. In all cases where decibel limits for frequency response and frequency for stated separation are given by manufacturer, these are included. Output is usually referred to a recorded velocity of 1 cm/sec; this figure should be multiplied by five for the practical music output. ● denotes stereo equipment.

AUDIO AND DESIGN LTD., 40 Queen Street, Maidenhead, Berks. Tel: Maidenhead 25204.

Laboratory 9. 9 in. pickup arm designed for low-mass ultra-high compliant cartridges tracking at very low stylus pressures. Damped unipivot arm with no lead-out wires. Bias correction and lifting device incorporated. Lathe base all fully adjustable by finger locking levers. Price: £25 (plus £5 4s. 1d. PT).

Laboratory 12. 12 in. version for professional use available to special order. Price on request.

★

AUDIO DYNAMICS CORPORATION, New York, U.S.A. Sole U.K. agents: KEF Electronics Ltd., Tovil, Maidstone, Kent. Tel: Maidstone 57258. Cables: KEF, Maidstone.

●**ADC 10/E Mk II.** Stereo cartridge. Induced magnet. Sensitivity 4 mV at 5·5 cm/sec. Separation 30 dB, 50 Hz-10 KHz. FR 10 Hz-20 KHz ±2 dB. Stylus 0·7 × 0·3 diamond. Vertical tracking angle 15°. Pw ½-1½ gm. Compliance 35×10^{-6} cm/dyne. Cartridge weight 7 gm. Designed for use only with the ADC 40 arm. Price: £37 10s. (plus £7 18s. 4d. PT).

●**ADC 660.** Stereo cartridge. Induced magnet. For use with all high grade arms. Stylus 0·5 thou diamond. Sensitivity 7 mV at 5·5 cm/sec. FR 10 Hz-20 KHz ±3 dB tracking angle. Pw 1½-4 gm. Compliance 20×10^{-6} cm/dyne. Weight: 7 gm. Separation 30 dB 50 Hz to 8 KHz. Price: £13 5s. (plus £2 15s. 11d. PT).

●**ADC 660/E.** Similar specification to ADC 660 but with elliptical stylus 0·3 × 0·7 thou. Pw 1½-3 gm. Price: £18 15s. (plus £3 17s. 1d. PT).

●**ADC 220.** Stereo magnetic cartridge. Full details and price not available at time of going to press.

ADC 40 Mk II. Complete low inertia arm with side thrust compensator and anti-drag lead out arrangement. Single-thrust ball bearings used at four points. Accurately machined walnut non-resonant arm. Adjustable counter-weight. Plug-in head shell accommodates nearly all cartridges. Easy installations. Built-in arm rest. Arm length 10⅝ in. overall. Pivot to stylus tip 9 in. Rear overhang 1¾ in. Price: £15 15s. (plus £3 6s. 6d. PT).

★

AUDIO-TECHNICA. Distributors: Shriro (U.K.) Ltd., 8 Bush Lane, Cannon Street, London, E.C.4. Tel: 01-626 4711/3. Cables: Shriro, London, E.C.4.

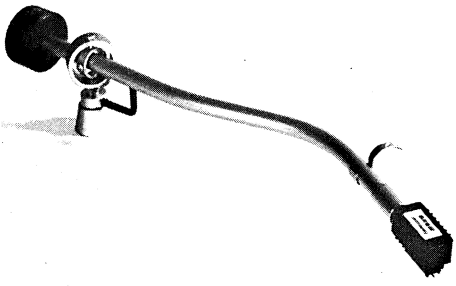
●**AT-66.** Stereo moving magnet cartridge. Du-exciting principle. Tracking angle 15°. Pw ½-2 gm. Compliance: 30×10^{-6} cm/dyne. Output: 4 mV at 1 KHz 5 cm/sec. Separation: 25 dB at 1 KHz. FR 10 Hz-20 KHz ±2 dB. Stylus: 0·7 thou. diamond. Price: £6 2s. 6d. (including PT). Replacement stylus AT66-7D (grey) £3 8s. 6d. (including PT).

●**AT-21.** Stereo moving magnet cartridge. Du-exciting principle. Tracking angle 15°. Pw ½-2 gm. Compliance: 30×10^{-6} cm/dyne. Output: 4 mV at 1 KHz 5 cm/sec. Separation: 30 dB at 1 KHz. FR 10 Hz-25 KHz ±2 dB. Stylus: 0·5 or 0·7 thou diamond. Price: £8 11s. 3d. (including PT). Replacement stylus AT21-7D (grey) £5 17s. (including PT).

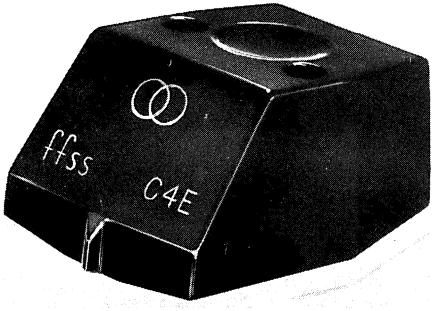
●**AT-21X.** Similar to AT-21 but with 0·3 × 0·7 diamond stylus. Price: £15 4s. 6d. (including PT).

●**AT-33.** Stereo moving magnet cartridge. V-magnet principle. Tracking angle 15°. Pw ½-2½ gm. Compliance: 23×10^{-6} cm/dyne. Output: 5 mV at 1 KHz 5 cm/sec. Separation: 27 dB. FR 10 Hz-20 KHz ±2 dB. Stylus: 0·7 thou diamond. Price: £10 10s. 6d. (including PT). Replacement stylus AT33-7D (grey) £5 7s. 6d. (including PT).

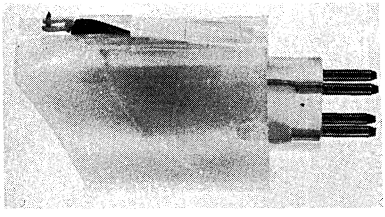
●**AT-35.** Stereo moving magnet cartridge. V-magnet principle. Tracking angle 15°. Pw ½-2½



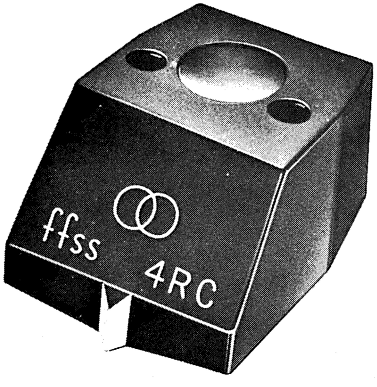
Connoisseur Classic pickup



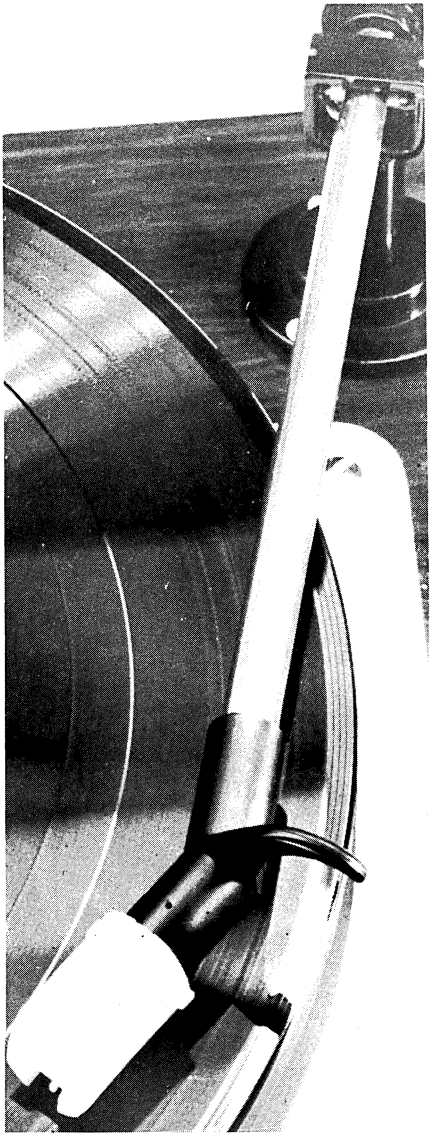
Decca C4E Mk 4



Decca Deram cartridge



Decca ffss 4RC cartridge



Decca Anti-Rumble pickup

Decca Mk. I "Super" arm and head

gm. Compliance: 23×10^{-6} cm/dyne. Output: 5 mV at 1 KHz 5 cm/sec. Separation: 30 dB. FR 10 Hz-25 KHz ±2 dB. Stylus: 0·5 or 0·7 thou diamond. Price: £18 4s. 6d. (including PT). Replacement stylus AT35-5D (0·5 thou yellow) £13 1s. 6d. (including PT); AT35-7D (0·7 thou grey) £13 1s. 6d. (including PT).

●**AT-35X.** Similar to AT-35 but with $0{\cdot}3 \times 0{\cdot}7$ diamond stylus. Price: £23 16s. 3d. (including PT).

★

BANG & OLUSEN U.K. DIVISION, Eastbrook Road, Gloucester. Tel: 0452 21591.

●**SP6, SP7, SP8, SP9.** Stereo cartridges. Moving iron. Pw 1-3 gm. Tip mass 1·5 mg. Compliance $12\text{-}15 \times 10^{-6}$ cm/dyne. FR 20 Hz-20 KHz ±2·5 dB. Separation approx 28 dB at 500 Hz. Output 7 mV per channel at 5 cm/sec. Rec load 47K. Diamond stylus. Fully shielded. Stylus protected against damage if arm dropped on record. Replaceable stylus assembly. SP6 for standard ½ in. fixing centres. SP7 plug-in fitting for B & O arms. SP8 and SP9 similar to SP6 but with elliptical stylus and gold plated. Price: SP6 and SP7 £6 12s. 9d. (plus £1 9s. 9d. PT); SP8 and SP9 £13 5s. 6d. (plus £2 19s. 6d. PT).

●**Stereodyne SP.1 and SP.2.** Stereo cartridge. Moving iron. Plug-in. Stylus 0·7 thou diamond. Pw 2-4 gm. Range 30 Hz-15 KHz ±2 dB. Separation 22 dB min. Output 7 mV. Rec load 47K. Price: £4 19s. 3d. (plus £1 2s. 3d. PT). Replacement styli: 0·5, 0·7, 1·0, 3·0 thou diamond. Price: £2 6s. (plus 10s. 6d. PT).

●**ST/L.** 9 in. pickup arm, less cartridge. Price: £6 12s. 9d. (plus £1 9s. 9d. PT).

●**ST/P arm.** Professional 12 in. arm. Price: on application.

●**GF2, GF3 Pre-amplifiers for above.** See Pickup Accessories section.

★

BSR LTD., Monarch Works, Cradley Heath, Warley, Worcs. Tel: Cradley Heath 69272. Telex 33282.

●**C.1.** Ceramic stereo turnover cartridge. Stylus: sapphire or diamond, ·0007 LP/stereo, ·0025/78. Pw 2-6 gm. Lateral and vertical compliances 5×10^{-6} cm/dyne and 3×10^{-6} cm/dyne. FR 20 Hz-10 KHz ±2 dB, up to 15 KHz −6 dB. Output: 0·11V ±2 dB. Load impedance: 2 megohms 100 pF. Price: (sapphires) £2 10s. (plus 10s. 9d. PT); (diamond LP) £3 2s. 6d. (plus 13s. 7d. PT).

★

BURNE-JONES & COMPANY LTD., 18 Brunswick Road, Sutton, Surrey.

B.J. Tan/11 arm. Designed to overcome tracking error. Total tracking error less than ½ degree. Height adjustable. Price: £2 2s.

B.J. Super 90 Mk. II pickup arm. Two models. 12 in. and 16 in. Price (including plug-in shell to carry standard cartridges) £8 8s.

★

CONNOISSEUR. See A. R. Sugden and Co. Ltd.

★

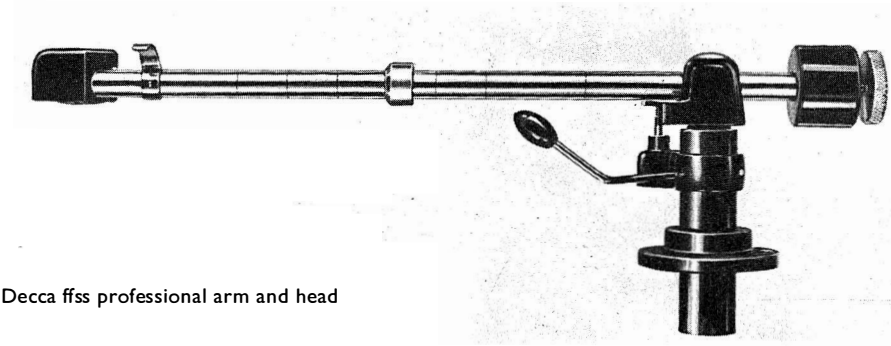
COSMOCORD LTD., Eleanor Cross Road, Waltham Cross, Herts. Tel: Waltham Cross 27331. Cables: Acos, Waltham Cross.

●**ACOS GP77 Stereo.** Ceramic. For Hi-Light pickup. FR 50 Hz-15 KHz ±3 dB. Output 30 mV/cm/sec. Separation −20 dB at 1 KHz. Rec input impedance 2 megohms or higher. Pw 2 gm. Compliance 6 micro-cm/dyne. Effective tip mass 0·9 mg. Diamond stylus, 0·5 thou. Price: (with diamond stylus) £2 6s. 6d. (plus 10s. 1d. PT).

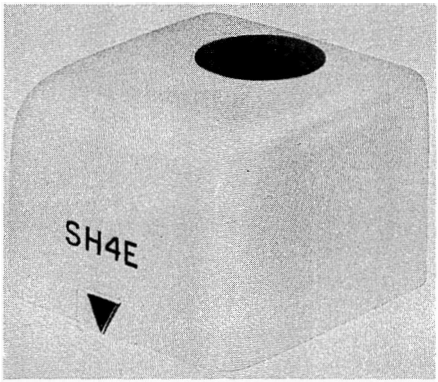
●**Acos GP77 Mono LP.** Ceramic. FR 50 Hz-18 KHz ±3 dB. Rec input impedance 2 megohms. Pw 2 gm. Compliance 6 micro-cm/dyne. Effective tip mass 0·9 mg. Diamond stylus, 1·0 thou. Price: (with diamond stylus) £2 6s. 6d. (plus 10s. 1d. PT).

Acos GP77 Mono 78. Specification as for LP head. Sapphire stylus, 2·5 thou. Price: (with sapphire stylus) £1 11s. (plus 6s. 9d. PT).

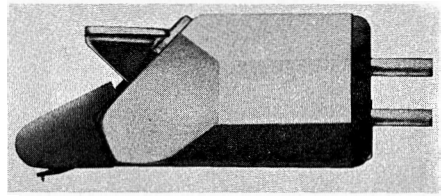
Acos 91-1 SC. Mono/stereo compatible crystal cartridge. Turnover dual stylus. Pw 3-6 gm. Tip mass 2·5 milligram (sapphire), 2·8 milligram (diamond). Compliance: vertical 2×10^{-6} cm/dyne, lateral 4×10^{-6} cm/dyne. FR 50 Hz-12 KHz. Output 178 mV. Rec load 1 megohm. Price: (sapphire/sapphire) £1 7s. 6d. (plus 5s. 11d. PT); (diamond/sapphire) £1 16s. 1d. (plus 7s. 10d. PT).



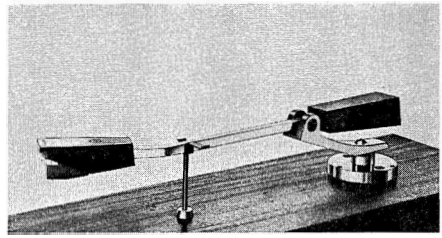
Decca ffss professional arm and head



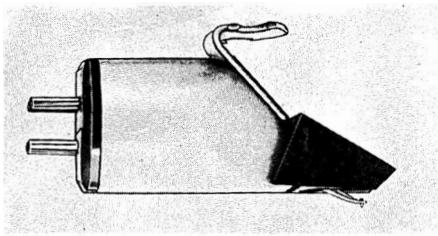
Decca SH4E Mk 4



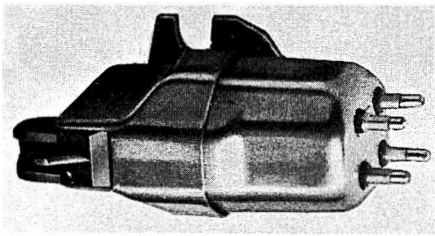
Empire Scientific 888SE



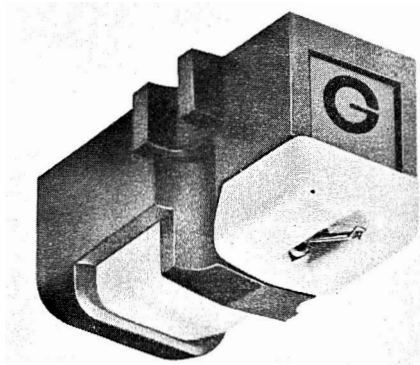
Goldring G65 pickup



Empire Scientific 808



Empire Scientific 880P



Goldring 800 cartridge

Acos GP92. Mono ceramic cartridge. Turnover stylus assembly. LP 0·8 thou diamond or sapphire, 78 2·5 thou sapphire. Pw 5-10 gm. Tip mass 2·5 mg dynamic. Compliance $2{\cdot}5 \times 10^{-6}$ FR 150 Hz-16 KHz $\pm$ 3 dB, 12 dB down at 30 Hz relative to 1 KHz. Output 100 mV. Load impedance 1 megohm. Low temperature coefficient. Price: (sapphire/sapphire) £1 10s. (plus 6s. 6d. PT); (diamond/sapphire) £2 (plus 8s. 8d. PT).

●**Acos GP93.** Stereo crystal cartridge. Turnover dual stylus. Stylus 0·6-0·7 thou diamond or sapphire, 2·5 thou sapphire. Pw 4-8 gm. Tip mass 2·5 mg dynamic. Compliance: vertical $2{\cdot}2 \times 10^{-6}$ cm/dyne, lateral $2{\cdot}2 \times 10^{-6}$ cm/dyne. FR flat 250 Hz-18 KHz 3 dB down at 100 Hz relative to 1 KHz. Output 250 mV. Rec load 1 megohm. Low temperature coefficient. Price: (sapphire/sapphire) £2 (plus 8s. 8d. PT); (diamond/sapphire) £2 10s. (plus 10s. 10d. PT).

●**Acos GP94.** Stereo ceramic cartridge. Turnover dual stylus. Stylus 0·6-0·7 thou diamond or sapphire, 2·5 thou sapphire. Pw 2-4 gm. Tip mass 2·5 mg dynamic. Compliance: lateral 5×10^{-6} cm/dyne, vertical 6×10^{-6} cm/dyne. FR Flat 100 Hz-12 KHz, 7-8 dB down at 30 Hz relative to 1 KHz. Separation 20 dB at 1 KHz 8 dB at 10 KHz, minimum. Output 80 mV minimum. Load impedance: 1 megohm each channel. High capacity ceramic elements (1,000 pF). Low temperature co-efficient. Price: (sapphire/sapphire) £2 5s. (plus 9s. 9d. PT); (diamond/sapphire) £2 15s. (plus 11s. 11d. PT).

●**Acos GP95.** Specification and price as GP93. Stylus (LP) 0·7-0·8 thou; (stereo/LP) 0·6-0·7 thou.

●**Acos GP96.** Specification and price as GP94 Stylus (LP) 0·7-0·8 thou; (stereo/LP) 0·6-0·7 thou.

★

DECCA SPECIAL PRODUCTS, Ingate Place, Queenstown Road, London, S.W.8.
Tel: 01-622 6677.

●**Deram ceramic.** Stereo/mono cartridge. White shell transcription quality. Pw 2·5 gm. Tip mass 0·6 mg. Compliance 9×10^{-6} lateral, 5×10^{-6} vertical. FR 18 Hz-18 KHz $\pm$3 dB. Separation better than -20 dB at 1 KHz. Output 50 mV per channel. Rec load impedance 2 megohms. Stylus 0·5-0·6 thou diamond. Price: £4 6s. 3d. (plus 18s. 9d. PT).

NOTE: All Deram cartridges are of transcription quality, the black shell range intended primarily for cheaper auto-changers is discontinued.

Deram ceramic. Mono cartridge. Stylus 1 thou diamond. All other details as for stereo/mono cartridge. Price: £4 6s. 3d. (plus 18s. 9d. PT).

Deram ceramic. Mono 78 cartridge. Stylus 3 thou sapphire. All other details as for stereo/mono Deram. Price: £2 11s. 9d. (plus 11s. 3d. PT).

●**ffss Mk II head.** Variable reluctance stereo/mono head. FR 40 Hz-16 KHz. Separation -20 dB at 1 KHz, -15 dB at 50 Hz and 12 KHz. Output 1·2 mV/cm/sec per channel. Stylus 0·5 thou diamond. Pw 3·5 gm. Tip mass less than 1 mg. Compliance 10×10^{-6} lateral, 2×10^{-6} vertical. Rec load 50K. Price: £12 19s. 6d. (plus £2 15s. 6d. PT).

●**ffss Mk 4 head H4E.** Variable reluctance stereo/mono head. FR 20 Hz-20 KHz (20 Hz-16 KHz $\pm$2 dB). Separation as for Mk III. Output 5 mV at 5 cm/sec per channel. Stylus $0{\cdot}3 \times 0{\cdot}65$ thou elliptical diamond. Pw 1-2½ gm. Compliance 30×10^{-6} lateral, 6×10^{-6} vertical. Rec load 50K. Output from each channel balanced within 1 dB. Price: £18 3s. 3d. (plus £3 17s. 9d. PT).

●**ffss Mk 4 head SH4E.** Variable reluctance stereo/mono head. FR 20 Hz-20 KHz $\pm$2 dB. Separation as for Mk III. Output 5 mV at 5 cm/sec per channel. Stylus $0{\cdot}3 \times 0{\cdot}65$ thou elliptical diamond. Pw 1-2½ gm. Compliance 30×10^{-6} lateral, 6×10^{-6} vertical. Rec load 50K. Output from each channel balanced within 1 dB. Price: £25 19s. (plus £5 11s. PT).

●**ffss Mk 4 cartridge C4E.** Stereo/mono cartridge. FR 20 Hz-20 KHz (20 Hz-16 KHz $\pm$2 dB). Separation as for Mk III. Output 5 mV at 5 cm/sec per channel. Stylus $0{\cdot}3 \times 0{\cdot}65$ thou elliptical diamond. Pw 1-2½ gm. Compliance 30×10^{-6} lateral, 6×10^{-6} vertical. Rec load 50K. Output from each channel balanced within 1 dB. Price: £18 3s. 3d. (plus £3 17s. 9d. PT).

●**ffss Mk 4 cartridge SC4E.** Stereo/mono cartridge. FR 20 Hz-20 KHz $\pm$2 dB. Separation as for Mk III. Output 5 mV at 5 cm/sec per channel. Stylus $0{\cdot}3 \times 0{\cdot}65$ thou elliptical diamond. Pw 1-2½ gm. Compliance 30×10^{-6} lateral, 6×10^{-6} vertical. Rec load 50K. Output from each channel balanced within 1 dB. Price: £25 19s. (plus £5 11s. PT).

●**ffss Mk 4 cartridge 4RC.** Stereo magnetic head. Diamond stylus 0·5/6 thou. Pw 3·5 gm. Tip mass less than 1 milligram. Compliance: 15×10^{-6} cm/dyne lateral, 4×10^{-6} cm/dyne vertical. FR 30 Hz-20 KHz (30 Hz-16 KHz ± 3 dB). Separation: better than 20 dB. Output: 1·5 mV at 1 cm/sec at 1 KHz. Rec load 47K. Price: £13 16s. 6d. (plus £2 19s. 6d. PT).

ffss Mono 78. Variable reluctance 78 equivalent of Mk II stereo/mono head. Stylus 2·8 thou diamond. Price: £8 13s. (plus £1 17s. PT).

ffss Mk 4 cartridge 78C. Mono magnetic cartridge. Diamond stylus 2·8 thou. Pw 3·5 gm. Tip mass less than 1 milligram. Compliance: 15×10^{-6} cm/dyne lateral. FR 30 Hz-16 KHz ± 3 dB. Output: 1·5 mV cm/sec. Rec load 47K. Price: £8 13s. (plus £1 17s. PT).

Deram ARI arm. Anti-rumble integrated design. Used with Deram cartridge achieves mechanical rumble filter without attenuation of wanted frequencies. Price: £6 0s. 9d. (plus £1 6s. 3d. PT).

ffss Mk I "Super". Transcription arm suitable for all *ffss* heads only. Price: £6 18s. (plus £1 10s. PT).

ffss "Professional" Arm. Suitable for all *ffss* heads. Includes lowering device and pressure adjustment. Price: £15 11s. 5d. (plus £3 6s. 7d. PT).

ffss "International" Arm. Stereo pickup arm. Jewelled uni-pivot. Pw $\frac{1}{2}$-$3\frac{1}{2}$ gm. Constantly variable magnetic bias compensation. Suspended on magnetic cushion. Provision for damping lateral and vertical resonances. Price: £21 12s. 6d. (plus £4 12s. 6d. PT).

NOTES: Decca maintains that head and arm should be designed as an entity for optimum results. For this reason Decca *ffss* arms and heads have an exclusive head fitting, which also ensures accurate alignment. All *ffss* heads will fit all *ffss* arms, but heads with elliptical stylus should be used only with "Professional" arms, or arms reaching the "Super" specification. Original Mk I arms not reaching "Super" specification can be converted for £3 3s.

The anti-rumble properties of the ARI arm depend on its being used with a Deram cartridge. Deram heads are suitable for use with amplifiers having sensitivity of 100 mV.

Styli for all Deram pickup heads, including diamond 78, are £1 7s. 6d. each including PT.

Decca *ffss* pickup heads can be inspected for a charge of 12s. 6d. When the stylus is worn on a Decca *ffss* head it must be returned to the maker for replacement. The service offered is complete replacement of the head with a reconditioned head having a new stylus. Performance is guaranteed to be as new. Prices for this service are as follows: Mk III elliptical styli £6 6s. (including £1 2s. 6d. PT); spherical stereo/mono styli £5 5s. (including 18s. 9d. PT); mono LP and 78 styli £4 14s. 6d. (including 16s. 8d. PT); Mk 4 H4E or C4E elliptical styli £7 7s. (including £1 6s. 3d. PT); Mk 4 SH4E or SC4E elliptical styli £9 9s. (including £1 13s. 3d. PT); Mk 4 4RC spherical styli £5 5s. (including 18s. 9d. PT); Mk 4 78C spherical styli £4 14s. 6d. (including 16s. 8d. PT).

Mk I *ffss* heads are no longer in production but existing ones can be modified to Mk II specification for £2 2s.

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EAGLE PRODUCTS. Distributors: B. Adler & Sons (Radio) Ltd., 32a Coptic Street, London, W.C.1. Tel: 01-636 9606/7. Cables: Reldab, London.

●**Silver M.1007F.** Stereo cartridge. Moving magnet. LP and stereo. 0·7 thou diamond stylus. Pw 2-4 gm. Compliance 5×10^{-6} cm/dyne. FR 20 Hz-18 KHz. Separation 22 dB at 1 KHz. Output 10 mV at 5 cm/sec at 1 KHz. Rec load 100K. Price: £5 10s. 4d. (plus 19s. 8d. PT).

Prices quoted for Eagle products are approximate.

★

ELAC. Electroacustic GmbH., Kiel, West Germany. Distributors: Mitchell Enterprises Ltd., 61 West Street, Dorking, Surrey. Tel: 0306 4229.

●**STS322.** Stereo cartridge. Moving magnet. $\frac{1}{2}$ in. fixing centres. Stylus 0·5 thou diamond. Pw 2·5-3 gm. Compliance 12×10^{-6} cm/dyne. FR 20 Hz-20 KHz ± 2 dB. Separation 26 dB at 1 KHz, 20 dB at 10 KHz. Output 1 mV. Rec load 33-51K. Price: £20 18s. 11d. (including PT).

●**STS322/E.** Similar specification to STS322 but with elliptical stylus. Price: £23 19s. 3d. (including PT).

MST1. Mono magnetic cartridge. $\frac{1}{2}$ in. fixing centres. Stylus ($33\frac{1}{3}$, 45 rpm), 1 thou diamond,

(78 rpm) 2·6 thou sapphire. Pw 5-8 gm. Tip mass 2·5 mg. Compliance $5{\cdot}1 \times 10^{-6}$ cm/dyne. FR 20 Hz-20 KHz ± 2 dB. Output 4·5 mV. Rec load 37K. Price: (diamond) £8 2s. 8d. (including PT).

●BST406. Stereo ceramic cartridge. Stylus ($33\frac{1}{3}$, 45 rpm) 0·7 thou, (78 rpm) 2·6 thou. Pw 5-8 gm. Compliance 4×10^{-6} cm/dyne. Range 20 Hz-18 KHz ± 2 dB. Output 90 mV. Rec load 500K-1 megohm. Cross-talk damping at 1 KHz 20 dB. Price: (sapphire) £4 12s. 11d.

●KST106. Stereo crystal cartridge. Similar specification to BST406 except output 150 mV. Price: (sapphire) £3 2s. 2d. (including PT).

●KST107. Similar specification to KST106 except with LP/stereo stylus only. Price: £3 2s. 2d. (including PT).

●KST110. Stereo crystal cartridge. Stylus 0·7 thou diamond. Compliance 12×10^{-6} cm/dyne. Pw 2-4 gm. FR 20 Hz-18 KHz. Rec load 500K-1 megohm. Output 60 mV. Price to be announced.

●STS244. No details or price at time of going to press.

Full range of replacement styli available. STS240: standard, LP/stereo or handcut and polished stereo only. STS322: standard, handcut and polished stereo only or elliptical stereo only. BST406 and KST106: sapphire or diamond. 78 and LP/stereo turn-over, LP and stereo only turn-over, LP/stereo non turn-over.

★

EMPIRE SCIENTIFIC. Distributors: Howland-West Ltd., 2 Park End, South Hill Park, London, N.W.3. Tel: 01-794 6666.

●808. Stereo/mono magnetic cartridge. Standard $\frac{1}{2}$ in. fixing. 0·7 thou diamond stylus. Pw 1-6 gm. Compliance 8×10^{-6} cm/dyne. FR 10 Hz-20 KHz. Separation more than 30 dB. Output 8 mV. Rec load 47K. Price: £8 (plus £1 13s. 10d. PT).

●888. Stereo/mono magnetic cartridge. Standard $\frac{1}{2}$ in. fixing. 0·7 thou diamond stylus. Pw $\frac{3}{4}$-6 gm. Compliance 10×10^{-6} cm/dyne. FR 10 Hz-24 KHz. Separation better than 30 dB. Output 8 mV each channel. Rec load 47K. Price: £10 5s. (plus £2 3s. 3d. PT).

●888E. Stereo/mono magnetic cartridge for high-grade autochangers. Standard $\frac{1}{2}$ in. fixing. $0{\cdot}4 \times 0{\cdot}9$ diamond stylus. Pw $\frac{3}{4}$-5 gm. Compliance 12×10^{-6} cm/dyne. FR 10 Hz-30 KHz. Separation more than 30 dB. Output 8 mV. Rec load 47K. Price: £13 10s. (plus £2 17s. PT).

●888/P. Stereo/mono magnetic cartridge. Standard $\frac{1}{2}$ in. fixing. 0·6 thou hand-polished diamond stylus. Pw $\frac{1}{2}$-4 gm. Compliance 15×10^{-6} cm/dyne. FR 8 Hz-28 KHz. Separation better than 30 dB. Output 8 mV each channel. Rec load 47K. Price: £11 5s. (plus £2 7s. 6d. PT).

●888/PE. Stereo/mono magnetic cartridge. Standard $\frac{1}{2}$ in. fixing. $0{\cdot}2 \times 0{\cdot}9$ thou elliptical hand-polished diamond stylus. Pw $\frac{1}{2}$-3 gm. Compliance 20×10^{-6} cm/dyne. Frequency response 6 Hz-30 KHz. Separation better than 30 dB. Output 8 mV each channel. Rec load 47K. Price: £14 9s. (plus £3 1s. PT).

●888SE. Stereo/mono magnetic cartridge. $0{\cdot}3 \times 0{\cdot}7$ thou diamond stylus. Pw $\frac{1}{2}$-3 gm. Compliance 25×10^{-6} cm/dyne. FR 6 Hz-32 KHz. Separation more than 30 dB. Output 8 mV. Rec load 47K. Price: £21 (plus £4 8s. 8d. PT).

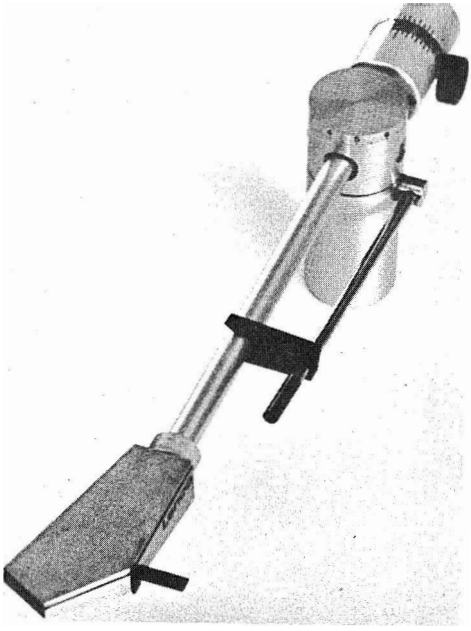
●999VE. Stereo/mono magnetic cartridge. Stylus: $0{\cdot}2 \times 0{\cdot}7$ thou elliptical. Pw $\frac{1}{2}$-$1\frac{1}{2}$ gm. Compliance 30×10^{-6} cm/dyne. FR 6 Hz-35 KHz. Separation: >30 dB. Output: 5 mV. Rec. load 47K. Price: £37 (plus £7 16s. PT).

★

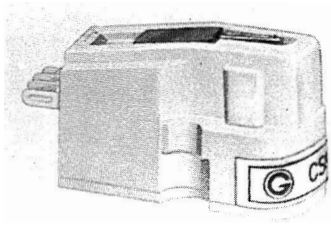
EUPHONICS. Distributors: Elstone Electronics Ltd., Hereford House, North Court, Vicar Lane, Leeds 2. Tel: Leeds 39834.

●Miniconic. Semiconductor stereo cartridge. Crystalline silicon element treated so that changing pressures produced by stylus vary the resistance. FR 20 Hz-20 KHz ± 2 dB. Pw 0·5 gm. Tracks up to 40 KHz. Stylus $0{\cdot}2 \times 0{\cdot}7$ elliptical diamond. Compliance 25 micro-cm/dyne horizontal and vertical. Output dependent on setting of power supply unit and adjustable between 8 mV at 47K to 400 mV at 500K. Also supplies 100 mV at 600 ohms. Must have external power source which may be from a separate unit or derived from associated equipment. Price: (U15 LS laboratory standard) £25 5s. 11d.; (U15-LS-P1 plug-in type) £25 5s. 11d.; (U15-P professional, 0·5 thou conical stylus) £14 16s. 5d.; (U15-P-P1 plug-in type) £14 16s. 5d. All prices include PT.

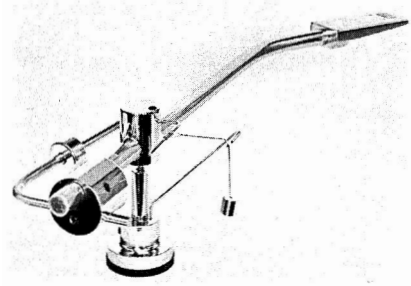
Miniconic PS-15 Power Supply. Supplies 6 mA polarising current to each element at 14V



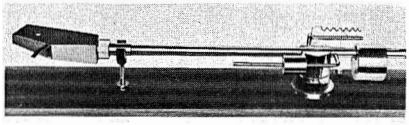
Goldring-Lenco P77 arm



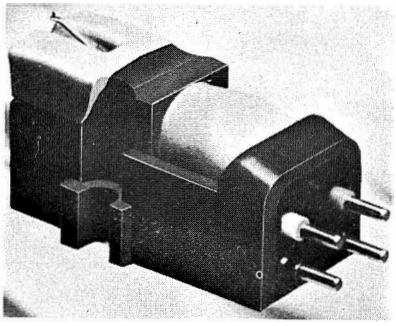
Goldring CS90 stereo ceramic cartridge



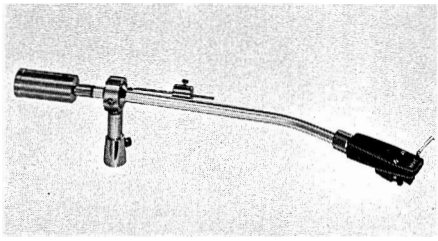
Hadcock GH Unipoise arm



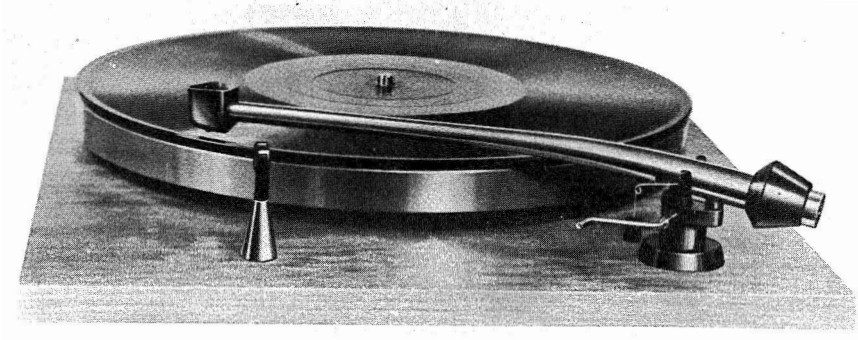
Goldring L75 pickup arm



Goldring G800/E cartridge



Neat G30 pickup arm



Leak stereo pickup

DC. Inverts phase of one element to provide normal in-phase output signals. Matches impedance and levels to suit any type of pre-amplifier input. Price: £9 9s.

TA-15. Low mass professional pickup arm. Suitable for 12 in. turntables. Accepts U15 plug-in heads. Price: £21 14s. 9d. including PT.

★

EXPERT PICKUPS LTD., 74 Brownlow Road, New Southgate, London, N.11. Tel: 01-888 5350.

Expert moving coil pickups serviced. Full details on request.

Replacement stylus service. For detachable cantilever systems using client's own stylus assembly. Radius to choice; from 0·5 thou (stereo) to 4 thou (78 oversize). Ellipticals where suitable. Radius checked using X 500 magnification.

Grade A. Finest quality, highly polished, giving minimum background noise and optimum results.

Grade B. Commercial standard, 0·5 thou to 2·5 thou only. Oversize sapphires and diamonds (Grade A only) for Pathe and Edison reproducers formed and fitted. Expert Pickup diamonds are available only direct from makers.

Special quotations and prospectus on request.

★

GOLDRING MANUFACTURING CO. (GREAT BRITAIN) LTD., 486/488 High Road, Leytonstone, E.11. Tel: 01-539 8343/5. Cables: Echovox, London.

●**CS85.** Stereo/mono ceramic cartridge. Turnover stylus. Sapphire or diamond stylus 0·7 thou and 1·0 thou (or 2·5 thou for 78 rpm). Pw 3-5 gm. Tip mass 2 mg. Compliance 6×10^{-6} cm/dyne. FR 20 Hz-14 KHz. Separation 20 dB at 1 KHz, 10 dB at 10 KHz. Output 180 mV. Rec load: 1-2 megohms. Price: to be announced.

●**CS90.** Stereo ceramic cartridge. Stylus 0·5 or 0·7 thou diamond. Pw 2 gm. Compliance 8×10^{-6} cm/dyne. FR 30 Hz-18 KHz. Separation: 25 dB at 1 KHz, 10 dB at 10 KHz. Output 50 mV. Rec load: 1-2 megohms. Price: £4 4s. (plus 18s. 2d. PT).

●**CS91E.** Stereo/LP ceramic cartridge. Stylus: elliptical diamond. Pw $1\frac{1}{2}$-3 gm. Tip mass 1 mg. FR 20 Hz-20 KHz. Separation 25 dB. Output 20 mV. Rec load: 2 megohms. Price: £6 6s. (plus £1 7s. 4d. PT).

MX4L. Turnover stereo compatible mono crystal cartridge. Pw 3-5 gm. Stylus: sapphire or diamond 0·7 and 3 thou. Compliance: 7×10^{-6} cm/dyne lateral, 5×10^{-6} cm/dyne vertical. FR 20 Hz-15 KHz. Output: 200 mV. Rec load: 1 megohm. Price: £1 1s. (plus 4s. 7d. PT).

MX4M. Turnover stereo compatible mono crystal cartridge. Pw 4-6 gm. Stylus: sapphire or diamond 0·7 and 3 thou. Compliance: 5×10^{-6} cm/dyne lateral, 3×10^{-6} cm/dyne vertical. FR 20 Hz-15 KHz. Output: 400 mV. Rec load: 1 megohm. Price (with sapphire): £1 1s. (plus 4s. 7d. PT).

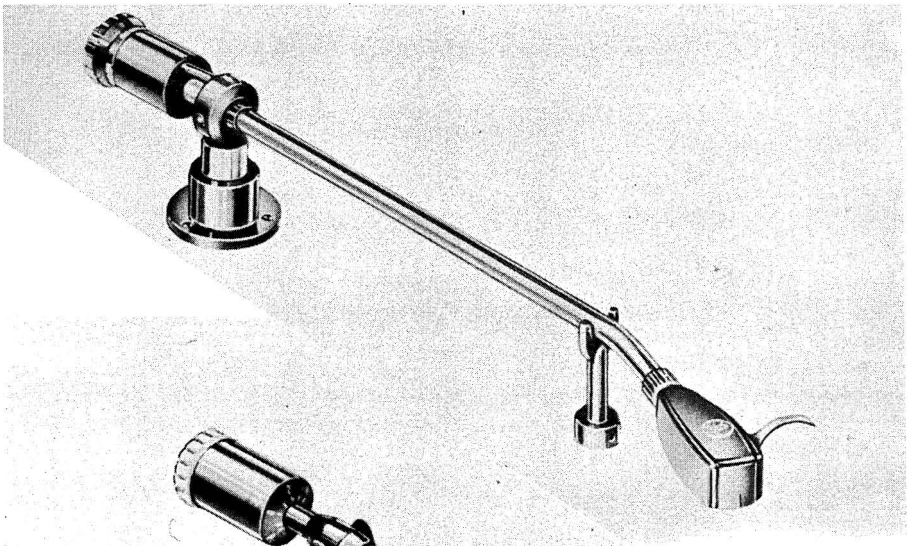
●**"800".** Stereo magnetic cartridge. Stylus 0·5 thou diamond. Pw 1-3 gm. Tip mass less than 1 mg. Compliance 20×10^{-6} cm/dyne. FR 20 Hz-20 KHz ± 3 dB. Separation 20 dB at 1 KHz, 15 dB at 10 KHz. Output 1 mV. Rec load 47K. Price: £10 10s. (plus £2 5s. 6d. PT).

●**G800E.** Stereo magnetic cartridge. Stylus: $0{\cdot}3 \times 0{\cdot}8$ diamond. Pw $\frac{3}{4}$-$1\frac{1}{2}$ gm. Tip mass: less than 1 mg. Compliance: 30×10^{-6} cm/dyne lateral and vertical. FR 10 Hz-25 KHz. Separation: 25 dB at 1 KHz, 15 dB at 10 KHz. Output 1 mV. Rec load: 47K-100K. Price: £15 4s. 6d. (plus £3 6s. PT).

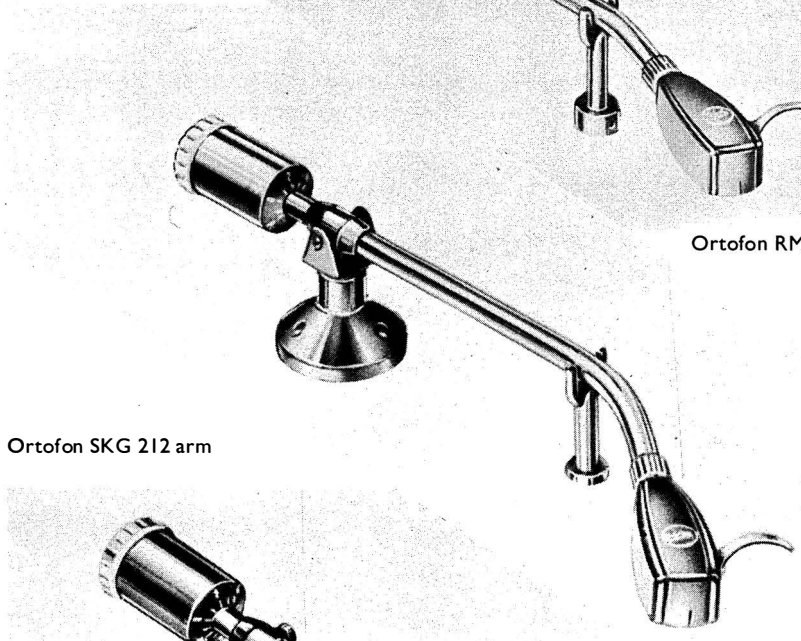
G65. Low-mass tubular arm. Removable head slide, moving counterweight, stylus pressure adjustment, height adjustment. Price: £6 6s. (plus £1 7s. 4d. PT).

Lenco P77. Transcription pickup arm. Pw adjustable and calibrated in grammes. Lowering device incorporated. Can be balanced in all planes. Fitted with hydraulic lowering device and anti-skating bias adjustment. Price: £30 (plus £6 10s. PT).

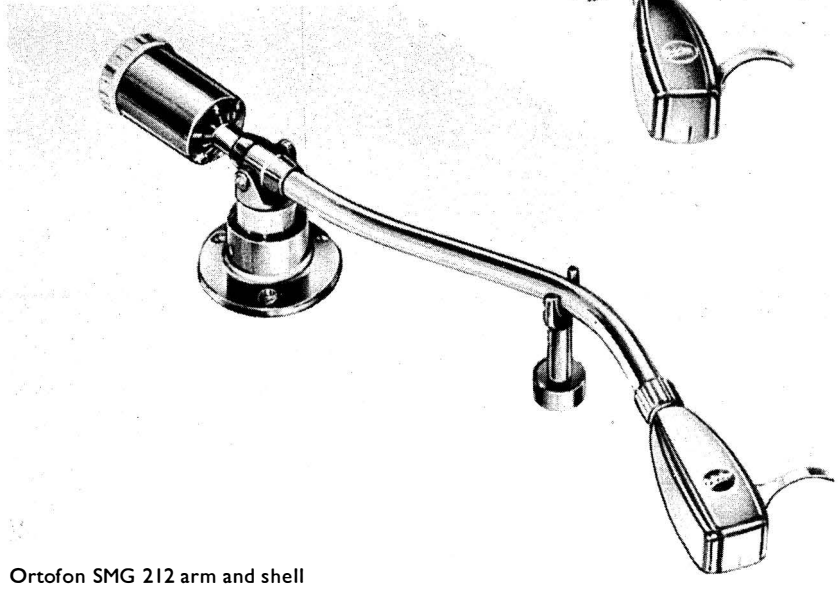
Goldring/Lenco L75. Transcription pickup arm. Calibrated stylus pressure adjustment. Removable plug-in shell with adjustable stylus position. Anti-skating bias compensator. Price: £10 2s. 6d. (plus £2 3s. 11d. PT).



Ortofon RMG 309 arm



Ortofon SKG 212 arm



Ortofon SMG 212 arm and shell

G. F. C. HADCOCK, Audio Division, The Old Vicarage, Doveridge, Derby, DE6 5NN. Tel: Uttoxeter 2452.

GH Unipoise Arm Mk 3. Finely engineered tubular metal arm with head shell. Accepts all lightweight cartridges down to $\frac{1}{2}$ gm. Standard $\frac{1}{2}$ in. fixing centres. Simplicity of design permits ease of mounting and operation. Bias adjustment included. Easily adjusted calibrated playing weight 0-3 gms. GH Uni-lift lowering device available separately (see Pickup Accessories Section). Dimensions: length $13\frac{1}{4}$ in., height 2-4 in., pivot to stylus point $9\frac{3}{4}$ in., pivot to centre of turntable 9·1 in., rear overhang clearance required $3\frac{1}{4}$ in. Price: £13 18s. 3d. (plus £2 19s. 6d. PT).

★

H. J. LEAK & CO. LTD., 57/59 Brunel Road, East Acton, London, W.3. Tel: 01-743 1173. Cables: Sinusoidal, Ealux, London.

●**Leak Mk 4.** Stereo pickup complete. Variable reluctance. Stereo/mono head. Stylus $0{\cdot}3 \times 0{\cdot}7$ thou elliptical diamond. Easily replaceable by user. Pw 2 gm. Compliance 10×10^{-6} lateral, 10×10^{-6} vertical. FR 30 Hz-20 KHz. No high frequency or other peaks to cause noise or "edgy" reproduction. Separation −25 dB at 1 KHz. Output 1·2 mV per cm/sec RMS per channel. Rec load 47K-100K. Arm: single pivot bearing with light viscous damping. Friction not greater than 10 mg. Built-in raising and lowering device. Effective tip mass less than 1 mg. Coils individually screened with mu-metal, whole cartridge enclosed in mu-metal case. Price: £23 (plus £4 13s. 6d. PT).

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NEAT CORPORATION. Distributors: Howland-West Ltd., 2 Park End, South Hill Park, London, N.W.3. Tel: 01-794 6666.

Neat G30. Transcription arm and shell. Wired for mono or stereo. Easy mounting. Accommodates all standard cartridges. Adjustable tracking weight. Supplied with aluminium head shell, pickup rest, pressure gauge and plug-in leads with phono plugs. Vertical balance by miniature ball bearings, horizontal balance by jewelled pivots. Decoupled balance weight at rear of arm provides coarse adjustment of playing weight, rider weight at side of arm provides fine adjustment. Screw collar permits height adjustment. Pivot to stylus $9\frac{3}{4}$ in. Arm length 13 in. Leads 56 in. Height (adjustable) $1\frac{3}{4}$-$3\frac{1}{4}$ in. Mounting hole $\frac{1}{2}$ in. dia. Cartridge fixing $\frac{1}{2}$ in. centres. Price: £9 7s. (plus £1 19s. 6d. PT).

Neat Lift. Optional oil lift for G30 arm. Price: £3 (plus 12s. 8d. PT).

●**Neat V70.** Magnetic stereo cartridge. Stylus 0·5 thou diamond. Pw $1\frac{1}{2}$-3 gm. Separation: 30 dB at 1 KHz. Rec. load 50K. Output: 5 mV at 100 Hz 5 cm/sec. Price: £4 5s. (plus 17s. 11d. PT).

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ORTOFON. Fonofilm Industri A/S Copenhagen. Distributed in the U.K. by Metro-Sound (Sales) Ltd., Bridge Works, Wallace Road, London, N.1. Tel: 01-226 8641. Cables: Metrosound, London.

Type AG. Moving coil, interchangeable head with vertical coils. Diamond stylus. Output voltage LP 0·5 mV. Range 20 Hz-14 KHz ±2 dB. Pw 5-7 gm. Load impedance 2 ohms (transformer required). Price: £7 5s. (plus £1 10s. 7d. PT).

Type C (without shell). Moving coil as above. Diamond stylus. Output voltage LP 0·3 mV. Range 20 Hz-20 KHz linear. Pw 3 gm. Load impedance 2 ohms (transformer required). Price: £13 5s. (plus £2 16s. 8d. PT).

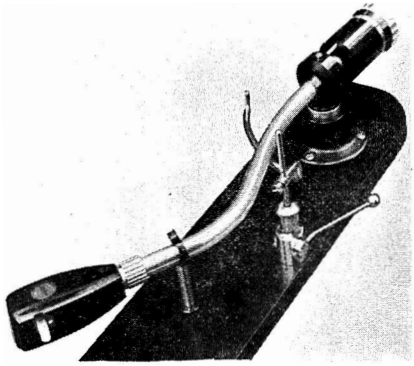
Type CE. As type C but with elliptical stylus. Price: £18 5s. (plus £3 18s. 1d. PT).

Transformer. For use with above pickups. Price: £3 5s.

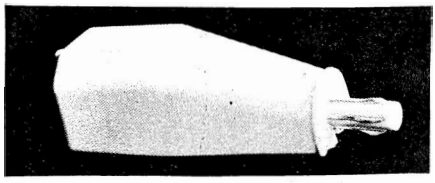
●**S15.** Moving coil cartridge with 15 degree angle and wider compliance than previously obtained. Output impedance 2 ohms. Effective tip mass 0·9 mg. Pw 1-2 gm. Output 0·04 mV/cm/sec. Stylus 0·7 thou diamond. Tracking angle 15 degrees. Compliance 20×10^{-6} cm/dyne. Separation 20-30 dB. FR 20 Hz-20 KHz ±2 dB. Shielded against magnetic fields. Price: £20 10s. (plus £4 5s. 8d. PT).

●**S15E.** Similar to S15 but with $0{\cdot}3 \times 0{\cdot}7$ elliptical diamond stylus. Price: £25 10s. (plus £5 9s. 1d. PT).

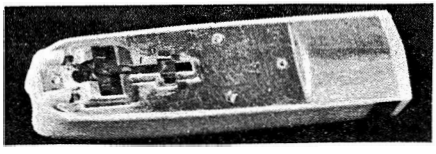
●**S15T.** Similar to S15 but with built-in transformers. Weight (including transformers) 18.5 gm. Pw 1-2 gm. Output impedance 15K. Rec load 47K. Output 2 mV. Price: £22 10s. (plus £4 16s. 3d. PT).



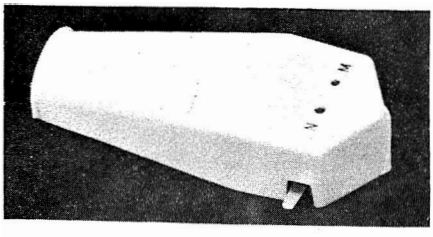
Ortofon RMG/212 pickup arm and shell



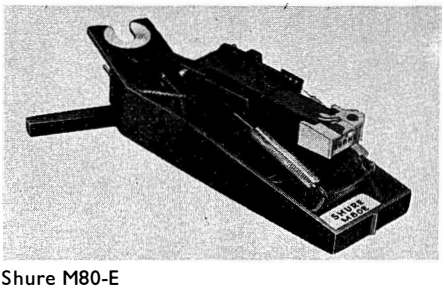
Philips AG 3402 stereo head



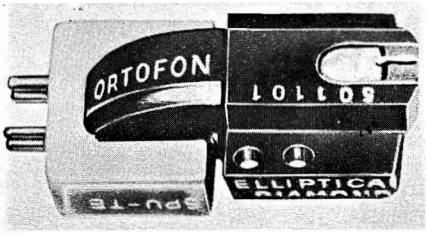
Philips AG 3060 stereo head



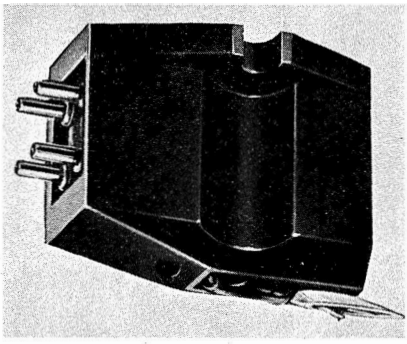
Philips AG 3301 crystal stereo



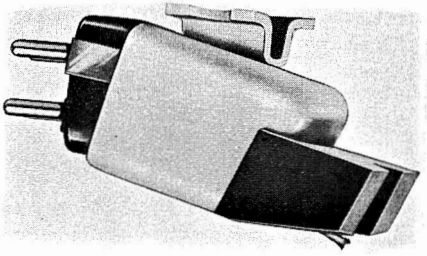
Shure M80-E



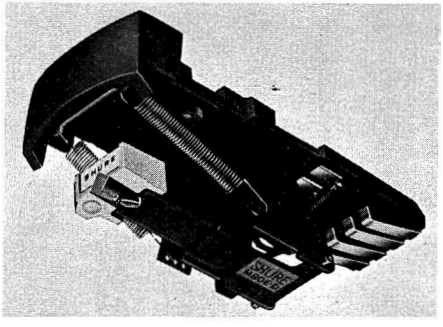
Ortofon SPU-T/E cartridge



Ortofon SL.15/E



Pickering V15 AM2 cartridge



Shure M80E-D

●**S15TE.** Similar to S15T but with $0{\cdot}3 \times 0{\cdot}7$ elliptical diamond stylus. Price: £27 10s. (plus £5.16s. PT).

Shells. Type M metal shells for 15 Series cartridges. Price: £1 5s. (plus 5s. 4d. PT).

●**SL15/E.** Moving coil stereo cartridge. Pw 1-2 gm. Tip mass 0·9 mg. Compliance 25×10^{-6} cm/dyne. FR 10 Hz-40 KHz. Separation 20-30 dB. Output 0·04 mV/cm/sec (loaded). Output impedance 2 ohms. Matching transformer required for most amplifiers (see transformer below). Stylus diamond $0{\cdot}6 \times 0{\cdot}3$ thou. Tracking angle 15 degrees. Price: £22 10s. (plus £4 16s. 3d. PT).

●**SL15.** Similar specification to SL15/E but with spherical 0·6 thou diamond stylus. Price £18 5s. (plus £3 18s. 1d. PT).

●**Transformer module.** Primary impedance 2 ohms. Secondary impedance 15K. Load 10K to 50K without change in frequency response. FR 20 Hz-40 KHz. Price: £7.

●**SPU (without shell).** Moving coil stereo cartridge. Diamond stylus 0·00065-0·0007. Output voltage 0·05 mV. Range 20 Hz-20 KHz. Separation 20-25 dB. Pw 2 gm. Rec load 2 ohms. Price: £13 5s. (plus £2 16s. 8d. PT).

●**SPU-T (without shell).** Moving coil cartridge with built-in transformers. Diamond stylus. Channel separation 20-25 dB. Range 20 Hz-20 KHz. Load imp 50K ohms. Pw 2 gm. Output voltage 2 mV. Available with pure stereo 0·0005 or 0·00065 diamond for use with mono/stereo. Price: £15 5s. (plus £3 5s. 3d. PT).

●**SPU-E (without shell).** Stereo cartridge. Moving coil. Stylus elliptical diamond 23×8 microns. Pw 2 gm. Tip mass 1 mg. Compliance 10×10^{-6} cm/dyne. Range 20 Hz-20 KHz. Separation 25 dB. Rec. load 2 ohms. Output voltage 0·05 mV. Price: £18 5s. (plus £3 18s. 1d. PT).

●**SPU-T/E (without shell).** Stereo cartridge with built-in transformers. Output voltage 2mV Rec load 50K. Other details as for SPU-E. Price: £20 5s. (plus £4 6s. 8d. PT).

Shells. Type G shell for SPU and C Series cartridges. Price: £1 (plus 4s. 3d. PT).

●**SKG/212.** 12 in. pickup arm with adjustable playing weight. Price: £7 (plus £1 9s. 11d. PT).

●**SMG/212.** 12 in. pickup arm for stereo and mono cartridges. Playing weight adjustable from 0-12 gm. Price: £11 (plus £2 7s. 1d. PT).

●**RMG/309.** 16 in. pickup arm. Details as for SMG/212. Price: £21 (plus £4 9s. 10d. PT).

●**RMG/212.** Pickup arm with shell. Details as for RMG/309, but with plug insert for leads. For details of lowering device see Ortofon Hi-Jack. Price: £19 6s. (plus £4 2s. 7d. PT).

●**RS212.** Similar to RMG arm but with the addition of automatic anti-skating device. Length of arm 11·8 in. Centre of arm base to turntable centre $8\frac{3}{8}$ in. Height adjustable $1\frac{3}{8}$-$2\frac{3}{8}$ in. Arm base 2 in. dia. Centre of base to stylus tip 9 in. Off-set angle 22·7 degrees. Stylus pressure adjustable 0-4·5 gm. Suitable for cartridges weighing 7-19 gm. Hi-Jack cueing device built in. Ratio between stylus pressure and anti-skating force is factory adjusted to suit Ortofon cartridge with elliptical stylus. Ratio adjustment screw provided to alter for other cartridges. Price £25 (plus £5 6s. 11d. PT).

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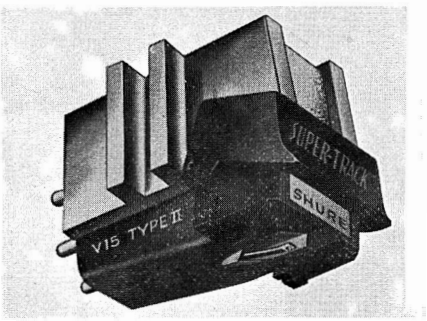
PHILIPS ELECTRICAL LTD., Century House, Shaftesbury Avenue, W.C.2. Tel: 01-437 7777. Cables: Phillamps, London.

AG.3016. Crystal head fitted with sapphire styli. Output voltage 100 mV. Range 30-15,000 Hz. Pw 5-7 gm. Load imp 470K ohms. Replacement type for all mono heads with three contact socket connection. Price: £1 1s. 6d. (plus PT).

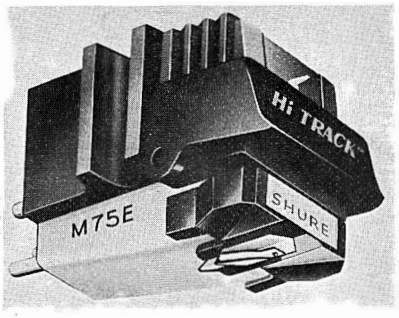
●**AG.3401.** Stereo magnetodynamic head with diamond stylus. Microgroove only with three-contact socket connection. Output voltage 2 mV per channel. Range 20 Hz-20 KHz. Pw 3-5 gm. Load imp 68K per channel. Price: £8 2s. 9d. (plus PT).

●**AG.3301.** Crystal stereo pickup cartridge with turnover head. Sapphire styli. Three-contact socket connection. Output voltage 120 mV per channel. Pw 4-6 gm. Load imp 470K per channel. Price: £1 8s. (plus PT).

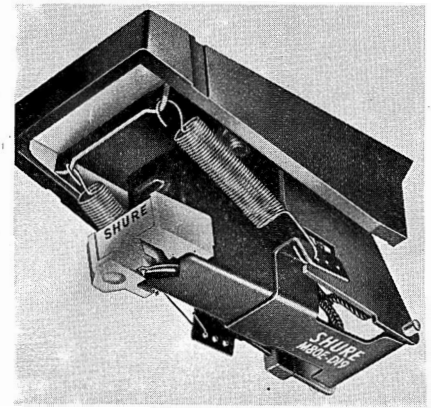
●**AG.3060.** Crystal stereo pickup. Diamond 0·7 thou stylus. Replacement type for Philips featherweight pickups. Three-contact socket connection. Range 30 Hz-12 KHz. Output voltage 120 mV per channel. Pw 4-6 gm. Load imp 470K ohms per channel. Price: £2 6s. 6d. (plus PT).



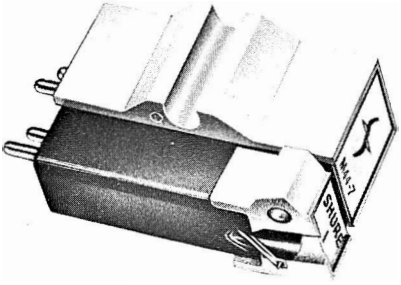
Shure V15-11



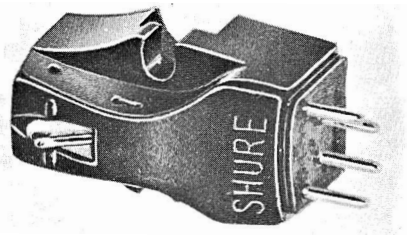
Shure M75-E



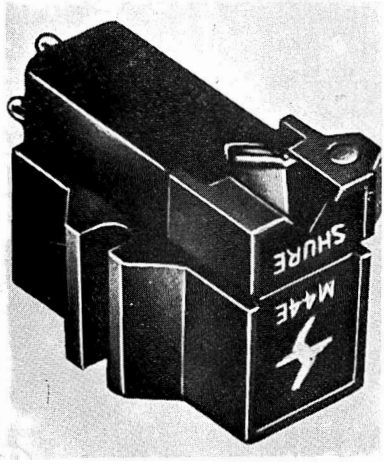
Shure M80E-D19



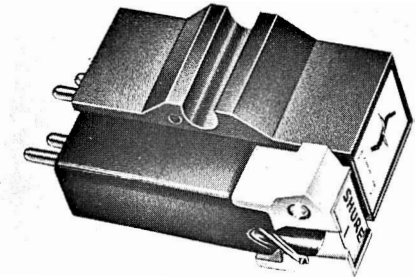
Shure M55-E cartridge



Shure M3D-M cartridge



Shure M44-E



Shure M44-7 cartridge

●**AG.3063.** Identical to AG. 3060 but with sapphire 0·7 thou stylus. Price: £1 8s. (plus PT).

●**AG.3304.** Stereo crystal turnover head. Styli 3 thou sapphire for 78, diamond 0·7 thou for microgroove. Otherwise identical to AG.3301. Price: £2 14s. 3d. (plus PT).

●**AG.3402.** Identical to AG.3401 but with five-contact plug connection. Price: £8 2s. 9d. (plus PT).

●**AG.3306.** Stereo crystal head with turnover sapphire styli: 783 thou, LP 0·7 thou. Five-contact plug connection. Pw 3-6 gm. Compliance (lat) 3×10^{-6} cm/dyne; (vert) $1{\cdot}8 \times 10^{-6}$ cm/dyne. Range 30 Hz-16 KHz. Separation 18 dB. Output 70 mV. Load imp 470K per channel. Price: £1 6s. 4d. (plus PT).

●**AG.3310.** Identical to AG.3306 but with diamond LP stylus. Price: £2 14s. 3d. (plus PT).

●**AG.3407.** Stereo magnetic-dynamic head for microgroove records only. 0·7 thou diamond stylus. Pw 2-4 gm. Output 1·2 mV/cm/sec. FR 20 Hz-20 KHz $\pm 2{\cdot}5$ dB. Separation better than 24 dB at 1 KHz. Compliance (lateral) 6×10^{-6} cm/dyne; (vertical) 5×10^{-6} cm/dyne. Rec load 68K each channel. Price to be announced.

●**AG.3409.** Identical to AG.3407 but with 3 thou stylus for 78 rpm records only. Price to be announced.

GP.316. Mono crystal plug-in head. 1·0 and 3·0 thou sapphire stylus. Pw 5-7 gm FR 30 Hz-15 KHz. Rec load 470K. Output 100 mV. Price: £1 10s. 2d. (plus PT).

●**GP.230.** Stereo ceramic plug-in head. Stylus 0·7 and 3·0 thou sapphire. Pw 3-6 gm. FR 30 Hz-15 KHz. Rec load 470K. Output 45 mV. Price: £2 3s. 6d. (plus PT).

●**GP.306.** Stereo crystal plug-in head. Stylus 0·7 and 3·0 thou sapphire. Pw 3-6 gm. FR 30 Hz-16 KHz. Rec load 470K. Output 45 mV. Price: £1 10s. 8d. (plus PT).

●**GP.310.** Stereo crystal plug-in head. Stylus 0·7 thou diamond, 3·0 thou sapphire. Pw 3-6 gm. FR 30 Hz-16 KHz. Rec load 470K. Output 45 mV. Price: £3 3s. (plus PT).

●**GP404.** Stereo magneto-dynamic five-pole male plug-in head. Stylus 0·7 thou diamond. Pw 3-5 gm. FR 20 Hz-20 KHz. Rec load 68K. Output 1 mV. Price: £10 17s. 6d. (including PT).

●**GP.407.** Stereo magneto-dynamic plug-in head. Stylus 0·7 thou diamond. Pw 2-4 gm. FR 20 Hz-20 KHz. Rec load 68K. Output 1 mV. Price: £12 5s. (plus PT).

●**GP.409.** Stereo magneto-dynamic plug-in head. Stylus 0·7 thou sapphire. Pw 2–4 gm. FR 20 Hz-20 KHz. Rec load 68K. Output 1 mV. Price: £11 3s. 8d. (plus PT).

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PICKERING. Imported by Auriema Ltd , 23/31 King Street, London, W.3. Tel: 01-992 5388.

●**Pickering V15.AC-2.** Moving magnet stereo cartridge with plug-in stylus assembly. High output, rugged stylus assembly and good hum rejection. FR 20 Hz-20 KHz. Output 7·5 mV. Channel separation 35 dB. Pw 3-7 gm. Mu-metal shielding. 15 degree tracking angle. Suitable for record changers including Garrard AT60, Model 50, Autoslim, RC-80, etc. Price: £8 12s. 6d. (plus £1 18s. 4d. PT).

●**Pickering V15.AT-2.** Moving magnet stereo cartridge with plug-in stylus assembly. High output, light weight, good hum rejection. FR 20 Hz-20 KHz. Output 6·9 mV. Channel separation 35 dB. Pw 1-5 gm. Mu-metal shielding. 15 degree tracking angle. Suitable for record changers including Garrard LAB80, AT60, AT6, Dual 1009, 1010, Miracord, Lesa, etc. Price: £9 9s. (plus £2 2s. PT).

●**Pickering V15.AM-2.** Moving magnet stereo cartridge with plug-in stylus assembly. For manual turntables and transcription units. Light tracking and high compliance. FR 20 Hz-20 KHz. Output 5·5 mV. Channel separation 35 dB. Pw $\frac{3}{4}$-3 gm. Mu-metal shielding. 15 degree tracking angle. Suitable for Garrard, Connoisseur, Thorens, Dual, etc. Price: £11 3s. (plus £2 9s. 7d. PT).

●**Pickering V15.AME-2.** Moving magnet stereo cartridge with plug-in stylus assembly. For highest grade equipment. Very low tip mass, light tracking and high compliance. FR 20 Hz-20 KHz. Output 5·5 mV. Channel separation 35 dB. Pw $\frac{3}{4}$-$1\frac{1}{2}$ gm. Mu-metal shielding. Elliptical stylus. 15 degree tracking angle. Price: £15 10s. (plus £3 8s. 11d. PT).

●**Pickering V15.AT-3.** Dustamatic. Output: 6 mV. Separation 35 dB. Pw 1-5 gm. FR 10 Hz-25 KHz. Stylus 0·7 thou conical. Impedance 47K. Price: £11 (plus £2 8s. 11d. PT).

●**Pickering V15.AM-3.** Dustamatic. Output: 5 mV. Separation 35 dB. Pw $\frac{3}{4}$-3 gm. FR 10 Hz-25 KHz. Stylus 0·7 thou conical. Impedance 47K. Price: £12 12s. (plus £2 16s. PT).

●**Pickering V15.ATE-3.** Dustamatic. Output: 6 mV. Separation 35 dB. Pw 2-5 gm. FR 10 Hz-25 KHz. Stylus $0{\cdot}4 \times 0{\cdot}9$ elliptical. Impedance 47K. Price: £15 10s. (plus £3 8s. 11d. PT).

●**Pickering V15.AME-3.** Dustamatic. Output: 5 mV. Separation 35 dB. Pw $\frac{3}{4}$-$1\frac{1}{2}$ gm. FR 10 Hz-25 KHz. Stylus $0{\cdot}2 \times 0{\cdot}9$ elliptical. Impedance 47K. Price: £16 10s. (plus £3 13s. 4d. PT).

NOTE: Dustamatic cartridges incorporate brush that cleans record grooves and prevents skating. Full details on request.

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SHURE ELECTRONICS LTD., 84 Blackfriars Road, London, S.E.1. Tel: 01-928 6361.

●**M3D-M.** Stereo Dynetic cartridge. Moving magnet. $\frac{1}{2}$ in. fixing centres. Stylus 0·7 thou diamond. Pw 3-6 gm. Compliance 4×10^{-6} cm/dyne. FR 20 Hz-15 KHz. Separation 20 dB at 1 KHz. Output 1 mV. Load impedance 47K. Price: £8 7s. 6d. (including PT).

●**M31E.** Stereo Dynetic cartridge. Moving magnet. $\frac{1}{2}$ in. fixing centres. Elliptical stylus. Pw 1-2 gm. Recommended for use with transcription automatic changers. Price: £13 19s. 2d. (including PT).

●**M32E.** Stereo Dynetic cartridge. Moving magnet. $\frac{1}{2}$ in. fixing centres. Elliptical stylus. Pw $2\frac{1}{2}$-5 gm. Recommended for use with automatic turntables. Price: £12 14s. 11d. (including PT).

M32-3. Moving magnet cartridge for 78 rpm records only. For collectors who wish to own a separate cartridge for this purpose. Price: £10 18s. 6d. (including PT).

●**M44-C.** Stereo Dynetic cartridge. Moving magnet. $\frac{1}{2}$ in. fixing centres. Stylus 0·7 thou diamond (1 thou and 3 thou styli available). Pw 3-5 gm. Compliance $7{\cdot}5 \times 10^{-6}$ cm/dyne. FR 20 Hz-20 KHz. Separation 25 dB at 1 KHz. Output 1·8 mV. Load impedance 47K. Price: £12 14s. 11d. (including PT).

●**M44-E.** Stereo Dynetic cartridge. Moving magnet. $\frac{1}{2}$ in. fixing centres. Stylus $0{\cdot}7 \times 0{\cdot}4$ thou bi-radial diamond (3 thou stylus available). Pw $1\frac{3}{4}$-4 gm. Compliance 15×10^{-6} cm/dyne. FR 20 Hz-20 KHz. Separation >25 dB at 1 KHz. Output 1·8 mV. Rec load 47K. Price: £17 2s. 4d. (including PT).

●**M44-5.** Stereo Dynetic cartridge. Moving magnet. $\frac{1}{2}$ in. fixing centres. Stylus 0·5 thou diamond (1 thou and 3 thou styli available). Pw $\frac{3}{4}$-$1\frac{1}{2}$ gm. Compliance 25×10^{-6} cm/dyne. FR 20 Hz-20 KHz. Separation 25 dB at 1 KHz. Output 1·2 mV. Load impedance 47K. Price: £14 4s. 1d. (including PT).

●**M44-7.** Stereo Dynetic cartridge. Moving magnet. $\frac{1}{2}$ in. fixing centres. Stylus 0·7 thou diamond (1 thou and 3 thou styli available). Pw $1\frac{1}{2}$-3 gm. Compliance 20×10^{-6} cm/dyne. FR 20 Hz-20 KHz. Separation 25 dB at 1 KHz. Output 2·1 mV. Load impedance 47K. Price: £12 14s. 11d. (including PT).

●**M55-E.** Stereo Dynetic cartridge. Moving magnet. $\frac{1}{2}$ in. fixing centres. Stylus $0{\cdot}7 \times 0{\cdot}2$ thou elliptical diamond (3 thou stylus available). Pw $\frac{3}{4}$-$1\frac{1}{2}$ gm. Compliance 25×10^{-6} cm/dyne. Output 1·3 mV. Load imp 47K. Price: £20 7s. 10d. (including PT).

●**M75-E.** Stereo Dynetic cartridge. Moving magnet. $\frac{1}{2}$ in. fixing centres. Stylus $0{\cdot}7 \times 0{\cdot}2$ thou bi-radial diamond (3 thou stylus available). Pw $\frac{3}{4}$-$1\frac{1}{2}$ gm. Trackability (see note at end) at 1 gm in SME 3009 arm: 400 Hz 18 cm/sec, 1 KHz 25 cm/sec, 10 KHz 14 cm/sec. FR 20 Hz-20 KHz. Separation at 1 KHz >25 dB. Output 1·1 mV. Rec load 47K per channel. Price: £25 9s. 10d. (including PT).

●**M75-6.** Stereo Dynetic cartridge. 15 degree angle. Moving magnet. $\frac{1}{2}$ in. fixing centres. Stylus 0·6 thou conical diamond (3 thou stylus available). Pw $\frac{3}{4}$-3 gm. Trackability (see note at end) at 2 gm in SME 3009 arm: 400 Hz 18 cm/sec, 1 KHz 25 cm/sec, 10 KHz 14 cm/sec. FR 20 Hz-20 KHz. Separation >25 dB at 1 KHz. Output 1·2 mV. Rec load 47K per channel. Price: £17 2s. 4d. (including PT).

●**M75E-D19.** M75-E cartridge supplied ready-mounted for use with Dual models 1019, 1009SK, 1010S and 1016. Gard-a-matic retractile safety suspension. Price: £27 6s. 3d. (including PT).

●**M75E-95G.** M75-E cartridge supplied ready-mounted and wired in slide-in carrier for use with Garrard SL95 turntable. Gard-a-matic retractile suspension. Price: £27 6s. 3d. (including PT).

●**M75-G.** Stereo Dynetic cartridge. 15 degree angle. Moving magnet. ½ in. fixing centres. Stylus 0·6 thou conical diamond (3 thou stylus available). Pw ¾-1½ gm. Trackability (see note at end) at 1 gm in SME 3009 arm: 400 Hz 18 cm/sec, 1 KHz 25 cm/sec, 10 KHz 14 cm/sec. FR 20 Hz-20 KHz. Separation >25 dB at 1 KHz. Output 1·1 mV. Rec load 47K per channel. Price: £17 2s. 4d. (including PT).

●**M80-E.** Stereo Dynetic cartridge. 15 degree angle. Moving magnet. ½ in. fixing centres. Stylus 0·7 × 0·2 thou bi-radial diamond (3 thou stylus available). Pw 1½ gm. Compliance 25 × 10^{-6} cm/dyne FR 20 Hz-20 KHz. Separation nominally >25 dB at 1 KHz. Output 1·3 mV. Rec load 47K per channel. Designed specifically for use with Garrard LAB80 and A70 turntables. Price: £21 9s. 9d. (including PT).

●**M80E-D.** Stereo Dynetic cartridge. 15 degree angle Moving magnet. ½ in. fixing centres. Stylus 0·7 × 0·2 thou bi-radial diamond (3 thou stylus available). Pw 1½ gm maximum. Compliance 25 × 10^{-6} cm/dyne. FR 20 Hz-20 KHz. Separation nominally >25 dB at 1 KHz. Output 1·3 mV. Rec load 47K per channel. Designed specifically for Dual 1009 turntable. Price: £21 9s. 9d. (including PT).

●**M80E-D19.** Stereo Dynetic cartridge. 15 degree angle. Moving magnet. ½ in. fixing centres. Stylus 0·7 × 0·2 thou bi-radial diamond (3 thou stylus available). Pw 1½ gm. Compliance 25 × 10^{-6} cm/dyne. FR 20 Hz-20 KHz. Separation nominally >25 dB at 1 KHz. Output 1·3 mV. Rec load 47K per channel. Designed specifically for the Dual 1019 and 1009-SK turntables. Price: £21 9s. 9d. (including PT).

●**V15-11.** Stereo Dynetic cartridge. 15 degree angle. Moving magnet. ½ in. fixing centres. Stylus 0·7 × 0·2 thou bi-radial diamond (3 thou stylus available). Pw ¾-1½ gm. Trackability (see note at end) at ¾ gm in SME 3009 arm: 400 Hz 18 cm/sec, 1 KHz 26 cm/sec, 5 KHz 26 cm/sec, 10 KHz 18 cm/sec. FR 20 Hz-25 KHz. Separation >25 dB at 1 KHz, >17 dB at 500 Hz-10 KHz. Output 0·7 mV. Rec load 47K. Price: £40 1s. 2d. (including PT).

NOTE: Trackability is a term introduced by Shure to give a measure of the total performance of a cartridge. It takes into account the mechanical design parameters of tip mass, inertia, compliances throughout the system, tracking pressure, recorded velocity, etc. Explanatory leaflet available on request.

S.M.E. LTD., Steyning, Sussex. Tel: Steyning 2228.

Model 3009 (9 in.). Series II precision pickup arm. Extremely low vertical and lateral friction. Side-thrust compensation. Hydraulically damped lowering control. Tracking force applied precisely, without the need for a gauge. Rapidly adjustable for a wide range of cartridges and heads. Price (with S.2 ultra lightweight shell): £22 17s. 6d. (plus £5 1s. 8d. PT).

Model 3012 (12 in.). Series II precision pickup arm. Details as above. Price (with S.2 ultra lightweight shell): £24 7s. 6d. (plus £5 8s. 4d. PT).

S.2 ultra lightweight shell. Weighs only 6 gm with mounting hardware. Price: £1 16s. (plus 8s. PT).

D.3. Adaptor for Decca *ffss* heads. Price: £2 (plus 8s. 10d. PT).

P.1. Spacer to adjust arm height for use with deep turntable. Price: 15s. (plus 3s. 4d. PT).

TD.124/3009. Mounting board to fit 3009 on Thorens TD.124. Price: £2 17s. 6d. (plus 12s. 9d. PT).

TD.124/3012. Mounting board to fit 3012 on Thorens TD.124. Price: £3 10s. (plus 15s. 6d. PT).

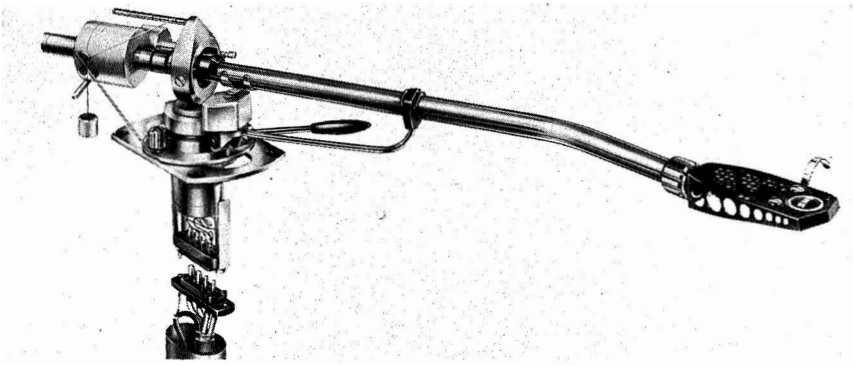
★

SONOTONE. Manufacturers: Technical Ceramics Ltd., Trade distributors: CHB Supplies Ltd., 8 Comberton Place, Comberton Hill, Kidderminster, Worcestershire. Tel: 0562-4861.

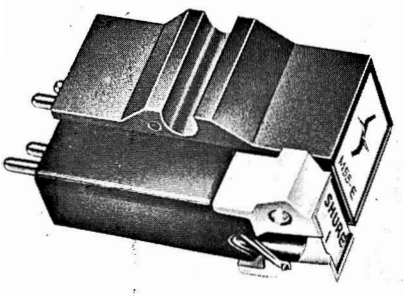
2T. Monaural ceramic cartridge with turnover stylus. Stylus sapphire 2·5 thou (78), 0·7 thou (LP). Pw 8-10 gm. Compliance 1 × 10^{-6} cm/dyne. Output 180 mV/cm/sec at 1 KHz. Capacitance 650 pF. Serviceable under all climatic conditions and compatible for 33⅓, 45 and 78 rpm records. Price: £1 5s. (plus 5s. 4d. PT).

2T35. Similar to 2T but output 280-435 mV.

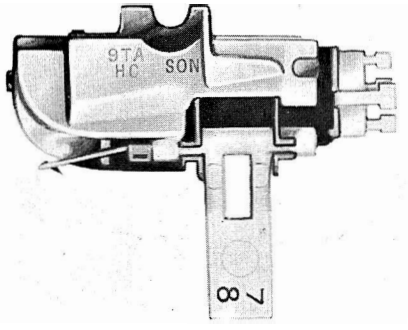
●**8TA.** Stereo ceramic cartridge with turnover stylus. Stylus sapphire 2·5 thou (78), 0·7 thou (LP). Pw 4-6 gm. Compliance 1·4 × 10^{-6} cm/dyne. Separation 25 dB at 1 KHz. Output 90 mV/cm/sec at 1 KHz. Capacitance 650 pF. Price: £1 15s. (plus 7s. 6d. PT).



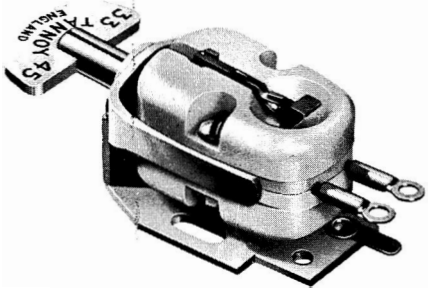
SME Series 2 precision pickup arm and shell



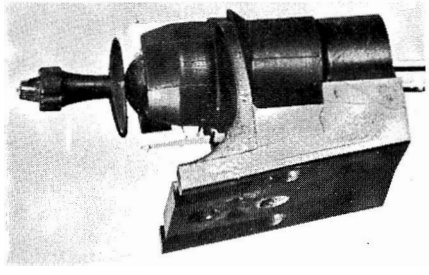
Shure M44-5 cartridge



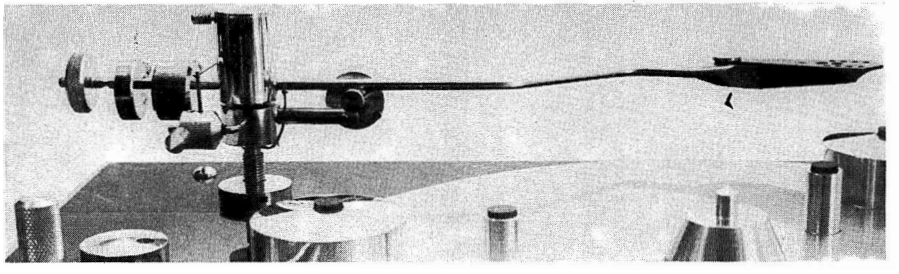
Sonotone 9TAHC cartridge



Tannoy Vari-twin Mk.II cartridge



Walton M.1 cartridge



Transcriptors Fluid Arm

●**8TAD.** Similar specification to 8TA but with diamond stylus. Price: £2 10s. (plus 10s. 8d. PT).

●**9TA.** Stereo turnover cartridge. Ceramic. Sapphire stylus. Pw 2-4 gm. Tip mass 3·5 mg. Compliance $5{\cdot}3 \times 10^{-6}$ cm/dyne. FR 30 Hz-15 KHz ±3 dB. Separation 27 dB. Output voltage 80-120 mV. Load imp 2 megohm. Price: £2 10s. (plus 10s. 8d. PT).

●**9TAD.** Similar specification to 9TA but with diamond stylus. Price: £3 5s. (plus 13s. 11d. PT).

●**9TAHC.** Stereo turnover ceramic cartridge. Choice of both sapphire styli or sapphire 78/diamond stereo LP. FR 20 Hz-20 KHz (±3 dB from 1 KHz). Rec load 2 meg. Sensitivity 55-85 mV/cm/sec at 1 KHz. Lateral compliance $8{\cdot}5 \times 10^{-6}$ cm/dyne. Separation 25 dB at 1 KHz. Pw 1-3 gm. Tip mass 2·5 mg. capacitance 800 pF. Price: (with sapphire stylus) £2 10s. (plus 10s. 8d. PT); (with diamond stereo/LP stylus) £3 5s. (plus 13s. 11d. PT).

●**19T.** Stereo turnover crystal cartridge. Stylus sapphire 2·5 thou (78), 0·7 thou (LP). Pw 7-9 gm. Compliance $1{\cdot}2 \times 10^{-6}$ cm/dyne. Separation 20 dB at 1 KHz. Output 270 mV/cm/sec at 1 KHz. Capacitance 1,200 pF. Price: (sapphire stylus) £1 12s. 6d. (plus 6s. 11d. PT); (diamond stylus) £2 7s. 6d. (plus 10s. 2d. PT).

●**20T.** Stereo crystal cartridge. Sapphire styli. FR 20 Hz-15 KHz (±4 dB from 1 KHz). Rec load 2 megohm. Sensitivity 270-535 mV/cm/sec at 1 KHz. Compliance 1×10^{-6} cm/dyne. Separation 20 dB at 1 KHz. Pw 8 gm. Capacitance 1,200 pF. Price: (sapphire stylus) £1 12s. 6d. (plus 6s. 11d. PT); (diamond stylus) £2 7s. 6d. (plus 10s. 2d. PT).

★

SONY (U.K.) LTD., 36-40 Wigmore Street, London, W.1. Tel: 01-935 3546.

●**Sony VC-8E.** Stereo moving coil cartridge. Stylus $0{\cdot}2 \times 0{\cdot}8$ thou diamond. Pw 0·5-2 gm. Lateral and vertical compliance 10×10^{-6} cm/dyne. FR 10 Hz-25 KHz. Separation 30 dB at 1 KHz, 20 dB at 10 KHz. Output 4 mV ±2 dB. Rec. load approx 40 ohms at 10 Hz-25 KHz. Price: £29 10s. (plus £4 12s. 3d. PT).

●**Sony PUA-237.** Transcription pickup arm. Playing weight 0-3 gm. Lowering device. Pressure adjustment. Bias compensator. Price: £37 19s. 6d. (plus £8 10s. 6d. PT).

●**Sony PUA-286.** Transcription pickup arm. Playing weight 0-3 gm. Lowering device. Pressure adjustment. Bias compensator. Price: £43 17s. 9d. (plus £9 17s. 3d. PT).

★

A. R. SUGDEN & CO. (ENGINEERING) LTD., Market Street, Brighouse, Yorkshire, Tel: Brighouse 2142. Cables: Connoisseur, Brighouse.

●**Connoisseur stereo ceramic cartridge SCU1.** ½ in. fixing centres. Stylus diamond 0·5-0·6 thou or 1 thou for mono. Pw 2-4 gm. Tip mass 1 mg. Compliance: lateral 12×10^{-6} cm/dyne; vertical 8×10^{-6} cm/dyne. Range: 25 Hz-18 KHz ±3 dB. Separation (1 KHz) 25-30 dB; (10 KHz) 18 dB. Output with rec. load of 100K, 50 mV per channel, RIAA equalisation required. Output with 2 megohm load, 150 mV per channel, no equalisation required. Features: Four-terminal output, easily replaceable diamond stylus. Price: £4 10s. (plus 19s. 3d. PT).

Connoisseur pickup arm SAU1. Lateral balance adjustment. Detachable head shell wired for stereo/mono. Optional lift/lower device. Single hole fixing. Single uni-pivot bearing. Accommodates all standard cartridges. Adjustable stylus force-calibrated weights supplied. Single lever height adjustment. Price: (with lift device, head shell and lateral balance) £7 15s. (plus £1 13s. 2d. PT).

Connoisseur pickup arm SAU.II. Gimbal mountings on ball bearings set at 45/45. Automatic bias compensator. Hydraulic lowering device. Decoupled counterbalance weight. Additional weight supplied to accommodate different cartridges. Single hole fixing. Height adjustable from 1 in. to 2 ins. Lightweight shell with ½ in. fixing centres. Five-pin plug connection to base of pickup. Low resistance self-cleaning contacts. Supplied with set of leads and separate precision balance with range 0-6 gm. Price: £10 10s. (plus £2 5s. 1d. PT). Extension stem for use with high turntables: 7s.

Connoisseur Classic pickup. Pickup arm complete with plug-in head. Ceramic cartridge. Stereo or mono as required. Stylus: diamond 0·5/0·6 thou stereo, diamond 1 thou LP, sapphire 2·8 thou 78. Pw 3-3½ gm. Specification as per SCU1 cartridge. Extra lightweight tubular arm. Gimbal mountings. Lightweight plug-in heads (less than 3½ gm). Sliding counter-balance weight adjustment. Price: (with stereo head) £7 2s. 6d. (plus £1 10s. 10d. PT).

★

TANNOY PRODUCTS LTD., West Norwood, London, S.E.27. Tel: 01-670 1131. Cables: Tannoy, London.

Variluctance. Turnover cartridge. Output voltages: LP: 10-12 mV; 78 18-20 mV. Range 20 Hz-16 KHz ±2 dB. Pw 5-6 gm (less with professional arms). Load imp 50K ohms. Price (with 2 diamonds): £12 (plus £2 13s. 11d. PT); (with 1 diamond and 1 sapphire): £9 10s. (plus £2 2s. 8d. PT); (with 2 sapphires): £7 (plus £1 11s. 5d. PT).

Single stylus version of Variluctance for LP also available. Price (with diamond): £6 15s. (plus £1 10s. 4d. PT).

★

THORENS. Distributors: Metro-Sound (Sales) Ltd., Bridge Works, Wallace Road, Canonbury, London, N.1. Tel: 01-226 8641. Cables: Metrosound, London, N.1.

TP.13 pickup arm. Offset angle 24 degrees. Tracking error <0·3 degrees/inch. Vertical and horizontal pivots on special precision bearings. Simultaneous vertical and horizontal balance adjustment. Tracks at 0·5 gm stylus pressure. Arm resonance below 10 Hz, no resonance in audio response. Counterweight with fine adjustment. Stylus pressure adjustment calibrated in ¼ gm steps. Extra light aluminium plug-in shell. Viscous damped lowering device. Price: £11 (plus £2 12s. 11d. PT).

TP.14 pickup arm. Precision 9 in. arm. Horizontally and vertically balanced. Patented plug-in shell with adjustable vertical tracking angle. Viscous-damped lowering and lifting control. Anti-skating horizontal bias device. Stylus pressure adjustable ½ to 4 gm. Price: £18 10s. (plus £4 9s. PT).

TP.50 shell. For TP.13 and TP.14 pickup arms. Price: £2 10s. (plus 12s. PT).

TD.224 shell. For TD.224 transcription unit. Price: £1 6s. 3d. (plus 6s. 4d. PT).

BTD-12S shell. Price: £1 2s. (plus 5s. 4d. PT).

★

TRANSCRIPTORS LTD., 551 Holloway Road, London, N.19. Tel: 01-272 6419.

Transcriptor fluid arm. Stereo or mono low-mass arm with fluid Uni-pivot mount. Modular counter-weight system with fine balance adjustment. Suitable for all cartridges with compliance of 15×10^{-6} cm/dyne or above, tracking at not more than 2·5 gm. Hydraulic lowering device with manual over-ride control. Incorporates precise cueing system. Single hole fixing. Integrated leads. Plug-in head shell. Roller-action adjustable bias compensation. Price: £14 5s. (plus £3 1s. 9d. PT).

★

WALTON. Rainer-Walton Enterprises Ltd., 19 New End, London, N.W.3. Tel: 01-435 7706.

Walton M.1. High quality stereo-compatible cartridge for record players and radiograms. Mono cartridge incorporating "decoupled stylus" system which plays all types of record without distortion-producing groove damage. Crystal unit. Turn-over type. Stylus: (diamond) 0·5/6 thou; (sapphire) 0·6/7 thou. Pw 5 gm. Tip mass 1·6 mg. Vertical and horizontal compliances: $2{\cdot}5 \times 10^{-6}$ cm/dyne, $4{\cdot}0 \times 10^{-6}$ cm/dyne. FR 40 Hz-12 KHz. Output: 250 mV. Rec load 1 megohm or greater. Price: £1 10s. (plus 6s. 5d. PT).

★

WORDEN AUDIO DEVELOPMENTS LTD., 54 Chepstow Road, London, W.2. Tel: 01-229 4996.

Worden articulated arm Mk III. Radially operative single arm with articulated head piece. Tracking correct to ±¼°. Vertical and lateral friction less than 50 mg. Adjustable counter-balance weight. Height adjustment. Detachable head-shell accepts all standard ½ in. centre fixing cartridges. No resonances above 10 Hz. Extra head shells available. Built-in lowering and lifting device. Price: to be announced.

PICKUP ACCESSORIES

AURIOL (GUILDFORD) LTD., Farnham Trading Estate, Farnham, Surrey. Tel: Farnham 3366.

Auriol pickup control. This unit eliminates accidental damage to the record by the stylus, the control provides air cushioned lowering and positive vertical lifting and lowering of the stylus. The supporting arm is serrated and calibrated for accurate positioning of the stylus at any pre-selected position within 1-2 micro-grooves. Three cursors are provided to mark starting positions and an indexing clip is supplied to suit any specified pickup arm. Price: £3 1s. 8d. (plus 13s. 4d. PT).

Auriol pickup control Mk II. This is dimensionally similar to the above but the arm will swing clear of the turntable to allow its use with the Autochanger/Manual player units. Price: £3 14s. (plus 16s. PT).

★

ARENA. Distributors: Highgate Acoustics, 71-73 Great Portland Street, London, W.1. Tel: 01-636 2901.

●**Arena F.1 preamplifier.** For magnetic pickups. Specially designed for use with Arena T. 1900F tuner/amplifier. Power supply through cable connection from stereo output socket. Plastic case. Price: £5 5s.

●**Arena FS.1 preamplifier.** Preamplifier F.1 combined with 240V AC mains power pack. Suitable for use with any stereo amplifier. Two matched silicon transistors in each channel. Matches magnetic pickup into amplifier having crystal or ceramic input only. Price: £7 7s.

★

BANG & OLUFSEN U.K. DIVISION, Eastbrook Road, Gloucester. Tel: 0452 21591.

M/lift. For Bang & Olufsen arms only. Hydraulic operation. Price: £3 3s. 3d. (plus 14s. 3d. PT).

●**Type GF2.** Transistorised stereo pickup preamplifier. Sensitivity: 7 mV input for 0·5V output per channel. NL −62 dB. Price: £6 5s.

●**Type GF3.** Preamplifier. Price: £6 5s.

BURNE-JONES & CO. LTD., 18 Brunswick Road, Sutton, Surrey.

Alignment protractor. For measuring the tracking accuracy of all pickup assemblies. Made in plastic ivorine. Price: 8s.

★

CLENDISC (MAIL ORDER) LTD., c/o Mrs. E. Smith, 7 Trinity Court, Gray's Inn Road, London, W.C.1. Tel: 01-837 9088.

Clendisc. An anti-static cleaner and preserver for records. Price: 4s. 1d. Clendisc record cleaning pad. Price: 3s. 4d. including tax.

★

COLTON & CO. (LAPIDARIES) LTD., The Crescent, Wimbledon, London, S.W.19. Tel: 01-946 9401.

Antistaticloth. A soft cloth impregnated with an anti-static material, for cleaning records. Price: 2s. 6d.

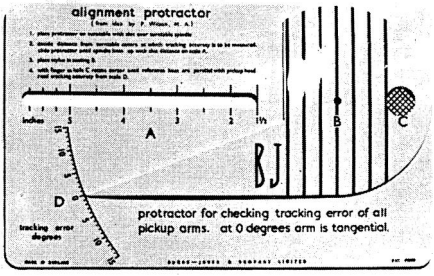
Colton E.P. record centre adaptors (45 rpm). Small plastic centre pieces which enable E.P. records to be used again on slim spindle changers after the large centre piece has been removed. Price: 3s. per packet of one dozen (plus 8d. PT).

Varilift. A precision instrument for lowering pickup on to record. Instantly adjustable for height using a single knurled nut. Screw valve provides variable rate of fall which, being hydraulically controlled, is smooth and independent of pickup weight. Provision is made for locking in the raised position when required. Price: £3 0s. 9d. (plus 13s. 2d. PT).

Precision level. Circular bubble-type spirit level in white plastic case 1 $\frac{3}{16}$ in. diameter, $\frac{1}{2}$ in. high. Three fixing holes provided or it may be fixed with adhesive. Ensures accurate levelling in all directions. Price: 6s. 9d.

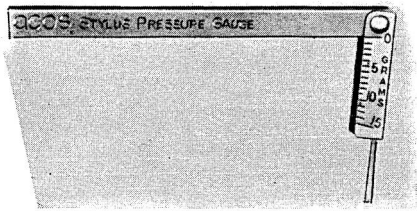
Antistatimat. All-rubber 12 in. turntable mat. Accurately balanced and moulded with guard edge recess. Introduction of certain materials into the rubber renders it conductive to static charges on micro-groove records. When a record is placed on the mat static charges are dispersed freeing the record from induced noises

Auriol Mk. II pickup control

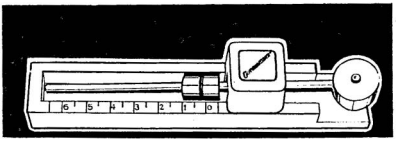


B-J alignment protractor

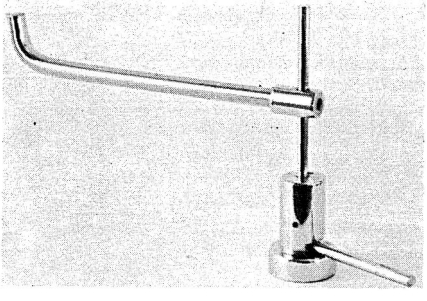
Colton antistaticloth



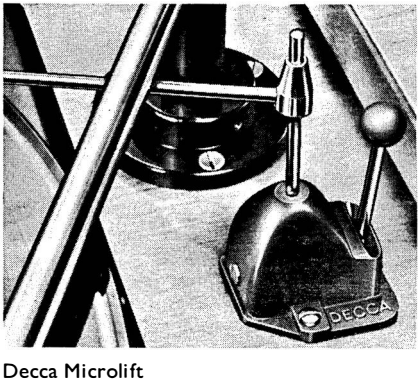
Acos stylus pressure gauge



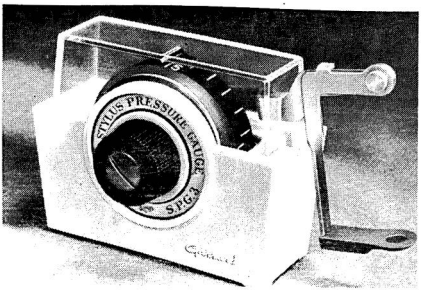
Connoisseur Stylus Balance



Hadcock GH Uni-lift



Decca Microlift



SPG 3

without use of sprays, etc. Price: 13s. 6d. (plus 2s. 10d. PT).

Plastisleeves. Made from 200-gauge polythene and designed to protect microgroove records from dust and damp. Supplied in packets of 12. Prices: 7 in. round bottom 2s. 4d., 12 in. round bottom 5s.

Plasticovers. Made from 200-gauge polythene and designed to protect record sleeves against rubbing and scratching. Supplied in packets of 12. Price: 7 in. square bottom 1s. 3d., 12 in. square bottom 3s. 1d.

Chek. Self-adhesive anti-slip pads for use with records played on auto-changers. Prevents records slipping one against another. Packets of 10. Price: 2s. 7d. (plus 6½d. PT).

Times-Fifty. Miniature pocket microscope with stylus locating slot and adjustable focus. Gives clear picture of stylus tip at X50 magnification. 4½ in. long and fitted with pen clip. Price: 17s. 6d.

Magnalift. Centre lift off device. Fixes beside pickup and automatically lifts arm off record at end of playing cycle. Finished in black wrinkle and satin chrome. Price: £2 10s. 8d. (plus 10s. 10d. PT).

Variscale. Tracking force indicator. Simple and accurate stylus balance measuring from ½ to 6 gm. Finish: black wrinkle and satin chrome. Price: 16s. 11d. (plus 3s. 8d. PT).

Precise. Manually operated pickup lifting device. Simple precise movement. Single hole mounting. Finish: satin chrome. Price: £1 8s. 6d. (plus 5s. 4d. PT).

Superactive. New formula anti-static fluid. For cleaning and neutralising static in records and other plastic surfaces. Can be applied with sponge or cloth, leaves no sticky deposit. Suitable for recharging anti-static devices. Supplied in dispenser with dropper nozzle. Price: (½ oz) 2s. 6d., (1 oz) 4s. 6d.

★

COSMOCORD LTD., Eleanor Cross Road, Waltham Cross, Herts. Tel: Waltham Cross 27331.

Acos stylus pressure gauge. A spring balanced gauge calibrated 0-15 gm. Accurate to within 0·5 gm. Price: 9s. 6d. (plus 2s. 1d. PT).

DECCA SPECIAL PRODUCTS, Ingate Place, Queenstown Road, London, S.W.8. Tel: 01-622 6677.

Magnetic bias compensator. Neat, simple, unobtrusive device using magnetism precisely to neutralise the forces which draw a pickup towards the centre of the turntable. Type A for Mk I and Mk I "Super" *ffss* arms, and for Deram ARI arm. Type B for current Decca "Professional" arm. Prices: Types A and B 18s. 6d. (plus 4s. PT).

Counterweight adjuster. Placed on counterweight of Mk I *ffss* arm produces tracking weight of 2 gm for Mk III and mono elliptical heads. Already supplied with Mk I "Super" arms. Price: 7s. (plus 1s. 6d. PT).

Centre locator. Fits on *ffss* arm like *ffss* head. Pickup arm is correctly positioned when the locator moulding fits the turntable centre spindle. Price: 5s. (plus 1s. PT).

Decca Microlift. A device for raising and lowering a manual pickup arm at any point on the record for minimising risk of damage either to record or stylus through handshake. Easy to fit to most types of back-pivoted pickup. It does not hinder record handling by over-lapping the turntable. Price: £1 6s. (plus 5s. 6d. PT).

Deccalift. Motorised lifting and lowering device which can be controlled at the turntable and/or remotely. Requires 6·3V AC. Transformer optional extra. Price: £6 18s. (plus £1 10s. PT).

Stylus cleaner. Incorporates wheel covered in soft hair, which engages with the stylus when in its rest position. A height adjustment screw enables the cleaner to be accommodated to suit most non-automatic record players on the market. Price: £1 0s. 7d. (plus 4s. 5d. PT)

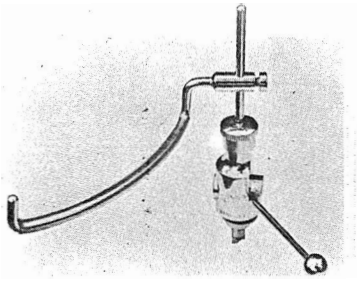
★

M. B. FITCH. U.K. Distributors: Metro-Sound Manufacturing Co. Ltd., Bridge Works, Wallace Road, London, N.1. Tel: 01-226 8641. Cables: Metrosound, London, N.1. Overseas Distributors: T. D. Bailey & Son Ltd., 9 St. Helen's Place, London, E.C.3.

"Hi-Jack" Model "D". A raising and lowering device specially designed for direct attachment to the Decca *ffss* pickup pedestal. All

The "Dust Bug"

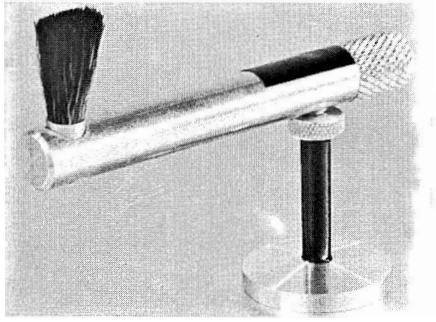
Manual parastat



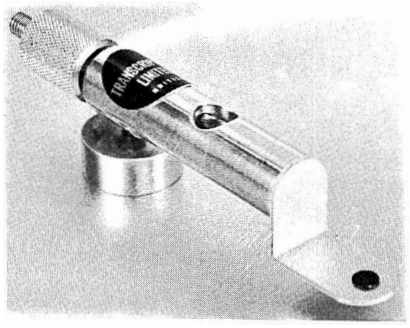
Ortofon "Hi-Jack"

Metro-Sound stylus cleaning kit

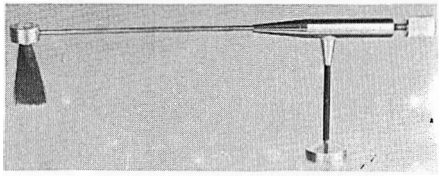
Metro-Sound metro-mat



Transcriptor stylus brush



Transcriptor stylus scales



Transcriptor sweep arm record cleaner

metal chrome plated construction, positive stops in fully raised and lowered positions. Price: £1 1s. (plus 4s. 8d. PT).

"Hi-Jack" Model "U". A raising and lowering device specially suited for use with the Garrard 4HF motor unit for which no extra fixing hole is required. 1½ in. height adjustment by means of sliding head. All metal chrome plated construction. One $\frac{3}{16}$ in. hole needed for fixing. Price: £1 1s. (plus 4s. 8d. PT).

★

GARRARD ENGINEERING LTD., Newcastle Street, Swindon, Wilts. Tel: Swindon 5381. Cables: Garrard, Swindon.

SPG3. Stylus pressure gauge. Suitable for all current pickup arms and heads. Elegantly styled. Range 0-12 gm with ½ gm indications. Supplied with 5 gm checking weight. Price: 18s. 7d. (plus 4s. 2d. PT).

★

GOLDRING MANUFACTURING CO. (GREAT BRITAIN) LTD., 486/488 High Road, Leytonstone, E.11. Tel: 01-539 8343/5. Cables: Echovox, London.

Lenco STB.2. Stylus pressure balance. A simple and accurate device, not relying on springs. Price: 13s. 9d. (plus 3s. PT).

Lencoclean. Record cleaning device mounted on turntable. Tracks in front of the pickup, dispensing a narrow band of special fluid. Leaves no deposit on record, cleans the groove and cools the point contact. Keeps stylus point clean. Price: £2 2s. (plus 9s. 1d. PT).

★

G. F. C. HADCOCK, Audio Division, The Old Vicarage, Doveridge, Derby, DE6 5NN. Tel: Uttoxeter 2452.

GH Uni-lift. Raising and lowering device suitable for use with all pickup arms. Two-hole fixing for stability. Ensures accurate lowering and easy cueing. Allen key provided for height adjustment of horizontal arm. Finish: chromium plated brass. Price: £1 15s. (plus 7s. 6d. PT).

LENNARD DEVELOPMENTS LTD., 7 Slades Hill, Enfield, Middlesex. Tel: 01-366 0601.

Play-fair Stylus Timer. Manually operated device which indicates when stylus is due for replacement. Self-adhesive to attach to motor board if desired. Swiss mechanism. Neat plastic case with instructions. Two models: one for sapphires, one for diamonds. Price (either model): 16s. 3d. (plus 3s. 6d. PT).

Play-fair cleaning pad. Anti-static. Price: 2s.

★

METRO-SOUND MANUFACTURING CO. LTD., Bridge Works, Wallace Road, Canonbury, London, N.1. Tel: 01-226 8641. Cables: Metrosound, London, N.1.

Metro-Mat. New ribbed rubber mat. Suitable for all turntables. Discharges static from all LP records. Price: 12s. 9d. including PT.

High Fidelity Stylus Cleaning Kit. Comprises bottle of special cleaning fluid, fine brush applicator and dirt remover. Safe for use with all pickups. Price: 7s. 3d. including PT.

Record care kit. Price: 5s. 8d. including PT.

Metrosponge. Record cleaner. Price: 3s. including PT.

Cleaning cloth. Antistatic cleaning cloth. Price: 2s. 6d. (no PT).

45 rpm adaptors. Per dozen pack. 3s. 9d. including PT.

Metro-scale. Stylus balance. Price: 7s. 4d. including PT.

Lubricating kit. Price: 6s. (no PT).

Disc-Key. 45 rpm anti-slip guard. Price: 2s. 6d. including PT.

Spirit level. Price: 6s. (no PT).

Ioniser. New high fidelity cleaner. Permanently anti-static. Made of humid soft velvet in enclosed plastic moulding for protection against dirt. Price: 7s. (no PT).

High Fidelity Maintenance kit. Price: £1 12s. 6d. including PT.

ORTOFON A/S. Distributors: Metro-Sound Sales Ltd., Bridge Works, Wallace Road, London, N.1. Tel: 01-226 8641. Cables: Metrosound, London, N.1.

Ortofon "Hi-Jack". Pickup arm lift/lowering device. All metal chromium plated. Special spring-loaded friction system for "air cushioned" lowering. Adjusting lowering speed. Positive positioning on record. Works independently of weight of cartridge or stylus force. Mk II model for use with Ortofon arms, Mk IV model free-standing for use with any arm. Price: £3 5s. (plus 13s. 11d. PT).

★

PHILIPS ELECTRICAL LTD., Century House, Shaftesbury Avenue, London, W.C.2. Tel: 01-437 7777. Cables: Phillamps, London.

EG7036. Head shell to suit Philips AG2030/2230, GC030 and GA230 record players. Accepts international standard $\frac{1}{2}$ in. fixing cartridges. Complete with mounting pressure gauge and fitting tools. Price: £2 19s. (plus 13s. 3d. PT).

GH905. Preamplifier unit to fit inside Philips GA217 player unit to match GP404 magneto-dynamic pickup to amplifiers with input for crystal pickup only. Input impedance 50K. Gain 34 dB. Hum and noise −80 dB. Price: £7 7s.

GH921. Preamplifier unit to fit inside Philips AG2230 or GA230 to match GP407 magneto-dynamic head to amplifiers with crystal pickup input only. Specification similar to GH905. Price: £7 7s.

A. R. SUGDEN & CO. (ENGINEERS) LTD., Market Street, Brighouse, Yorkshire. Tel: Brighouse 2142. Cables: Connoiseur, Brighouse.

Connoisseur Stylus Balance. Precision stylus balance with sliding weight adjustment. Scale calibrated 0-6 gm. Simple operation giving accurate stylus pressure settings. Price: 16s. 9d. (plus 3s. 7d. PT).

★

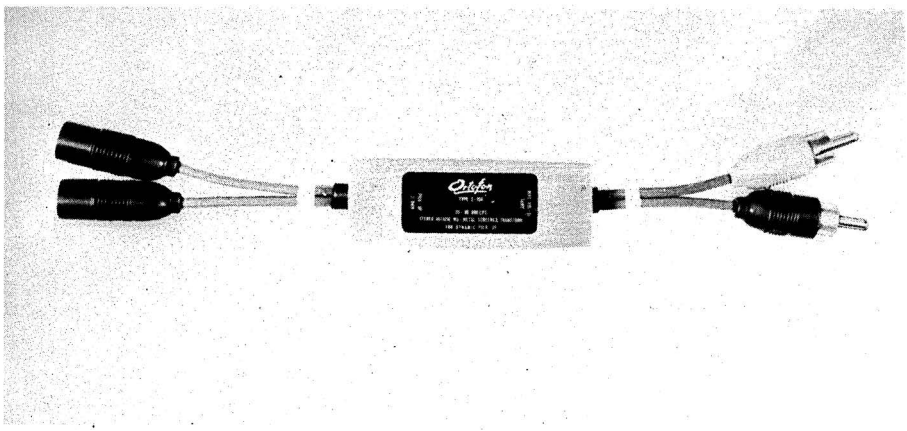
TRANSCRIPTORS LTD., 551 Holloway Road, London, N.19. Tel: 01-272 6419.

Transcriptor Stylus scales. Precision scales in polished aluminium with jewelled pivot. Sensitive to less than 0·01 gm. Accuracy better than 0·02 gm. Measures 0-5 gm in increments of 0·05 gm. Bubble read-out. Supplied with reference calibration check weights. British made. Price: £2 (plus 8s. 8d. PT).

Transcriptors sweep arm. Record cleaning device for permanent fixing. Height adjustable over $3\frac{1}{2}$ in. Tracks at $\frac{1}{4}$-$\frac{1}{2}$ gm. Balance cursor. Integrated parking device. Precision unipivot construction. Polished aluminium. Price: £2 5s. (plus 9s. 9d. PT).

Transcriptors stylus brush. For permanent installation. Comprises squirrel hair brush for cleaning stylus. Adjustable for height. Single hole fixing. Polished aluminium construction. Price: £1 7s. 6d. (plus 6s. PT).

Transcriptors anti-feedback legs. As fitted to Transcriptors turntable. Effectively isolates turn-



Ortofon Transformer Modules

table from acoustic feedback. Polished aluminium construction. Supplied in sets of three. Price (set): £2 5s. (plus 9s. 9d. PT).

Transcriptors record brush. Squirrel hair brush for cleaning records by hand (too soft for any other purpose). Polished aluminium construction. Removable handle. Size: $6 \times \frac{1}{2}$ in. Price: 15s. (no purchase tax).

Transcriptors spirit level. Polished aluminium construction. Accuracy 0·005 degrees maximum gradient level. Price: 15s. (no purchase tax).

★

CECIL E. WATTS LTD., Darby House, Sunbury-on-Thames, Middx. Tel: Sunbury 3252.

The "Dust Bug". Claimed to be the most efficient method of removing static and dust from records as they are played. Instantly fitted, suitable for all types of records. Record quality is improved, surface noise and wear reduced. Price: 17s. 6d. (plus 3s. 9d. PT).

"Parostatik" regd. **Disc Preener.** For record maintenance where anti-static agents are not desirable (where stylus force is less than 2 gm). Price: 6s. 9d.

Manual Parastat. Manual Model Parastat record cleaning machine. For the cleaning and application of anti-static agents to LP records. Price: £2 5s.

Spares and replacements. Dust Bug nylon bristle and plush pad. Price: 1s. 9d. New Formula dispenser. Price: $\frac{1}{2}$ oz. 2s. 6d., 1 oz. 4s. 6d. Parastatik wicks (improved models only). Price: 2s. (packet of four). Parastat brush. Price: 8s. 6d. Parastat nylon velvet pad covers. Price: 2s. Parastat white PVC sponge. Price: 1s. Humid Mop for use with manual Parastat. Price: 4s. 6d. Replacement sponges. Price: 2s. 6d. set. New Formula 1 oz. Parastatik dispenser. Price: 4s. 6d.

★

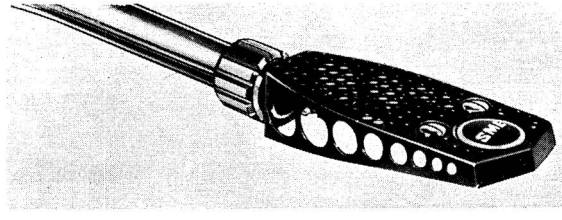
WILSON STEREO LIBRARY LTD., 104-106 Norwood High Street, London, S.E.27. Tel: 01-670 6394.

W.S.L. Blank Disc. Highly polished blank vinyl disc for adjusting side thrust and alignment. Indicates the amount of side thrust to be corrected. Mirror-like surface reflects underside of cartridge and stylus and assists in accurate alignment. Supplied with instructions for correcting side thrust. Price: 13s. 6d. postage and packing included.

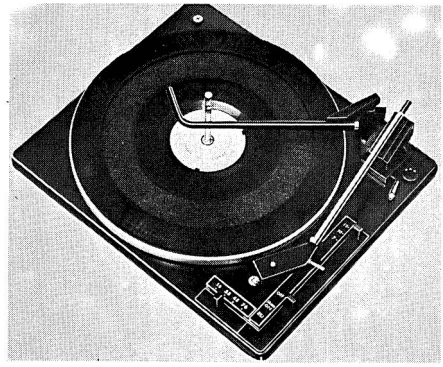
W.S.L. Side Thrust Corrector. Pulley device which may be fitted to any pickup to correct side thrust. Should be used in conjunction with W.S.L. Blank Disc for precise elimination of side thrust. Price: 8s. (including PT).

SME Model 2000 plinth system

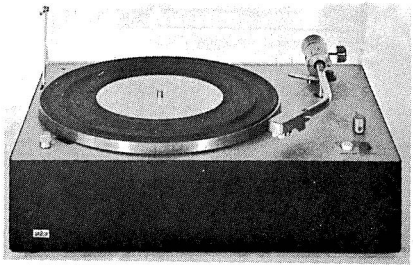
SME ultra light shell.



Beogram 1000

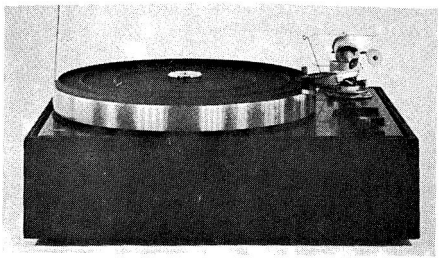


B.S.R. UA65



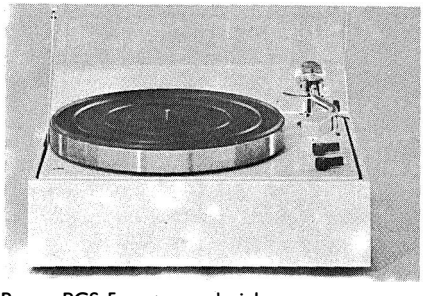
Braun PS-1000 motor and pickup

BSR UA70



Braun PCS-52E motor and pickup

B.S.R. UA75 turntable



Braun PCS-5 motor and pick-up

Connoisseur SAU2 arm and plinth

DIRECTORY OF MOTOR UNITS

BANG & OLUFSEN U.K. DIVISION, Eastbrook Road, Gloucester. Tel: 0452 21591.

●**Beogram 1000 V.** Three-speed motor unit complete with pickup arm, cartridge and dust cover. Speeds 33⅓, 45, 78 rpm with fine speed control. Wow 0·2%. Rumble −35 dB at 1·4 cm/sec. 100 Hz NARTB. 12 in. turntable. Belt drive. Own motor. Type STL pickup arm. Built-in hydraulic arm lift. Stroboscopic mat. Anti-microphonic suspension. Plinth mounted. B & O ST/L arm, SP7 magnetic cartridge and micro-lift. Price: £33 5s. 6d. (plus £7 9s. 6d. PT).

●**Beogram 3000.** Plinth-mounted motor unit complete with arm and cartridge. Teak or rosewood plinth. Speeds: 33⅓ and 45 rpm with adjustment. Wow: 0·17% peak. Rumble: 45 dB below NARTB standard 14 cm/sec. Anti-magnetic turntable. 10¼ in. diameter. 3½ lb. Belt drive without idlers. Six-pole Papst motor. Pickup arm: ST/L 15°. Anti-static mat. Stroboscope. Price: £67 11s. 6d. (plus £15 3s. 6d. PT).

●**GF2, GF3 Pre-amplifiers for above.** See Pick-up Accessories section.

★

BRAUN AG. Distributors: Fi-Cord International, Charlwoods Road, East Grinstead, Sussex. Tel: East Grinstead 21351.

PS410. Turntable, pickup arm, cartridge, mounted on plinth with plexiglass lid. Speeds 16⅔, 33⅓, 45, 78 rpm with ±3% fine adjustment. W and F less than 0·02%. Rumble better than −56 dB. Turntable 10¼ in. 5 lb. Stepped spindle, friction wheel, intermediate roller and drive belt. Four-pole synchronous motor. Tubular cranked metal pickup arm. Lowering and raising device. Cueing for 7 in., 10 in. and 12 in. records. Tracking error: less than ±2 degrees. FR (Shure M75-6 cartridge) 20 Hz-20 KHz. Size: 14⅞ × 6⅞ × 11¼ in. Price: £70 19s. 5d. (including PT).

PCS5. Turntable, pickup arm, cartridge, mounted on plinth with plexiglass lid. Speeds 16⅔, 33⅓, 45, 78 rpm. Accuracy within −0·3% and +0·7%. Wow less than 0·1%. Flutter less than 0·05%. Rumble −52 dB. Turntable 11⅞ in. diameter, 6·6 lb. Drive by stepped pulley, friction wheel, capstan, belt and idler. Hysteresis synchronous motor. 9 in. tubular metal pickup arm. Lowering device. Cueing for 7 in., 10 in. and 12 in. records. Price (with Shure M44 cartridge fitted): £112 4s. 11d. including PT; (without cartridge) £101 18s. 6d. including PT.

PS2. Turntable unit with pickup arm and cartridge. Two-pole motor. Friction wheel drive. Speeds: 45, 33⅓, 16⅔ rpm. Speed fluctuations <0·3%. Turntable 7½ in. Rumble and noise: −50 dB. Dynamically balanced pickup arm. Tracking pressure 5-7 gm. Adjustable counterweight. Cartridge: Elac KST107 with 0·5 thou sapphire for mono and stereo. Automatic shut-off and disengagement of drive. Size: 12 × 9 × 4⅛ in. Price: £18 6s. 5d. (including PT).

PCS52E. Same as PCS5 but fitted with SME 3009 pickup arm and Shure M55E cartridge. Price: £190 14s. 2d. (including PT).

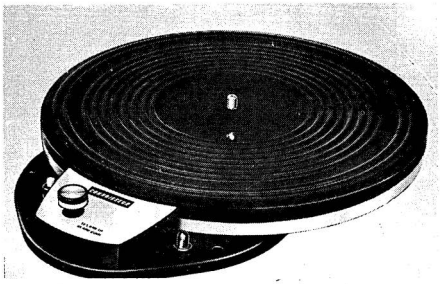
PS1000. Four-speed motor unit with pickup arm. Speeds: 78, 45, 33⅓, 16⅔ rpm. Speed adjustment ±3%. W. and F. below 0·1%. Rumble −60 dB. Pickup arm balanced horizontally by two adjustable counterweights. Tracking adjustable down to 0·4 gm. Hydraulic lowering device, relay-operated by feathertouch button. Automatic photo-electric shut-off. Size: 17¼ × 6⅞ × 12⅞ in. Price: £193 0s. 4d. (including PT).

★

BSR LTD., Monarch Works, Cradley Heath, Warley, Worcs. Tel: Cradley Heath 69272. Telex: 33282.

UA65. Automatic turntable unit with pickup arm. Speeds: 78, 45, 33⅓, 16⅔. Wow: below 0·2% RMS. Flutter: below 0·06% RMS. 11 in. diameter pressed steel turntable. Belt and pulley drive. Two-pole induction motor. Mains: 100-125V 60 Hz, 200-250V 50 Hz. Low-mass tubular arm with cartridge shell incorporating finger lift. Will accommodate all standard cartridges. Automatic pickup arm lock. Cue and pause lever. Anti-skate control. Price: £9 9s. 6d. (plus £2 0s. 7d. PT).

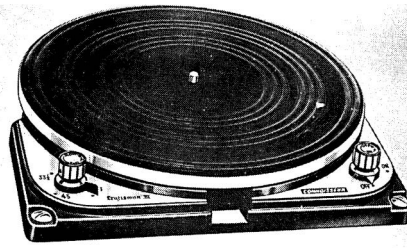
UA70. Manual/automatic motor unit with pickup. Speeds: 78, 45, 33⅓, 16⅔ rpm. 11 in. diameter deep-rim turntable. Pulley drive. Four-pole induction motor. Tubular counter-



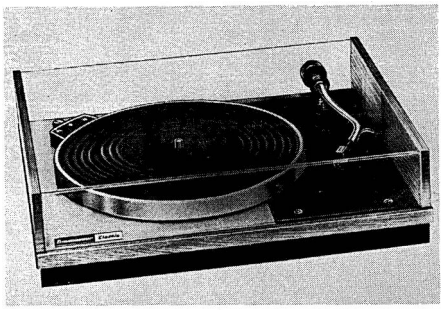
Connoisseur Craftsman II motor unit

Connoisseur BD1 motor unit

Connoisseur Classic motor unit

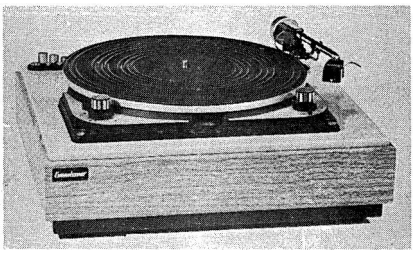


Connoisseur Craftsman III

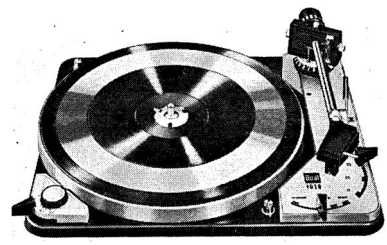


Connoisseur Classic on plinth

Decca Deccadec



Connoisseur Craftsman III on plinth with arm



Dual 1019 turntable unit

balanced pickup arm with coarse and fine adjustments. Detented and calibrated stylus pressure control. Adjustable anti-skate control. Automatic pickup lock. Interchangeable spindles. Automatic shut-off. Price: (without cartridge) £11 19s. 6d. (plus £2 11s. 3d. PT).

UA75. Automatic/manual motor unit with pickup arm and shell. Heavy diecast non-ferrous alloy. Interchangeable spindle for manual or automatic. Cartridge holder takes all standard cartridges. Arm locked when not in use. Low mass counter-balanced arm. Cue/pause lever to raise or lower arm precisely. Calibrated bias control. Calibrated stylus pressure selector. Suppressed switching. Muting on automatic. Plinth available as extra. Price: £14 9s. 6d. (plus £3 1s. 11d. PT).

★

CONNOISSEUR. See A. R. Sugden and Co. Ltd.

★

DUAL ELECTRONICS LTD., Radnor House, London Road, Norbury S.W.16. Tel: 01-764 9465/6.

Dual 1019. Transcription turntable with automatic changing facility. Speeds: 78, 45, $33\frac{1}{3}$, $16\frac{2}{3}$ rpm. Variable speed adjustment $\pm 6\%$. Dynamically balanced low-mass arm with direct dial stylus pressure (0-5 gm) and direct dial bias compensation. Dynamically balanced non-ferrous turntable weighing over $7\frac{1}{2}$ lb. Cueing control. Rotating single-play spindle. Continuous pole motor with low stray field. Radially elastic suspension. Friction-damped rubber-cushioned spring suspension. Rumble virtually eliminated. Accepts any standard cartridge with $\frac{1}{2}$ in. fixing centres but specially recommended are Shure M80E-D19 and Shure V15-11. Plinths and covers in teak and rosewood. Full specification on request. Price: £44 2s. (including PT); with Shure M75 cartridge £52 10s. (including PT).

Dual 1015/F. Transcription turntable with automatic changing facility. Counter-balanced pickup arm. Three speeds. Variable speed control. Direct dial stylus pressure adjustment (0-5 gm). Direct dial bias compensation. Cueing control. Full specification on request. Price: £32 11s. (including PT); with Shure M75 cartridge £40 19s. (including PT).

Dual 1010/F. Turntable providing manual operation with autochanger. Three speeds. Variable speed control. Four-pole fully screened motor. Cueing control. Full specification on request. Price: £24 3s. (including PT); with Dual CDS 630 cartridge £28 7s. (including PT); with Shure M3D-M cartridge £30 9s. (including PT).

★

DECCA SPECIAL PRODUCTS, Ingate Place, Queenstown Road, London, S.W.8. Tel: 01-622 6677.

●**Decca "Studio" turntable.** Full details and price to be announced.

●**Deccadec de luxe.** Motor unit with Deram transcription head and arm including all fittings for cabinet mounting. Speeds: $16\frac{2}{3}$, $33\frac{1}{3}$, 45, 78 rpm with no fine adjustment. $10\frac{1}{2}$ in. non-magnetic turntable. Pulley drive. Garrard motor. Automatic motor switch off and return of pick-up at end of record. Built-in anti-rumble filter. Lifting and lowering device and bias compensation. Price: £15 11s. 5d. (plus £3 6s. 7d. PT).

★

ELAC. Electroacustic GmbH., Kiel, West Germany. Distributors: Mitchell Enterprises Ltd., 61 West Street, Dorking, Surrey. Tel: 0306 4229.

Miracord 50H. Four speeds, with automatic shut-off. Magnetic pickup cartridge STS333. (Can also be supplied without cartridge or with other Elac cartridges.) Studio tone arm with adjustable stylus force (2-6 gm). Heavy balanced turntable, 12 in. dia (driven by special hysteresis motor), 220V AC, 50 Hz or 110V AC, 60 Hz. Push-button control for various functions. Size: $14\frac{1}{2} \times 12\frac{1}{2}$ in. Weight: $14\frac{3}{4}$ lb. Price on request.

Miraphon 22H. Design and basic technical characteristics same as for Miracord 50H. Incorporates built-in arm raising and lowering device. Weight: $14\frac{3}{4}$ lb. Price on request.

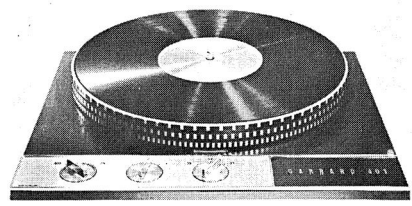
Miracord 630. Similar design to Model 50H but full specification and price not available at time of going to press.

★

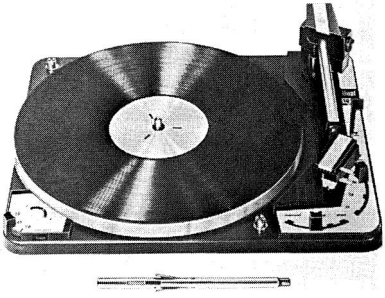
FERGUSON. British Radio Corporation Ltd., 284 Southbury Road, Enfield, Middlesex. Tel: 01-366 1155.

●**Ferguson 202RP.** Record unit in cabinet to match Unit Audio equipment. Turntable: Garrard SP25 with bias compensation, cueing de-

Dual 1015 turntable unit



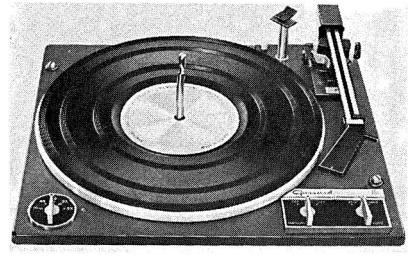
Garrard 401 motor unit



Dual 1010 turntable unit

Garrard SL95 turntable unit

Ferguson 202RP



Garrard SL75 turntable unit

Garrard SP25 Mk II turntable unit

Garrard LAB80 Mk II

vice and interchangeable head. Cartridge: Sonotone stereo ceramic 9TA with diamond stereo LP and sapphire 78 styli. Mains: 200-250V AC 50 c/s. Output socket: 5-pin DIN for stereo pickup. Supplied with 5 ft. lead for connecting to Unit Audio amplifiers. Size: $16\frac{1}{4} \times 14 \times 8\frac{1}{2}$ in. Finish: teak with transparent Perspex lid. Price: £25 5s. 10d. (plus £5 8s. 2d. PT).

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GARRARD ENGINEERING LTD., Swindon, Wiltshire, England. Tel: Swindon 5381. Cables: Garrard, Swindon.

Model 401. Transcription motor. Three speeds: $33\frac{1}{3}$, 45, 78 rpm. Adjustable by eddy current brake. 6 lb. machined aluminium turntable with gear-cut illuminated strobe markings on rim. Statically balanced. Die-cast aluminium unit plate. Completely screened spring-mounted shaded-pole motor. Anti-static turntable mat. Styled by Eric Marshall and finished in metallic charcoal with chrome relief. W. and F. less than 0·05% RMS. Rumble almost non-existent. Mains: 110-125V and 220-250V, 50 or 60 Hz according to pulley fitted. Size: $13\frac{3}{4}$ in. wide, $14\frac{5}{8}$ in. front to rear, $2\frac{1}{8}$ in. above motor board, $3\frac{15}{16}$ in. lower edge of unit plate. Price: £25 9s. 7d. (plus £5 13s. 3d. PT).

Lab 80 Mark II. Transcription turntable with autochange facility and automatic single record play. Two speeds: $33\frac{1}{3}$, 45 rpm. 12 in. diameter heavy non-magnetic turntable. Statically balanced. Plug-in head. Wood afrormosia counterbalanced arm with aluminium stabilising channel. Bias compensator. Magnetic auto-trip. Fine stylus pressure click adjustment. Wired for mono and stereo. Dynamically balanced rotor. Mains: 100-130V, 200-250V, 50 or 60 Hz according to pulley. Size: $15\frac{3}{4}$ in. wide, $14\frac{5}{32}$ in. front to rear, $5\frac{1}{8}$ in. above and $3\frac{7}{16}$ in. below lower edge of unit plate. Plus clearances. Price: £25 15s. 1d. (plus £5 14s. 6d. PT).

WB2. Teak finish wood base for Lab 80 Mk II. Price: £3 16s. 8d. (plus 17s. PT).

SPC2. Rigid transparent plastic dust cover for Lab 80 Mk II. Price: £3 12s. 8d. (plus 16s. 2d. PT).

SP25 Mk II. High quality single record playing unit. Die-cast non-magnetic turntable. Four speed. Magnetically screened motor. Cueing device to raise or lower pickup arm where required. Counter-balanced tubular aluminium arm. Plug-in head. Integral calibrated stylus pressure adjustment. Bias compensator. Automatic trip and return. Wired for stereo and mono. Mains: 100-130V, 200-250V, 50 or 60 Hz according to pulley. Size: $15\frac{1}{8}$ in. wide, $12\frac{1}{2}$ in. front to rear, $2\frac{7}{8}$ in. above, $2\frac{3}{4}$ in. below lower edge of unit plate. Plus clearances. Price: £12 10s. 8d. (plus £2 15s. 8d. PT).

WB1. Teak finish wood base for SP25 Mk II. Price: £2 13s. 9d. (plus 11s. 11d. PT).

SPC1. Rigid transparent plastic dust cover for SP25 Mk II. Price: £2 12s. 3d. (plus 11s. 7d. PT).

SL95. Transcription turntable with autochange facility and automatic single record play. Combined record size and speed selector. $11\frac{1}{2}$ in. aluminium turntable. Afrormosia pickup arm set into aluminium. Gimbal mounted. Counterbalanced. Calibrated fine stylus force adjustment. Calibrated bias compensator. Slide-in cartridge carrier accepts most makes and types. Cue and pause facility. Retractable record platform. Wired for mono and stereo. Synchro-Lab constant speed motor. Size (including rear and side overhang of pickup arm): $15\frac{5}{16}$ in. wide, $14\frac{1}{8}$ in. front to rear, $4\frac{1}{8}$ in. above, $2\frac{15}{16}$ in. below lower edge of unit plate. Plus clearances. Price: £36 10s. 6d. (plus £8 2s. 4d. PT).

WB4. Teak finish wood base for SL95. Price: £4 7s. 6d. (plus 19s. 5d. PT).

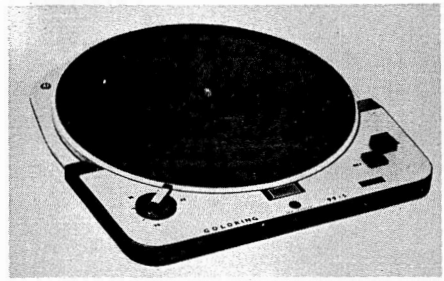
SPC4. Rigid transparent plastic dust cover for SL95. Price: £3 9s. 6d. (plus 15s. 5d. PT).

SL75. Transcription turntable with autochange facility and automatic single record play. Combined record size and speed selector. $11\frac{1}{2}$ in. diameter aluminium turntable. Diecast aluminium pickup arm. Counterbalanced. Calibrated fine stylus force adjustment. Calibrated bias compensator. Slide-in cartridge carrier accepts most makes and types. Cue and pause facility. Retractable record platform. Wired for stereo and mono. Synchro-Lab constant speed motor. Size (including rear and side overhang of pickup arm): $15\frac{9}{16}$ in. wide, $14\frac{1}{16}$ in. front to rear, $4\frac{1}{8}$ in. above, $2\frac{15}{16}$ in. below lower edge of unit plate. Plus clearances. Price: £28 12s. 6d. (plus £6 7s. 3d. PT).

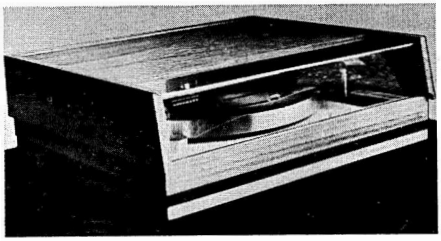
WB4. Teak finish wood base for SL75. Price: £4 7s. 6d. (plus 19s. 5d. PT).

SPC4. Rigid transparent plastic cover for SL75. Price: £3 9s. 6d. (plus 15s. 5d. PT).

Garrard AP75 turntable unit



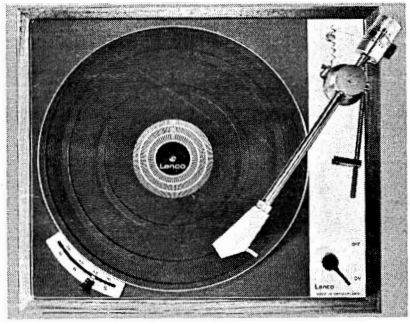
Goldring G99-S



Goodmans MT1000

Goldring-Lenco GL68

Goldring GL75 with plinth and cover



Goldring GL77 turntable unit

Perpetuum Ebner PE Studio 33

Philips GC.030

AP75. Single record playing unit. Manual or automatic play of single records. Combined record size and speed selector. $10\frac{1}{2}$ in. diameter aluminium turntable. Diecast aluminium pick-up arm. Counterbalanced. Calibrated fine stylus force adjustment. Calibrated bias compensator. Slide-in cartridge carrier accepts most makes and types. Cue and pause facility. Wired for stereo and mono. Four-pole induction motor. Size (including rear and side overhang of pickup arm): $15\frac{9}{16}$ in. wide, $14\frac{1}{16}$ in. front to rear, $2\frac{5}{8}$ in. above, $2\frac{15}{16}$ in. below lower edge of unit plate. Plus clearances. Price: £19 3s. (plus £4 5s. 1d. PT).

WB4. Teak finish wood base for AP75. Price: £4 7s. 6d. (plus 19s. 5d. PT).

SPC4. Rigid transparent plastic dust cover for AP75. Price: £3 9s. 6d. (plus 15s. 5d. PT).

★

GOLDRING MANUFACTURING CO. (GREAT BRITAIN) LTD., 486/488 High Road, Leytonstone, London, E.11. Tel: 01-539 8343/5.

Goldring-Lenco GL68. Integrated turntable and pickup arm. Infinitely variable speeds 30-80 rpm with preset click stops for $16\frac{2}{3}$, $33\frac{1}{3}$, 45, 78 rpm. Wow 0·2%. Speed constancy: 1% change for 13% change in voltage. Turntable 12 in. diameter pressed steel. Drive via vertical idler. Four-pole motor. Pickup arm Goldring G65. Pickup lowering device. Idler wheel disengagement. Price: £18 7s. 6d. (plus £3 19s. 8d. PT).

Goldring-Lenco GL75. Integrated turntable and pickup arm. Four speeds, infinitely variable. Wow <0·2%. Flutter <0·2%. Speed change less than 1% for 13% voltage change. 12 in. diameter diecast zinc turntable, 8 lb. Vertical pulley drive. Four-pole 15W induction motor. L75 pickup arm. Counter-balance weight adjustment, knife-edge bearing, plug-in shell. Hydraulic lowering device. Price: £29 8s. (plus £6 7s. 5d. PT).

Goldring-Lenco GL77. Integrated turntable unit with P77 pickup arm. Speeds: infinitely variable, with four click-in positions at $16\frac{2}{3}$, $33\frac{1}{3}$, 45 and 78 rpm. W and F: 0·06%. Rumble −60 dB. Speed constancy: ±0·2% for 10% mains voltage change. 12 in. diameter turntable. Die-cast zinc alloy. Weight 8 lb. Drive: idler wheel against conical shaft of motor. Four-pole constant velocity motor. P77 all-balance arm. Plug-in shell. Adjustable stylus position. Hydraulic lowering device. Anti-skating bias compensation. Price: £51 10s. (plus £11 3s. 2d. PT).

Goldring G99. Transcription motor only. Infinitely variable speeds 30-80 rpm. Wow 0·1%. Speed remains constant with 13% voltage change. Turntable 12 in. die-cast zinc. Vertical idler wheel with provision for disengagement. Four-pole motor. Built-in illuminated strobe. Pushbutton on-off. Price: £19 19s. (plus £4 6s. 5d. PT).

★

GOODMANS LOUDSPEAKERS LTD., Axiom Works, Lancelot Road, Wembley, Middlesex. Tel: 01-902 1200. Cables: Goodaxiom, Wembley.

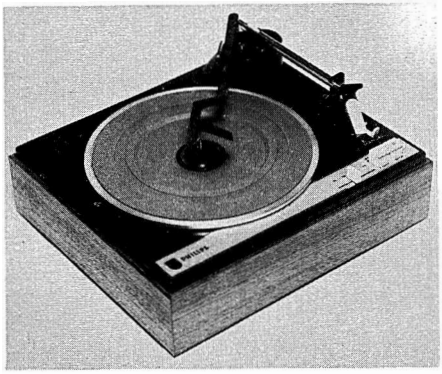
Goodmans MT1000. Complete record unit comprising turntable, pickup arm, plinth with hinged cover, and plug-in connection panel. Motor and arm details as Thorens TD150A unit. Cartridges: Shure M75-MB aligned and tested by Goodmans. Polished wood housing with perspex-fronted lid. Finish: teak or walnut. Designed to match Goodmans Audio Suite equipment. Size: $15\frac{3}{4}$ in. wide, $13\frac{3}{4}$ in. deep (closed), $16\frac{3}{4}$ in. deep (open), $5\frac{5}{8}$ in. high (closed), $16\frac{1}{2}$ in. high (open). Price: £58 6s. 6d. (plus £14 0s. 8d. PT).

★

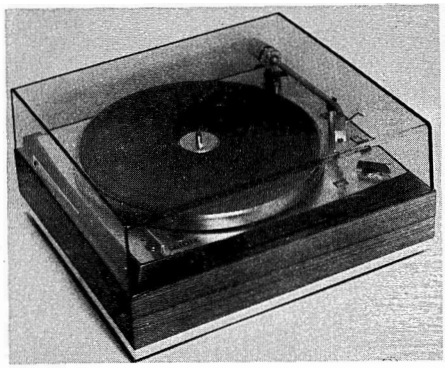
PERPETUUM-EBNER. Distributors: Howland-West Ltd., 2 Park End, South Hill Park, London, N.W.3. Tel: 01-794 6666.

PE Studio 33. Turntable with pickup arm. Speeds: $16\frac{2}{3}$, $33\frac{1}{3}$, 45, 78 rpm with fine control +1% to −2%. Wow better than ±0·15%. Flutter better than ±0·1%. Rumble −46 dB. Turntable 11 in. diameter 4·4 lb. non-magnetic alloy casting. Belt drive via intermediate pulley. Shaded pole induction motor. Pickup arm adjustable 0-6 gm stylus pressure. Slow motion lowering device. Automatic lift optional. Push-button on-off. Illuminated strobe. Size: 14 in. wide, 13 in. deep, $3\frac{3}{8}$ in. above, $3\frac{7}{8}$ in. below. Weight: 16 lb. Price: £45 (plus £9 10s. PT).

PE.34. Turntable with pickup arm. Speeds: $16\frac{2}{3}$, $33\frac{1}{3}$, 45, 78 rpm with fine control +1% to −2%. Wow better than ±0·15%. Flutter ±0·1%. Rumble −42 dB. Turntable 11 in. diameter 3·9 lb. cast alloy. Belt drive via intermediate pulley. Four-pole induction motor. Pickup arm mounted on precision bearings with

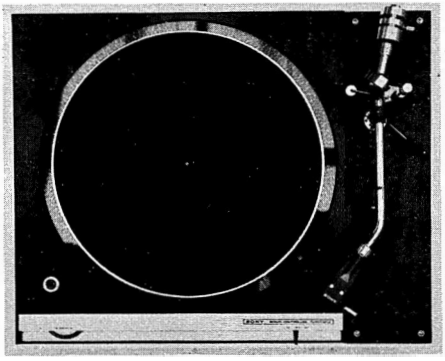


Philips GA.145

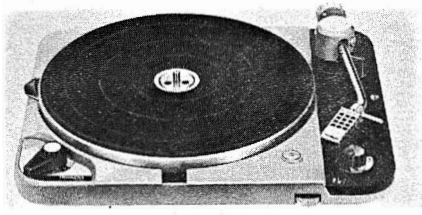


Philips GA.230

Philips GA217

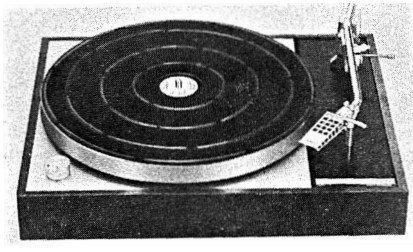


Sony turntable



Thorens TD 124 Series 2

Sansui SR 4040



Thorens TD 150 AB

adjustable stylus pressure. Slow-motion arm lowering device. Price: £29 15s. (plus £6 5s. 7d. PT).

PE.720. Transcription unit with auto-change facilities. Full details and price to be announced.

PE.2001. Transcription unit with auto-change facilities. Full details and price to be announced.

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PHILIPS ELECTRICAL LTD., Century House, Shaftesbury Avenue, London, W.C.2. Tel: 01-437 7777. Cables: Phillamps, London.

●**GA.145.** Auto-changer record turntable on plinth. Speeds: 78, 45, 33⅓, 16⅔ rpm. W and F 0·15%. Rumble −35 dB. Pickup head: GP310 stereo crystal. Motor: asymmetrical AC. Mains: 110, 127, 220, 240V AC. Consumption: 6W. Size: 14¼ × 12½ × 7 in. Weight: 12 lb. Finish: teak veneered plinth with removable clear plastic lid. Price: £22 2s. 11d. (plus £4 19s. 6d. PT).

●**GC.030.** Transcription record turntable with pickup arm and head. Speeds: 78, 45, 33⅓, 16⅔ rpm ±0·5%. Rumble > −60 dB. Pickup head: GP407 magneto-dynamic. Tone arm friction: horizontal <0·15 gm at stylus tip, vertical <0·2 gm at stylus tip. Variable side thrust compensation. Motor: Symmetrical asynchronous type. Mains: 110, 127, 220, 240V AC 50 Hz. (60 Hz version available). Consumption: 10W. Size: 15½ × 13¼ in. Price: £35 0s. 11d. (plus £7 17s. 5d. PT).

●**GA.230.** Specification as for GC.030 but with teak veneered plinth and clear plastic lid. Size: 15½ × 13¼ × 6⅞ in. Weight: 21¼ lb. Price: £47 16s. 8d. (plus £10 14s. 11d. PT).

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PIONEER. Distributors: Swisstone Ltd., 48a Station Road, Cobham, Surrey. Tel: 0932-6 2853/4214.

PL-41. High quality belt-drive transcription motor and turntable. Full specification and price on request.

SANSUI. Sole UK importer: Technical Ceramics Ltd., Thorn Hill Southampton. Tel: 0703-48055. Distributors for Scotland, North and Midlands: Audio Distributors, 4 Lion Street Kidderminster. Tel: 0562-3293.

Sansui SR4040. Plinth mounted motor and pickup arm with dust cover. Speeds: 45 and 33⅓ rpm. Wow and flutter: <0·08%. Rumble −46 dB. Two-piece turntable, 8 in. inner, 12 in. outer. Zinc alloy turntable, 5½ lb. Belt drive. Four-pole motor, capacitor start. Static balanced tubular arm. Tracking error <0·1%. Anti-static mat. Hydraulic cueing device. Magnetic cartridge available. Price: (without cartridge) £65 5s. 10d. (plus £14 10s. 2d. PT); (cartridge) £11 3s. 4d. (plus £2 9s. 8d. PT).

★

SONY (U.K.) LTD., 36-40 Wigmore Street, London, W.1. Tel: 01-935 3546.

TTS-3000. Turntable and motor unit only. Speeds: 33⅓ and 45 rpm. Fine speed control ±5%. W and F <0·05% RMS. Signal/noise ratio over 60 dB. Speed constancy: 0·05%. 12 in. diameter die-cast aluminium turntable. Weight: 3 lb 5 oz. Belt drive. Servo-controlled DC motor. Illuminated strobe. Built-in spirit level indicator. Price: £65 14s. 9d. (plus £14 15s. 3d. PT).

★

A. R. SUGDEN & CO. (ENGINEERS) LTD., Market Street, Brighouse, Yorkshire. Tel: Brighouse 2142. Cables: Connoiseur, Brighouse.

Connoisseur "Craftsman" two speed transcription motor. Operates at 33⅓ and 45 rpm fixed speeds. Full 12 in. turntable of non-ferrous material. All bearings are adjustable throughout the life of the unit. Synchronous motor. Price: £15 (plus £3 7s. 3d. PT).

Connoisseur "Craftsman" three speed transcription turntable. Requires minimum mounting space. Heavy non-ferrous 12 in. turntable. 33⅓, 45 and 78 rpm. 4% variation on all speeds. Neon lit stroboscope fitted. Dynamically and electrically balanced synchronous motor. All bearings are adjustable. Price: £20 (plus £4 9s. 10d. PT).

Connoisseur Classic Turntable Unit. Motor and turntable only mounted on metal platform. Speeds: 33⅓ and 45 rpm (fixed). Wow: better than 0·15%. Flutter: better than 0·1%. Rumble: −50 dB when measured at RIAA characteristics referred to 7 cm/sec at 1 KHz. 10¼ in. lathe turned aluminium turntable weighing approximately 2 lb. Soft rubber drive rollers. Two slow-speed (375 rpm) motors, one for each record speed. Price: £12 10s. (plus £2 13s. 6d. PT).

Connoisseur Classic. Combined assembly of 2-speed motor, transcription arm and cartridge mounted on Afrormosia plinth complete with Perspex dust cover. Also available with SAU-1 or SAU-2 arms. Two slow speed synchronous motors, 33⅓ rpm 45 rpm direct drive. All spindles high quality carbon steel, phosphor-bronze bearings. 10¼ in. lathe turned aluminium turntable. Price: £26 10s. (plus £5 13s. 4d. PT).

Craftsman plinth assembly. Available with Craftsman 2-speed or 3-speed motor with SAU-1 or SAU-2 arm with lifting device and head shell fitted with SCU1 cartridge. Size: 16 × 14 × 7½ in. Finish: satin polished wood plinth, black base and with grey motor mounting board and Perspex cover. Prices from: 2-speed: £35 (plus £7 17s. 3d. PT).

Connoisseur BD1. Two-speed motor unit supplied as motor only or plinth mounted with any Connoisseur arm. Two fixed speeds, 33⅓ and 45 rpm. Wow <0·1%. Flutter <0·1%. Rumble: −50 dB measured at RIAA characteristics ref 7 cm/sec at 1 KHz. No change in speed for 20% variation in supply voltage. 10¼ in. non-ferrous lathe-turned turntable. Precision ground belt drive. Unique drive arrangement eliminates transmission noise. Simple manual speed change. Low hum field. Slim line construction. Only 1¾ in. required below mounting platform. Mains: 100-120V and 200-240V, 50 or 60 Hz. Price: (provisional) £11 10s. (plus £2 9s. 2d. PT). Price of assemblies on application.

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THORENS. Distributors: Metro-Sound (Sales) Ltd., Bridge Works, Wallace Road, Canonbury, London, N.1. Tel: 01-226 8641. Cables: Metrosound, London, N.1.

TD.124 Series II. Transcription turntable. Four speeds, variable ±3%. Neon lit stroboscope with mirror. Double turntable (non-ferrous flywheel as standard but cast-iron available to order), with clutch action, four-pole motor. Belt plus idler drive system. Inbuilt levelling device with spirit indicator. Total W and F 0·15% p-p. Rumble −35 dB. New NAB stereo standards. Price: £37 (plus £8 18s. PT).

TD.224. Transcription turntable and arm with autochange facility. Four speeds, variable ±3%. Built-in neon lit stroboscope. Incorporates BTD-12S arm. Total W and F 0·15% p-p. Rumble −35 dB. New NAB standards. Auto-change facility with record stacking before and after play separate from turntable. Each record placed on turntable individually and removed after playing. Price: £70 17s. 6d. (plus £17 1s. 1d. PT).

TD.150. Transcription turntable. Two speeds, 33⅓ and 45 rpm. Low-speed synchronous motor (375 rpm). Belt drive. 12 in. non-ferrous 7½ lb turntable. Spring-mounted damped support for turntable bearing and pickup wooden panel. Total W and F 0·2% p-p. Rumble −35 dB. New NAB stereo standards. Price: £23 5s. (plus £5 11s. 11d. PT).

TD.150.B. As TD.150 plus wooden base mounting. Price: £26 10s. (plus £6 7s. 6d. PT).

TD.150.A. As TD.150 plus TP.13 precision pickup arm horizontally and vertically balanced. Viscous damped lowering control. Patented plug-in shell with adjustable vertical tracking angle. Stylus pressure adjustable ½ to 4 gm. Price: £28 5s. (plus £6 15s. 11d. PT).

TD.150.AB. As TD.150.B plus wooden base mounting. Price: £31 10s. (plus £7 11s. 7d. PT).

Teak plinths. Suitable for TD.124 and TD.135 units. Price: £5 10s. (plus £1 6s. 6d. PT).

Perspex covers. Suitable for TD.124 and TD.135 units. Price: £4 (plus 19s. 3d. PT).

Teak plinth (special). Suitable for TD.124 fitted with S.M.E. 3012 arm. Price: £6 10s. (plus £1 11s. 3d. PT).

Perspex cover (special). Suitable for TD.124 fitted with S.M.E. 3012 arm. Price: £5 10s. (plus £1 6s. 6d. PT).

TRANSCRIPTORS LTD., 551 Holloway Road, London, N.19. Tel: 01-272 6419.

Reference turntable. Self-standing unit incorporating height adjustable acoustic feedback legs. Speeds: $33\frac{1}{3}$ and 45 rpm with $\pm 3\%$ fine speed adjustment. Laminate covered base in various colours. Polished aluminium or brass metalwork. Built-in spirit level. Hinged Perspex top with swing leg support. Reed-switch on/off control. Synchronous motor. 7 lb non-ferrous turntable. Soft rubber belt drive. Neon lit Perspex strobe idler. PTFE main bearing. Turntables up to 20 lb available for studio work. Rumble: −60 dB. Speed stability: 0·005% short term, 0·5% long term. Size: $17 \times 17 \times 7$ in. (22 in. back to front with lid open). Mains: Available for all mains frequencies and voltages, including DC. Price: £38 (plus £8 4s. 8d. PT).

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WHARFEDALE. Rank-Wharfedale Ltd., Idle, Bradford, Yorkshire. Tel: 612552. Cables: Wharfdel, Idle, Bradford. Telex: 51407.

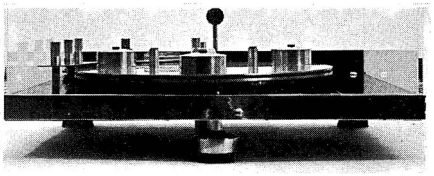
WTT-1. Turntable and pickup in oiled teak plinth with lid. To match Wharfedale System 20 equipment. Thorens TD124 transcription turntable, Thorens TP-14 pickup arm, Shure M75-E cartridge. Size: $19 \times 13\frac{1}{4} \times 7\frac{3}{4}$ in. Price: £94 (including PT).

WTT-2. Turntable and pickup in oiled teak plinth with lid. To match Wharfedale System 20 equipment. Garrard LAB80 turntable and pickup arm. Shure M75-6 cartridge. Size: $19 \times 13\frac{1}{4} \times 7\frac{3}{4}$ in. Price: £56 (including PT).

★

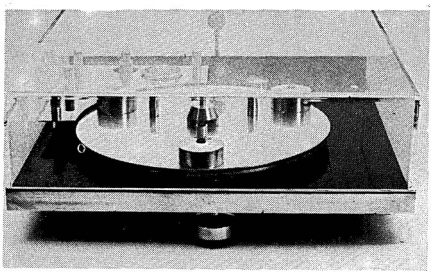
ZENITH RADIO CORPORATION. Distributors: United Mercantile Co. Ltd., 13/14 Queen Street, London, W.1. Tel: 01-499 4901. Cables: Ramsaco, Telex, London.

●**Stereo Professional.** Four-speed automatic record changer unit. Speeds, $16\frac{2}{3}$, $33\frac{1}{3}$, 45, 78 rpm. $11\frac{3}{4}$ in. 4 lb turntable. Belt drive. $8\frac{9}{16}$ in. pickup arm. Floating-action cartridge. Ceramic cartridge with 0·7 thou diamond and 3 thou sapphire. Separation 25 dB. Output 350 mV. Rec load 1-3 megohms. Price: £52 10s. (plus PT).

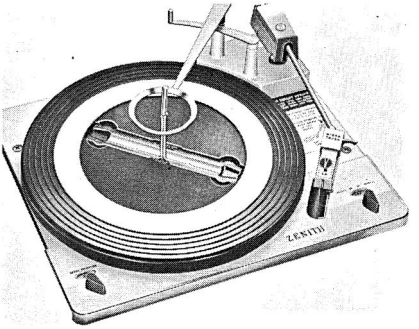


Transcriptor motor

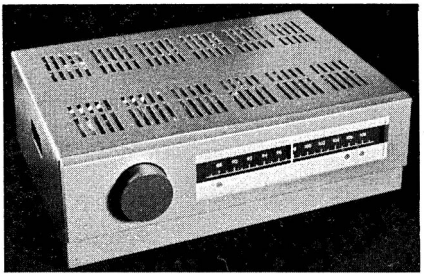
Wharfedale



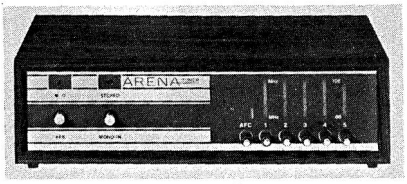
Transcriptor motor with cover



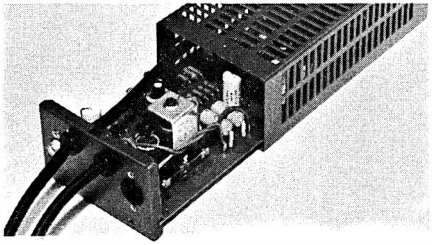
Zenith 4-speed professional



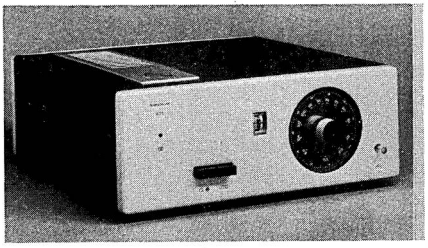
Quad stereo tuner



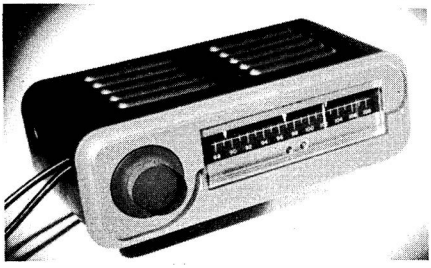
Arena F211



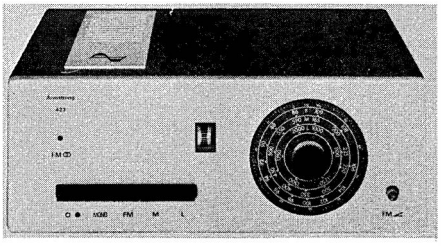
Quad multiplex decoder



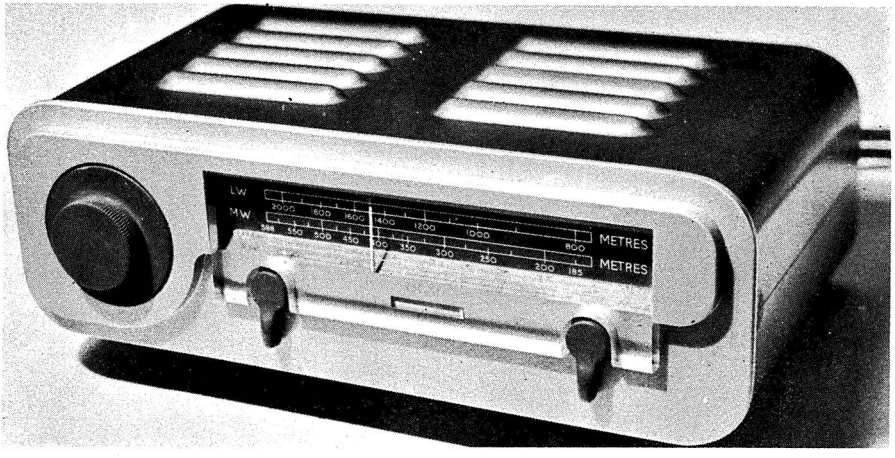
Armstrong 424 tuner



Acoustical FM tuner



Armstrong 423 AM-FM tuner



Acoustical AM tuner covering short, medium and long-wave bands

DIRECTORY OF RADIO TUNERS

★ In the abridged specifications of these directory entries the following abbreviations have been used: **Psn**=Power supply needed; **AFC**=Automatic frequency control; **AGC**=Automatic gain control; **ind**=Indicator; **disc**=Discriminator; **imp**=Impedance; **det**= Detector.

ACOUSTICAL MANUFACTURING CO. LTD., St. Peter's Road, Huntingdon, Hunts. Tel: 0480 2561/2. Cables: Acoustical.

Quad F.M. tuner. Variable tuning. Range 87·5-108 MHz. Special double neon display ind. Psn 330V at 27 mA; 6·3V at 1·85 amps. Size: $10\frac{1}{2} \times 3\frac{1}{2} \times 6$ in. Price: £24 (plus £6 PT).

Quad Multiplex decoder. Stereo multiplex adaptor for Quad FM tuner. Transistorised. Psn 330V DC, 8 mA mono plus extra 9 mA on stereo. Price: £16.

Quad A.M. II tuner (European). Variable tuning. Ranges: 800-2070 m, 185-588 m, 5·8-18·5 MHz. Magic eye indicator. Output 100 mV nominal for 30% modulation. Output resistance 15K. Filter rejection 9 KHz. Psn 330V at 35 mA; 6·3V at 1·2 amps. Size: $10\frac{1}{2} \times 3\frac{1}{2} \times 6$ in. Price: £24 (plus £6 PT).

Quad A.M. II tuner. (Overseas.) Variable tuning. Ranges: 185-588 m, 2·2-6·6 MHz, 5·8-18·5 MHz. Filter rejection 10 KHz. Magic eye indicator. Output 100 mV nominal for 30% modulation. Output resistance 15K. Psn 330V at 35 mA; 6·3V at 1·2 amps. Size: $10\frac{1}{2} \times 3\frac{1}{2} \times 6$ in. Price: £24 (plus £6 PT).

●**Quad FM stereo tuner.** Range: 87·5-108 MHz. Variable tuning. Foster-Seeley detector. Twin neon tuning indicator. Sensitivity: 2 μV for 20 dB quieting. Aerial input: 75 ohms coaxial. Output: 100 mV for 30% modulation. Multiplex decoder fitted. AFC. Mains. Automatic stereo-mono switching. Separate mono output in addition to stereo. Stereo beacon. Size: $10\frac{1}{4} \times 3\frac{5}{8} \times 7\frac{1}{8}$ in. Price: £40 (plus £10 PT).

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ARENA. Distributed by: Highgate Acoustics Ltd., 184-188 Great Portland Street, London, W.1. Tel: 01-636 2901/4.

●**Arena F211.** Transistorised stereo FM tuner. Range: 88-108 MHz. Five preset stations. Modular construction. Multiplex decoder fitted. Sensitivity: 2·5 μV. Three aerial tuned circuits, four IF filters. 11 silicon transistors. Finish: teak or rosewood. Size: $10\frac{1}{2} \times 3\frac{1}{8} \times 7\frac{3}{4}$ in. Designed for use with Arena F210 stereo amplifier. Suitable for operation also with other hi-fi amplifiers. Price: £32 11s. (including PT): multiplex decoder £7 7s. extra.

★

ARMSTRONG AUDIO LTD., Warlters Road, London, N.7. Tel: 01-607 3213/4.

Model 423. AM/FM tuner. Range: VHF 86-109 MHz, MW 185-590 metres, LW 1000-2000 metres. Variable tuning. FM ratio detector. Meter tuning indicator. Sensitivity: FM 1·5 μV for 30 dB quieting, AM 5 μV for 20 dB quieting. Aerial input: 75 ohms coaxial and 300 ohms balanced. Output: 0-1V variable. Stereo multiplex decoder optional (see M4 Decoder below). FM quiet-tuning control. Stereo indicator light. Edge connector for plug-in decoder. Mains: 100-125V and 200-250V AC. Size: $10\frac{3}{4}$ in. wide, $10\frac{1}{2}$ in. deep, 4 in. high. Price: £35 19s. 9d. (plus £8 3s. 9d. PT).

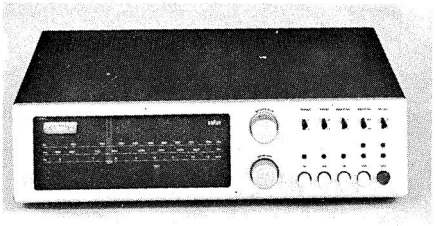
Model 424. FM tuner. Range: 86-109 MHz. Variable tuning. Ratio detector. Meter tuning indicator. Sensitivity: 1·5 μV for 30 dB quieting. Aerial input: 75 ohms coaxial and 300 ohms balanced. Output: 0-1V variable. Stereo multiplex decoder optional extra (see M4 Decoder below). Quiet-tuning control. Stereo indicator light. Edge connector for plug-in decoder. Mains: 100-125V and 200-250V AC. Size: $10\frac{3}{4}$ in. wide, $10\frac{1}{2}$ in. deep, 4 in. high. Price: £27 7s. 3d. (plus £6 4s. 6d. PT).

Model M4. Plug-in stereo multiplex decoder for 423 and 424 tuners. Price: £9 10s.

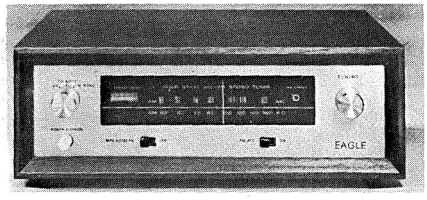
★

BANG & OLUFSEN U.K. DIVISION, Eastbrook Road, Gloucester. Tel: 0452 21591.

●**Beomaster 5000.** Transistor stereo FM tuner. FM/VHF only. Variable tuning. Ratio detector. Meter tuning indicator. Sensitivity: 0·8 μV for

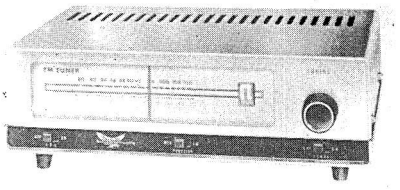


Braun CE-1000 tuner

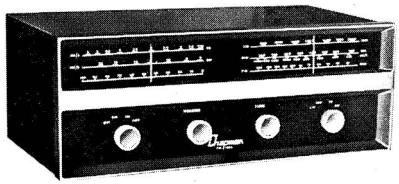


Eagle AFT60

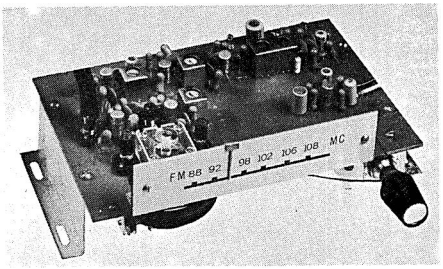
Chapman S6BS/FM Mk. II tuner



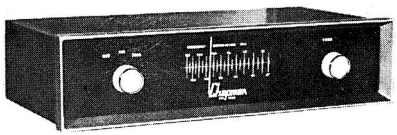
Eagle FMT 640 FM tuner



Chapman FM 1005 AM/FM tuner

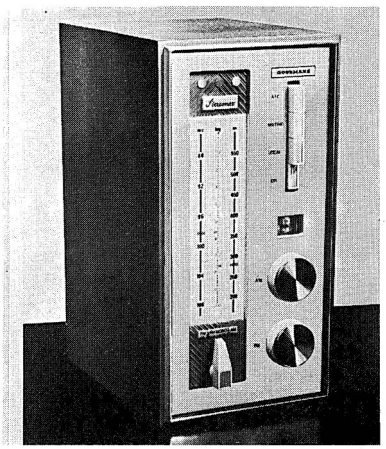


Eagle FMT.41



Chapman FM 1000 FM tuner

Dynaco FM-3



Goodmans Stereomax AM/FM

20 dB quieting. Aerial input: 75 ohms coaxial and 300 ohms balanced. Output: 55 mV-1V adjustable. Stereo multiplex decoder incorporated. AFC. Inter-station muting. Mains supply. Price: £84 6s. 3d. (plus £18 18s. 9d. PT).

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BRAUN AG. Distributors: Fi-Cord International, Charlwoods Road, East Grinstead, Sussex. Tel: East Grinstead 21351.

●**CE250.** FM stereo tuner. Sensitivity: 1·2 μV for 30 dB quieting, at 40 KHz deviation. Distortion: 0·5% at 1 KHz and 40 KHz deviation. Limiting point 1·5 μV. Selectivity: 46 dB for 400 KHz (IHF Standard). Separation: 35 dB at 1 KHz and 40 KHz deviation. Output: 0·5V. Size: $10\frac{1}{4} \times 4\frac{1}{4} \times 12\frac{5}{8}$ in. Price: £125 13s. 4d. (including PT).

●**CE500.** AM/FM tuner. VHF, MW and LW. 18 transistors, 20 diodes. Stereo multiplex decoder and indicator. AFC. Distortion: 0·5% at 1 KHz and 40 KHz modulation. Sensitivity (VHF): 1·2 μV for 30 dB signal to noise at 40 KHz deviation. Separation: 35 dB at 1 KHz and 40 KHz. Output: FM 0·5V. Characteristics exceed requirements of DIN 45 500. Size: $10 \times 4 \times 12\frac{1}{2}$ in. Finish: grey wrinkle steel case with aluminium front panel. Price: £174 3s. 8d. (including PT).

●**CE1000.** All-transistor tuner. LW, MW, SW and FM/VHF. Stereo multiplex fitted. Push-button operation. Separate dials and drives for AM and FM. Meter tuning indicator. AFC, automatically switches off when hand touches tuning knob. Variable AM selectivity. 30 transistors, 2 nuvistors, 18 germanium diodes, 9 silicon diodes, 2 photo-electric cells. Switchable FM noise suppression. Internal ferrite rod for MW and LW. FM sensitivity: 0·8 μV for 30 dB quieting. MW/LW sensitivity: 5 μV for 6 dB quieting. Limiting level 1 μV. AM suppression better than 50 dB. FM bandwidth: 120 KHz below and 240 KHz above limiting level. Detector bandwidth 1 MHz. Distortion factor $<0{\cdot}5\%$. Output: approx. 0·5V. Black steel cabinet with aluminium front plate. Size: $16 \times 4\frac{3}{8} \times 13\frac{3}{8}$ in. Price: £348 12s. (including PT).

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BRYAN AMPLIFIERS LTD., 120 Ashley Road, Hale, Altrincham, Cheshire. Tel: 061-928 6026.

●**Model 1500.** Stereo FM tuner. Range: 87·5-108 MHz. Variable tuning. Ratio detector. Meter tuning indicator. Sensitivity: 3 μV for 20 dB quieting. Aerial input: 75 ohms coaxial. Output: 150 mV RMS at 22·5 KHz deviation. Available with multiplex decoder. AFC. AC mains supply. Mono-stereo switching. Automatic decoding. Size: $13\frac{3}{4} \times 5\frac{1}{4} \times 10\frac{5}{8}$ in. Price: (mono) £30 10s. 10d. (plus £6 12s. 8d. PT); (stereo) £39 13s. (plus £8 18s. PT).

★

CHAPMAN. Chapman division, Reslosound Ltd., Reslo Works, Spring Gardens, Romford, Essex. Tel: Romford 61926 (three lines).

Chapman AM/FM tuner model S6BS/FM Mk II. Free-tuned. Range FM 87·7-108 MHz; AM 6 bandspreads: 11, 13, 16, 19, 25 and 31 m; also 15-43, 43-140, 175-570 m. Wide-band ratio det. Magic eye ind. Self-powered. Size: $13\frac{3}{4} \times 8\frac{1}{4} \times 13\frac{1}{2}$ in. Price: £64 (plus £13 12s. PT).

Chapman AM tuner model S6BS/P Mk II. Free-tuned. Range 6 bandspread ranges: 11, 13, 16, 19, 25 and 31 m, also 13-43, 43-140, 175-570 m. Magic eye ind. Self-powered. Size: $13\frac{3}{4} \times 11 \times 8\frac{1}{4}$ in. Price: £50 (plus £12 3s. 9d. PT).

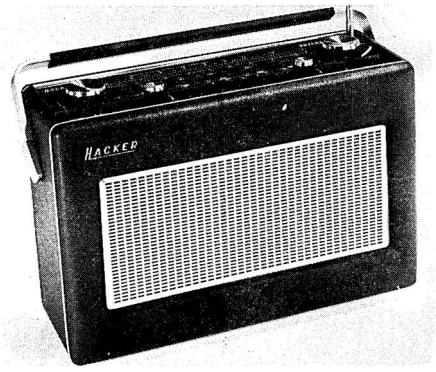
Chapman FM1000A/B. Transistorised FM tuner in wood case. Variable tuning. Range 87·5-108 MHz. AGC. Multiplex output. Aerial input 75 ohms coaxial. Output: 150 mV. Self-powered. Later models fitted with tuning meter. Size: $14\frac{1}{2} \times 3\frac{1}{2} \times 7\frac{1}{4}$ in. Price: £28 (plus £6 16s. 5d. PT).

Chapman FM1000A/B (D). Similar to FM-1000A/B but including SD.1166 stereo multiplex decoder. Price: £37 (plus £9 0s. 5d. PT).

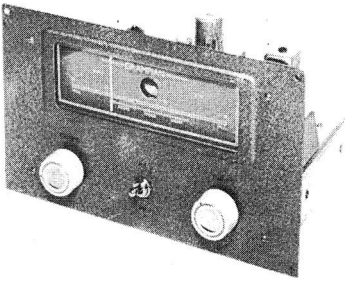
Chapman FM1005A/B. Transistorised AM/FM tuner in wood case. Variable tuning. Range FM 87·5-108 MHz; AM 16-50 m, 50-195 m, 195-550 m, 800-2000 m. AGC. Multiplex output. Aerial imp. FM 75 ohms; AM high imp. Output: 250 mV, 100K. Self-powered 100-125V, 10W consumption. Size: $14\frac{1}{2} \times 5\frac{1}{2} \times 7\frac{1}{4}$ in. Price: £48 (plus £11 14s. PT).

Chapman FM1005A/B (D). Similar to FM-1005A/B but including SD.1166 stereo multiplex decoder. Price: £57 (plus £13 17s. 11d. PT).

Chapman SD.1166 decoder. Free-standing unit in metal case. Self-powered for operation from 200-250V 40-60 Hz. (100-125V to order). Complete with plugs and cables. Price: £14 10s.

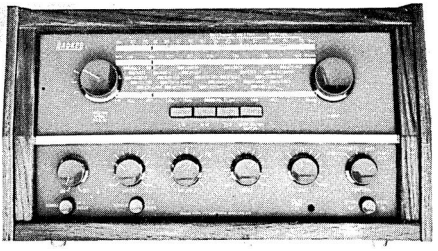


Hacker Sovereign

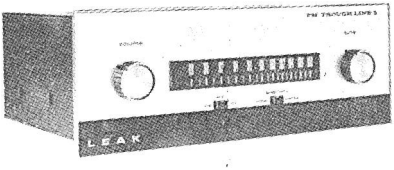


Grampian 571 FM tuner

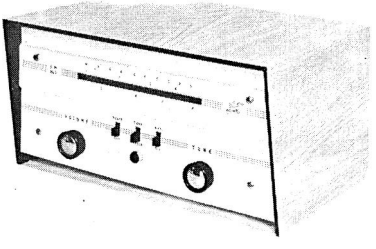
L & H Signalmaster 6087



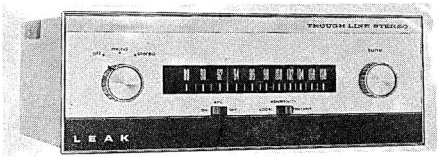
Hacker SAR1000 shelf unit



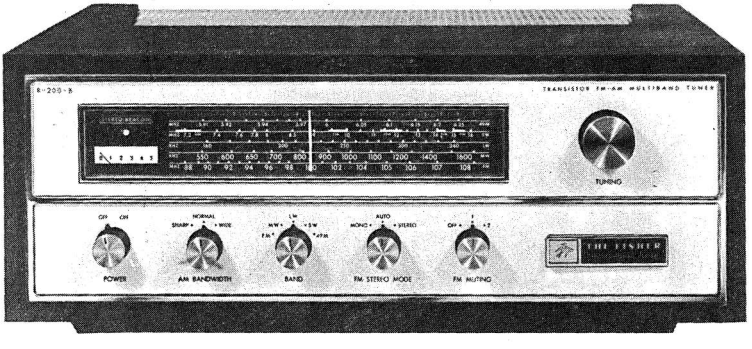
Leak Troughline 3 FM tuner



Lowther FM tuner Mk. V



Leak Troughline Stereo



Fisher R-200-B AM/FM stereo tuner

DUAL ELECTRONICS LTD., Radnor House, London Road, Norbury, S.W.16. Tel: 01-764 9465/6.

●**Dual CT.12.** Fully transistorised AM/FM tuner. Range: VHF, MW, SW, 49 metre band. Stereo multiplex decoder incorporated. Full technical specification not available on going to press. Price: £72 9s. (including PT).

★

DYNACO. Distributors: Howland-West Ltd., 2 Park End, South Hili Park, London, N.W.3. Tel: 01-794 6666.

FM-3. Variable tuned VHF/FM tuner for shelf mounting or building in. Synchronous balanced-bridge detector. Twin indicators for tuning and stereo transmissions. Sensitivity 4 μV for 30 dB quieting. Output 2V. Multiplex decoder fitted. Four IF stages with progressive limiting. Completely stable without AFC. Can be fully aligned without use of test instruments. Size: $13\frac{1}{2} \times 4\frac{1}{2} \times 8$ in. Mains power unit. Price: (assembled) £63 18s. 4d. (plus £15 3s. 7d. PT); (kit) £53 5s. 3d. (plus £12 13s. PT).

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EAGLE PRODUCTS. Distributors: B. Adler & Sons (Radio) Ltd., 32a Coptic Street, London, W.C.1. Tel: 01-636 9606/7. Cables: Reldab, London.

FMT 41 FM tuner. Range: 88-108 MHz. Transistorised. Variable tuning. Aerial input: 75 ohms coaxial. Sensitivity: 10 μV input for 10 mV output. Supply: 9V at less than 9 mA. Six transistors, three diodes. Chassis model for building in. Single tuning control and slide rule scale. Price: £7 17s. 6d. (plus £1 11s. 6d. PT).

FMT 640 FM tuner. Variable tuning. Range: 88-108 MHz. AFC. Armstrong circuit with dual limiters and wide-band discs. FM calibrated signal meter. Input for multiplex adaptor. Aerial imp 300 ohms. Self-powered. Size: $11 \times 6\frac{1}{2} \times 3\frac{3}{4}$ in. Price: £24 1s. 9d. (plus £4 5s. 3d. PT).

AFM 200. AM/FM tuner. VHF/FM 88-108 MHz, MW 187-560 m. Variable tuning. Foster Seeley. Magic eye indicator. Sensitivity 2 μV for 20 dB quieting. Aerial input 300 ohms unbalanced. Socket for adding multiplex decoder. AFC. Mains 240V AC. 11 valves (including magic eye). Price: £27 6s. 9d. (plus £5 3s. 3d. PT).

●**AFT.60.** Transistorised AM/FM stereo tuner. Range: FM 88-108·5 MHz, MW 187-500 m. Variable tuning. Meter tuning indicator. Stereo beacon. Sensitivity: FM 2 μV, AM 500 μV. Aerial input: 75 ohms coaxial. Output: 50-200 mV variable. Decoder included. Four double-tuned IF stages. Switchable AFC. 13 silicon transistors. Mains: 220/240V AC. Size: $12\frac{3}{4} \times 4\frac{1}{2} \times 9\frac{1}{2}$ in. Price: £40 7s. 4d. (plus £9 7s. 8d. PT).

Prices quoted for Eagle Products are approximate.

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FISHER RADIO CORPORATION, Long Island City 1, New York, U.S.A. Distributors: Getz Bros. and Co. Inc., 2 Harewood Place, London, W.1. Tel: 01-499 6901.

●**R-200-B.** Transistorised FM stereo/AM multi-band short wave tuner. FM section: synchrode front end. Sensitivity 1·8 μV. Stereo beacon indicates multiplex transmissions. Interstation muting. Tuning meter. Wide-band IF strip and discriminator. AM section: LW 850-2000 m, MW 184-590 m, SW 7-16·5 MHz, bandspread 49 m (5·9-6·3 MHz). Tuned RF stage. Three IF stages. AGC. Variable selectivity. Whistle filter. Internal ferrite rod for MW and SW. Mains: all standard AC voltages. Size: $15\frac{1}{8} \times 4\frac{3}{4} \times 11\frac{7}{8}$ in. Weight: $18\frac{3}{4}$ lb. Price: £181 13s. (including PT).

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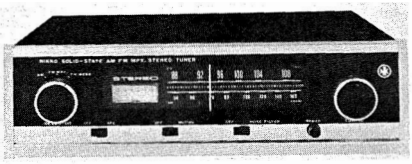
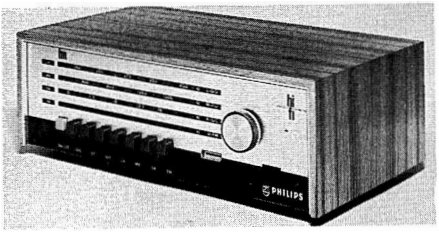
GOODMANS LOUDSPEAKERS LTD., Axiom Works, Lancelot Road, Wembley, Middlesex. Tel: 01-902 1200. Cables: Goodaxiom, Wembley.

●**Stereomax.** All-silicon transistor AM/FM stereo tuner. Ranges: VHF 87·5-108 MHz, MW 186-550 metres. Variable tuning with separate dials and drives for AM and FM. Ratio detector on FM. Meter tuning indicator, lamp stereo indicator. Sensitivity: 2 μV for 30 dB quieting. Aerial input: FM/VHF 70 ohms coaxial, 300 ohms balanced. Output: 250 mV for 30% modulation. Multiplex decoder fitted but version without decoder available. AFC on both wavebands. Controls: AM tuning, FM tuning, wavechange switch including mono/stereo, on/off push-button, AFC, local-distant switch, quiet tuning switch. Mains: 105, 120, 200, 220, 240V AC 40-60 Hz. Size: $5\frac{1}{2}$ in. wide, $10\frac{1}{2}$ in. high, $7\frac{1}{4}$ in. deep. Finish: teak or walnut. Price: £65 5s. (plus £15 14s. PT).

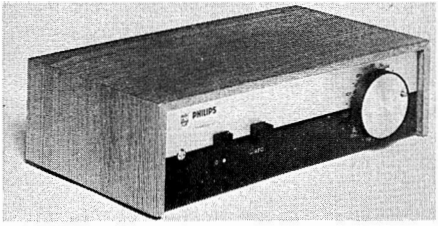


Nikko FAM-12F (new styling)

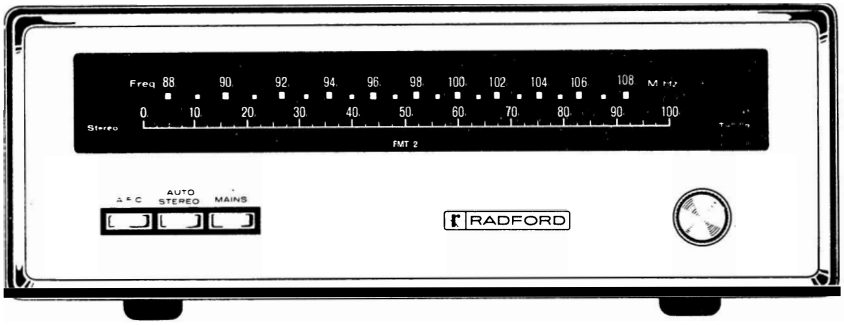
Nikko FAM.12



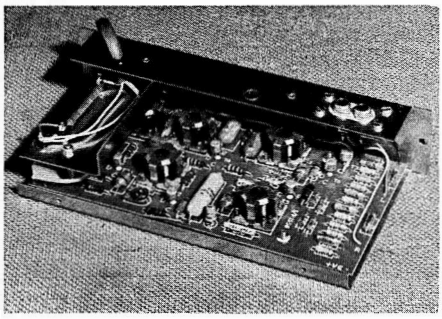
Philips GH.924



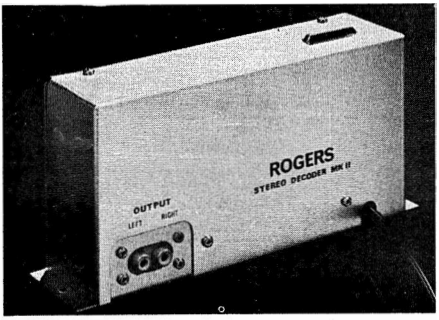
Philips GH.926



Radford FMT 2 FM tuner



Rogers stereo decoder



Rogers stereo decoder

GRAMPIAN REPRODUCERS LTD., 19 Hanworth Trading Estate, Feltham, Middx. Tel: 01-894 9141. Cables: Reamp, Feltham.

FM tuner 571. Free-tuned. Range: 85-98 MHz. Ratio det. Magic eye ind. Psn 300V at 35/40 mA; 6·3V at 2·5 amps. Size: $10\frac{1}{4} \times 5\frac{1}{2} \times 6\frac{1}{4}$ in. Price: £23 (plus £5 3s. 4d. PT).

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GRUNDIG (GREAT BRITAIN) LTD., Hi-Fi Division, 15 Orchard Street, London, W.1. Tel: 01-935 4898.

●**RT40M.** AM/FM tuner. Ranges: VHF 87-108 MHz, MW 185-587 m, LW 858-2000 m, SW1 49 metre band, SW2 18·5-55·6 m. Variable tuning. Independent selection of AM and FM stations. Tuning meter. Stereo indicator beacon. Sensitivity: VHF 1·4 μV, AM 10 μV (for 10 mV audio). Stereo multiplex decoder incorporated. Switched AFC. 27 transistors, 19 diodes. IFs 470 KHz and 10·7 MHz. Output: FM 1V, AM 0·8V for 30% modulation. FR 30 Hz-15 KHz. Distortion factor <0·5% per 75 KHz. Variable selectivity: 3, 5 and 9 KHz. Outlet for amplifier and recorder. Mains: 110, 130, 220, 240V 50-60 Hz. Consumption: 11W. Shelf or cabinet mounting. Size: $15\frac{3}{8} \times 10\frac{1}{2} \times 6$ in. Finish: light walnut or teak. Price: £96 18s. 1d. (plus £20 13s. 11d. PT).

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HACKER RADIO LTD., Norreys Drive, Cox Green, Maidenhead, Berks. Tel: Maidenhead 22261/5.

Hacker SAR1000 shelf operated stereo audio radio units, series 1000, comprising: AM/FM tuner, twin channel 20-watt amplifiers, stereo decoder, controls—volume, bass, treble, balance and function. Inter-station muting. High pass filter, low pass filter. Fully integrated units, all transistor. Provisional price: £99.

Sovereign MK. II RP25 AM/FM transistor portable receiver. Separate AM and FM tuner circuits and powerful push-pull audio amplifier, output 1·5 watts with less than 1% distortion. 16 transistors and 5 diodes. MW, 185-575 metres (520-1,620 KHz); LW, 1,070-1,940 metres (155-280 KHz); VHF/FM, 101-87·5 MHz. Aerials: 10-in. ferrite AM, and telescopic FM. Sockets: ext. aerials: 15 m/v audio output for tape recording: audio input (36 m/v at 50K ohms) for pick-up, mic. or tape replay: low voltage audio output for personal earphone. Sensitivity: (AM) 2 mV at 200 m for 10 dB sig/noise at 30% mod: 6 mV at 500 m, ditto: 6 mV on LW. (FM) better than 1 mV for 10 dB sig/noise with full limiting at 5 mV. Image rejection better than 56 dB. IF rejection better than 70 dB, AM rejection better than 50 dB. Audio amplifier, transformerless and DC coupled. FR 30 Hz-20 KHz ±2 dB. Controls: bass lift +10 dB at 50 Hz, treble lift +14 dB at 10 KHz. Speaker: 8 × 5 in. elliptical. Finish: padded Cordoba leathercloth in black with silver trim, or blue with white trim. Size: $10 \times 12\frac{3}{4} \times 4\frac{3}{4}$ in. Price: £36 16s. 6d. (plus £7 17s. 6d. PT).

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HEATHKIT. See Constructional Kit Section.

★

HENRY'S RADIO LTD. See Constructional Kits Section.

★

KIRKSAETER. Distributed by: Elstone Electronics Ltd., Hereford House, Vicar Lane, Leeds, 2. Tel: 0532 39834.

●**RT.100.** Transistorised stereo tuner. Full specification and price on request.

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KNIGHT-KITS. See Constructional Kits Section.

★

H. J. LEAK & CO. LTD., Brunel Road, London, W.3. Tel: 01-743 1173/0626. Cables: Sinusoidal, Ealux, London.

Trough Line 3 FM tuner. Range: 88-108 MHz. Variable tuning. Foster-Seeley discriminator. Switchable AFC. Sensitivity: 1·5 μV for full limiting. Aerial impedance 75 ohms coaxial or 300 ohms balanced. Output: 0·5V RMS via cathode follower. Magic eye tuning indicator. Mains: 110, 117, 130, 210, 230, 250V 40/60 Hz. Consumption 45W. Size: (chassis) $11\frac{1}{2} \times 4\frac{1}{4} \times 7\frac{3}{4}$ in.; (cabinet) $12 \times 4\frac{3}{4} \times 9\frac{3}{4}$ in. Panel cut-out $10\frac{7}{8} \times 4$ in. Weight: (chassis) 9 lb 6 oz; (cabinet) 11 lb 14 oz. Price: (chassis model) £35 15s. 4d. (including PT); (cabinet model) £43 15s. 8d. (including PT).

●**Stereo Trough Line 3 FM tuner.** Range: 88-108 MHz. Variable tuning. Foster Seeley discriminator. Switchable AFC. Sensitivity: 2 μV for full limiting. Aerial impedance 75 ohms coaxial or 300 ohms balanced. Output: 150 mV per channel from 75 KHz deviation (50-80 mV per channel for normal transmission). Transistorised decoder included. Manual switching for mono or stereo. Separation: −26 dB at 1 KHz, −20 dB at 10 KHz. Mains: 110, 117, 130, 210, 230, 250V AC 40/60 Hz. Consumption 45W. Flywheel tuning. Local/distant sensitivity switch. Size: (chassis) $11\frac{1}{2} \times 4\frac{1}{4} \times 7\frac{3}{4}$ in.; (cabinet) $12 \times 4\frac{3}{4} \times 9\frac{3}{4}$ in. Weight: (chassis) 9 lb 14 oz; (cabinet) 12 lb 6 oz. Price: (chassis model) £50 11s. 4d. (including PT); (cabinet model) £58 11s. 8d. (including PT).

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L. & H. Distributors: Britimpex Ltd., 16-22 Great Russell Street, London, W.1. Tel: 01-636 7600. Cables: Britron, London.

Signalmaster Mk III 6087. Self-contained battery-operated FM/VHF tuner. Will also operate from 32V from L & H Audiomaster amplifier. Plug-in V aerial. Socket for 70 ohm external aerial. Push-button on/off and AFC. Illuminated tuning scale. Transistors. Range: 86-104 MHz. PP9 or equivalent battery. Consumption 9 mA. Teak case. Size: $11\frac{1}{4} \times 3\frac{1}{2} \times 7\frac{1}{8}$ in. Price: £25 18s. (plus £5 11s. 1d. PT).

Stereo decoder module. Plug-in type suitable for Signalmaster Mk III. Fits inside case. Channel separation better than 32 dB at 1 KHz. Consumption 3 mA. Automatic stereo beacon. Price: £7 17s. 6d. Connecting lead with 5-pin plug. Price: 15s.

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LOWTHER MANUFACTURING CO., Lowther House, St. Mark's Road, Bromley, Kent. Tel: 01-460 5225. Cables: Lowther, Bromley.

FM tuner Mk V self-powered. Twin gang tuning, horizontal scale. Range 87·5-108 MHz. AFC. Foster-Seeley disc. Switched ind 50 c/s injection. Self-powered. Size: $13\frac{1}{4} \times 5\frac{1}{2} \times 5$ in. Price: £24 10s. (plus £5 16s. 4d. PT).

FM tuner Mk V. Variable tuning. Range 87·5-108 MHz. AFC. Foster-Seeley disc. Switched AFC and hum check ind. Psn 250V 30 mA; 6·3V 2 amps. Size: $10\frac{1}{4} \times 4\frac{3}{4} \times 7$ in. Price: £22 (plus £5 4s. 6d. PT).

●**Stereo decoder GL2.** Multiplex decoder suitable for Mk V tuners. Price: £18.

FM tuner Mk VI. Range 87·8-101 MHz. Variable tuning. Switched AFC. AGC. Aerial input: 70/80 ohms coaxial. Output: 0·75V RMS. Self-powered. Mains: 200-240V AC. All transistor. Size: $10\frac{1}{4} \times 7 \times 4\frac{3}{4}$ in. Price: £35 (plus £8 13s. 8d. PT).

●**Stereo decoder GL1.** Multiplex decoder suitable for Mk VI tuner. Price: £16.

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MARTIN ELECTRONICS LTD. See Constructional Kits Section.

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MEDLEY MUSICAL LTD., 4 Felltram Way, Charlton, London, S.E.7. Tel: 01-858 3426/7.

●**FM tuner.** Stereo FM tuner including built-in multiplex decoder. Full details not available at time of going to press. Price: approximately 35 gns (including PT).

●**AM/FM tuner.** AM/FM tuner to match other Medley Musical equipment, electrically and aesthetically, to be released in September 1968. Full details and price on request.

★

NIKKO ELECTRIC MFG. CO. LTD. Distributors: Howland-West Ltd., 2 Park End, South Hill Park, London, N.W.3. Tel: 01-794 6666.

●**Nikko FAM-12F.** AM/FM transistorised tuner. Range: VHF 88-108 MHz, MW 182-566 metres. Variable tuning. Meter indicator. Sensitivity: 2 μV for 20 dB quieting. Output: 0·5V. Stereo multiplex decoder fitted. Switchable AFC. Mains: 200-240V 50/60 Hz. Local-distance control. Noise filter. Stereo indicator. 17 transistors, 16 diodes. Size: $12 \times 10 \times 3\frac{1}{2}$ in. Weight: $7\frac{3}{4}$ lb. Price: £55 (plus £12 3s. 10d. PT).

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PHILIPS ELECTRICAL LTD., Century House, Shaftesbury Avenue, London, W.C.2. Tel: 01-437 7777. Cables: Phillamps, London.

GH.926. Transistorised FM tuner. Range: 87·5-104 MHz. Variable tuning. Sensitivity:

<3 μV for 26 dB signal-to-noise. Bandwidth: 120 KHz for 26 dB signal-to-noise. IF 10·85 MHz. Output: 1V 2K. Provision for preset tuning to three stations. Switchable AFC. Power supply: 9V (six 1·5V LPU2 or equivalent) or from GH.925 amplifier. Size: $12\frac{1}{2} \times 8\frac{1}{4} \times 3\frac{3}{8}$ in. Weight: 4 lb. Shelf-mounting cabinet. Price: £21 5s. 2d. (plus £4 15s. 6d. PT).

●**GH.927.** Transistorised FM stereo tuner. Range: 87·5-108 MHz. Variable tuning. Moving coil tuning and stereo indicator. Sensitivity: (mono) 5 μV, (stereo) 26 μV, both for 26 dB signal-to-noise. Output: 200 mV. Switchable AFC. IF 10·7 MHz. Bandwidth: 200 KHz. 23 semiconductors. Mains: 110-127V, 200-240V AC. Consumption: 2·5W. Size: $14 \times 6\frac{1}{2} \times 3\frac{1}{2}$ in. Weight: $3\frac{1}{2}$ lb. Shelf-mounting teak cabinet. Price: £34 10s. 11d. (plus £7 15s. 2d. PT).

●**GH.924.** Stereo AM/FM tuner. Range: VHF 87·5-108 MHz, MW 185-580 metres, LW 750-2000 metres, SW 16·5-51 metres. FR 20 Hz-15 KHz ±1·5 dB. Signal-to-noise: 48 dB. AFC. Sensitivity: (FM mono) 6 μV, (FM stereo) 60 μV, (AM) 100 μV, all for 26 dB signal-to-noise. Moving coil tuning indicator. Switchable quiet FM tuning. FM aerial input: 300 ohms. Mains: 100, 127, 220, 240V AC 50-60 Hz. Size: $15 \times 8\frac{3}{4} \times 5\frac{1}{4}$ in. Weight: 10 lb. Shelf-mounting teak cabinet. Price: £53 0s. 4d. (plus £11 18s. 2d. PT).

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PIONEER. Distributors: Swisstone Ltd., 48a Station Road, Cobham, Surrey. Tel: Cobham 0932-6 2853/4214.

●**TX-400.** AM/FM stereo multiplex tuner. Range: VHF 88-108 MHz, MW 187-561 metres. Sensitivity: 2·5 μV for 20 dB quieting. Aerial input: 300 ohms balanced. AFC. Multiplex decoder built-in. Valves. Mains: 115/230V 50 Hz. AC. Size: $13\frac{7}{8} \times 5\frac{3}{8} \times 11\frac{1}{4}$ in. Full specification and price on request.

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QUAD. See Acoustical Manufacturing Co. Ltd.

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RADFORD. Radford Marketing Division, Eastbrook Road, Gloucester. Tel: OGL-2 21591.

●**FMT2MPX.** All-silicon transistor FM tuner. Range: 87·5-108·5 MHz. Variable tuning. Foster-Seeley discriminator. Meter tuning indicator. Sensitivity: 3 μV for 30 dB signal-to-noise. Aerial input: 75 ohms coaxial or 300 ohms balanced. Output: up to 2V at 100% modulation. AFC. Mains: 110/250V 50-60 Hz. Size: $10\frac{1}{2} \times 3\frac{1}{4} \times 12\frac{5}{8}$ in. Weight: 12 lb. Built-in multiplex stereo decoder. Price: £47 10s. (plus £10 13s. 8d. PT).

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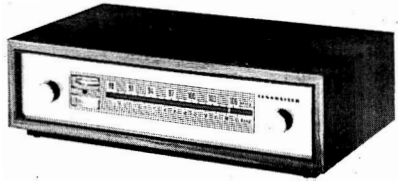
ROGERS DEVELOPMENTS (ELECTRONICS) LTD., 4-14 Barmeston Road, Catford, London, S.E.6. Tel: 698-7424/4340. Cables: Rodevco, London, S.E.6.

Mk III switched FM tuner Series III. Range: 87-96 MHz. AFC. Ratio detector. Stereo beacon. Multiplex conversion facilities. Aerial imp 70-90 ohms. Output 0·25V RMS. Self-powered. Cathode follower output. Size: (chassis model) $11 \times 6\frac{1}{2} \times 4\frac{1}{2}$ in.; (case model) $11 \times 7\frac{1}{4} \times 5\frac{3}{8}$ in. Suitable for un-powered multiplex decoder. Price: (chassis model) £16 16s. (plus £3 16s. 5d. PT); (cabinet model) £19 10s. (plus £4 8s. 9d. PT).

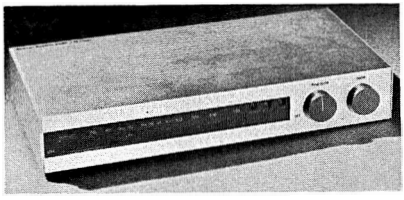
Multiplex stereo decoder Mk II. Designed for use with Rogers FM tuners but also suitable for operation with other makes of tuner. Unpowered and self-powered versions. Automatic electronic switching for stereo broadcasts. Mullard Vinkor tuned circuits. Seven silicon planar transistors. Selective anti-noise filter. High degree of filtering permits tuner to be connected to tape recorder without interference (input impedance to recorder must be over 100K). Stabilised 12V supply. Input signal level: 0·5-1V. Input imp 30K approx. Output: 700 mV RMS for input of 350 mV RMS per channel. Separation: better than 30 dB at 1 KHz. Total spurious output (including 19/38 KHz): better than −50 dB. Mains: 105-125V, 200-250V AC 3W. Size: (less power supply) $7\frac{3}{8} \times 2 \times 4$ in.; (with power supply) $9\frac{1}{4} \times 2 \times 4$ in. Weight: (unpowered) 1 lb 6 oz; (powered) 2 lb 1 oz. Price: (unpowered) £15; (powered) £17.

●**Ravensbourne 2 FET tuner.** Range: 88-108 MHz. Variable tuning. Wide-band ratio detector. Centre-zero tuning meter. Sensitivity: 2·7 μV for 30 dB quieting. Aerial impedance: 75 ohms coaxial and 300 ohms balanced. Output: 200 mV average for 30% modulation. Optional multiplex decoder (built-in). Switched AFC. FET front end. Inter-station noise suppression. Mains: 200-250V AC. Consumption: 8W. Size: (chassis) $11\frac{1}{2} \times 11 \times 4$ in.; (case) $12\frac{1}{2} \times 11\frac{1}{2} \times 5\frac{1}{4}$ in. Price: (chassis less decoder) £35

Rogers FM tuner (switched)

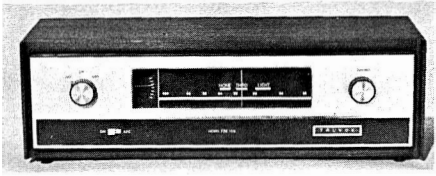


Sennheiser EFM 303

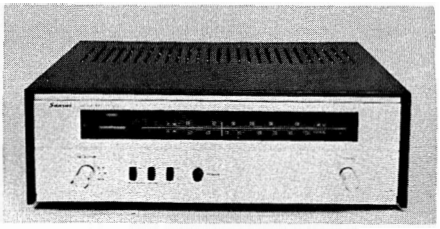


Sinclair System 2000

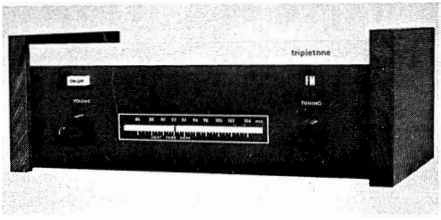
Rogers "2 FET" FM tuner



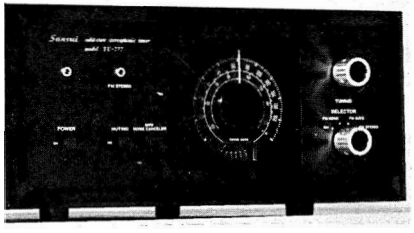
Truvox FM 100 tuner



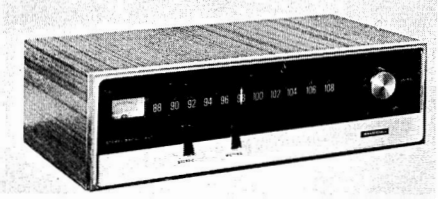
Sansui TU70



Tripletone FM tuner Series 3



Sansui TU 777



Wharfedale WFM.1

(plus £7 19s. 3d. PT); (chassis with decoder) £49 10s. (plus £11 5s. 3d. PT); (cabinet model less decoder) £39 (plus £8 17s. 5d. PT); (cabinet model with decoder) £53 10s. (£12 3s. 5d. PT).

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SANSUI. Sole UK importer: Technical Ceramics Ltd., Thorn Hill Southampton. Tel: 0703-48055. Distributors for Scotland, North and Midlands: Audio Distributors, 4 Lion Street Kidderminster. Tel: 0562-3293.

●**Sansui TU70.** AM/FM multiplex stereo tuner. Range: VHF 88-108 MHz. MW 186-560 metres. Variable tuning. Ratio detector. Magic eye tuning indicator. Sensitivity: 1·2 μV for 20 dB quieting. Aerial input: 300 ohms balanced. Output: 1·2V. Fitted with stereo decoder. Switchable AFC. Stereo indicator. Switchable quiet tuning. Noise filter. Mains: 100, 117, 240V AC 50/60 Hz. Size: $12\frac{5}{8} \times 15\frac{7}{8} \times 5\frac{1}{2}$ in. Price: £63 11s. 6d. (plus £14 2s. 6d. PT).

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SENNHEISER ELECTRONICS. Distributors: Audio Engineering Ltd., 33 Endell Street, London, W.C.2. Tel: 01-836 0033.

●**EFM.303 Stereo Tuner.** Range: 87·5-108·5 MHz. Variable tuning. Two meters for tuning indication. Sensitivity <2 μV for 20 dB quieting. Output 0·5V. Built-in multiplex decoder. Automatic stereo transmission indicator. Interstation noise suppression. Switched AFC. Mains: 200-240V 50 Hz. Size: 15×4×9 in. Price: £121 10s. (including PT).

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SHIRLEY LABORATORIES LTD., 23 Ripley Road, Worthing, Sussex. Tel: Worthing 49098.

FM tuner SB/V16. Variable tuning. Standard range. Ratio det. Magic eye ind. Psn 200-300V 15 mA; 6·3V 2·5 amps. Price: £20. (plus £3 15s. PT).

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SINCLAIR RADIONICS LTD., 22 Newmarket Road, Cambridge. Tel: 0223 52996.

●**System 2000.** Transistorised mono or stereo FM tuner. Range: 86-108 MHz. Variable tuning with facility for remote operation. Pulse counting discriminator. Electronic fine tuning. Electronic tuning indicator. 11 silicon transistors. Interstation muting. AFC. Plug-in multiplex decoder. Automatic stereo switching. Stereo beacon. Output: 500 mV low impedance. FR 10 Hz-20 KHz ±1 dB. Sensitivity 5 μV for full limiting. Mains: 200-250V 50 or 60 Hz. 100-125V versions available. Separate aerial inputs for low-level and high-level signals. Aerial inputs 75 ohms coaxial. Finish: cabinet and all controls solid aluminium. Size: 12×6×2 in. Price: (mono) £26 5s. (including PT); (stereo/mono) £30 9s. (including PT); (plug-in decoder) £4 4s.

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SONY (U.K.) LTD., 36-40 Wigmore Street, London, W.1. Tel: 01-935 3546.

●**Sony ST-5000W.** Stereo transistorised FM tuner. Range: 87-108 MHz. Variable tuning. Sensitivity: 2 μV for 20 dB quieting. Aerial impedance: 300 ohms balanced, 75 ohms coaxial. Output: 700 mV and 0-2V variable. Multiplex decoder fitted. AFC. Mains: 100, 117, 220 or 240V 50/60 Hz. Size: $5\frac{3}{4} \times 15\frac{3}{4} \times 12\frac{1}{4}$ in. Price: £147 16s. (plus £33 4s. PT).

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STEREOSOUND PRODUCTIONS LTD., Capital Works, Wakefield Road, Brighouse, Yorkshire. Tel: Brighouse 1755.

●**88 tuner.** All-transistor AM FM tuner with stereo multiplex decoder. Designed to match Stereosound 88 amplifier/player and tape recorder system. Full specification on request. Price: £31 10s. (including PT).

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TRIO. Distributors: B. H. Morris & Co. (Radio) Ltd., 84-88 Nelson Street, Tower Hamlets, London, E.1. Tel: 01-790 4824.

●**TK-350E.** Solid state stereo tuner. Wavebands: MW 187-576 m, VHF 88-108 MHz. Variable tuning. Ratio detector. Tuning meter. Stereo indicator lamp. Sensitivity: FM 2 μV, AM 10 μV. Output voltage: FM 2V (400 Hz 100% modulation), AM 0·4V (400 Hz 30% modulation). Decoder fitted. Automatic mono-stereo switching. Four-gang tuning. Five IF stages with four limiters. Noise filter. FR (FM) 20 Hz-20 KHz ±2 dB. Signal-to-noise: FM 60 dB, AM 45 dB. Stereo separation: 38 dB (at 400 Hz). Output impedance: 1K. Mains: 110-120V or 220-230V 50/60 Hz. Consumption 15W. Size: $12\frac{1}{2} \times 4\frac{1}{8} \times 9\frac{1}{4}$ in. Weight: $9\frac{1}{4}$ lb. Price: £57 15s.

TRIPLETONE MANUFACTURING CO. LTD., 241a The Broadway, Wimbledon, S.W.19. Tel: 01-542 1189.

Tripletone FM tuner Series 3. Variable tuning. Range: 86-104 MHz. AGC and interstation quieting. Ratio detector. Aerial input 70-80 ohms coaxial. Output: 0-500 mV cathode follower. Mains: 200-250V AC. Size: $11 \times 6\frac{1}{2} \times 3\frac{3}{4}$ in. Price: £16 7s. (plus £3 12s. 8d. PT).

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TRUVOX LTD., Hythe, Southampton. Tel: Hythe (0421-24) 3265.

FM100. Variable tuning FM/VHF tuner covering 87·5-108·5 MHz. Ratio detector. Meter tuning indicator plus beacon for stereo transmissions. Sensitivity: 1·5 μV for 20 dB quieting. Aerial imp 75 ohms coaxial, 300 ohms balanced. Output: 0-1V variable. Internally-fitting decoder available. Switched AFC. Overload limiting diode. Preset output control. Mains: 100-120V, 200-250V, 40-60 Hz. Price: £28 15s. 1d. (plus £6 9s. 2d. PT).

MPX100 stereo decoder. Designed for FM100 tuner. Price: £15 4s. 6d.

●**FM200.** Transistorised stereo FM tuner in teak cabinet or for panel mounting. Range: 87·5-108·5 MHz. FR 20 Hz-20 KHz ±1 dB. Separation −38 dB at 1 KHz. Sensitivity: 1·5 μV for 20 dB quieting. Aerial inputs: 75 ohms coaxial, 300 ohms balanced. Switched AFC. Centre-zero tuning meter. Automatic stereo beacon. Inter-station muting. Automatic stereo switching with manual over-ride. Output: 0-1 V variable via emitter follower. Mains: 100-120V, 200-250V 50/60 Hz. Plug-in multiplex decoder. All silicon transistors. Size: $16 \times 6\frac{7}{8} \times 5\frac{1}{8}$ in. Panel cut-out: $15 \times 3\frac{3}{4}$ in. Price: £36 19s. 4d. (including PT).

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WHARFEDALE. Rank Wharfedale Ltd., Idle, Bradford, Yorkshire. Tel: Bradford 612552. Cables: Wharfdel, Idle, Bradford. Telex: 51407.

●**WFM-1.** Stereo FM/VHF tuner. Range: 87·5-108 MHz. Variable tuning. All transistor. Centre-zero tuning meter. Sensitivity: 1·75 μV for 30 dB signal-to-noise ratio (75 ohms). Aerial input: 75 ohms coaxial, 300 ohms balanced. Multiplex stereo decoder fitted. AM rejection >40 dB. Crosstalk better than −35 dB. Distortion <0·6% at 75 KHz deviation. Stereo indicator lamp. Switchable inter-station muting. Size: $15\frac{1}{2} \times 6\frac{7}{8} \times 5$ in. Finish: oiled teak veneer shelf-mounting cabinet. Price: £43 2s. 2d. (plus £10 4s. 10d. PT); (self-powered version) £45 15s. 11d. (plus £10 17s. 7d. PT).

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WYE ELECTRONICS LTD., Queen Street North, Whittington Moor, Chesterfield, Derbyshire. Tel: Chesterfield 51116.

Wye FM tuner. Full details not available at time of going to press. Price: £24 7s. 6d. (plus £4 16s. 6d. PT).

DIRECTORY OF TUNER/AMPLIFIERS

★ The abbreviations used in this section are defined at the beginning of the Tuner and Amplifier Sections.

AKAI. Distributors: Pullin Photographic Ltd., 11 Aintree Road, Perivale, Greenford, Middlesex. Tel: 01-998 1541. Cables: Pullinfoto, Greenford, Middlesex.

●**Akai AA7000.** Transistorised stereo tuner/amplifier. Range: VHF 87-109 MHz, MW 187-560 metres. Variable tuning. Meter tuning indicator. Sensitivity: 1·6 μV for 20 dB quieting. Aerial input: VHF 75 ohms coaxial. Stereo multiplex decoder fitted. All silicon transistors. Stereo indicator. Quiet tuning facility. Rotatable internal ferrite rod on AM. Inputs: PU 3·5 mV 100 ohms, aux high 1·2V 250 ohms, aux low 400 mV 150 ohms, tape 400 mV (monitor) 1 megohm, tape 350 mV (record output) 50K. Noise level: PU 60 dB, aux and tape 70 dB. Output: 40W per channel (music). HD 1% at rated power. FR 20 Hz-35 KHz. Output impedance: 8-16 ohms. Mains: 100-240V AC. Consumption: 160W. Size: $20\frac{3}{4} \times 17\frac{1}{2} \times 4\frac{1}{2}$ in. Price: £131 14s. 6d. (plus £29 19s. 4d. PT).

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ARENA. Distributors: Highgate Acoustics Ltd., 71-73 Great Portland Street, London, W.1. Tel: 01-636 2901.

●**Arena T.2400.** All-transistor tuner/amplifier. Constructed on miniature module system. Range: FM/VHF 87·5-105·5 MHz. Push-button selection of up to five FM stations. Electronic station scanning. Inputs: tape recorder, PU.1, PU.2. Output: 15W each channel. Outlets: four speakers, one headphone. Sockets for FM aerial feeder. Size: $19\frac{3}{4} \times 9\frac{3}{4} \times 3\frac{7}{8}$ in. Price: £82 19s. (including PT); multiplex decoder £7 7s. extra.

●**Arena T.2500F.** All-transistor tuner/amplifier. Constructed on miniature module system. Five wavebands: LW, MW, SW1, SW2, VHF/FM. Push-button selection of up to five FM stations. Electronic station scanning on FM. Duplex tuning. Sockets for recorder and pickup. Output: 15W each channel. AFC. Finish: teak, light oak or Brazilian rosewood. Size: $17\frac{1}{4} \times 8\frac{1}{4} \times 5\frac{3}{4}$ in. Price: £93 9s. (including PT); multiplex decoder £7 7s. extra.

●**T1500.** Transistorised stereo tuner/amplifier. Range: FM/VHF, LW, MW, 49-metre band. Controls: volume, bass, treble, tuning, mode, wavechange. Inputs for PU and recorder. Outlets for speakers and recorder. Module construction. Multiplex decoder fitted. 28 silicon transistors, 21 diodes. Vari-cap FM tuning. Output: 6W RMS per channel. Sensitivity: AM 10 μV, FM 1 μV. Full specification not available at time of going to press. Price: £64 1s. (including PT).

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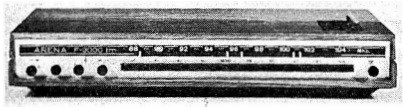
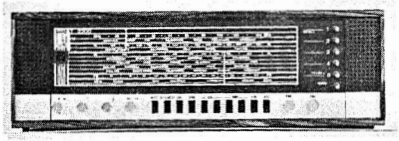
ARMSTRONG AUDIO LTD., Warlters Road, London, N.7. Tel: 01-607 3213/4.

Model 227M. Mono tuner/amplifier. AM/FM. Variable tuning. Range: MW 180-600 m; FM 87-108 MHz. Foster-Seeley disc. Tuning meter. Aerial imp 70-80 ohms. Output: 10W. Psn 200-250V AC. Inputs: gram/tape playback 80 mV, 1 megohm. Controls: vol, bass, treble, sel, tuning. Rumble filter −6 dB at 35 Hz. FR 30 Hz-20 KHz ±1 dB. H and N better than −55 dB. HD less than 0·5% at 8W (overall). Feedback 15 dB. LS matching 4, 8, 16 ohms. Output stages 2 × ECL86. Free-standing. Size: $13 \times 5\frac{3}{8} \times 10\frac{1}{2}$ in. Optional case. Price: £34 18s. 9d. (plus £8 1s. PT).

●**Model 425.** FM tuner/amplifier. Range: VHF 86-109 MHz. Variable tuning. Ratio detector. Meter tuning indicator. Sensitivity: 1·5 μV for 30 dB quieting. Aerial impedance: 75 ohms coaxial and 300 ohms balanced. Plug-in stereo multiplex decoder optional extra (see Radio Tuner Section). Quiet-tuning control. Stereo indicator light. Inputs: PU(1) 60 mV 100K, PU(2) 3·5 mV 50K, tape play 400 mV 100K. Noise level: PU −55 dB, tape −70 dB. Controls: balance (maximum to zero each channel), bass ±10 dB, treble ±10 dB, loudness (two volume levels with loudness contours at low level), rumble filter −5 dB at 30 Hz, treble filter(1) 6·5 KHz −3 dB, 10 KHz −25 dB, treble filter(2) 4·5 KHz −3 dB, 9 KHz −40 dB. Output: 15W RMS per channel. Output impedance 4-16 ohms. HD <0·5% at rated output. FR 20 Hz-20 KHz −1 dB at 15W RMS. Transistorised. Mains: 100-125V and 200-250V AC. Size: $16\frac{1}{4} \times 10\frac{1}{2} \times 4$ in. Price: £63 15s. 6d. (plus £14 10s. 3d. PT).



Arena T2400



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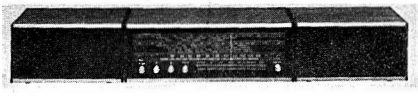
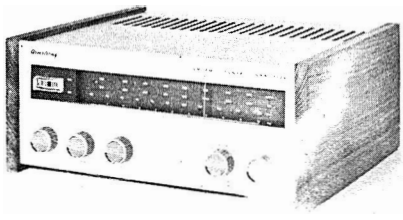
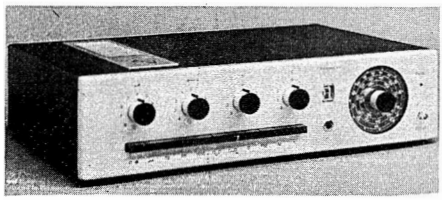


Arena T1500H plus two HT21 speakers

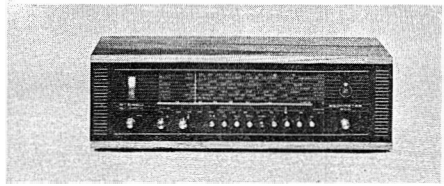
Armstrong 227M tuner/amplifier



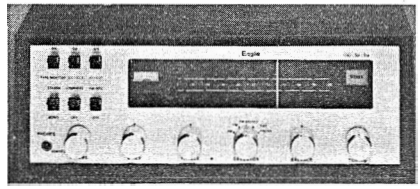
Armstrong 227M mono tuner/amplifier



Armstrong 426

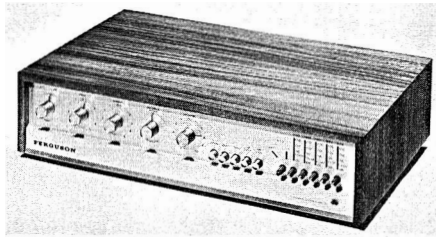


Beomaster 900M

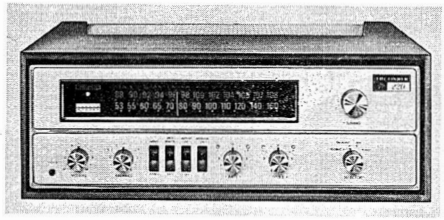


Eagle RA96

Ferguson 205STA



Ferguson 206STA



Fisher 220-T

●**Model 426.** AM/FM tuner/amplifier. Range: VHF 86-109 MHz, MW 185-590 metres, LW 1,000-2,000 metres. Variable tuning. FM ratio detector. Meter tuning indicator. Sensitivity: 1·5 μV for 30 dB quieting on VHF, 5 μV for 20 dB quieting on AM. Aerial impedance: 75 ohms coaxial and 300 ohms balanced. Plug-in stereo multiplex decoder optional extra (see Radio Tuner Section). FM quiet-tuning control. Stereo indicator light. Inputs: PU(1) 60 mV 100K, PU(2) 3·5 mV 50K, tape play 400 mV 100K. Noise level: PU −55 dB, tape −70 dB. Controls: balance (maximum to zero each channel), bass ±10 dB, treble ±10 dB, loudness (two volume levels with loudness contours at low level), rumble filter −5 dB at 30 Hz. Treble filter(1) 6·5 KHz −3 dB, 10 KHz −25 dB, treble filter(2) 4·5 KHz −3 dB, 9 KHz −40 dB. Output: 15W RMS per channel. Output impedance: 4-16 ohms. HD <0·5% at rated output. FR 20 Hz-20 KHz −1 dB at 15W RMS. Transistorised. Mains: 100-125V and 200-250V AC. Size: $16\frac{1}{4} \times 10\frac{1}{2} \times 4$ in. Price: £71 3s. (plus £16 3s. 9d. PT).

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BANG AND OLUFSEN U.K. DIVISION, Eastbrook Road, Gloucester. Tel: 0452 21591.

●**Beomaster 900K Mk II.** AM/FM transistorised stereo tuner/amplifier. Range: VHF 88-108 MHz, MW 188-578 m, LW 940-2040 m, SW 41-49 m. Variable tuning. Ratio detector. Meter tuning indicator. Aerial input 75 ohms coaxial. Stereo multiplex decoder available. AFC. Inputs: mic, PU mag, PU ceramic, radio, aux(1), aux(2). Controls: bass, treble, balance, volume, selector, on/off, mode, rumble filter, scratch filter, loudness, speaker switches. Output: 60W RMS per channel. HD 0·6% at rated output. FR 20 Hz-20 KHz ±1·5 dB. Noise −90 dB below 60W. Output impedance 4 ohms. Mains supply. Price: complete outfit from £227 15s. (including PT).

900M. AM/FM tuner/amplifier. Range: VHF 88-108 MHz, MW 188-578 m, LW 940-2040 m. Switchable AFC. 23 transistors, seven diodes. Tuning indicator. Duplex tuning drive (separate pointers for AM and FM). Inputs: tape 250 mV, PU 180 mV 100K. Outlet: tape 20 mV. Output: 6W RMS per channel. Mains: 220-240V AC. Consumption: 65W. Dimensions: $29\frac{1}{2} \times 11\frac{3}{4} \times 5\frac{1}{2}$ in. Price: £65 14s. 9d. (plus £14 15s. 9d. PT).

●**Beomaster 1000.** Transistorised FM tuner and stereo amplifier. Inputs: mag. PU 5 mV 47K, crystal PU 180 mV 100K. Controls: Scratch filter, rumble filter, bass, treble, volume, balance. Output 15W per channel. Distortion 1% at full output. FR 30 Hz-20 KHz. Output imp 3-5 ohms. Fitted with multiplex decoder. Size: $19\frac{7}{8} \times 3\frac{7}{16} \times 10$ in. Mains: 110-240V. Price: £81 1s. (plus £18 4s. PT).

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BRAUN AG. Distributors: Fi-Cord International, Charlwoods Road, East Grinstead, Sussex. Tel: East Grinstead 21351.

●**TS45.** Stereo tuner/amplifier. Transistorised. VHF 88-108 MHz, MW 188-545 m. Variable tuning. Foster-Seeley discriminator. Meter indicator. Sensitivity: 1·5 μV for 26 dB quieting. Aerial 300 ohms balanced twin. Optional multiplex. AFC switchable. Output: 12W each channel. Distortion less than 1% at 1 KHz for 12W output. FR 30 Hz-20 KHz. Output impedance: 4 ohms. Mains: 240V AC. Size: $19\frac{1}{4} \times 11\frac{1}{4} \times 4\frac{3}{8}$ in. Price: £177 15s. 11d. (including PT).

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DYNATRON RADIO LTD., St Peter's Road, Furze Platt, Maidenhead, Berks. Tel: 0628 23331.

●**Dynatron TRV17.** Ranges: MW 185-570 m, LW 1,100-2,000 m. VHF 87-108 MHz. Variable tuning. Stereo beacon indicator. Sensitivity: MW 10 μV for 20 dB quieting average over band, LW 15 μV for 20 dB quieting average over band, VHF (minimum) 2·5 μV for 10 dB quieting, 6 μV for 30 dB quieting, 10 μV for 40 dB quieting, average over band. AFC (pull-in range ±350 Kc/s or better). AGC +70 dB for 6 dB change in audio (AM). Tuner: 14 transistors, 12 diodes. Multiplex decoder included. Separate RF and IF channels for AM and FM. Inputs: radio and tape 36 mV for 10W at 1 KHz, mag PU 5 mV for 10W at 1KHz, crystal PU 16 mV for 10W at 1 KHz. Controls: (push-button) wavechange, AFC and bass boost (±10 dB at 100 Hz), (rotary) tuning, selector, balance, (±6 dB each channel), volume, treble (±10 dB at 10 KHz), bass (±10 dB at 100 Hz), toggle switch for mains on-off. Audio amplifier: 16 transistors, 4 diodes. Output: 10W RMS per channel into 3 ohms. HD <0·4% at 8W, <1% at maximum output (12·5W per channel). H and N: main amplifier −95 dB, tape input −70 dB, crystal PU −58 dB, mag PU −62 dB, all relative to 10W. FR 30 Hz-24 KHz −3 dB on radio, tone controls flat; 40 Hz-20 KHz ±1·5 dB on PU inputs, corrected to RIAA. Sockets: on PU inputs, corrected to RIAA. Sockets: external

AM and VHF aerials, tape recorder, external speakers (3-15 ohms), shuttered mains socket for recorder or player. Size: $16\frac{1}{2} \times 12 \times 4\frac{1}{2}$ in. Price: £61 11s. 8d. (plus £13 3s. 5d. PT).

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EAGLE PRODUCTS. Distributed by: B. Adler & Sons (Radio) Ltd., 32a Coptic Street, London, W.C.1. Tel: 01-636 9606/7. Cables: Reldab, London.

●**RA.96.** Transistorized AM/FM tuner amplifier. Range: FM 88-108 MHz, MW 186-555 m. Sensitivity: FM 2 μV, AM 700 μV. FR: 20 Hz-20 KHz ±2 dB. Inputs: PU(1) 3·5 mV 47K, PU(2) 150 mV 1 megohm, tape monitor 60 mV 100K, tape record 100 mV 100K, aux 60 mV 100K. Bass control ±12 dB at 50 Hz. Treble control ±12 dB at 10 KHz. Rumble filter −10 dB at 50 Hz. Treble filter −13 dB at 10 KHz. FET FM front end. 24 transistors, 16 diodes. Output: 10W RMS per channel. HD <1% at 8W. Meter tuning indicator. Stereo beacon. Phone jack. Mains: 220-240V AC. Size: $14 \times 5 \times 11\frac{5}{8}$ in. Price: £68 18s. (plus £17 2s. PT).

Prices quoted for Eagle Products are approximate

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FERGUSON. British Radio Corporation Ltd., 284 Southbury Road, Enfield, Middlesex. Tel: 01-366 1155.

●**Ferguson 205STA.** Transistorised stereo tuner/amplifier. Range: VHF 87·5-101 MHz, MW 185-566 m, LW 1,120-2,025 m, SW 16-51 m. Variable tuning. Meter tuning indicator. Sensitivity: VHF 15 μV for 20 dB limiting, MW 420-500 μV for 20 dB S/N. Aerials: built-in 8 in. ferrite rod for MW and LW, sockets for SW and VHF. Stereo multiplex decoder built-in. Stereo indicator lamp. Switchable AFC. 26 transistors, 16 diodes. Inputs: PU 20 mV 50K, tape 50 mV 60K. Outlets: ext speakers 8 ohms, tape 120-200 mV 4·7K. Output: 7W per channel. HD <1% at rated output. FR 30 Hz-20 KHz ±3 dB. Controls: volume (bass compensated), bass +14 dB −12 dB, treble ±10 dB at 10 KHz, tuning, AFC on-off, mode, wavechange, pickup balance (on rear). Mains outlet sockets. Mains: 200-250V AC 50 Hz. Consumption 20W. Size: $16\frac{3}{4}$ in. wide, $9\frac{7}{8}$ in. deep (11 in. overall), $8\frac{5}{8}$ in. high. Finish: teak. Designed to match Ferguson Unit Audio system. Price: £48 0s. 7d. (plus £10 5s. 5d. PT).

●**Ferguson 206STA.** Transistorised FM/VHF stereo tuner/amplifier. Range: 87·5-105 MHz. Preset tuning with five press-buttons, each button tunes entire range. Sensitivity: 20 μV for 20 dB limiting. Stereo multiplex decoder fitted. Stereo indicator light. Switchable AFC. 27 transistors, 12 diodes. Inputs: PU 16 mV, tape 140 mV 54K, radio 16 mV 6·8K. Controls: mains on-off, bass ±14 dB, treble ±10 dB at 10 KHz, balance, volume. Output: 7W per channel (RMS). HD <1% at rated output. FR 30 Hz-20 KHz ±3 dB. Outlets ext speakers 8 ohms, tape 70 mV 68K, two mains outlets. Mains: 200-250V AC 50 Hz. Consumption: 20W. Size: $19\frac{1}{4}$ in. wide, $11\frac{1}{2}$ in. deep, 5 in. high. Designed to match Ferguson Unit Audio system. Finish: teak. Price: £44 3s. 11d. (plus £9 9s. 1d. PT).

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FISHER RADIO CORPORATION, Long Island City 1, New York, U.S.A. Distributors: Getz Bros. and Co. Inc., 2 Harewood Place, London, W.1. Tel: 01-499 6901.

●**400.** Stereo tuner/amplifier. FM 86-108 MHz. Variable tuning. Ratio detector. Strip tuning indicator. Sensitivity: 1·8 μV for 20 dB quieting. Aerial input 300 ohms balanced. Multiplex decoder fitted. AFC. Valves. Inputs: pickup (1) 4·4 mV, pickup (2) 14 mV, tape head 2·8 mV, auxiliary 280 mV. Controls: bass ±22 dB at 50 Hz, treble ±22 dB at 10 KHz, filter −3 dB at 5 KHz, then 12 dB/octave above 6 KHz. Output 25W RMS per channel. HD 0·5% at 1 KHz, at rated output. FR 25 Hz-25 KHz. Noise level −80 dB. Mains input 200W. Size: $17\frac{1}{2} \times 13\frac{1}{2} \times 5\frac{3}{4}$ in. Weight 31 lb. Price: £124 19s. (including PT).

●**500T.** Stereo tuner/amplifier. Sensitivity 1·8 μV. Signal-to-noise ratio 70 dB. Selectivity 50 dB. Stereo separation 35 dB (at 1 KHz). Output: 90W music. HD 0·8% at 1 KHz at rated output. Size: $16\frac{3}{8} \times 5\frac{1}{8} \times 12\frac{3}{4}$ in. Weight: 21 lb. Finish: walnut. Price: £208 19s. (including PT).

●**550T.** Stereo tuner/amplifier. Sensitivity 1·8 μV. Signal-to-noise ratio 68 dB. Selectivity 50 dB. Stereo separation more than 35 dB (at 1 KHz). Output: 90W music. HD 0·8% at 1 KHz at rated output. Size: $16\frac{3}{4} \times 5\frac{1}{8} \times 15\frac{1}{4}$ in. Weight: 29 lb. Finish: walnut. Price: £229 19s. (including PT).

●**700-T.** Transistorised FM stereo tuner/amplifier. Front end field effect transistors. Two RF stages. Four IF stages. Three limiters. Auto-

matic stereo switching. Full technical specification on request. Size: $16\frac{3}{4} \times 5\frac{1}{8} \times 12\frac{3}{8}$ in. Weight: 24 lb. Price: £229 19s. (including PT).

●**220-T.** Stereo tuner/amplifier incorporating field effect transistors. Ranges: FM 88-108 MHz, AM 187-570 m. AFC. Variable tuning. Inputs: PU 3·6-9·5 mV, aux 410-800 mV. Output: 16W RMS per channel at 8 ohms, 20W RMS per channel at 4 ohms. Controls: volume, balance, mono/stereo switch, bass, treble, tuning, function selector, switches for speakers, monitoring and muting. HD 0·8%. FR 30 Hz-20 KHz ±1 dB. H and N −80 dB, PU −55 dB, aux −65 dB. Bass control: 17 dB at 50 Hz. Treble control: 16 dB at 10 KHz. Finish: walnut cabinet with enamelled and gold-plated front panel. Size: $15\frac{1}{8} \times 4\frac{3}{4} \times 11$ in. Weight: $17\frac{1}{2}$ lb. Price: £181 13s. (including PT).

●**200T.** Stereo tuner/amplifier. Sensitivity 2·0 μV. Signal-to-noise ratio 65 dB. Selectivity 40 dB. Stereo separation 35 dB (at 1 KHz). Output: 70W music. HD 0·8% at rated output. H and N −80 dB. Size: $15\frac{1}{8} \times 4\frac{3}{4} \times 11\frac{1}{2}$ in. Weight: 22 lb. Finish: walnut. Price: £156 9s.

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GRUNDIG (GREAT BRITAIN) LTD., Hi-Fi Division, 15 Orchard Street, London, W.1. Tel: 01-935 4898.

●**RTV350.** Transistorised stereo tuner/amplifier. Ranges: VHF 87·5-108 MHz, MW 185-588 m, LW 857-2069 m, SW 18·5-55 m. Variable tuning. Built-in ferrite rod for M and L, dipole for SW and VHF. Multiplex decoder included. Stereo beacon. Inputs for PU and tape. Controls: volume, tuning, balance, bass, treble, wavechange, on/off, mode. Output: 10W per channel (music). Mains: 110, 130, 220, 240V 50 Hz. Consumption: 40W. Size: $21\frac{1}{2} \times 6 \times 8\frac{3}{4}$ in. Finish: teak or walnut. Price: £96 12s. (including PT).

●**RTV600.** Transistorised stereo tuner/amplifier. Ranges: VHF 87·5-108 MHz, LW 680-2050 m, MW 185-587 m, SW1 34-99 m, SW2 13·5-35 m, SW3 bandspread ±60 KHz of SW bands. Sensitivity: FM 1·5 μV, AM (MW) 6·5 μV. IFs: 460 KHz and 10·7 MHz. AFC. Noise level: −70 dB at 40 KHz deviation. Distortion factor: <0·5%. FR 40 Hz-15 KHz ±2 dB. Stereo decoder with automatic switching and stereo beacon. Separation: better than 40 dB at 2 KHz. Aerials: internal ferrite rod, FM dipole 240 ohms. 3 KHz and 5 KHz treble filters. Output: 20W RMS per channel. FR (audio stages) 20 Hz-20 KHz ±1·5 dB. Inputs: mag PU 3 mV 47K, tape 200 mV 470K. Output impedance: 4-16 ohms. Automatic overload cut-out. Bass control: −20 dB + 15 dB at 20 Hz. Treble control: −20 dB + 15 dB at 20 KHz. Mains: 110, 130, 220, 240 V 50-60 Hz. Consumption (no load): 30W. Finish: teak or walnut with aluminium front panel. Size: $25\frac{3}{8} \times 5\frac{3}{4} \times 13$ in. Price: £171 3s. 3d. (plus £36 14s. 9d. PT).

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KIRKSAETER. Distributed by: Elstone Electronics Ltd., Hereford House, Vicar Lane, Leeds, 2. Tel: 0532 39834.

●**Compact 70.** All-silicon transistor tuner/amplifier. Precision made and outstanding design. Full specification and price on request.

●**RTX.70.** Tuner/amplifier for larger rooms. Fully transistorised. Sensitive FM tuner with advanced circuitry. Four tuned RF stages. Interstation muting. Full specification and price on request.

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KNIGHT-KITS. See Constructional Kits

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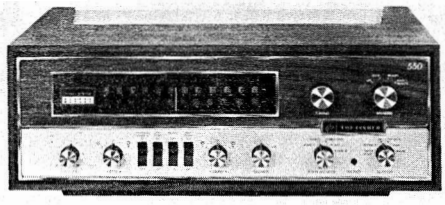
KORTING. Distributors: Europa Electronics Ltd., Howard Place, Shelton, Stoke-on-Trent. Tel: Stoke-on-Trent 29316.

●**Stereo 400.** Stereo tuner/amplifier in modern satin finish wood cabinet. Ranges: SW, MW, LW VHF/FM. Variable tuning. Strip tuning indicator. Sensitivity: VHF 3 μV, SW 10 μV, MW 5 μV, LW 8 μV. Internal rotatable ferrite aerial for MW and LW, folding dipole for VHF. Provision for external aerials. Transistor multiplex decoder. Stereo indicator. AFC. Nine valve circuit. Inputs: stereo PU, stereo tape recorder. Controls: bass, treble, balance, volume, push-button waveband selection. Output: 10W RMS per channel. FR 30 Hz-20 KHz. Output imp: 4·5 ohms. Mains: 110, 127, 220, 240V 50 Hz. Consumption: 70W. Size: 21 × 9 × 8 in. Weight: 13 lb. Price on request.

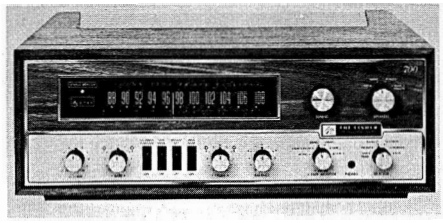
●**Stereo 500.** Transistor stereo tuner/amplifier in modern style wood cabinet. Ranges: MW, LW, SW, VHF/FM. Variable tuning. AFC on FM. Meter tuning indicator. AGC. Internal rotatable ferrite rod for MW and LW. Folding

Fisher 200-T

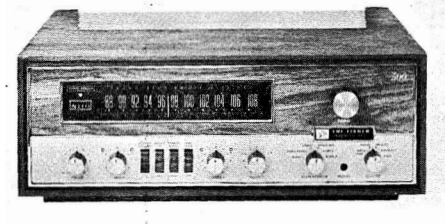
Fisher 400 FM/stereo tuner amplifier



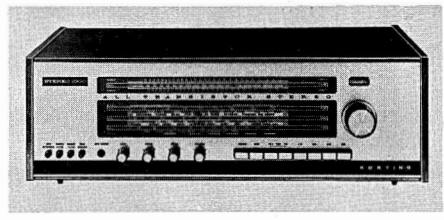
Fisher 550-T



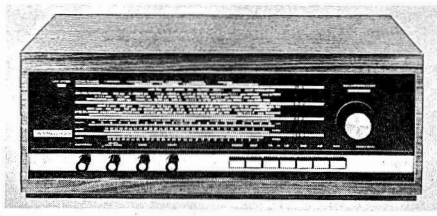
Fisher 700-T FM/stereo tuner amplifier



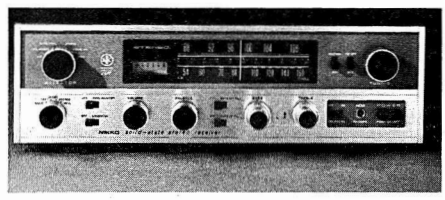
Fisher 500-T



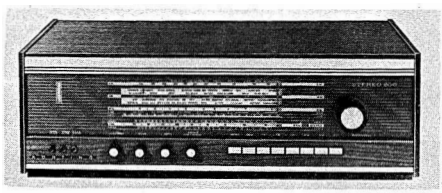
Korting Stereo 1000



Korting Stereo 400



Nikko ST.701LA



Korting Stereo 600

Nikko ST501

dipole for FM. Output: 15W RMS each channel. 4-5 ohms. FR 20 Hz-100 KHz. Controls: bass, treble, balance, volume. Eight push-buttons for AFC, stereo, FM, LW, MW, SW, pickup, tape, on/off. Output stages: two AD148 transistors each channel. Mains 110, 127, 220, 240V AC 50 Hz. Consumption: 40W maximum. Stereo multiplex decoder incorporated. Size: $21\frac{1}{4} \times 8\frac{5}{8} \times 9$ in. Price on request.

●**Stereo 600.** Stereo tuner/amplifier in modern satin finish walnut cabinet. Ranges: SW, MW, LW, VHF/FM. Variable tuning. Strip tuning indicator. Internal rotatable ferrite aerial for MW and LW. Provision for external aerials. Transistor stereo multiplex decoder. Stereo indicator. Automatic stereo/mono switch. Inputs: stereo pickup, stereo tape recorder. Controls: volume, treble ±15 dB, bass ±15 dB, balance ±15 dB, rumble and scratch filters, solo/treble filter, push-button waveband selection. Output: 15W RMS per channel. FR 30 Hz-20 KHz. Output imp: 4·5 ohms. Mains: 110, 127, 220, 240V AC. Size: $24\frac{1}{2} \times 9\frac{1}{2} \times 8$ in. Weight: $17\frac{1}{2}$ lb. Price on request.

●**Stereo 1000.** Transistorised stereo tuner/amplifier in modern satin finish walnut cabinet. Ranges: SW, MW, LW, VHF/FM. Variable tuning. Aerials: ferrite rod aerial for MW and LW, provision for external aerials. Stereo multiplex decoder with automatic indicator and automatic mono/stereo switch. AFC. 39 transistors, 16 diodes. Inputs: stereo magnetic PU, stereo crystal PU, stereo tape recorder. Output: 25W RMS per channel. Output imp: 4·5 ohms. Controls: volume, treble ±15 dB, bass ±15 dB, balance ±15 dB, rumble and scratch filters, solo/treble filter, push-button waveband selection. FR 15 Hz-40 KHz. Mains: 110, 127, 220, 240V AC. Size: $24\frac{1}{2} \times 9\frac{1}{2} \times 8$ in. Weight: $20\frac{1}{4}$ lb. Price on request.

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NIKKO ELECTRIC MFG. CO. LTD. Distributors: Howland-West Ltd., 2 Park End, South Hill Park, London, N.W.3. Tel: 01-794 6666.

●**Nikko ST501.** Transistor AM/FM tuner amplifier. Range: VHF 88-108 MHz, MW 182-565 m. Variable tuning. Meter tuning indicator. Sensitivity: 1·8 μV for 20 dB quieting. Aerial input: 300 ohms balanced. Multiplex decoder fitted. AFC. Inputs: mag PU 2·8 mV 50K, tape head 1·8 mV 250K, aux (1) 200 mV 250K, aux (2) 500 mV 1 megohm. Noise level: PU −60 dB, tape −55 dB, aux −65 dB. Controls: selector, tuning, volume, speaker on/off, mode, tape monitor, loudness, balance, bass (left and right), treble (left and right), mains on/off, local/distance. Output: 18W RMS into 8 ohms. HD 0·8% at rated output. FR 20 Hz-20 KHz ±1 dB at full power. Output impedance: 4-16 ohms. Mains: 117-240V 50/60 Hz. Size: $15\frac{1}{4} \times 12\frac{3}{4} \times 4\frac{3}{4}$ in. Price: £98 (plus £21 1s. 2d. PT).

●**Nikko ST701-LA.** Transistor AM/FM tuner/amplifier. Range: VHF 88-108 MHz, MW 182-565 m. Variable tuning. Field effect transistor FM detector. Meter tuning indicator. Sensitivity: 1·8 μV for 20 dB quieting. Multiplex decoder fitted. Switched AFC. Inputs: PU (mag) 2·8 mV 50K, tape head 1·8 mV 200K, aux 200 mV 250K, aux 500 mV 800K. Controls: mode, function, volume, balance, bass (one on each channel), treble (one on each channel), tape monitor, loudness, scratch filter, rumble filter, muting, AFC, speaker on/off, mains on/off. Output: 25W RMS per channel at 8 ohms. HD <0·3% at 20W, <0·8% at 25W. FR 15 Hz-50 KHz. Noise level: tape −55 dB, mono −60 dB, aux −65 dB. Output impedance: 4-15 ohms. Mains 117-250V 50/60 Hz. Automatic circuit breaker. Size: $15\frac{1}{2} \times 4\frac{1}{2} \times 12\frac{3}{4}$ in. Price: £109 10s. (plus £24 5s. 5d. PT).

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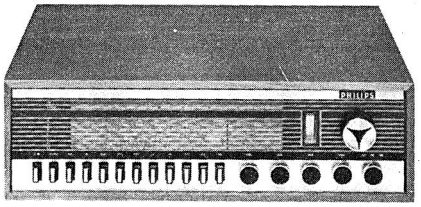
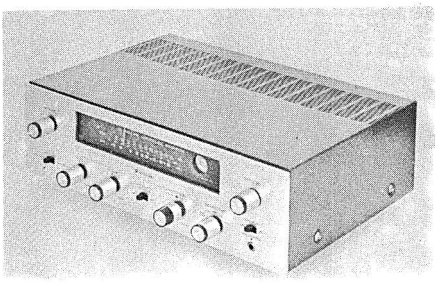
PHILIPS ELECTRICAL LTD., Century House, Shaftesbury Avenue, London, W.C.2. Tel: 01-437 7777. Cables: Phillamps, London.

●**RB771.** Stereo tuner/amplifier. Transistors. Range: VHF 87·5-104 MHz, MW 185-580 m, LW 1,140-2,000 m. Separate variable tuning for AM and FM with provision for preset facility on FM. Ratio detector. Sensitivity: VHF 10 μV, MW 25 μV, LW 4 μV. Aerial input 300 ohms balanced. Multiplex decoder fitted. Switchable AFC. Internal ferrite aerial for MW and LW. Inputs: PU 400 mV 500K, tape 25 mV 50K. Controls: volume, loudness +8 dB at 100 Hz to +6 dB at 10 KHz, treble +12 dB −10 dB at 10 KHz, bass ±10 dB at 100 Hz. Output: 8W RMS per channel. Output impedance 4-8 ohms. HD <1% at rated power. FR 40 Hz-16 KHz ±1·5 dB. Output transistors: AD161/AD162. AC mains. Size: $18\frac{1}{2} \times 3\frac{1}{4} \times 9$ in. Price: £74 (plus £16 12s. 5d. PT).

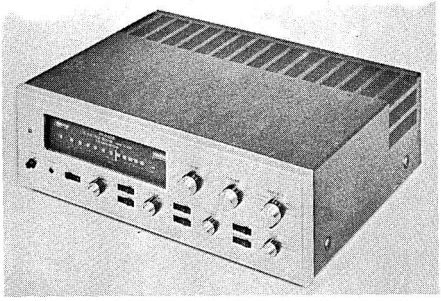
●**RB960.** Stereo tuner/amplifier. Transistors. Range: VHF 87·5-104 MHz, MW 185-580 m, LW 850-2,000 m, SW 16·5-50 and 60-187 m. Variable duplex tuning system. Ratio detector. Meter tuning indicator. Sensitivity 5 μV for 26 dB quieting. Aerial impedance 300 ohms



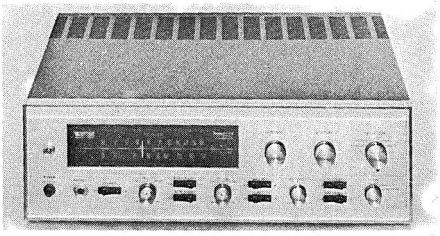
Philips RB960



Pioneer SX-34B



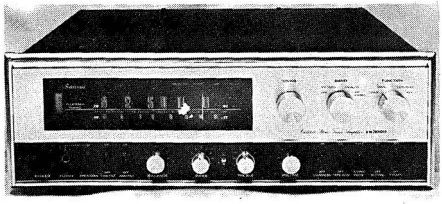
Pioneer SX-1000TA



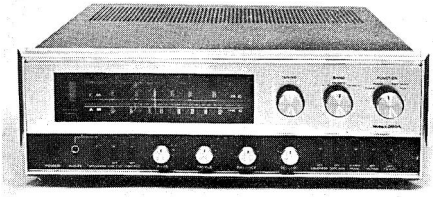
Pioneer SX-600T

Pioneer ER-420

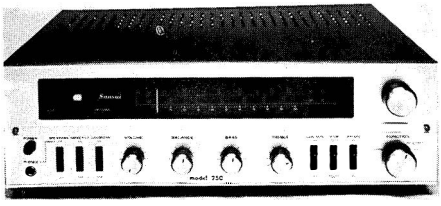
Pioneer SX-800



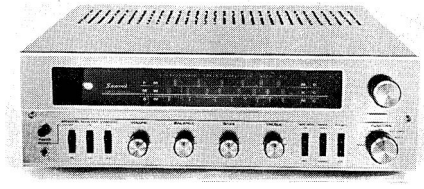
Sansui 3000



Sansui 500A



Sansui 250



Sansui 220

balanced. Multiplex decoder fitted. Switchable AFC. Internal ferrite rod for AM bands. Inputs: PU(1) 4·5 mV 7K, PU(2) 120 mV 35K, tape 350 mV 75K. Noise level −50 dB. Controls: volume, loudness +6 dB at 80 Hz and +6 dB at 12 KHz, balance ±12 dB, bass ±15 dB at 80 Hz, treble +12 dB −8 dB at 12 KHz. Output: 10W RMS per channel. Output impedance: 4-8 ohms. HD <1%. FR 40 Hz-16 KHz ±1·5 dB at rated output. Noise level −50 dB. Output transistors: two AD149. AC mains. Consumption 75W. Size: $17\frac{1}{2} \times 5\frac{1}{2} \times 11\frac{1}{4}$ in. Price: £84 10s. (plus £18 19s. 7d. PT).

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PIONEER. Distributors: Swisstone Ltd., 48a Station Road, Cobham, Surrey. Tel: 0932-6 2853/4214.

●**SX-34B.** AM/FM multiplex stereo tuner/amplifier. FM section: 88-108 MHz, sensitivity 3 μV, aerial input 300 ohms balanced. AM section: MW 187-560 m, sensitivity 20 μV, ferrite aerial. Multiplex decoder fitted. Inputs: mag pickup 2·5 mV, ceramic pickup 30 mV, aux 300 mV, tape playback 350 mV. Controls: bass ±10 dB at 50 Hz, treble ±10 dB at 10 KHz, loudness +5 dB at 50 Hz, +8 dB at 10 KHz, with volume control set at −30 dB. 14 valves, 10 diodes. Output: 11W RMS, 17W music, each channel. Output impedance 8 or 16 ohms. Output stages: two ECL82 push-pull each stage. Tape monitor and playback sockets. Stereo headphone jack. Mains: 115-230V AC. Size: $16\frac{3}{4} \times 13\frac{1}{2} \times 5\frac{3}{8}$ in. Weight: $26\frac{1}{2}$ lb. Full specification and price on request.

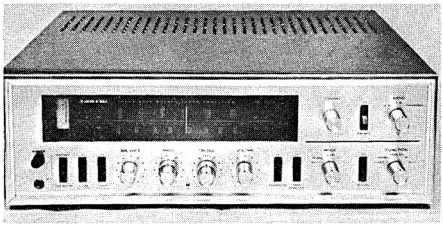
●**ER-420.** AM/FM multiplex stereo tuner/amplifier. FM section: 87-108 MHz, sensitivity 2 μV, SN 55 dB, aerial input 300 ohms balanced. AM section: MW 187-560 m, sensitivity 20 μV, selectivity ±4 KHz (sharp), ±10 KHz (broad), built-in ferrite rod with provision for external aerial. Inputs: mag pickup 2·7 mV, ceramic pickup 29 mV, tape head 1·8 mV, tape monitor 200 mV, aux 200 mV. Output: 15W RMS each channel. Output impedance 8 or 16 ohms. FR 20 Hz-20 KHz ±1 dB. HD <1% at rated output. H and N better than 68 dB (mag). Controls: bass ±14 dB at 50 Hz, treble +11 dB−13 dB at 10 KHz, low filter −6 dB at 50 Hz, high filter −14 dB at 10 KHz. 18 valves, 10 diodes. Two 6BQ5/EL84 push-pull each channel. Mains: 115-230V AC. Size: $17\frac{1}{2} \times 17\frac{1}{2} \times 6$ in. Weight: 35 lb. Full specification and price on request.

●**SX-800A.** AM/FM multiplex stereo tuner/amplifier. Automatic FM mono/stereo switching circuit. FM section: nuvistor front end, 88-108 MHz, sensitivity 2 μV, SN 55 dB, aerial input 300 ohms balanced. AM section: 187-560 m, sensitivity 10 μV, selectivity ±7 KHz (broad), ±4 KHz (sharp), internal ferrite rod, provision for external aerial. Inputs: mag pickup 3 mV, ceramic pickup 30 mV, tape head 2 mV, monitor 150 mV, aux 150 mV. Controls: bass ±15 dB at 50 Hz, treble 10 dB −12 dB at 10 KHz, low filter −8 dB at 50 Hz, high filter −14 dB at 10 KHz. Output: 90W music (total). Nine valves, 14 transistors and diodes. Two nova-type 7868 push-pull each channel. FR 20 Hz-20 KHz ±1 dB. Mains: 115-230V AC. Size: $17\frac{1}{2} \times 16\frac{7}{8} \times 5\frac{1}{2}$ in. Weight: 35 lb. Specification and price on request.

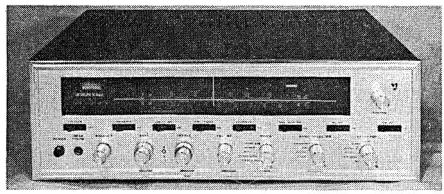
●**SX-600T.** AM/FM transistor multiplex stereo tuner/amplifier. Automatic stereo/mono switching circuit. 60 transistors, 4 nuvistors. FM section: nuvistor front end, 88-108 MHz, sensitivity 2 μV, SN 60 dB, aerial input 300 ohms balanced. AM section: 187-560 m, sensitivity 16 μV, internal ferrite rod aerial with provision for external aerial. Inputs: mag pickup 2·7 mV 60K, ceramic pickup 70 mV 100K, tape head 1·5 mV 150K, tape monitor 330 mV 180K, aux 240 mV 220K. Output: 17·5W RMS each channel 16 ohms load. Output impedance 8-16 ohms. FR 20 Hz-20 KHz ±2 dB. Quiet tuning on FM. Meter tuning indicator. Mains: 115-230V AC. Size: $17\frac{1}{2} \times 17 \times 5\frac{7}{8}$ in. Weight: 27 lb. Full specification and price on request.

●**SX-1000TA.** Transistor FM multiplex stereo tuner/amplifier. 88-108 MHz. Sensitivity 2 μV. SN better than 60 dB. Aerial input 300 ohms balanced. Automatic mono/stereo switching. Inputs: mag pickup 2·8 mV 45K, ceramic pickup 87 mV 100K, tape head 1·8 mV 130K, tape monitor 225 mV 200K, aux 225 mV 200K. Output: 40W RMS each channel. FR 20 Hz-60 KHz ±1 dB. HD 0·5% at rated output. Damping factor 30. H and N better than 70 dB. Mains: 115-230V AC. Size: $16 \times 5\frac{1}{2} \times 13\frac{3}{4}$ in. Weight: 25 lb. Full specification and price on request.

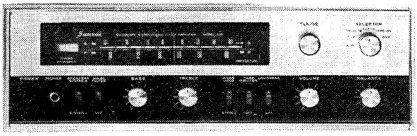
●**SX-300T.** Transistor and valve AM/FM stereo tuner/amplifier. Range: VHF 87-108 MHz. MW 187-572 m. Sensitivity: (FM) 3 μV, (AM) 28 μV. SN better than 55 dB. Aerial input: (FM) 300 ohms balanced. Ferrite aerial for AM with provision for external wire. Output: 12·5W RMS per channel. HD <1% at rated output. FR 20 Hz-20 KHz. ±3 dB. Damping factor 25. 41 transistors, 12 valves. Full specification and price on request.



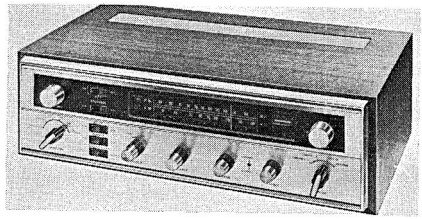
Sansui TR707A



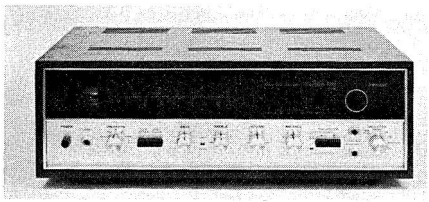
Sansui 1000A



Sansui 400

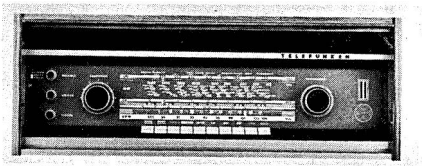


Sanyo DC60

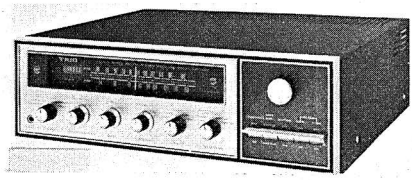


Sansui 5000

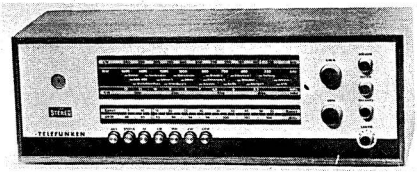
Teleton SRQ-502X



Telefunken Opus



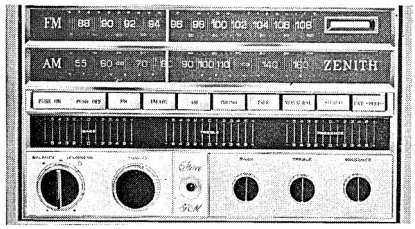
Trio TK-140E



Telefunken Operette

Trio TK-40E

Trio TK-60BE



Zenith AM/FM tuner/amplifier

SANSUI. Sole UK importer: Technical Ceramics Ltd., Thorn Hill Southampton. Tel: 0703-48055. Distributors for Scotland, North and Midlands: Audio Distributors, 4 Lion Street Kidderminster. Tel: 0562-3293.

●**Sansui 220.** AM/FM tuner and stereo amplifier. Range: VHF 88-108 MHz, MW 186-560 m, SW 30-86 m. Variable tuning. Ratio detector. Magic eye. Sensitivity: 2·5 μV for 20 dB. Aerial input: 300 ohms balanced. Provision for external decoder. Inputs: tape mon 660 mV 500K, tape rec 660 mV 500K, PU 3 mV 50K, aux 150 mV 2·2 megohms. Noise level: −70 dB. Controls: volume, treble cut and boost, bass cut and boost, balance, function, speakers on-off, noise filter, loudness, tape mon, mode, AFC on-off. Output: 10W per channel. HD 1·5% at 8W per channel. FR 30 Hz-20 KHz. 2 dB. Output impedance: 8 or 16 ohms. AC mains. Size: $17\frac{3}{8} \times 12\frac{5}{8} \times 5\frac{1}{4}$ in. Price: £74 6s. (plus £16 10s. 6d. PT).

●**Sansui 250.** AM/FM stereo tuner/amplifier. Range: VHF 88-108 MHz, MW 186-560 m. Variable flywheel tuning. Ratio detector. Magic eye. Sensitivity: 2·5 μV for 20 dB. Aerial input: 300 ohms balanced. Switchable AFC. Stereo decoder fitted. Inputs: tape mon 660 mV 500K, tape rec 660 mV 500K, PU 3 mV 50K, aux 150 mV 2·2 megohms. Noise level −70 dB. Controls: volume, balance, bass boost and cut, treble boost and cut, tuning, input selector, speakers on-off, noise filter, loudness, tape mon, mode, AFC. Valves and transistors. Output: 10W per channel. HD 1·5% at 8W per channel. FR 30 Hz-20 KHz ±2 dB. Output impedance: 8 or 16 ohms. Size: $17\frac{3}{8} \times 12\frac{5}{8} \times 5\frac{1}{4}$ in. Price: £79 (plus £17 11s. 4d. PT).

●**Sansui 400.** AM/FM stereo tuner/amplifier. Range: VHF 88-108 MHz, MW 186-560 m. Variable tuning. Ratio detector. Meter tuning indicator. Sensitivity: 2 μV for 20 dB quieting. Aerial input: 300 ohms balanced. Fitted stereo decoder. Inputs: PU 2·2 mV 50K, tape head 2 mV 100K, tape monitor 150 mV 100K, aux 150 mV 100K. Noise level −70 dB on PU, −80 dB all other inputs. Controls: speakers A or B, noise filter, mode, tape monitor, loudness, bass, treble. Output: 20W RMS per channel. HD <1% distortion at rated output. FR 20 Hz-30 KHz ±1 dB. Output impedance: 4-16 ohms. Mains: 100, 117, 220, 240V 50/60 Hz. Consumption 85 VA. Size: $16\frac{1}{2} \times 5\frac{1}{8} \times 12\frac{3}{4}$ in. Price: £102 4s. 8d. (plus £22 14s. 4d. PT).

●**Sansui 500A.** AM/FM stereo tuner/amplifier. Range: VHF 88-108 MHz, MW 186-560 m. Variable tuning. Ratio detector. Meter indicator. Sensitivity: 1·4 μV for 20 dB. Aerial input: 300 ohms balanced. Stereo decoder fitted. Switchable AFC. Stereo indicator. Quiet tuning. Built-in AM ferrite aerial. Inputs: PU (mag) 2·5 mV 50K, tape head 2 mV 250K, aux 180 mV 250K, tape mon 150 mV 150K, tape rec 180 mV 250K. Noise level: −70-75 dB. Controls: bass boost and cut, treble boost and cut, balance, volume, tuning, wavechange, selector, speakers on-off, low-pass filter, high-pass filter, loudness, tape monitor, mode, muting, AFC. Output: 23W per channel. HD 1% at 20W per channel. FR 20 Hz-20 KHz ±1·5 dB. Output impedance: 8 and 16 ohms. Transistors and valves. Size: $18\frac{3}{8} \times 15 \times 5\frac{7}{8}$ in. Price; £98 16s. (plus £21 19s. PT).

●**Sansui TR707A.** Solid-state AM/FM stereo tuner/amplifier. Range: VHF 88-108 MHz, MW 186-560 m. Variable tuning. FM ratio detector. Meter tuning indicator. Sensitivity: 1·8 μV for 20 dB. Aerial input 300 ohms balanced. Stereo decoder fitted. Switchable AFC. Stereo indicator. Quiet tuning control. Built-in ferrite AM aerial. Inputs: PU (mag) 2·4 mV 50K, PU (crystal) 50 mV 100K, tape head 2 mV 50K, mic 2·3 mV 50K, record 90 mV 100K, monitor 90 mV 100K, aux 360 mV 100K. Noise level −70 dB. Controls: balance, bass (independent or ganged left and right channels) cut and boost, treble (independent or ganged left and right channels) cut and boost, volume, tuning, wavechange, mode, selector, speakers on-off, low-pass filter, high-pass filter, loudness, tape monitor, AFC, muting. Transistors. Output: 25W RMS per channel. HD 1% at 18W per channel. Output impedance: 8-32 ohms. FR 20 Hz-20 KHz ±1 dB. Size: $17\frac{7}{8} \times 14\frac{1}{4} \times 5\frac{1}{2}$ in. Price: £111 14s. 6d. (plus £24 15s. 6d. PT).

●**Sansui 1000A.** AM/FM stereo tuner/amplifier. Range: VHF 88-108 MHz, MW 186-560 m. Variable tuning. FM ratio detector. Meter tuning indicator. Sensitivity: 1·0 μV for 20 dB. Aerial input 300 ohms balanced. Stereo decoder fitted. Switchable AFC. Stereo indicator. Quiet tuning control. Internal ferrite AM aerial. Inputs: mic 1·8 mV 50K, tape head 1·5 mV 50K, PU(1) 0·5 mV, PU(2) 1·5 mV 50K, aux(1) 65 mV 150K, aux(2) 110 mV 250K, record 65 mV 150K, monitor 65 mV 150K. Controls: balance, bass (independent or ganged left and right channels) cut or boost, treble (independent or ganged left or right channels) cut or boost, volume, mode, wavechange, selector, tuning, speaker on-off, presence, low-pass filter, high-pass filter, loudness, tape monitor, muting, AFC. Output: 40W RMS per channel. HD 1% at 40W per channel. FR 20 Hz-20 KHz ±1 dB.

Output impedance: 8 or 16 ohms. Damping factor 9·5. Size: $17\frac{7}{8} \times 14\frac{1}{4} \times 5\frac{1}{2}$ in. Price: £111 14s. 6d. (plus £24 15s. 6d. PT).

●**Sansui 2000.** AM/FM stereo tuner/amplifier. Range: VHF 88-108 MHz, MW 186-560 m. Variable tuning. Ratio detector. Meter tuning indicator. Sensitivity: 1·4 μV for 20 dB quieting. Aerial input: 75 ohms coaxial. Multiplex decoder fitted. AFC. FET front end. Inputs: PU 2·2 mV 50K, tape head 2 mV 100K, aux 150 mV 100K, tape monitor 150 mV. Noise level: −70 dB on PU, −75 dB on other inputs. Controls: speakers A or B, bass/treble cut, bass (each channel), treble (each channel), loudness, muting, tape monitor, reverse stereo, mono. Output: 32W RMS per channel. FR 15 Hz-40 KHz ±1·5 dB. Output impedance: 4-16 ohms. Mains: 240V 50 Hz. Consumption: 150VA. Size: $16\frac{3}{8} \times 14\frac{7}{8} \times 13\frac{1}{4}$ in. Price: £124 2s. 9d. (plus £27 11s. 9d. PT).

●**Sansui 3000.** AM/FM solid-state stereo tuner/amplifier. Range: VHF 88-108 MHz, MW 186-560 m. Variable tuning. FM ratio detector. Meter tuning indicator. Sensitivity: 1·4 μV for 20 dB. Aerial input: 300 ohms balanced. Stereo multiplex decoder fitted. Switchable AFC. Inputs: PU 2·5 mV 50K, tape head 1·8 mV 500K, record 180 mV 250K, tape monitor 150 mV 250K, aux 180 mV 250K. Noise level −75 dB. Controls: tuning, wavechange, selector, balance, bass boost and cut, treble boost and cut, volume, speakers on-off, low-pass filter, high-pass filter, loudness, tape monitor, mode, muting, AFC. Stereo indicator. Quiet tuning. Switchable noise filter. Built-in FM aerial. Output: 45W RMS per channel. HD 0·8% at 40W per channel. FR 20 Hz-20 KHz ±1·5 dB. Noise level −70 dB. Output impedance: 4, 8-32 ohms. Damping factor 15. Size: $18\frac{3}{8} \times 15 \times 6\frac{7}{8}$ in. Price: £139 3s. 6d. (plus £30 18s. 6d. PT).

●**3000A.** AM/FM tuner amplifier. Similar specification to 3000 except output 48W RMS per channel. Price: £143 9s. 3d. (plus £31 17s. 8d. PT).

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SANYO. Distributed by: Electronic Equipment Department, Marubeni-Iida Co. Ltd., 164 Clapham Park Road, London, S.W.4. Tel: 01-720 1911.

●**Sanyo DC-60.** Transistorised stereo integrated tuner/amplifier. Range: 87·5-108 MHz, 186-550 m. Variable tuning. Ratio detector. Meter tuning indicator. Aerial input 300 ohms balanced. Multiplex decoder fitted. AFC. Inputs: PU (crystal) 400 mV 470K, PU (mag) 5 mV 50K, tape head 25 mV 50K, aux 200 mV 100K. Controls: bass ±8 dB at 100 Hz, treble ±8 dB at 10 KHz, noise filter −10 dB 10 KHz, rumble filter −10 dB at 50 Hz. Output: 30W RMS per channel. HD <1% at rated output. FR 20 Hz-20 KHz ±1 dB. Output impedance: 4-16 ohms. AC mains. Size: $18 \times 11\frac{1}{2} \times 6$ in. Price: £99 (including PT).

●**Sanyo DC-534.** Transistorised stereo integrated tuner/amplifier. Range: VHF 87·5-108 MHz, MW 186-550 m, variable tuning. Ratio detector. Meter tuning indicator. Aerial input 75 ohms coaxial. Multiplex decoder fitted. AFC. Inputs: PU 5 mV 50K, tape head 3 mV 50K, tape play 1V 1K. Controls: bass ±10 dB at 100 Hz, treble ±10 dB at 10 KHz, noise filter −10 dB at 9 KHz, rumble filter −10 dB at 60 Hz. Output: 12W RMS per channel. FR 20 Hz-20 KHz ±1 dB. Output impedance 8 ohms. Includes transcription motor, pickup arm and cartridge. Price: £132 10s. (including PT).

●**DC-434.** Transistorised stereo integrated tuner/amplifier. Range: 88-108 MHz, MW 186-550 m. Variable tuning. Ratio detector. Meter tuning indicator. Aerial input 75 ohms coaxial. Multiplex decoder fitted. AFC. Inputs: PU 5 mV 75K, tape head 2·5 mV 85K, aux 100 mV 90K, tape play 250 mV 150K. Controls: bass ±12 dB at 100 Hz, treble ±12 dB at 10 KHz, noise filter, rumble filter, loudness, separate controls for each channel. Output: 16W RMS per channel. HD 0·5% at total output. FR 20 Hz-20 KHz ±1 dB. Output impedance: 8 ohms. AC mains. Fitted transcription motor, pickup arm and cartridge. Size: $24\frac{1}{2} \times 16 \times 11\frac{3}{4}$ in. Price: £172 10s. (including PT).

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TANDBERG. Distributors: Elstone Electronics Ltd., Hereford House, North Court, Vicar Lane, Leeds 2. Tel: Leeds 39834/6. Grams: Elstone, Leeds.

Huldra 8-55. AM/FM tuner/amplifier. Range: FM 87·5-108 MHz, LW 857-2,000 m, MW 186-590 m, marine 50·9-187 m, SW 13-50·9 m. Variable tuning, one system for FM, one for AM. Provision for multiplex decoder. Switched AFC. Four movable station markers for FM. 9 KHz filter. Variable selectivity on AM. Push-button operation of wavebands and function. Independent bass and treble controls plus six-position tone selector switch. Output: 10W

RMS per channel. FR 20 Hz-20 KHz (30 Hz-17 KHz −3 dB). Input suitable for all pickups including magnetic. Output impedance 4 ohms. Mains: 115, 130, 150, 220, 240V 50/60 Hz. 5 valves, 20 transistors. Printed circuit. Size: $19\frac{3}{4} \times 8\frac{5}{8} \times 10$ in. Price: (with multiplex decoder) £87 9s. (plus £19 3s. PT).

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TELEFUNKEN. Distributors: A.E.G. (Great Britain) Ltd., Lonsdale Chambers, 27 Chancery Lane, London, W.C.2. Tel: 01-242 9944. Cables: Allgem, London.

●**Telefunken Operette.** Transistorised stereo tuner/amplifier. Range (model 2650MX): FM, SW, MW, LW; (model 5650MX): FM up to 108 MHz, MW, SW1 (6·8-16 MHz), SW2 (2·2-6·9 MHz). 25 transistors, 10 diodes, 3 rectifiers. Separate flywheel-powered tuning for AM and FM. Independent bass and treble controls. Balance control. FM stereo decoder with automatic stereo indicator. 15W output. Distortion less than 1%. Sockets for pickup, recorder, external aerial and earth. Size: $20 \times 7\frac{1}{2} \times 6\frac{3}{4}$ in. Price: £89 19s. 9d. (plus £19 5s. PT).

●**Telefunken Opus Studio.** Stereo tuner/amplifier. Range as for Operette except SW1 6·9-22·5 MHz. 19 transistors, 11 diodes, 4 rectifiers, 6 valves. Switchable AFC. Slow motion SW tuning. Separate bass, treble and balance controls. FM stereo decoder with automatic stereo indicator. Sensitivity: <1·0 μV for signal-to-noise ratio 26 dB (FM/VHF). Rumble filter. Noise filter. Stereo base adjustment. Automatic noise suppression. 50W output. FR 20 Hz-30 KHz ±3 dB. Distortion 0·2% at 1 KHz. Cabinet: light matt walnut or teak. Size: $25\frac{1}{2} \times 10\frac{3}{4} \times 10$ in. Price: £125 18s. 5d. (plus £26 18s. 7d. PT).

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TELETON. Teleton Electro (U.K.) Ltd., 24-32 Kilburn High Road, London, N.W.6. Tel: 01-624 9102/3. Telex: 21880.

●**SRQ-302X.** Transistorised stereo tuner/amplifier. Range: VHF 88-108 MHz, MW 187-550 m. Variable tuning. Meter tuning indicator. Sensitivity: 2·5 μV on FM, 20 μV on AM. Aerial input 300 ohms balanced, internal ferrite rod for AM. AFC. Stereo decoder included. Stereo beacon. Output: 10W RMS per channel. HD <2% at rated output. FR 20 Hz-20 KHz ±1 dB. Inputs: PU(1) 3 mV, PU(2) 50 mV, tape 250 mV, aux 250 mV. Treble control ±12 dB at 10 KHz. Bass control ±12 dB at 50 Hz. Loudness control, treble and bass filters. Output impedance: 8 ohms. Mains: 220/240V 50/60 Hz. Size: $16\frac{1}{4} \times 5\frac{1}{8} \times 13\frac{1}{2}$ in. Weight: $16\frac{1}{2}$ lb. Price on application.

●**SRQ-401X.** Transistorised stereo tuner/amplifier. Range: 88-108 MHz. Sensitivity: 2·5 μV for 20 dB quieting. AFC. Stereo multiplex decoder fitted. Meter tuning indicator. Aerial input 300 ohms balanced. Output 15W RMS per channel. HD <2% at rated output. FR 20 Hz-20 KHz ±1 dB. Inputs: PU(1) 3 mV, PU(2) 50 mV, tape play 250 mV, aux 250 mV. Bass control ±12 dB at 50 Hz. Treble control ±12 dB at 10 KHz. Loudness control. Output impedance 8 ohms. Mains: 220/240 50/60 Hz. Size: $16\frac{1}{4} \times 5\frac{1}{8} \times 13\frac{1}{2}$ in. Weight: $16\frac{1}{2}$ lb. Price on application.

●**SRQ-402X.** Transistorised stereo integrated AM/FM tuner amplifier. Output: 30W RMS. FR 20 Hz-20 KHz ±1 dB. AFC. Tuning meter. Full specification and price on request.

●**SRQ-502X.** Transistorised stereo integrated AM/FM tuner amplifier. Output: 40W RMS. Multiplex decoder fitted. Oiled walnut cabinet. Full specification and price on request.

●**SRQ-602X.** Transistorised stereo integrated AM/FM tuner amplifier. Output: 50W RMS. Multiplex decoder fitted. AFC. Advanced design techniques employed. Full specification and price on request.

Details of full range of Teleton hi-fi equipment will be sent on request.

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TRIO. Distributors: B. H. Morris & Co. (Radio) Ltd., 84-88 Nelson Street, Tower Hamlets, London, E.1. Tel: 01-790 4824.

●**TK-40E.** Solid state AM-FM stereo tuner amplifier. Wavebands: AM 187-555 m, FM 88-108 MHz. Tuning meter with automatic stereo indicator lamp. Sensitivity: AM 10 μV, FM 2·5 μV. Decoder built-in. Three-gang tuning. Five IF stages with four limiters. Inputs: PU 2 mV, aux 150 mV, tape play 150 mV. Bass control: ±10 dB at 50 Hz. Treble control: ±10 dB at 10 KHz. Output: 35W music total. FR 20 Hz-30 KHz ±3 dB. Signal-to-noise: PU −60 dB, aux −70 dB. Output impedance: 4, 8 or 16 ohms. Automatic mains circuit breaker. Treble filter. Low-level centre channel output. Walnut finish

metal case. Size: $16\frac{1}{2} \times 5 \times 12$ in. Weight: $19\frac{3}{4}$ lb. Mains: 110-120V or 220-230V AC. Consumption: 60W at full power. Price: to be announced.

●**TK-60BE.** Solid state AM-FM stereo tuner amplifier. Wavebands: AM 187-555 m, FM 88-108 MHz. Sensitivity: FM 2 μV, AM 10 μV. FR (FM) 20 Hz-20 KHz ±2 dB. Five FM IF stages. Four-gang tuning (FM). Output: 60W total (music) at 4 ohms, 50W total (music) at 8 ohms. FR (amplifier) 20 Hz-50 KHz ±1 dB. Signal-to-noise: PU −60 dB, aux −70 dB. Inputs: PU 2 mV, tape head 2·5 mV, aux 150 mV, tape play 150 mV. Bass filter: 80 Hz roll-off. Treble filter: 6 KHz roll-off. Bass control: ±10 dB at 50 Hz. Treble control: ±10 dB at 10 KHz. Centre channel output. Output impedance 4-16 ohms. Size: $17\frac{3}{4} \times 5\frac{3}{4} \times 14$ in. Weight: 24 lb. Mains: 220-240V 50/60 Hz. Consumption: 90W at full power. Price: to be announced.

●**TK-140E.** Solid state AM/FM stereo tuner amplifier. Wavebands: AM 187-555 m, FM 88-108 MHz. Tuning meter with automatic stereo switching and indicator light. Sensitivity: AM 10 μV, FM 2 μV. Four-gang tuning. FET front end. Five IF stages with four limiters. Interstation muting. Inputs: PU 2 mV, tape head 2·5 mV, aux. 150 mV, tape play 150 mV. Signal-to-noise: PU −63 dB, tape head −63 dB, tape play −70 dB. Bass filter: 80 Hz roll off. Treble filter: 6 KHz roll off. Bass control: ±10 dB at 50 Hz. Treble control: ±10 dB at 10 KHz. Output: 50W RMS per channel. HD 0·5% at rated output. FR 20 Hz-50 KHz ±2 dB. Centre channel output. Output impedance: 4, 8 or 16 ohms. Size: $16\frac{1}{2} \times 5\frac{1}{4} \times 14\frac{1}{4}$ in. Weight: 31 lb. Walnut finish cabinet. Price: to be announced.

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WIEN-TOKAI. Distributors: H. O. Thomas Electronics Ltd., 26-27 Avenue Chambers, Vernon Place, London, W.C.1. Tel: 01-405 9569.

●**FMX18.** AM/FM stereo tuner/amplifier. Range: FM 88-108 MHz, MW 187-561 m. Variable tuning. Sensitivity: (FM) 40 μV for 30 dB quieting, (AM) 400 μV for 20 dB quieting. Multiplex decoder fitted. Ferrite rod aerial for AM, provision for external aerials. Output: 5W RMS per channel. Output impedance: 8 ohms. FR 100 Hz-15 KHz ±2 dB. 18 transistors, 9 diodes, 1 vari-cap. Bass ±10 dB at 100 Hz. Treble ±15 dB at 10 KHz. PU input 500 mV. S to N better than 48 dB. Mains: 220-240V AC. Price: £43 1s. (including PT).

●**FMX23.** AM/FM stereo tuner/amplifier. Range: FM 88-108 MHz, MW 187-561 m. Variable tuning. Sensitivity: (FM) 4 μV for 30 dB quieting, (AM) 300 μV for 20 dB quieting. Multiplex decoder fitted. Automatic stereo beacon. Output: 14W RMS per channel into 8 ohms. Output impedance 8 ohms. FR 30 Hz-20 KHz ±1 dB. 23 transistors, 10 diodes, 1 vari-cap. Ferrite rod for AM. Provision for external aerials. Bass +15 dB −12 dB at 100 Hz, treble +15 dB −12 dB at 10 KHz. PU input (mag) 4 mV, PU input (crystal) 40 mV. S to N better than 62 dB. Mains: 220/240V AC. Price: £64 1s. (including PT).

●**FMX24.** AM/FM stereo tuner/amplifier. Range: FM 88-108 MHz, MW 187-561 m. Variable tuning. Sensitivity: (FM) 4 μV for 30 dB quieting, (AM) 300 μV for 20 dB quieting. Multiplex decoder. Tuning meter. Automatic stereo beacon. Output: 24W RMS per channel. FR 50 Hz-20 KHz ±2 dB. 23 transistors, 10 diodes, 1 vari-cap. Ferrite rod aerial for AM, provision for external aerials. Bass +14 dB −15 dB at 100 Hz, treble +15 dB −13 dB at 10 KHz. Inputs: PU (mag) 4 mV, PU (crystal) 40 mV, tape 100 mV. S to N better than 62 dB. Mains: 220/240V AC. Price: £74 11s. (including PT).

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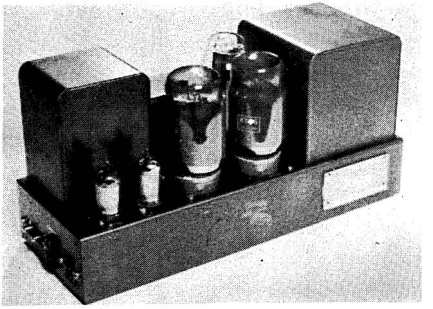
ZENITH RADIO CORPORATION. Distributors: United Mercantile Co. Ltd., 13/14 Queen Street, London, W.1. Tel: 01-499 4901. Cables: Ramsaco, Telex, London.

●**AM and Stereo/FM tuner/amplifier.** FM/VHF 88-108 MHz. MW 187-545 m. Push-button controls. Strip indicator. Separate bass, treble and presence controls. Indicator for stereo broadcasts. Combined loudness and balance control. AFC. 16-transistor amplifier. 120W RMS total output. Price: £159 (plus PT).

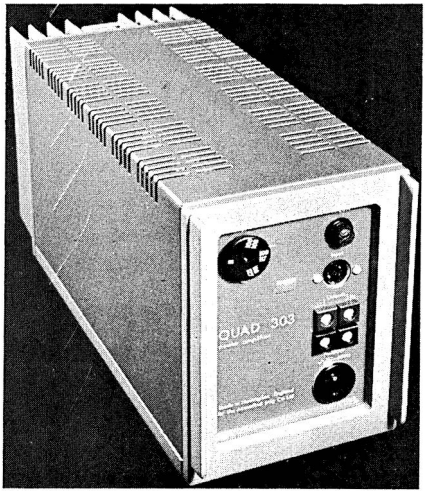
DIRECTORY OF AMPLIFIERS & CONTROL UNITS

★The following abbreviations are used in this directory section: **HD**=Harmonic Distortion; <=less than; **H and N**=Hum and Noise; **Pat**=Power supplies available for tuner; **RMS**=root mean square; **NL**=Noise level; **Sel**=Selector switch; **Psn**=Power supply needed; ●=Stereo equipment.

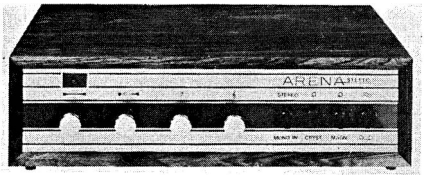
Quad 33 control unit



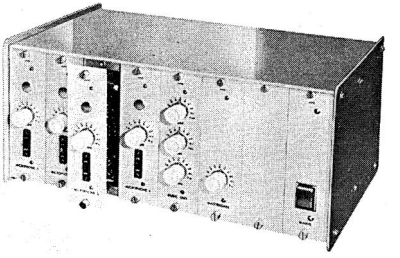
Quad II power amplifier



Quad 303 amplifier

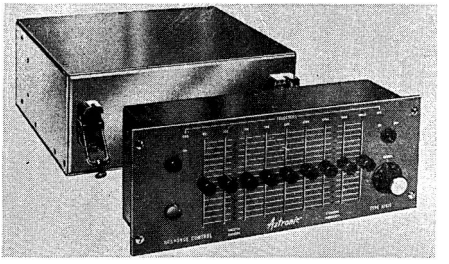


Arena F210

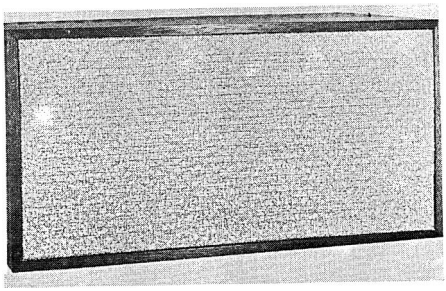


Astronic 70W

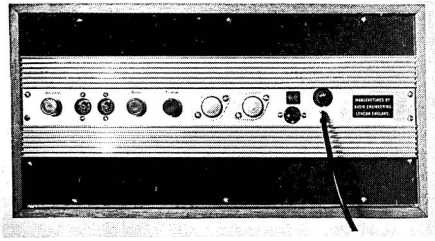
Astronic A46



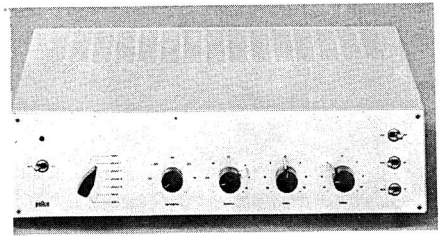
Astronic A1671 Response Unit



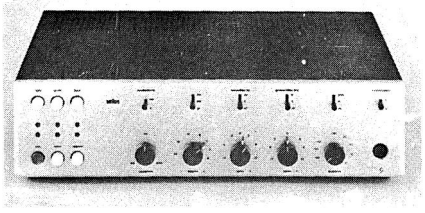
Audio Engineering QL4 (front view)



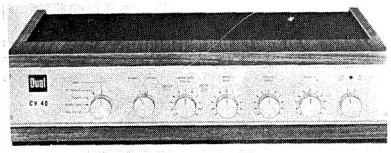
Audio Engineering QL4 (rear view)



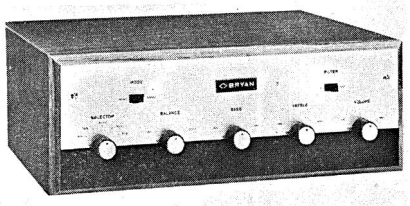
Braun CSV13/60 integrated stereo amplifier



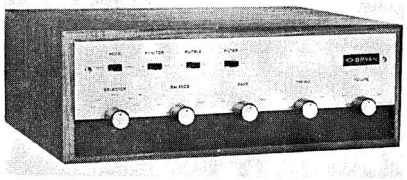
Braun CSV1000 integrated stereo amplifier



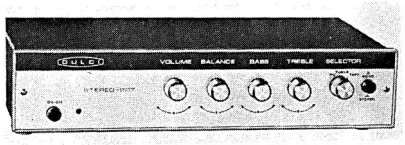
Dual CV40



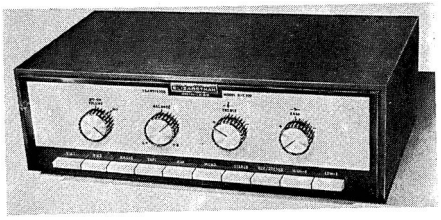
Bryan 900



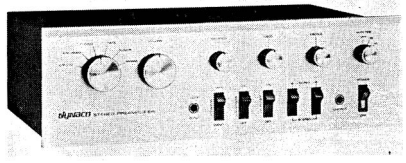
Bryan 9000



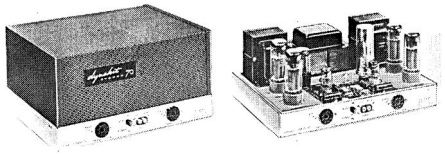
Dulci 207



DIT220 Princess



Dynaco PAT-4



Dynaco ST 70 mono/stereo amplifier

ACOUSTICAL MANUFACTURING CO. LTD., St Peter's Road, Huntingdon, Hunts. Tel: 0480 2561/2. Cables: Acoustical.

Quad II amplifier. 15W. Dist total 3rd harmonic and higher. <0·1% at 12W. Input for spec output 1·4V RMS for 15W. Response 20-Hz-20 KHz ±0·2 dB, 10 Hz-50 KHz ±0·5 dB. Feedback incorporated in original ultra-linear arrangement. NL −80 dB at 15W. Output imp 7 and 15 ohms. Output: KT66's. Original combined anode/screen current circuit. Size: $12\frac{1}{2} \times 4\frac{3}{4} \times 6\frac{1}{2}$ in. To operate with Q.C.II or Q.22 control units. Price: £25.

Quad 50. High quality transistor power amplifier primarily intended for professional and industrial use. Input: 500 mV RMS into 22K in parallel with 180 pF for 50W output. Output: 50W RMS. Two models available, one for 4, 9 or 16 ohms load, the other for 50V or 100V line. Outputs in both cases are isolated. Damping factor 10. Total harmonic distortion <0·25% at any level up to 50W output at 700 Hz. Hum −83 dB. Consumption: 24-120W depending on power output. Mains: 100-127V or 200-250V 50-60 Hz to order. Size: $12\frac{3}{4} \times 6\frac{1}{2} \times 4\frac{3}{4}$ in. Weight: 24 lb. This amplifier is not suitable for use with the Quad 22 control unit.

●**Quad 33 control unit.** Transistorised mono/stereo control unit. Inputs: PU from 2 mV, radio(1) 100 mV 100K, radio(2) 100 mV 100K, tape from 100 mV 40K. Signal-to-noise level: −70 dB on PU, −85 dB on all other inputs. Output: 0·5V. Controls: volume, balance, bass, treble, filter slope, filter frequency. Mains powered. Designed for use with Quad 303 amplifier but suitable for operation with other high quality equipment. Size: $10\frac{1}{4} \times 3\frac{5}{8} \times 6\frac{1}{2}$ in. Price: £43.

●**Quad 303 power amplifier.** Transistorised stereo power amplifier. Output: 45W into 8 ohms. HD: −1 dB 30 Hz-35 KHz into 8 ohms, −1 dB 20 Hz-35 KHz into 16 ohms. Noise level: −100 dB. Sensitivity: 0·5V. Output impedance: 4-16 ohms. Output transistors: High voltage 2N3055. Mains. Designed for use with Quad 33 control unit but can be used with high quality equipment. Size: $4\frac{3}{4} \times 6\frac{1}{4} \times 12\frac{3}{4}$ in. Price: £55.

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RICHARD ALLAN RADIO LTD., Bradford Road, Gomersal, Cleckheaton, Yorkshire. Tel: 0976-2 2442/3. Cables: Acoustics, Bradford.

●**A21 Class A.** Transistor stereo integrated amplifier with Class A output stages. Inputs: radio 200 mV 250K, tape 200 mV 250K, aux 200 mV 250K, PU.1 3·5 mV 50K, PU.2 50 mV 1M. Controls: bass ±16 dB at 40 Hz, treble ±12 dB at 10 KHz, volume ±1 dB per channel, balance ±6 dB for 180 degrees rotation. Rumble filter 12 dB/octave below 45 Hz. Treble filter 12 dB/octave above 7 KHz. Push-button selection of input and operating mode. Output: 10W RMS per channel into 6 ohms. HD 0·1% at 7·5W at 1 KHz, less than 0·02% at 1W at 1 KHz. FR 20 Hz-20 KHz ±1 dB. SN: 80 dB on 200 mV inputs, 70 dB mag PU, 65 dB ceramic PU. Outlet to recorder: 200 mV. Size: $15\frac{1}{2} \times 5 \times 9$ in. Weight: 14 lb. Price: £52.

●**C41 control unit.** Transistorised stereo control unit designed for use with A41 power amplifier. Inputs: radio 200 mV 250K, tape 200 mV 250K, aux 200 mV 250K, PU.1 3·5 mV 50K, PU.2 50 mV 50K. Controls: bass ±16 dB at 40 Hz, treble ±12 dB at 10 KHz, volume ±1 dB per channel, balance ±6 dB for 180 degrees rotation. Rumble filter 12 dB/octave below 30 Hz. Treble filter: 4 KHz, 7 KHz and 10 KHz. Treble filter slope: gradual 6 dB/octave, steep 18 dB/octave. HD <0·1% at rated output. SN better than 85 dB on 200mV inputs, better than 75 dB on PU.2 input. Push-button selection of inputs and operating mode. Power: obtained from A41 power amplifier. Size: 10 × 4 × 6 in. Weight: 7 lb. Price: £34.

●**A41 Class A.** Power amplifier with Class A output stages designed for use with C41 control unit. Transistors. Output 20W RMS per channel into 15 ohms. HD at 15W <0·1% FR 20 Hz-20 KHz ±0·5 dB. SN 90 dB referred to 15W. Sensitivity for 20W output: 500 mV. Input impedance 200K. Size: $13\frac{1}{2} \times 8\frac{1}{2} \times 10$ in. Weight: 22 lb. Price: £59 10s.

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AMPEX GREAT BRITAIN LTD., Acre Road, Reading, Berkshire. Tel: Reading 84411. Cables: Videotape.

Ampex AA.620 Speaker/amplifier. Transistorised. Comprises 8 in. drive unit in special enclosure. Acoustically flat from 60 Hz-10 KHz. Built-in amplifier has 20W output. FR 20 Hz-20 KHz ±0·5 dB. Price on application.

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ARENA. Distributed by: Highgate Acoustics Ltd., 184-188 Great Portland Street, London, W.1. Tel: 01-636 2901/4.

●**Arena F210.** Transistorised integrated stereo amplifier. Inputs: PU 0·3 mV 50K, PU 35 mV

500K, radio 1·2 mV 18K, tape 14 mV 200K. Controls: balance ±6 dB, volume, bass ±10 dB at 100 Hz, treble ±15 dB at 10 KHz, selector. Output: 8W RMS per channel. Output impedance 4 ohms. Size: $10\frac{1}{2} \times 2\frac{7}{8} \times 7\frac{3}{4}$ in. Module construction. Price: £34 13s.

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ARMSTRONG AUDIO LTD., Warlters Road, London, N.7. Tel: 01-607 3213/4.

● **Model 421.** Integrated stereo transistor amplifier. Inputs: PU(1) 60 mV 100K, PU(2) 3·5 mV 50K, radio 100 mV 100K, tape play 400 mV 100K. Noise level: PU −55 dB, radio −60 dB, tape −70 dB. Controls: balance (maximum to zero each channel), bass ±10 dB, treble ±10 dB, loudness (two different volume levels with loudness contours at low level), rumble filter −5 dB at 30 Hz, treble filter(1) 6·5 KHz −3 dB, 10 KHz −25 dB, treble filter(2) 4·5 KHz −3 dB, 9 KHz −40 dB. Output: 15W RMS per channel. Output impedance: 4-16 ohms. Output transistors: AL102. FR 20 Hz-20 KHz −1 dB at 15W RMS. Mains: 100-125V and 200-250V AC. Size: $10\frac{3}{4} \times 10\frac{1}{2} \times 4$ in. Price: £45 10s.

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ASSOCIATED ELECTRONIC ENGINEERS LTD., 10 Dalston Gardens, Stanmore, Middlesex. Tel: 01-907 4474/6.

Astronic A1671 Response Control Unit. Designed for professional users. Incorporates silicon planar transistors throughout. Input impedance: 600 ohms (standard model). Sensitivity: 0 dBm (0·77V). Output similar. Maximum output level for 1% distortion 7·5V (+20 dBm overload). HD (including noise) 0·3% at 0 dBm. Nine response selector slide switches (standard model) each with seven lift positions and seven cut positions (2 dB steps). With nine controls in zero position response is ±0·25 dB 20 Hz-20 KHz. Mains: 200-250V 40-60 Hz. Cabinet or rack mounting versions. Size (control unit only): $10 \times 4 \times 3\frac{3}{4}$ in., (amplifier) additional 9 in. deep. Weight: 12 lb. Various specifications and accessories available for special requirements. Prices: £120-£145 approximately.

Astronic A1715. Transistor mono power amplifier. Output 35W RMS. HD 0·5% at rated output. FR 20 Hz-20 KHz ±1 dB. Feedback 10 dB. Noise level −80 dB. Input 0·5V. Output impedance 8 ohms. Output transistors 40363. Mains: 200-250V AC. Size: $16 \times 8 \times 9$ in. Designed to operate with any Series 1700 input units or other high quality controls units. Price: £37 18s.

Astronic A1746. Transistor mono power amplifier. Output 10W RMS. HD 0·7% at rated output. FR 20 Hz-25 KHz ±1 dB at 10W. Feedback 6 dB. Noise level −75 dB. Input 0·5V. Output impedance 8 ohms. Output transistors 40310. Mains: 200-250V AC. Size: $8 \times 6 \times 7$ in. Designed to operate with any Series 1700 input units or similar high quality control units. Price: £26.

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AUDIO ENGINEERING LTD., 33 Endell Street, London, W.C.2. Tel: 01-836 0033.

QL.4 Music Monitor. Neat bookcase speaker with 30W transistor amplifier built-in. Developed from portable monitor unit designed for the B.B.C. Inputs: radio, pickup, tape, etc. Controls: volume, bass, treble, room acoustics compensator. Outlet for extn. speaker. Mains powered. Easily replaced speaker grille material. Size: $15 \times 7\frac{3}{4} \times 8\frac{3}{4}$ in. Full details and specification on request. Price: £40 19s.

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BRADMATIC LTD., 338 Aldridge Road, Streetly, Sutton Coldfield, Warwickshire. Tel: 021-353 3171.

MA30. Transistor power amplifier. Output: 21·5V RMS which will provide 30W approximately into 15 ohms load. Distortion: <0·5% at 15W at 1 KHz, <1·0% at 30W at 1 KHz. FR 10 Hz-17·5 KHz ±3 dB. AC and DC feedback. Noise level: −72·5 dB. Inputs: 100 mV at 10K, 5 mV at 10K. Output impedance: 12 ohms or above. Power supply needed: 35V balanced at 1·5A (52W) at 30W output. Designed to operate with most control units. Size: $7 \times 4 \times 4$ in. Weight: $3\frac{1}{4}$ lb. Price: (MA30 amplifier) £15 8s.; (PP30X2 power unit, sufficient for two MA30 amplifiers): £12 2s.; (MA30PP amplifier and power unit on one chassis): £26 8s.

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BRAUN AG. Distributors: Fi-Cord International, Charlwoods Road, East Grinstead, Sussex. Tel: East Grinstead 21351.

● **CSV 60.** Integrated stereo valve amplifier. Output: 30W. Distortion 0·8% for 30W at

1 KHz. FR 20 Hz-30 KHz ±3 dB, 40 Hz-15 KHz ±1 dB. Inputs: magnetic PU 1·5 mV, crystal PU 3 mV, mic 10 mV, radio 200 mV, tape 200 mV. Output imp 4, 8, 16 ohms and electrostatic. Mains: 110-240V AC. Size: 16 × $12\frac{7}{8}$ × 4 in. Price: £139 10s.

● **CSV 250.** Integrated stereo transistor amplifier. Inputs: radio, mag pickup, tape, aux. Controls: volume, treble, bass, balance, stereo/mono switch, PB tape control. Output: 15W RMS per channel. Distortion: <0·5% at 1 KHz. Cross talk damping: >40 dB at 1 KHz. Noise level: 70 dB. Output impedance: 4 ohms. Finish: grey wrinkle steel case with aluminium front panel. Size: 10 × 4 × $12\frac{1}{2}$ in. Price: £103 5s.

● **CSV 500.** Integrated stereo amplifier. Output: 45W RMS per channel. FR 10 Hz-35 KHz. Distortion: <0·5% (4 ohms); <0·3% (8 ohms). Rumble and treble filters. Compensated volume control. Presence boosting. Separate bass and treble filters each channel. Inputs: PU, tape, radio, mic, aux. Outputs: speakers 4-16 ohms, headphones 400 ohms. Size: $15\frac{3}{4}$ × $4\frac{1}{4}$ × $12\frac{5}{8}$ in. Price: £203 10s.

● **CSV 1000.** Integrated stereo amplifier. All transistor. 55W RMS output per channel. FR 20 Hz-30 KHz. Distortion <0·3% at 1 KHz. 45 silicon transistors, 13 silicon diodes, 2 zener diodes, 1 silicon rectifier. Five inputs with adjustable sensitivities. CCIR equalisation. Output impedance 4-16 ohms. Black steel cabinet with aluminium front panel. Size: 16 × $4\frac{3}{8}$ × $13\frac{3}{8}$ in. Price: £339 10s.

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BRYAN AMPLIFIERS LTD., 120 Ashley Road, Hale, Altrincham, Cheshire. Tel: 061-928 6026.

● **Model 900.** Integrated transistor stereo amplifier. Output: 10W RMS each channel. Controls: five-position input selector, mono-stereo mode switch, balance, bass, treble, 7 KHz filter, volume and on-off. Size: 13 × 10 × $4\frac{1}{4}$ in. Shelf-mounting teak cabinet available. Guaranteed for two years. Price: (chassis version) £39.

● **Model 9000.** Integrated stereo transistor amplifier. Output: 10W RMS per channel. Full range of controls and facilities. Guaranteed two years. Finish: shelf-mounting teak cabinet. Full specification on request. Price: £48 10s.

CORAL. Distributors: Denham and Morley Ltd., Denmore House, 173/5 Cleveland Street, London, W.1. Tel: 01-387 3656.

● **Coral A-707.** All-transistor integrated stereo amplifier. Inputs: tape head 1·5 mV, PU 3 mV, tuner 400 mV, aux 400 mV, tape monitor 400 mV. Controls: bass ±14 dB at 50 Hz, treble ±11 dB at 10 KHz, low-pass filter −8 dB at 50 Hz, high-pass filter −8 dB at 10 KHz, loudness +8 dB at 100 Hz and 10 KHz. Volume, balance. Output: 40W RMS per channel into 4 ohms. 35W per channel into 8 ohms, 23W per channel into 16 ohms. HD 1% at −1 KHz at rated output. FR 20 Hz-35 KHz ±1 dB at 8 ohms. Noise level: below 30 μV on high gain inputs, below 15 μV on low gain inputs. Output impedance: 4-16 ohms. Mains: 100-117V AC, 220-240V AC. Consumption: 17W at no-signal, 160W at full output. Size: 15 × $11\frac{1}{8}$ × $5\frac{1}{4}$ in. Weight: 19 lb. Price: £78 15s.

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CROWN INTERNATIONAL. Distributors: Carston Electronics Ltd., Electra House, Wiggenhall Road, Watford, Herts. Tel: 92 22272.

● **Crown International SA.30-30.** Transistorised stereo power amplifier. Output: 20W RMS per channel. HD <0·2% at 20W. FR 20 Hz-20 KHz, 0·1 dB at full output. Feedback: about 50 dB at 100 Hz. H and N 80 dB down. Input: 0·6V for rated output. Impedance: 4, 8 or 16 ohms output. Silicon power transistors. Mains: 117 60 Hz, 230V 50 Hz. Size: 19 × $8\frac{1}{2}$ × $1\frac{3}{4}$ in. Weight: $7\frac{1}{2}$ lb. Designed to operate with any make of hi-fi control unit. Price: £74 plus import duty.

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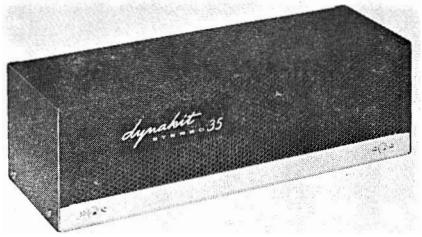
DUAL ELECTRONICS LTD., Radnor House, London Road, Norbury, S.W.16. Tel: 01-764 9465/6.

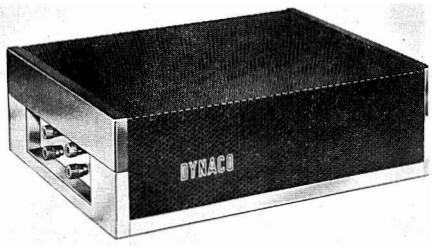
● **Dual CV.40.** All silicon transistors. Integrated control unit and amplifier. Output 20W RMS per channel. Impedance: 15 ohms. Inputs: PU (mag), PU (crystal), tape, mic, radio, aux. HD <1% at rated power. FR 20 Hz-20 KHz ±1·5 dB. Controls: bass ±17 dB at 40 Hz, treble ±12 dB at 16 KHz, tone contoured volume control, balance ±12 dB, mode switch, input selector, on-off. Signal-to-noise >50 dB. Mains: 110, 125, 220 and 240V AC. Consumption: 80W. Size: $16\frac{1}{2}$ × $11\frac{1}{2}$ × $4\frac{1}{4}$ in. Weight: $14\frac{1}{4}$ lb. Finish: shelf-mounting case in walnut, teak or rosewood. Full specification on request. Price: £64 10s.



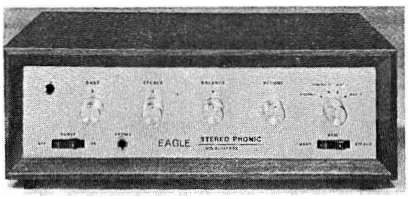
Dynaco ST 35 stereo amplifier

Howland-West Dynaco SCA-35 stereo amplifier

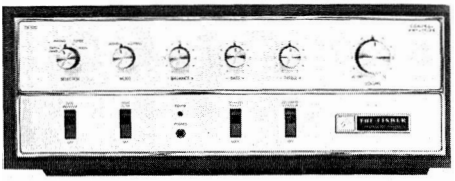
Eagle SA100



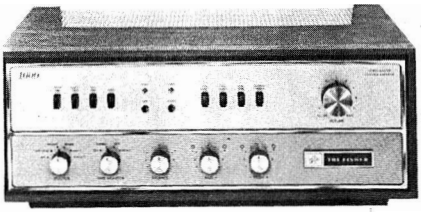
Dynaco Stereo 120



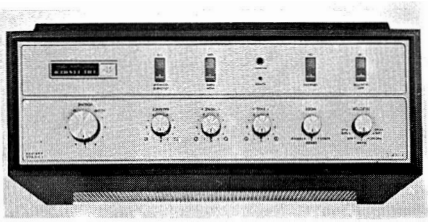
Eagle TSA60



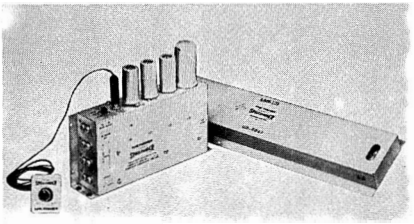
Fisher TX100



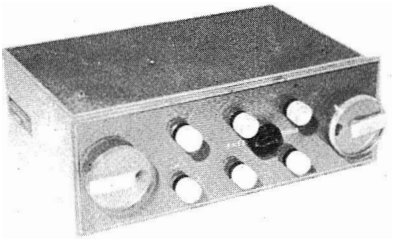
Fisher TX1000



Fisher X-100-A integrated stereo amplifier



Fisher K-10 reverberation amplifier



Kerr, McCosh DSI stereo control unit

●**Dual CV.12.** Fully transistorised integrated amplifier and control unit. Output: 8W RMS each channel. Impedance: 15 ohms. Inputs: tape, radio, PU, mic. Full specification on request. Price: £34 10s.

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DULCI. See Elizabethan Electronics Ltd.

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DYNACO. Distributors: Howland-West Ltd., 2 Park End, South Hill Park, London, N.W.3. Tel: 01-794 6666.

●**PAT.4.** Transistorised stereo control unit. Inputs: PU (low level), PU (high level), tape head, tape amplifier, radio, aux (high level), aux (high level) to socket on front panel. Noise level: −70 dB on low level inputs, −85 dB on high level inputs. Controls: selector, volume, balance, bass (left and right), treble (left and right), filter, loudness, tape monitor, bass filter, mode, on/off. Mains: 120-240V 50-60 Hz. Designed for use with Dynaco Stereo 120 or other similar high quality amplifiers. Size: $13\frac{1}{2} \times 4\frac{1}{4} \times 9$ in. Price: (assembled) £64 1s.; (kit) £51 9s.

●**SCA-35.** Integrated mono/stereo valve amplifier. Seven pairs of inputs covering high and low-level PU (50K), tape head NAB 100K, radio, tape and auxiliary. Controls: selector, volume, balance, bass, treble, stereo-mono switch, loudness switch, HF filter switch, on/off switch. Output: $17\frac{1}{2}$W per channel. Distortion: less than 1% over whole range ±0·25 dB of $17\frac{1}{2}$W per channel. FR 20 Hz-20 KHz ±0·25 dB. Noise: 70 dB below 10 mV input on low-level inputs, 80 dB below on high-level inputs. Output imp 8 and 16 ohms and centre channel. Mains supply. Size: $13\frac{1}{2} \times 4\frac{1}{4} \times 10$ in. Price: (assembled) £59 17s.; (kit) £52 10s.

●**ST-35.** Stereo valve main amplifier. Output: $17\frac{1}{2}$W per channel. FR 10 Hz-40 KHz ±1 dB. Distortion: less than 1% from 20 Hz-20 KHz within 1 dB of $17\frac{1}{2}$W each channel. Noise: more than 80 dB below. Input voltage for $17\frac{1}{2}$W output. 1V. Output imp 8 and 16 ohms. Suitable for use with pre-amplifiers. PAT.4 or other similar units. Size: $13 \times 5\frac{1}{2} \times 4$ in. Price: (assembled) £40 19s.; (kit) £34 13s.

●**ST-70.** Stereo valve main amplifier. 35W per channel. FR 10 Hz-40 KHz ±0·5 dB. Distortion less than 1% from 20 Hz-20 KHz within 1 dB of 35W output per channel. Noise more than 90 dB below 35W on each channel. Input voltage for 35W output, 1·3V. Output imp 4, 8 and 16 ohms. Mains power unit. Size: $13 \times 9\frac{1}{2} \times 6\frac{1}{2}$ in. To operate with PAT.4 or any other similar pre-amplifier. Price: (assembled) £59 17s.; (kit) £52 10s.

●**Stereo 120.** Transistor stereo power amplifier. Output: 35W RMS per channel. HD less than 0·25% up to 60W 20 Hz-20 KHz. FR 5 Hz-100 KHz ±0·5 dB. Noise: 95 dB below stated output (unweighted). Input: 1·5V for stated output. Output impedance: 4-16 ohms. Output transistors: selected RCA 2N3055. Mains: 220-240V AC Size: $13 \times 10\frac{1}{2} \times 4$ in. Designed for use with Dynaco PAT.4 or any other similar high quality stereo control unit Price: (assembled) £102 18s.; (kit) £87 3s.

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EAGLE PRODUCTS. Distributors: B. Adler & Sons (Radio) Ltd., 32a Coptic Street, London, W.C.1. Tel: 01-636 9606/7. Cables: Reldab, London.

●**SA.100.** Integrated stereo amplifier. Output: 5W RMS per channel. FR 40 Hz-20 KHz ±1 dB. HD <1% at full output. HN −58 dB. Inputs: PU 300 mV, radio 300 mV, aux 300 mV. Separation at 1 KHz better than 40 dB. Controls: input selector, mode, left channel volume, right channel volume, left channel tone (−14 dB at 10 KHz), right channel tone (−14 dB at 10 KHz). On-off switch. Output imp 4, 8, 16 ohms each channel. Mains: 240V AC. Size: $9\frac{1}{4} \times 4\frac{1}{2} \times 7$ in. Price: £21 10s.

●**SA.200.** Integrated stereo amplifier. Inputs: mag PU 5 mV, crystal PU 100 mV, radio 100 mV, tape 5 mV, mic 5 mV. Output: 7·5W per channel. Controls: selector, mode, volume, bass, treble, loudness, speaker/phones, on/off. Distortion less than 1% at 15W at 1 KHz, less than 0·25% at 1W at 1 KHz. FR 50 Hz-20 KHz ±2 dB. Output impedance: 4, 8, 16 ohms. Valves. Size: $12\frac{1}{4} \times 4\frac{3}{4} \times 8\frac{1}{4}$ in. Price: £31 10s.

●**TSA.10.** Integrated transistor stereo amplifier. Output: 5W RMS per channel. FR 50 Hz-20 KHz ±2 dB. Inputs: PU 80 mV, radio 80 mV. SN <50 dB at rated output. Controls: separate volume controls each channel, separate bass and treble controls, on-off switch. Cross-talk better than −45 dB. HD <1% at 3W. Output imp 4-16 ohms. Mains: 240V AC. Price: £14 14s.

●**TSA.20.** Integrated transistor stereo amplifier. Output: 10W RMS per channel at 8 ohms, 20W RMS per channel at 3 ohms. FR 30 Hz-20 KHz ±2 dB. HD <1% at 5W. Output imp 4-16 ohms. Inputs: PU (mag) 3 mV (RIAA), PU (cer/crystal) 100 mV (RIAA), radio 150 mV, aux 250 mV. SN better than 50 dB (mag PU), better than 60 dB (aux). Crosstalk better than −45 dB. 12 transistors, two diodes. Silicon transistors in pre-amplifier. Size: $10 \times 4\frac{1}{2} \times 8\frac{1}{2}$ in. Price: £26 5s.

●**TSA.60.** Transistorised stereo integrated amplifier. Inputs: PU(1) 5 mV 47K, PU(2) 100 mV 1 megohm, tape(1) 250 mV 100K, tape(2) 150 mV 50K, radio 100 mV 100K. Bass control ±10 dB at 100 Hz, treble control ±10 dB at 10 KHz. FR 30 Hz-20 KHz ±2 dB. HD <1% at 9W RMS. Output: 15W RMS per channel at 8 ohms. Output impedance: 4-16 ohms. 14 transistors, 4 diodes. Mains: 220/240V AC. Size: $12\frac{3}{4} \times 4\frac{1}{2} \times 9\frac{1}{2}$ in. Price: £39 10s.

Prices quoted for Eagle Products are approximate.

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ELIZABETHAN ELECTRONICS LTD., 10/18 Clifton Street, London, E.C.2. Tel: 01-247 1846.

●**Dulci 220.** Silicon transistor integrated amplifier. Inputs: PU(1) 3·5 mV 47K, PU(2) 35 mV 47K, radio 100 mV 250 K, tape 2·5 mV 47K. Controls: volume, balance, treble, bass, low pass filter, rumble filter. Output: 10W RMS per channel. HD 0·25%. FR 25 Hz-20 KHz at 10W output. Output impedance 15 ohms. Size: $15 \times 7 \times 4\frac{1}{2}$ in. Price: £40 19s.

●**Dulci 207.** Transistor integrated amplifier. Inputs: radio 100 mV 500K, tape 100 mV 500K, PU 100 mV 500K. Controls: on/off, volume, balance, bass, treble, selector, mono/stereo. Output: 7W RMS per channel. HD 2% at 7W. FR 45 Hz-20 KHz ±2 dB. Feedback: 15 dB. Noise level: 58 dB at 7W output. Output imp. 4 ohms for rated power, 15 ohms at reduced power. Two matched pairs AD161/2. Mains: 110-240V 50 Hz. Dimensions: $13\frac{3}{4} \times 2\frac{3}{4} \times 7$ in. Price: £19 19s.

★

ELSTONE ELECTRONICS LTD., Hereford House, North Court, Vicar Lane, Leeds 2. Tel: Leeds 39834/6.

●**Stereo WAL Gain.** Transistorised stereo pre-amplifier. To match pickups, tape or mic, at 50,000 at 3,500 ohms. Battery life 1,000 hrs. Size: $7 \times 2\frac{1}{8} \times 2\frac{1}{2}$ in. Price: £7 10s.

WAL Gain. Impedance matching transistor pre-amp, battery operated (3,000-hour life). Noise and distortion too low to measure, gain better than 100. Suitable for use with low output PU or for direct connection to tape head, mic, etc. Size: $3\frac{5}{8} \times 2\frac{1}{8} \times 2\frac{1}{8}$ in. Price: £5 10s.

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FISHER RADIO CORPORATION, Long Island City 1, New York, U.S.A. Distributors: Getz Bros. and Co. Inc., 2 Harewood Place, London, W.1. Tel: 01-499 6901.

●**X100-A.** Integrated stereo amplifier. 20W per channel. HD 0·8%. Response 20 Hz-20 KHz ±1 dB. NL better than −90 dB with vol control at minimum. Inputs for mono and stereo PU, tape head, tuner, aux, tape monitor. High-pass filter. Independent tone controls for each channel. Output stages EL184s. Psn 200-240V AC. Price (in chassis form): £61 19s. (including PT). Also available in cabinet form.

●**TX-100.** Transistorised stereo amplifier. 18 transistors, 8 diodes. Output: 25W RMS per channel. HD 0·5% at rated output. H and N −75 dB below rated output. FR 25 Hz-35 Khz ±2 dB. Mains: 105-250V 50/60 Hz. Size: $15\frac{1}{8} \times 4\frac{3}{4} \times 12\frac{1}{2}$ in. Walnut cabinet optional extra. Price: £88 4s.

●**TX-1000.** Transistorised stereo amplifier and control unit. Output: 50W RMS per channel. HD 0·8% at rated output. H and N −66 dB below rated output. FR 20 Hz-40 KHz ±1·5 dB. Mains: 105-250V 50/60 Hz. Size: $15\frac{1}{8} \times 4\frac{3}{4} \times 12\frac{3}{4}$ in. Walnut cabinet optional extra. Price: £150 3s.

●**Spacexpander K-10.** Reverberation amplifier for use with radio, records or tape. Mono or stereo. 3 valves, single control. Price: £38 17s.

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GOODMANS LOUDSPEAKERS LTD., Axiom Works, Wembley, Middx. Tel: 01-902 1200. Cables: Goodaxiom, Wembley.

●**Maxamp 30.** Integrated stereo transistorised amplifier. Inputs: pickup 3·5 mV 47K or 50 mV 100K, radio 100 mV 100K, tape 140 mV 50K, aux 3 mV 50K. Controls: input selector,

volume, balance, bass, treble, P-B tape play, P-B LF filter, P-B HF filter, P-B mono/stereo mode, P-B on/off. Indicator light when on. Output: 30W RMS (15W per channel) into 8 ohm load, 20W RMS (10W per channel) into 4 or 15 ohm load. HD less than 0·3% for 15W per channel into 8 ohm load at 1 KHz. FR 20 Hz-20 KHz $\pm\frac{1}{2}$ dB. Output impedance: 4, 8, 15 ohms. High level signal for tape recorder. Mains: 105, 120, 200, 220, 240V AC 40-60 Hz. Size: $10\frac{1}{2}\times5\frac{1}{2}\times7\frac{1}{4}$ in. Price: £54.

★

GRAMPIAN REPRODUCERS LTD., 19 Hanworth Trading Estate, Feltham, Middlesex. Tel: 01-894 9141.

Grampian 666 Ambiophonic unit. Enables one to four small speakers to be fed with amplified and delayed signal from main amplifier output. Delay device consists of two parallel springs and transducers as used in Grampian reverberation unit. Provides echoes similar to those produced by room 32×42 ft. Volume of delayed signals controllable by listener. Twin high-impedance line-bridging input connections. Output: $2\frac{1}{2}$W push-pull power amplifier with 5 ohms and twin 600-ohm outputs. Fully transistorised. Mains: 100-125V or 200-250V. Consumption: 8W. Size: $18\times4\frac{3}{4}\times5\frac{1}{4}$ in. Weight: 7 lb. Price: £55.

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GRUNDIG (GREAT BRITAIN) LTD., Hi-Fi Division, 15 Orchard Street, London, W.1. Tel: 01-935 4898.

●**SV40M.** Transistor stereo integrated amplifier. Inputs: 3 mV 47K, radio/tape 200 mV 470K, aux 200 mV at 1 megohm. Controls: volume, stereo balance, bass and treble. Output: 15W RMS per channel. Distortion: <0·5% at rated output. FR 20 Hz-20 KHz ±1 dB. SN -60 dB at 50 mW, -85 dB at 15W. Output impedance: 4-16 ohms. 25 transistors, 13 diodes. Transformerless output stages. Separation: better than 46 dB. Size: $16\times11\times5\frac{7}{8}$ in. Weight: $17\frac{1}{2}$ lb. Finish: natural matt walnut or teak, with satin aluminium front panel. Price: £88 4s.

●**SV80M.** Transistor integrated stereo amplifier and control unit. Inputs: mic 7·5 mV at 100K, PU (mag) 4 mV 47K, PU (crystal) 220 mV-3V 1 megohm, radio/tape 250 mV 470K. Controls: volume, stereo balance, bass ±18 dB at 30 Hz, treble ±18 dB at 15 KHz, push-button selector, scratch filter, rumble filter, tape monitoring, slope 1, slope 2, presence. Output: 30W RMS per channel. Distortion <0·5%. Outlets: two speakers 4-16 ohms, two 300-ohm phone sockets. 29 transistors, 15 diodes. Stabilised supply to pre-amplifier stages. Mains: 110, 130, 220, 240V 50-60 Hz. Consumption 120W maximum. FR 20 Hz-20 KHz. Size: $15\frac{3}{8}\times10\frac{1}{2}\times6$ in. Finish: light walnut or teak. Price: £119 14s.

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HART ELECTRONICS, 321 Great Western Street, Manchester 14. Tel: Rusholme 2212-3. Cables: Alloys, Manchester.

●**Bailey 20W amplifier.** See Constructional Kits Section for full details.

●**Dinsdale 10W amplifier.** See Constructional Kits Section for full details.

Mullard 10W Pi-mode amplifier. See Constructional Kits Section for full details.

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HEATHKIT. See Constructional Kit Section.

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HENRY'S RADIO LTD. See Constructional Kits Section.

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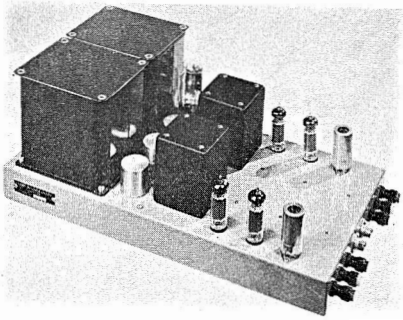
KERR McCOSH & CO. LTD., 435 Sauchiehall Street, Glasgow, C.2. Tel: 041-332 0988.

●**DSI stereo control unit.** Inputs: pickup and tape head 4 mV; crystal pickup and tape 140 mV; mic 1·5 mV. Sel switch, on/off, separate vol., treble, bass for each channel, flat/tone control. Tape record sockets. Size: $12\frac{1}{2}\times4\frac{1}{2}\times10\frac{1}{4}$ in. Price: £34.

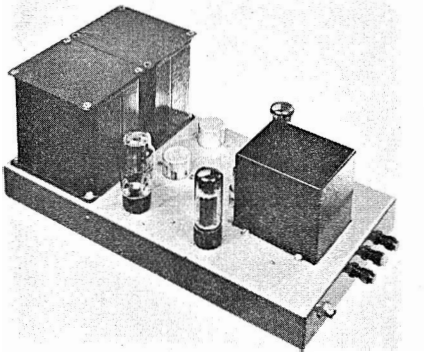
●**CWA 2/12.** 12W per channel. Distortion 0·1% at 12W. Noise level -95 dB. Response 25 Hz-30 KHz $\pm0{\cdot}2$ dB. Output imps 7·5 and 15 ohms. Input sensitivity 1V. Designed to operate with DSI pre-amplifier. Size: $20\times7\times8$ in. Price: £48.

CWA 40. Mono amplifier. 40W peak continuous sine wave. Distortion 0·1% at 38W. Noise level -98 dB. FR 25 Hz-30 KHz $\pm$ 0·2 dB. Output imps 7·5 and 15 ohms. Input sensitivity 1V. Designed to operate with DSI pre-amplifier. Size: $20\times9\times8$ in. Price: £45.

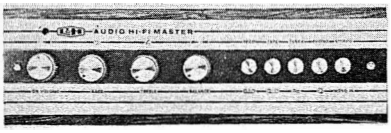


Kerr, McCosh CWA 2/12 stereo amplifier

Goodmans Maxamp

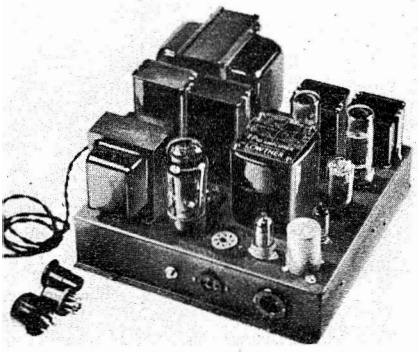


Kerr, McCosh CWA 40 amplifier

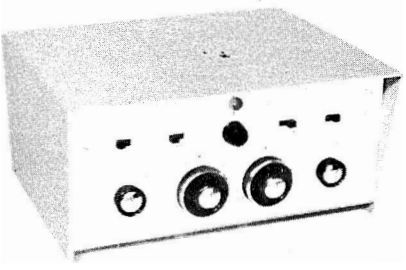


L & H

·Leak stereo 30 integrated amplifier



Lowther LL26 amplifier



Lowther stereo control unit

KIRKSAETER. Distributors: Elstone Electronics Ltd., Hereford House, Vicar Lane, Leeds, 2. Tel: 0532 39834.

●**TX.500.** Stereo transistorised amplifier and control unit. Full specification and price on request.

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KNIGHT-KITS. See Constructional Kits Section.

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H. J. LEAK & CO. LTD., Brunel Road, East Acton, London, W.3. Tel: 01-743 1173. Cables: Sinusoidal, Ealux, London.

●**Stereo 30.** Transistorised integrated amplifier. Inputs: PU (RIAA correction) 3·5 mV, 47K; tape head (CCIR correction) 3 mV, 47K; mic 3 mV, 33K; tuner 100 mV, 100K; tape amp 125 mV, 50K. Output: 10W per channel at 15 ohms, 15W at 4 ohms. Controls: input, bass, treble, filter, slope, vol (AC-on/off), function, balance, tape monitor. Low-pass filter-off, 9 KHz, 6 KHz, 4 KHz. Response: flat on mic, tuner, tape amp; RIAA on PU; CCIR on tape head. H and N −66 dB (tuner, tape amp); −52 dB (mic, PU, tape head). HD 0·1% at 8W, 15 ohms. Feedback 60 dB. LS matching 4, 15 ohms. NL (power amp, vol at minimum) −82 dB. Psn 110-250V, 40-60 Hz. Input level controls, tape outlets for recording with level control, tape monitor facility. Free-standing. Size: 13 × $4\frac{1}{4} \times 8\frac{3}{4}$ in. Price: (chassis model) £52; (cabinet model) £58 10s.

●**Stereo 70.** Transistorised integrated amplifier. Inputs: PU(1) 2 mV 47K RIAA, PU(2) 10 mV 33K RIAA, radio 25 mV 47K or 2 mV 47K, aux 60 mV 50K or 250 mV 50K, tape replay 400 mV 47K. Controls: bass ±16 dB at 50 Hz, treble ±16 dB at 14 KHz, volume, balance (zero to max on each channel), input selector, push-buttons for mode, tape monitor, treble filter, speaker, on/off. Output: 35W RMS per channel into 8 ohms, 28W RMS per channel into 15 ohms. HD 0·1% all powers up to 25W RMS. FR 30 Hz-20 KHz ±1 dB. Mains: 110, 117, 130, 210, 230, 250V 40/60 Hz. Consumption: 150 volt-amps. Size: (chassis) $13 \times 4\frac{1}{4} \times 8\frac{3}{4}$ in.; (cabinet) $13\frac{1}{2} \times 4\frac{3}{4} \times 9\frac{3}{4}$ in. Panel cut-out $12\frac{1}{2} \times 4$ in. Price: (chassis model) £63; (cabinet model) £69 10s.

L & H. Distributors: Britimpex Ltd., 16-22 Great Russell Street, London, W.1. Tel: 01-636 7600. Cables: Britron, London.

●**Audio Hi-Fi Master 6088.** Transistorised integrated stereo amplifier. Inputs: radio, tape, PU. Push-button selector. Output: 16W (music) per channel, 10W RMS per channel. 'Rego' button for adding bass or treble on record. Supplied with preamplifier module for mag PU. Module for ceramic PU available. Output impedance: 4 ohms minimum. FR 30 Hz-16 KHz ±1 dB. Teak case $11\frac{1}{4} \times 3\frac{1}{2} \times 7\frac{1}{8}$ in. Price: £41 9s. 6d.

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LOWTHER MANUFACTURING CO., Lowther House, St Mark's Road, Bromley, Kent. Tel: 01-460 5225. Cables: Lowther, Bromley.

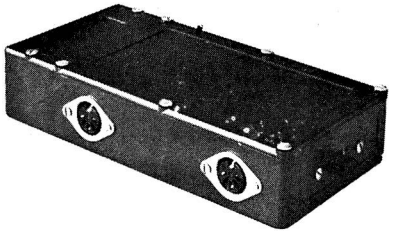
Lowther Mk V control unit. Inputs: mic 3 mV; pickup 3 mV −300 mV; radio and aux 100 mV. 5-pos sel, vol, bass, treble, filter, equalisation. Filters: 4·5, 7 and 9 KHz. HD <0·5%. H and N −65 dB. Output cathode follower 1V RMS. To operate with Lowther L18 amplifier. With A-B test facility. Size: $10\frac{1}{4} \times 4\frac{5}{8} \times 7$ in. Price: £25.

Lowther L18 amplifier. 18W. Distortion <0·1%. Input for specified output 0·75V. Response 20 Hz-40 KHz ±1 dB. Feedback 20 dB. Noise level −85 dB. Output impedance 16 ohms with adjustment. Output: EL506 distributed load circuitry. Pat. Size: 12 × 6 × 6 in. To operate with Mk V control unit. Price: £25 10s.

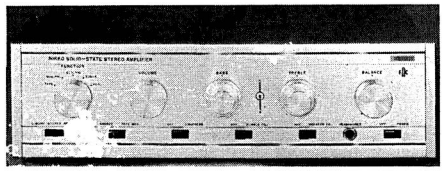
Lowther LL26 Mk II amplifier. 26W. Dist <0·1%. Input for spec output 0·75V. Response 20 Hz-70 KHz ±1 dB. Feedback 22 dB. NL −90 dB. Output imp 16 ohms with adjustment. Output: EL34s. Lowther Linear. Size: $11 \times 12 \times 7\frac{1}{2}$ in. Weight: 33 lb. To operate with Mk IV control unit. Price: £47.

●**Lowther Mk II stereo control unit.** Input as for master control unit Mk V. Tape input sockets. HD 0·1%. Dual low-pass filters. Dual output balanced and balance controls between channels. Size as Mk V. To operate with L18S power amp. Price: £45.

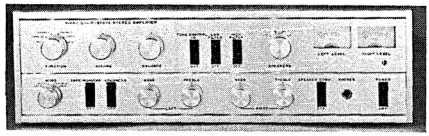
●**Lowther L18S stereo amplifier.** 18W output on each channel. Distortion 0·1%. Input for specified output 0·75V. Response 20 Hz-40 KHz. ±1 dB. Noise level −85 dB. Output imp 8·4 or 16 ohms. Output EL506 ultra linear. Size: 11 × $12 \times 7\frac{1}{2}$ in. To operate with Mk II control unit. Price: £47.



Metro-Sound pickup/mic stereo pre-amplifier

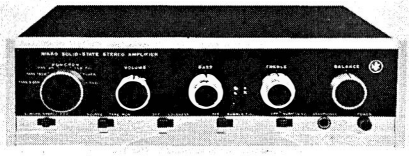


Nikko TRM-40



Nikko TRM120

Peak Sound SA8-8

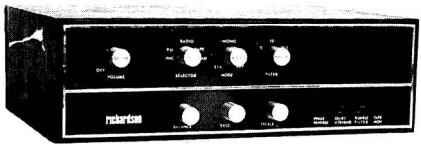


Nikko TRM-40B

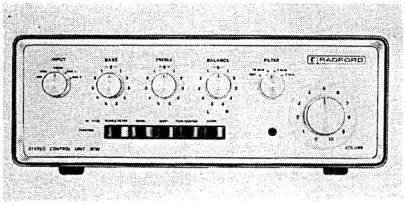
Philips GH923

Radon R 600S MK. II integrated amplifier

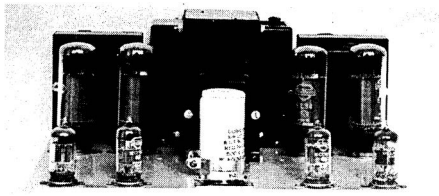
Philips GH925



Richardson SCPI



Radford SC22 stereo control unit



Richardson Power Amplifier

LUSTRAPHONE LTD., St Georges Works, Regent's Park Road, London, N.W.1. Tel: 01-722 8844.

Lo-Noise 15. Transistorised mono power amplifier. Output: 15W RMS. HD 0·5% at rated output. FR 25 Hz-22 KHz ±1 dB. Noise level −120 dB. Input for rated output 775 mV. Output impedance: 15 ohms and 100V line. Designed for use with Lustraphone Lo-Noise mixer. Size: $9 \times 6\frac{1}{2} \times 19\frac{1}{2}$ in. Supply: 240V AC or 24V DC. Price on application.

Lo-Noise 50. Transistorised mono power amplifier. Output: 50W RMS. HD 0·5% at rated output. FR 25 Hz-22 KHz ±1 dB. Noise level −120 dB. Input for rated output 775 mV. Output impedance: 15 ohms and 100V line. Designed for use with Lustraphone Lo-Noise mixer. Size: $9 \times 6\frac{1}{2} \times 19\frac{1}{2}$ in. Price on application.

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MARTIN ELECTRONICS LTD. See Constructional Kits Section.

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MEDLEY MUSICAL LTD., 4 Felltram Way, Charlton, London, S.E.7. Tel: 01-858 3426/7.

●**Medley 1600.** Integrated all silicon transistor stereo amplifier. Inputs: magnetic and ceramic PU, radio 100 mV 10K, tape 100 mV 10K. Controls: balance, treble ±15 dB at 14 KHz, bass ±15 dB at 40 Hz, selector, volume. Output: 8W RMS per channel (12W music). HD <1% at rated output. FR 30 Hz-30 KHz ±2 dB at 2W. H and N: −55 dB for all inputs. Output impedance: 8-15 ohms. Tape outlet: 200 mV per channel. Mains: 200-250V 50 Hz. Consumption: 25W at full output. Price (chassis form): £27 10s.; teak case £2 2s. 6d.

●**Medley MM25.** Integrated transistorised stereo amplifier. Inputs: PU(1) 3·5 mV 47K, PU(2) 20 mV 47K, radio 100 mV 220K, tape 100 mV 220K, aux 250 mV 430K. Controls: selector, bass ± 14 dB at 40 Hz, treble +12 dB −18 dB at 14 KHz, balance, volume, treble filter −10 dB at 7 KHz, 10 KHz, bass filter −18 dB at 50 Hz, mode, monitor A/B switch. Output: 12½W per channel RMS into 15 ohms. Output impedance: 8-16 ohms. HD <0·25% at full output. FR 40 Hz-18 KHz±3 dB at 10W. H and N: PU better than −52 dB, other channels better than −60 dB. Finish: teak veneered case with black/silver trim and panel. Mains: 200-250V 50-60 Hz (other voltages to order). Consumption: 48W at full output. Size: $13 \times 5\frac{1}{8} \times 11$ in. deep. Panel size: 12×4 in. Price: £40 19s.

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METRO-SOUND MANUFACTURING CO. LTD., Bridge Works, Wallace Road, Canonbury, London, N.1. Tel: 01-226 8641. Cables: Metrosound, London, N.1.

●**Pickup/microphone matching unit stereo preamplifier.** Transistorised. Input 0·05 mV, 2/50 ohms. Voltage gain 140. Response 20 Hz-30 KHz ±3 dB. Psn 9V battery, Type VT4, or equivalent. To operate with Ortofon SPUG, SPUG/E, SPU and SPU/E, and low impedance mics. Price: £7 10s.

●**De-luxe version,** with twin concentric precision w/w potentiometer. Price: £9 10s.

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NIKKO ELECTRIC MFG. CO. LTD., Distributors: Howland-West Ltd., 2 Park End, South Hill Park, London, N.W.3. Tel: 01-794 6666.

●**Nikko TRM-40B.** Integrated stereo transistor amplifier and control unit. Inputs: tape head 2 mV, PU (mag) 4 mV, radio 500 mV, PU (crystal) 300 mV. Controls: function, volume, bass (each channel), treble (each channel), balance, mode, tape monitor, loudness, rumble filter, scratch filter, on/off, stereo headphone jack. Output: 15W RMS at 8 ohms. HD <1% at stated output. FR 15 Hz-20 KHz ±1 dB. Noise level better than 60 dB. Output impedance 4-15 ohms. Mains supply. Size: $11\frac{1}{2} \times 9\frac{1}{2} \times 3\frac{3}{8}$ in. Price: £42 10s.

●**Nikko TRM-120.** Integrated transistor stereo amplifier. Inputs: mic 3 mV 50K, tape head 1·7 mV 200K, radio 200 mV, PU(1) 2·8 mV 50K, PU(2) 2·8 mV 50K, aux 500 mV 500K. Noise level: mic −60 dB, tape −55 dB, PU −60 dB, others −65 dB. Controls: function, volume, balance, tone controls in/out, low filter, high filter, speaker switching, mode, tape monitor on/off, bass right, bass left, treble right, treble left, on/off, meter level control, loudness. Output: 45W RMS into 8 ohms. HD 0·9% at rated output. FR 15 Hz-35 KHz ±1 dB at 30W. Output impedance: 4-16 ohms. Mains: 117-240V 50/60 Hz. Size: $15\frac{1}{2} \times 4\frac{3}{4} \times 12\frac{3}{4}$ in. Price: £95.

PEAK SOUND (HARROW) LTD., 32 St Judes Road, Englefield Green, Surrey. Tel: Egham 5316.

●**Twin-Twenty.** Stereo preamplifier. Available in ready-built or kit form. Transistorised. Inputs: PU 1 mV 200K, radio 50 mV 220K, aux 50 mV 220K. Output: 500 mV 0·1% distortion. Controls: left channel volume, right channel volume, selector, bass, treble, filter. Power required: 25V DC 12-15 mA (normally supplied by Twin Twenty Power Amplifier). Front panel: 14×4 in. Price: £6 10s.; (chassis kit) £4 15s.; (cabinet kit) £3 10s.

●**SA8-8.** Transistorised stereo integrated amplifier. Inputs: PU 50 mV 470K, radio 50 mV 470K. Controls: separate volume controls for each channel, bass, treble, selector, on/off. Output: 8·5W RMS per channel. FR 20 Hz-20 KHz ±3 dB. Feedback: 18 dB. Output impedance: 5 ohms. Output transistors: four AD149. AC mains. Size: 12×3×8 in. Price: £21; (amplifier kit) £10 10s.; (power supply kit) £3; (cabinet kit) £3.

●**Twin-Twenty Power Amplifier.** Transistor stereo amplifier kit. Output: 26·6W RMS 30 Hz-6 KHz. FR 30 Hz-120 KHz −3 dB at 1W. Noise level −60 dB. Input: 500 mV for rated output. Output impedance 15 ohms. Output transistors: 2N3055. Mains powered. Size: 14×4×9 in. Designed to operate with Twin-Twenty preamp. Price: £18 15s.; (chassis kit) £4 15s.; (cabinet kit) £4 15s.

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PHILIPS ELECTRICAL LTD., Century House, Shaftesbury Avenue, London, W.C.2. Tel: 01-437 7777. Cables: Phillamps, London.

●**GH.925.** Transistorised integrated stereo amplifier. Inputs: PU 20 mV 500K, tuner 20 mV 500K, tape 150 mV 500K. Controls: bass +8 dB −12 dB at 150 Hz, treble +9 dB −11 dB at 10 KHz, balance, volume, selector. Output: 4W RMS per channel. HD 10% for 4W output. FR 40 Hz-20 KHz ±3 dB. H and N more than −50 dB at 4W. Output impedance: 4-8 ohms. 14 transistors and diodes. Mains: 110, 127, 220, 240V 50/60 Hz. Consumption: 30W maximum. Size: $12\frac{1}{2}\times8\frac{1}{2}\times3\frac{1}{2}$ in. Weight: 5 lb. Shelf-mounting teak cabinet. Price: £24 3s.

●**GH.923.** Transistorised integrated stereo amplifier. Inputs: PU (mag) 1 mV 47K, PU (crystal) 40 mV 220K, tuner 40 mV 30K, tape 110 mV 70K. Controls: rumble filter 12 dB/octave, scratch filter 12 dB/octave, bass ±6 dB at 80 Hz, treble ±14 dB at 10 KHz, balance, volume. Output: 7W RMS per channel. Output impedance: 4-8 ohms. HD <0·8% at 7W per channel. FR 35 Hz-20 KHz ±1·5 dB. Separation more than −50 dB at 1 KHz. H and N more than −70 dB at 7W. Damping factor: 7 at 8 ohms impedance. 10 transistors and diodes. Mains: 110, 127, 220, 240V 50/60 Hz. Consumption: 35W maximum. Size: $13\frac{1}{2}\times8\frac{1}{4}\times5\frac{1}{2}$ in. Weight: $8\frac{1}{4}$ lb. Shelf-mounting teak cabinet. Price: £39 18s.

●**GH.919.** Transistorised integrated stereo amplifier. Inputs: PU (mag) 3 mV 47K, PU (crystal) 100 mV 100K, tuner 90 mV 100K, tape recorder 90 mV 100K, auxiliary 90 mV 100K. Controls: rumble filter 12 dB/octave, scratch filter 12 dB/octave, bass +18 dB −12 dB at 30 Hz, treble +14 dB −15 dB at 15 KHz, balance, volume. Output: 20W RMS per channel. Output impedance: 4-8 ohms. Damping factor: 40 at 8 ohms. HD <0·25% at 15W per channel at 1 KHz. FR 25 Hz-20 KHz ±1 dB. Separation: more than 60 dB at 1 KHz. H and N: > −70 dB. 22 transistors and diodes. Two stabilising zener diodes. Mains: 110, 127, 220, 240V AC 50/60 Hz. Consumption: 100W maximum. Size: $13\frac{1}{2}\times10\frac{1}{2}\times5\frac{1}{2}$ in. Shelf-mounting teak cabinet. Price: £59 17s.

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PIONEER. Distributors: Swisstone Ltd., 48a Station Road, Cobham, Surrey. Tel: 0932-6 2853/4214.

●**SA-40.** Integrated stereo amplifier. Valves. Inputs: tape head 1·5 mV, PU (mag) 2·3 mV, PU (crystal/ceramic) 38 mV, aux 150 mV. Output: 30W music (total. HD <1% at rated output. FR 30 Hz-20 KHz ±1 dB. Mains: 115/230V AC. Size: $13\frac{7}{8}\times5\frac{3}{8}\times10\frac{1}{4}$ in. Weight: $15\frac{1}{2}$ lb. Full specification and price on request.

SR-101. Double-scatter reverberation amplifier. Five valves. Delay time 1/28-1/35 second. Reverb time 2-3 seconds 1 KHz 8 Hz modulation. Distortion <5%. FR (reverb sound only) 100 Hz-3 KHz ±10 dB. Uses electrical circuit to create reverberation to increase "presence" and "brilliance". Visual indicator on front panel. Suitable for use with amplifiers with tape monitor sockets. Mains: 115-230V AC. Size: $12\frac{3}{4}\times8\frac{7}{8}\times4\frac{1}{8}$ in. Weight: 18 lb. Full specification and price on request.

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QUAD. See Acoustical Manufacturing Co. Ltd.

RADFORD. Radford Marketing Division, Eastbrook Road, Gloucester. Tel: OGL-2 21591.

●**SC22P.** Stereo control unit preamplifier employing valves and transistors. Inputs: PU 2 mV 68K, mic 1·5 mV 68K, radio 115 mV 1 megohm, aux(1) 115 mV 1 megohm, aux(2) 115 mV 1 megohm. Output: 1·5V RMS. Controls: volume, bass, treble, selector, balance, rumble filter, mode, 4 KHz filter, 7 KHz filter, 10 KHz filter, tape monitor, mains on/off. Mains input. Size: $10\frac{1}{4} \times 3\frac{3}{8}$ in. (cut-out); $12\frac{7}{8}$ in. deep. Price: £50.

●**STA.100.** Stereo valve power amplifier. Output: 100W RMS per channel. HD: less than 0·1% at 1 KHz at rated output. FR 20 Hz-20 KHz −1 dB +0 dB. Noise level: −95 dB at 60W. Input: 350 mV. Output impedance: 8-16 ohms. Output valves: KT88's. Mains supply. Designed to operate with SCP22P control unit or other similar high quality units. Price: £112 10s.

●**SCA.30.** Transistor integrated stereo amplifier. Inputs: mic 1·5 mV 68K, PU 1·8 mV 68K, radio 115 mV 1 megohm, tape 115 mV 1 megohm, aux 115 mV 1 megohm. Controls: volume, bass, treble, selector, balance, rumble filter, mode, 4 KHz filter, 7 KHz filter, 10 KHz filter, tape monitor, mains on/off. Output: 30W RMS per channel. HD: less than 0·1% at rated output. FR: flat 20 Hz-70 KHz at 38W into 12 ohms. Noise level −75 dB. Output impedance: 3·5-16 ohms. Mains input. Size: 14 × 5 × 12 in. Price: £106.

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RADON INDUSTRIAL ELECTRONICS CO. LTD., Brooklands Trading Estate, Orme Road, Worthing, Sussex. Tel: Worthing 1063. Cables: Radon, Worthing.

●**R600.S Mk II.** Integrated transistorised stereo amplifier in shelf mounting cabinet. Inputs: mag PU 5 mV, crystal PU 500 mV, radio 500 mV, aux 150 mV. FR 20 Hz-25 KHz ±3 dB. H and N −100 dB at 10W. Noise 20 dB below level of hum. Distortion 0·06% for 10W output, 0·1% for 12W. Bass control +12 dB to −12 dB at 100 Hz. Treble control +8 dB −10 dB at 10 KHz. HF filter 7 KHz, 9 KHz and flat. LF filter 20 Hz, 40 Hz and 80 Hz. Output: four AD140 transistors. Power output 10W RMS each channel (12W peak). Output imp 15 ohms. Separate output for recorder. Mains: 220-250V AC. Chassis size: $14\frac{1}{4}$ in. wide, $10\frac{1}{4}$ in. deep, $5\frac{1}{4}$ in. high. Perspex engraved panel in black with gold lettering. Cabinet in polished mahogany. Price: £60.

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J. RICHARDSON ELECTRONICS LTD., 43B Hereford Road, London, W.2. Tel.: 01-727-5096.

MA.135 Power Amplifier. Output: 30W RMS 0·1% distortion, 35W RMS 0·25% distortion, at 1 KHz. Sensitivity: 250 mV for 35W into 4, 8 and 16 ohms. Response: 20 Hz-20 KHz. Mains: 200-250V AC. Semiconductor power supply. Price: £35.

●**SA 170.** Power amp as **MA 135** but with two channels. Size: $12\frac{1}{2} \times 12 \times 7$ in. Price: £55.

MA.200 Power Amplifier. Output: 70W RMS 0·1% distortion, 100W RMS 0·25% distortion, at 1 KHz. Sensitivity: 250 mV for 70W into 4, 8 and 16 ohms, or 100V line. Line matching input transformer available. Prices on application.

●**SCP.1 Stereo Preamplifier.** FET and transistor. Self-powered. Low-noise circuit. Bass control ±20 dB, treble control ± 16 dB. Filters: 6 KHz, 9 KHz. Rumble filter. Quiet listening. Tape monitor phase reverse. Inputs: PU(1) mag 2 mV, PU(2) ceramic 50 mV, radio 250 mV, tape 250 mV, mic 3 mV, tape head 2·5 mV. Output: 250 mV to 1·0V. Size: $14\frac{1}{4} \times 10\frac{1}{4} \times 4\frac{1}{4}$ in. high. Mains: 110V, 200-250V AC. Price: £40.

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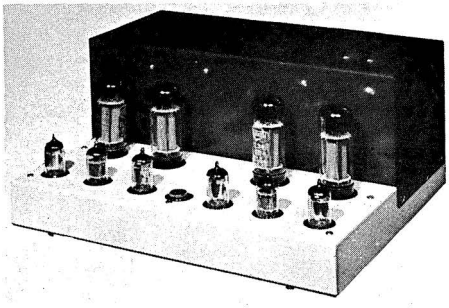
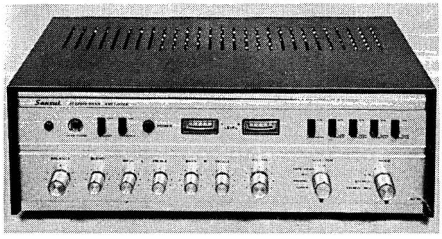
ROGERS DEVELOPMENTS (ELECTRONICS) LTD., 4-14 Barmeston Road, Catford, London, S.E.6. Tel: 698-7424/4340. Cables: Rodevco, London, S.E.6.

●**Master II stereo control unit.** Inputs: mic 1-10 mV, 100K; disc 1, 2-20 mV, 68K; disc 2, 60-600 mV, 2·2 megohms; tape 1-10 mV, 68K; radio 15-100 mV, 300K. (Impedance for mic and disc 1 inputs may be altered.) Output: 750 mV. Controls: input sel, vol, balance, on/off, equalisation, bass, treble, mono/stereo switches, high-pass filter, low-pass filter with variable slope and frequency, speaker/phones switch. Low-pass filters 7 KHz and 10 KHz +slope; high-pass filters 20 Hz and 60 Hz. To operate with Master stereo amplifier. Size: $14 \times 6\frac{1}{2} \times 5\frac{1}{8}$ in. Price: £40.



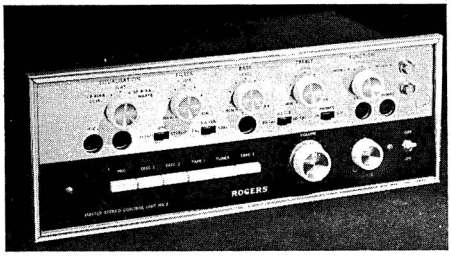
Rogers Master stereo amplifier



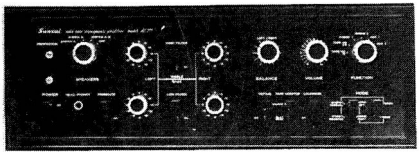
Sansui AU-70

Rogers HG88 Mk. III integrated amplifier

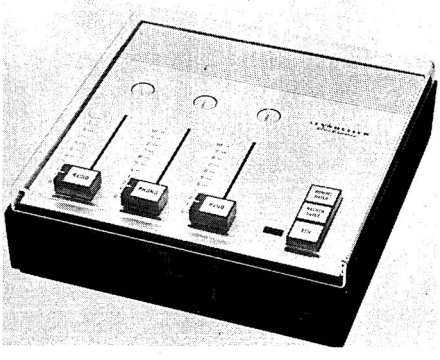
Sansui AU11



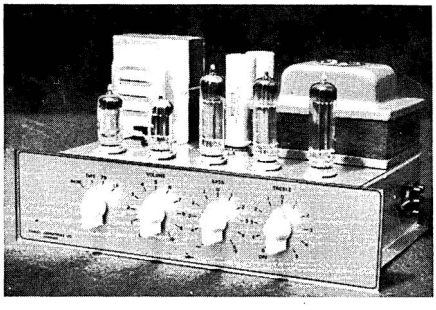
Rogers Master II stereo control unit



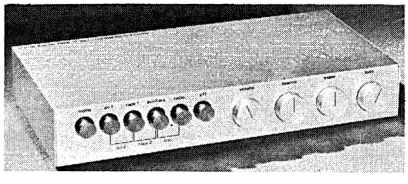
Sansui AU 777



Sennheiser VRS303



Shirley Jupiter SB/1-15E



Sinclair System 2000

●**Cadet III.** Stereo main amplifier and control unit. Inputs: radio 100 mV 470K, mag PU 3·8 mV 68K, crystal PU 65 mV 2 megohms, tape 600 mV. FR 20 Hz-20 KHz ±2 dB. Bass control ±13·5 dB at 40 Hz. Treble control +13·5 dB −16 dB at 10KHz. High-pass filter 60 Hz 10 dB/octave. Low-pass filter 6·5 KHz 10 dB/octave. Crosstalk −42 dB at 1 KHz, 26 dB at 10 KHz. Signal-to-noise: radio 60 dB, mag PU 54 dB, ceramic PU 52 dB. Balance control 9 dB range. Valves. Size: (control unit) $10\frac{3}{4} \times 4\frac{3}{4} \times 4\frac{1}{8}$ in., front panel $11\frac{1}{4} \times 4\frac{1}{2}$ in. Output 10W each channel. Distortion 0·25% at 5W at 1 KHz, 0·8% at 10W at 1 KHz. H and N −80 dB. Output impedance 3-5 ohms and 12-16 ohms. Mains: 110-122-220-244V 50/60 Hz. Size: (main amplifier) $10 \times 6\frac{1}{2} \times 4$ in. Prices: (chassis model) £33 15s.; (cabinet model) £37 10s.

●**Master Stereo Amplifier.** Valved power amplifier. Input: 1V. Output: 35W. Self-powered. Suitable for Master II Stereo control unit. Price: £50.

●**HG88 Mk III Integrated Stereo Amplifier.** Latest version of the "Eighty-eight" features increased power, more comprehensive input and control facilities. Re-styled to match new Cadet III range. Features include high performance filters, plug-in pickup matching adaptors, tape monitoring facility, tape panel socket. Silicon mains rectifier. Available in chassis or cabinet form. Output: 15W. Price: (chassis) £42; (in cabinet) £46 10s.

●**Ravensbourne.** Integrated stereo amplifier. Transistors. 25W output per channel. Full range of inputs and controls. Specification on request. Price: (chassis) £59 10s.; (cabinet) £4 10s.

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SANSUI. Sole UK importer: Technical Ceramics Ltd., Thorn Hill Southampton. Tel: 0703-48055. Distributors for Scotland, North and Midlands: Audio Distributors, 4 Lion Street Kidderminster. Tel: 0562-3293.

●**Sansui AU70.** Stereo integrated amplifier. Valves and transistors. Inputs: PU (mag) 1·1 mV 50K. PU (crystal) 3·6 mV 100K, tape 0·9 mV 50K, mic 0·9 mV 50K, aux 50 mV 500K, radio 50 mV 500K. Controls: balance, blend (continuous mono to stereo), bass boost and cut (independent left and right) treble boost and cut (independent left and right), volume, selector, mode, speaker on-off, presence, loudness, low-pass filter, high-pass filter, tone circuits on-off, tape monitor. Output: 25W RMS per channel. HD 0·15% at 20W per channel. FR 10 Hz-80 KHz ±1 dB at 1W. Feedback 26 dB. Noise level −60 dB. Output impedance: 8 or 16 ohms. Damping factor: 18. Size: $15\frac{7}{8} \times 12\frac{5}{8} \times 5\frac{5}{8}$ in. Price: £72 9s.

●**Sansui AU111.** Stereo integrated amplifier. Valves and transistors. Inputs: PU.1 1·1 mV low imp, PU.2 2 mV 100K, tape head 1·8 mV 100K, radio 220 mV 500K, aux 222 mV 500K, tape monitor 250 mV 500K. Controls: volume, balance, bass boost and cut 6 dB/octave (independent left and right channels), treble boost and cut 6 dB/octave (independent left and right channels), centre channel volume, selector, loudness, speakers on-off, presence, low-pass filter, high-pass filter, tape monitor, mode. Output: 45W RMS per channel. HD 0·8% at rated output. FR 20 Hz-50 KHz at 1W. Noise level: −80 dB (aux). Output impedance: 8 and 16 ohms. Damping factor 15. Size: $18\frac{1}{8} \times 13\frac{5}{8} \times 16\frac{3}{4}$ in. Price: £110 5s.

●**Sansui AU777.** Transistorised stereo integrated amplifier. Inputs: PU(1) 2 mV 47K, PU(2) 2 mV 100K, tape head (fast) 1·5 mV 200K, tape head (slow) 1·3 mV 200K, aux(1) 140 mV 100K, aux(2) 140 mV 100K, tape monitor 140 mV 100K. Output: 25W RMS per channel. HD <0·5% at rated output. FR 20 Hz-100 KHz. Output impedance: 8-16 ohms. AC mains. Consumption 165 VA. Size: $17\frac{1}{8} \times 6\frac{1}{8} \times 13\frac{1}{8}$ in. Price: £110 5s.

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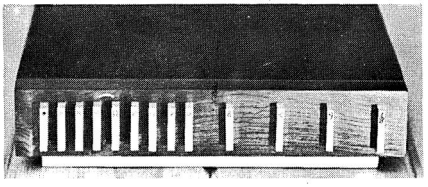
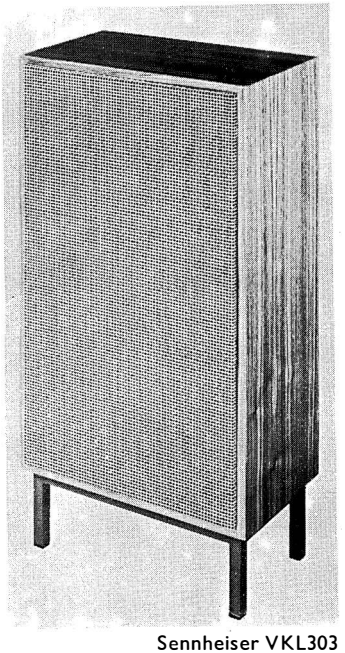
SENNHEISER ELECTRONIC. Distributors: Audio Engineering Ltd., 33 Endell Street, London, W.C.2. Tel: 01-836 0033.

●**VRS.303 Philharmonic.** Armchair control unit. Transistorised stereo pre-amplifier designed to operate with VKL.303 main amplifier and VMS.303 mixer. Controls: bass, treble, balance, volume, stereo width. Power supplied from power amplifier. Size: $4 \times 9 \times 3$ in. Price: see VKL.303.

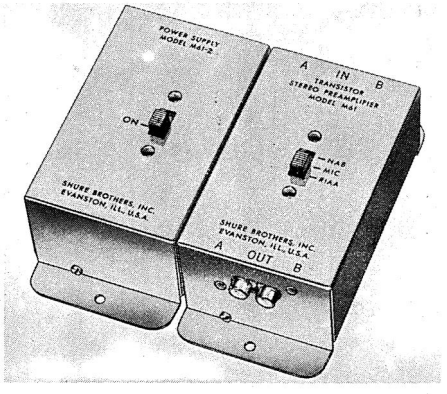
●**VMS.303 Philharmonic.** Stereo transistorised mixer unit for use with VRS.303 armchair control unit and VKL.303 amplifier/speaker units. Inputs: mic (1) 2 mV 50K, mic (2) 2 mV 50K, pick up (crystal), pick up (magnetic) 2·5 mV 50K, radio (1) 2 mV 50K, radio (2) 500 mV 120K, equalised tape 220 mV 100K. Outlets: tape 2×15 mV low Z, tape 2×300 mV high Z, headphones 2×1V 100 ohms. Controls: HF filter 15 dB/octave (3 dB at 6 KHz), LF filter 15 dB/



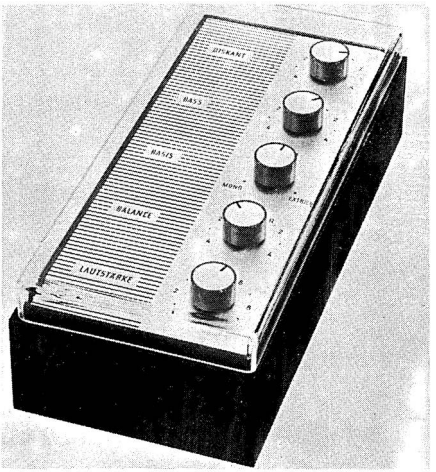
Sinclair Neoteric 60



Sennheiser VKL303



Shure M61/2



Sennheiser VMS303

Sony 1120

Sony 1080

Shure Solo-phone SA-2E

octave (3 dB at 60 Hz), sensitivity control for each of three channels. Power drawn from main amplifier VKL.303. Size: 9×9×3 in. Price: see VKL.303.

●**VKL.303 Philharmonic.** Transistorised power amplifiers built-into speaker enclosures. Designed to operate with VMS.303 mixer and VRS.303 armchair control unit. Power output: 30W RMS per channel. HD 0·1% at 20W 30 Hz-10 KHz. FR (including speakers) 50 Hz-15 KHz ±3 dB. Feedback >65 dB for all inputs. Noise level >85 dB (power amplifier only). Mains: 200-240V AC. Infinite baffle enclosures with LF and HF units. Variable equalisers to compensate for speaker position, room acoustics and stereo symmetry. Price (VRS.303, VMS.303, two VKL.303): £484.

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SHIRLEY LABORATORIES LTD., 23 Ripley Road, Worthing, Sussex. Tel: Worthing 49098.

"Jupiter" SB/1-15E. Integrated mono amplifier. 12W (17W peak). Dist 0·2% at 10W 1 KHz. FR 45 Hz-25 KHz ±1 dB. NL −80 dB. Inputs: radio/tape 100 mV; gram to suit pickup in use. LS matching, 15 ohms. Controls: bass, treble, vol, sel. Pat 300V, 30 mA; 6·3V, 1·5 amps. Output stages EL84s. Self-powered. Front panel 12×3 in. Price: £23 2s.

●**SBS/15 integrated stereo amplifier.** 12W per channel (17W peak). Dist 0·1%. FR 45 Hz-25 KHz ±1 dB. NL −85 dB. Inputs: radio 100 mV; gram (RIAA) 5 mV; mic 2 mV; tape from head 3 mV; tape recorder 100 mV. Output stages EL84s. Controls: variable vol, bass, treble, balance, switched sel, tape speed equalisation, mono/stereo. Self-powered. Pat 300V, 45 mA; 6·3V, ct, 2 amps. Equalisation for two or three tape speeds. Facility for playing on both channels from monaural source. Price: £63.

See also Tape Amplifiers Section.

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SHURE ELECTRONICS LTD., 84 Blackfriars Road, London, S.E.1. Tel: 01-928 6361.

●**Solophone SA-2E.** Provides personal stereo listening for one or two people. Gives sufficient amplification to accept output from any high quality cartridge (for example Shure Stereo Dynetic range), tape deck or FM tuner. There are input selector switch, separate volume controls for each channel and two headphone jacks mounted on the front panel. Size: $10\frac{1}{4} \times 3\frac{1}{2} \times 3$ in. Weight: 2 lb. Mains: 240V 50 Hz. Price: £18 18s.

●**M61 Series.** Stereo pre-amplifiers designed to permit magnetic cartridges and tape heads to be used with amplifiers not having the necessary input sensitivity. M61 Series amplifiers provide amplification and equalisation for tape and discs, also suitable for mic. FR 25 Hz-15 KHz ±2·5 dB. Input impedance: 47K at 1 KHz. Output impedance: low <1K at 10 KHz. Separation >50 dB at 1 KHz. H and N −50 dB. Size: $5 \times 5\frac{1}{4} \times 2$ in. Price: (M61-2 mains operated) £13 10s.; (M61-3 battery operated) £10 15s.

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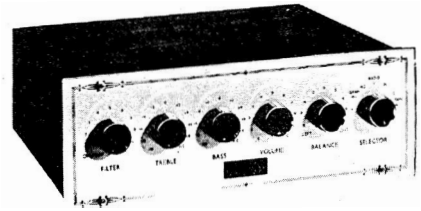
SINCLAIR RADIONICS LTD., 22 Newmarket Road, Cambridge. Tel: 0223 52996.

Sinclair Z-12. Transistorised mono amplifier. Eight transistors. Output into 3 ohm load: 5W RMS at 12V, 8W RMS at 15V, 13W RMS at 18V. Output into 1·5 ohm load: 10W RMS at 12V, 16W RMS at 15V. FR 15 Hz-50 KHz ±1 dB. Sensitivity: 2 mV into 2K. Signal-to-noise: better than 60 dB. Total distortion less than 1%. Size: 3×1·8×1·3 in. Quiescent consumption on 12V: 15 mA. DC supply required 6-20V. Price: £4 9s. 6d. (ready built). PZ4 power supply unit: Price £4 19s. 6d. extra.

●**Neoteric 60.** Transistorised stereo integrated amplifier. Inputs: PU(1) 2·7 mV 47K, PU(2) 2·7-160 mV 10K, radio 17 mV 1 megohm, tape head 2·5 mV 47K. Noise level: better than −60 dB all inputs. Controls: 10 KHz HF filter, 4 KHz HF filter, LF filter 12 dB/octave below 50 Hz, HF filter at 6 KHz. Volume, balance, bass, treble, on/off. Output: 15W RMS per channel into 8 ohms. HD 0·08% into 15 ohms at rated output. FR 20 Hz-100 KHz ±1 dB. Output impedance: 5-15 ohms. 28 transistors. Mains: 110-240V AC. Size: $8\frac{1}{2} \times 2\frac{1}{8} \times 9\frac{1}{4}$ in. Price: £57 15s.

●**System 2000.** Transistorised stereo integrated amplifier. Inputs: PU(1) 3 mV 68K, PU(2) 30 mV 220K, tape(1) 1·5 mV 100K, tape(2) 1 mV 100K, aux 500 mV 100K, radio 100 mV 100K, mic 2·5 mV 50K. Controls: push-button input selector, volume, balance, treble ±14 dB at 15 KHz, bass ±13 dB at 70 Hz. Output: 35W RMS total. Output impedance 3-15 ohms. HD <0·5% at all powers. FR 15 Hz-30 KHz ±1 dB. 18 transistors (12 silicon). Transformerless output. Mains: 200-250V 50 or 60 Hz (100-120V version available). Finish: cabinet and control knobs solid aluminium. Size: 12×6×2 in. Price: £30 9s.

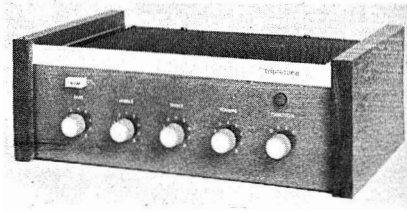


Symphony No. 2 integrated stereo amplifier

Trio TK150T

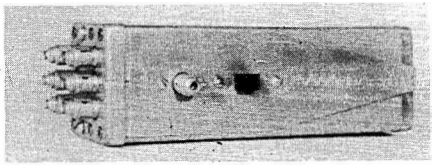
Tripletone Series 3 control unit

Tripletone Gemini

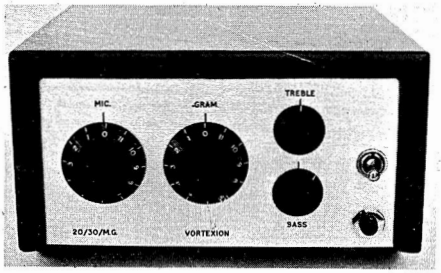


Tripletone Hi-Fi Major (Series 3)

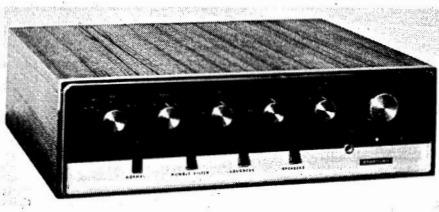
Tripletone Solid-state 8+8



Stereo WAL Gain



Vortexion 20/30W



Wharfedale WHF20

SONY U.K. DIVISION, Eastbrook Road, Gloucester. Tel: 0452 21591.

●**Sony TA-1080.** Transistor stereo integrated amplifier. Inputs: tape 0·7 mV 100K, PU(2) 2·3 mV 47K, tuner 120 mV (variable) 100K, aux 120 mV 100K. Controls: volume, balance, treble ±10dB at 10 KHz, bass ± 10 dB at 100 Hz, mode, input selector, tone control cut-out to give flat response, monitor. Output: 30W per channel. FR 30 Hz-100 KHz ±2 dB. HD <0·15% at rated output. Damping factor: >40. Noise: <0·05 μV with 8 ohms load. Signal/noise: >70 dB average. 30 silicon transistors, 21 diodes. Output impedance: 8-16 ohms. Mains: 100, 117, 220, 240V 50/60 Hz. Consumption: 25W at no signal, 200W at maximum output. Mounting bracket and oiled stained case optional extras. Size: $15\frac{3}{4} \times 12\frac{1}{4} \times 5\frac{3}{4}$ in. Price: £120.

●**Sony TA-1120.** Transistor stereo integrated amplifier. Inputs: PU(1) 5 mV 47K, PU(2) 1 mV 47K, tuner 200 mV 100K, tape head 1 mV 500K, mic 2 mV 500K. Noise level: tuner >90 dB, PU 70-80 dB, tape >70 dB, mic >65 dB. Controls: volume, balance, bass ±20 dB at 100 Hz, treble ±20 dB at 10 KHz, tone control cancel switch, mode, selector, low-pass filter, high-pass filter, monitor switch. Output: 50W per channel. Output impedance: 8-16 ohms. HD 0·1% at rated power. FR 10 Hz-100 KHz −1 dB at rated output. 46 silicon transistors, 23 diodes. Mains: 100, 117, 220, 240V 50/60 Hz. Consumption: 30W at no signal, 200W at maximum output. Oiled stained case optional extra. Size: $15\frac{3}{4} \times 12\frac{1}{4} \times 5\frac{3}{4}$ in. Price: £160.

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TELETON. Teleton Electro (U.K.) Ltd., 24-32 Kilburn High Road, London, N.W.6. Tel: 01-624 9102. Telex: 21880.

●**SAQ-202E.** Transistorised integrated stereo amplifier. Output: 5W RMS per channel. Full range of controls and filters. Oiled walnut cabinet. Full specification and price on request.

●**SAQ-501.** Transistorised integrated stereo amplifier. Output: 50W RMS. FR 20 Hz-20 KHz ±1 dB. Built-in preamplifiers. Full range of controls and filters. Oiled walnut cabinet. Full specification and price on request.

TRIO. Distributed by: B. H. Morris & Co. (Radio) Ltd., 84-88 Nelson Street, London E.1. Tel: 01-790 4824.

●**TK-250E.** Solid state integrated stereo amplifier. Inputs: PU(1) 2 mV, PU(2) 2 mV, tape head 2·5 mV, radio tuner 150 mV, aux 150 mV, tape play 150 mV. LF filter 80 Hz roll-off, HF filter 6 KHz roll-off. Bass control ±11 dB at 50 Hz. Treble control ±11 dB at 10 KHz. Volume control tracking error, within 3 dB. Output: 60W music at 4 ohms, 50W music at 8 ohms. 20W RMS per channel. HD 0·8%. FR 20 Hz-50 KHz ±1 dB. Signal-to-noise: PU −60 dB, tuner −70 dB. Output impedance: 4, 8 or 16 ohms. Centre channel output. Automatic mains circuit breaker. Mains: 110-120V or 220-230V 50/60 Hz. Consumption 110W at full power. Size: $12\frac{1}{2} \times 4\frac{1}{8} \times 9\frac{1}{4}$ in. Weight: 13 lb. Price: £49 10s.

●**Supreme I.** Solid state integrated stereo amplifier. Each channel employs separate bass, mid-range and high frequency amplifiers. Bass amplifier: 33W RMS per channel, FR 10 Hz-100 KHz. Mid-range amplifier: 23W RMS per channel, FR 100 Hz-100 KHz. High-frequency amplifier: 15W RMS per channel, FR 1-100 KHz. Total output: 142W RMS, 165W music. HD 0·5%. Signal-to-noise: 90 dB. Bass control: ±12 dB at 100 Hz. Treble control: ±12 dB at 10 KHz. LF filter, HF filter. Electronic cross-over network. Full details and specification on request. Price: £280.

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TRIPLETONE MANUFACTURING CO. LTD., 241a The Broadway, Wimbledon, S.W.19. Tel: 01-542 1189.

●**Gemini Series 3.** Integrated stereo amplifier. Inputs: PU 150 mV 1 megohm, radio 150 mV 1 megohm, tape 150 mV 1 megohm. Controls: bass ±15 dB at 50 Hz, middle ±12 dB at 400 Hz, treble ±15 dB at 10 KHz. Volume, function selector, push-button on/off. Output: 4W RMS per channel. Output impedance: 2-3 and 15 ohms. FR 30 Hz-20 KHz ±1·5 dB. Feedback 20 dB. Tape outlet: 1V 100K. H and N −70 dB. Two ECC83, two 6BW6, one EZ80. Size: $11 \times 6\frac{1}{2} \times 3\frac{3}{4}$ in. Weight: 10 lb. Price: £19 10s. (optional extra teak ends) £2 16s. 3d.

Hi-Fi Major Series 3. Integrated mono amplifier. All transistor. Inputs: PU 80 mV 2 megohms, tape 80 mV 100K, radio 200 mV 200K. Controls: bass ±18 dB at 30 Hz, middle +12 dB to −15 dB at 1 KHz, treble ±18 dB at

10 KHz. Filter 7 KHz turn-over, 6 dB/octave slope. Output: 10W RMS. HD <0·2%. FR 30 Hz-20 KHz ±1·5 dB. Noise level: −60 dB. Output impedance: 15 ohms. Mains: 200-250V AC. Size: $11 \times 7\frac{1}{2} \times 3\frac{3}{4}$ in. Weight: 8 lb. Output transistors: two AD149. Price £19 18s. 6d.

●**Solid State Stereo 8+8.** Transistorised integrated stereo amplifier. Inputs: PU 80 mV 2 megohms, radio 200 mV 100K, tape 80 mV 100K. Controls: bass ±18 dB at 30 Hz, middle +12 dB to −15 dB at 1 KHz, treble ±18 dB at 10 KHz, volume, function selector, filter (7 KHz turnover, 6 dB/octave slope). Output 8W RMS per channel. Output impedance: 15 ohms. Distortion: <0·2% at 8W RMS. FR 30 Hz-20 KHz ±1·5 dB. H and N −60 dB per channel at 8W. 20 transistors, four rectifiers. Tape outlet socket: 200 mV 100K ±1·5 dB 15 Hz-30 KHz. Size: $11 \times 7\frac{1}{2} \times 3\frac{1}{4}$ in. Weight: 8 lb. Price: £29 19s. 6d.; (optional extra teak ends) £2 16s. 3d.

Transistorised pre-amplifier Series 3. Mono or stereo version. Inputs for magnetic cartridges or tape heads. Various tape/disc combinations. S/N 70 dB. Equalisation ±2 dB (RIAA or CCIR curve). Psn 200-300V or 40V DC. Octal plug or B9G connector. Size: $5 \times 2 \times 2$ in. Price (mono): £3 17s. 6d.; (stereo): £5 10s.

●**Stereo balance indicator Series 3.** Indicates volumetric and tonal balance. Can be switched in or out as required, and gives channel reversal facilities. No power required. Price: £2 16s. 3d.

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TRUVOX LTD., Hythe, Southampton. Tel: Hythe (0421-24) 3265.

●**TSA100.** Transistorised integrated stereo amplifier. Inputs: PU(1) 50 mV 100K RIAA. PU(2) 3·5 mV 50K RIAA, tape 150 mV 100K. tuner 50 mV 100K, aux 50 mV 100K. Controls: Treble, balance, volume, function switch, monitor switch, scratch filter, rumble filter. Noise < −55 dB on PU, < −60 dB other functions. 12·5W IHFM output per channel into 15 ohms. Distortion less than 0·25% at 10W. FR 15 Hz-30 KHz ±1 dB. Transformerless output will feed any speaker 8-600 ohms. Four AD140. Mains supply 100-240V 40-60 Hz. Chassis form or shelf-mounting cabinet. Size: $16 \times 6\frac{7}{8} \times 5$ in. Price: £51 9s.

●**TSA200.** Transistorised integrated stereo amplifier in teak cabinet or for panel mounting. Inputs: PU(1) 50 mV 100K, PU(2) 3·5 mV 50K, tape 100 mV 100K, radio 100 mV 100K, aux 100 mV 100K. Tape output: 200 mV into 22K. FR 20 Hz-20 KHz ±1 dB at 10W. Bass control ±15 dB at 50 Hz, treble control ±15 dB at 14 KHz. Output 20W (IHFM) per channel. HD <0·25% at 20W. Treble filter −10 dB at 12 KHz, bass filter −10 dB at 20 Hz. Mains: 100-120V, 200-250V 50/60 Hz. Size: $16 \times 6\frac{7}{8} \times 5\frac{1}{8}$ in. Weight: 13 lb. All-silicon transistors. Price: £54 12s.

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VORTEXION LTD., 257/263 The Broadway, Wimbledon, London, S.W.19. Tel: 01-542 6242/3/4 and 2814. Cables: Vortexion, London, S.W.19.

CP50 Amplifier. A.C. Mains and 12-volt. The CP50 is an all silicon transistor amplifier for mains and 12-volt battery use, with 8Ω-15Ω and 100-volt line output. The amplifier itself has overload or short circuit protection and all inputs have reasonable overload protection. Very large heat sinks are used with good ventilation and it is quite cool running on speech or music peaking 50 watts and even with over 40 watts of continuous sine wave the temperature conditions are not exceeded. The reservoir capacitor has been divided into 4 parts, each fused. The frequency response is within 3 dB from 25 Hz to 20 KHz and bass and treble controls are fitted, of 26 dB sweep each. This is housed in our durable steel case. Size: $18 \times 6 \times 11\frac{1}{2}$ in. Battery consumption 3 amps. Weight: 35 lb. Prices: 1 PU and 2 low Mic. inputs £84. 1 PU and 3 low Mic. inputs £90. 4 low Mic. inputs £92.

All Silicon Mixer Amplifier 20/30 Watt. This is a high fidelity "minimised" distortion transistor amplifier made possible by the latest types of silicon transistors. Since it gives 20 watts at 0·1% harmonic and 0·2% intermodulation distortion and less than 3 times this at 30 watts on $7\frac{1}{2}\Omega$ it is suitable for high quality P.A. or High Fidelity use. No output transformer is fitted in this instance, but full overload protection is provided for this cool running amplifier which is suitable for continuous night and day operation and has a quiescent consumption of less than 4 watts from the mains. In the event of overload the output is instantly switched off until

it ceases without blowing any fuses, the circuit operates far faster than any fuse. The response is within 1 dB from 20 Hz-20 KHz and feedback bass and treble controls have a total range of 24-26 dB each. It can be supplied for balanced line low impedance microphone (or high impedance at reduced prices) and the normal auxiliary or gram at 50 mV on 100K. Price: £35.

30/50 Watt Amplifier. Can deliver 50 watts of speech and music or over 30 watts of continuous sine wave. Main amplifier has response of 30 Hz-20 KHz ±1 dB; 0·15% distortion. Outputs 4, 7·5, 15Ω and 100-volt line. Models are available with two, three, or four mixed inputs for low impedance balance line microphones, pick-up or guitar. Price with 4 mixed inputs: £77.

100 Watt All Silicon Amplifier. This is a high-fidelity amplifier for Audio frequencies featuring a new principle protection circuit, which is automatic on output overload, far faster than any fuse, and of course resetting when the signal is reduced. In addition a thermal cut-out is fitted which automatically switches off should it be possible for any reason to take the heat sinks beyond the safe limits. The large heat sinks are funnel cooled to add efficiency, and when supplying 100 watts power at low to medium frequencies the output transistors only have to dissipate some 18 watts each and they are capable of over 100 watts each. These transistors also have a voltage rating double that required. Large output transistors are not satisfactory above 20 KHz, and since it is not required for audio purposes, the overload limits the power capacity to the safe power available at high frequencies. The response is level from 30 Hz to 15 KHz and 3 dB maximum down at 20 KHz. Outputs are for 8-15 ohms and 100-volt line. Harmonic distortion does not tell the whole story with transistor amplifiers, so in this case only the intermodulation distortion is given which is less than 0·5%. The input required is less than 0·5 volt on 100KΩ. Price: £70.

200 Watt Amplifier. Can deliver its full audio power at any frequency in the range of 30 Hz-20 KHz ±1 dB. Less than 0·2% distortion at 1 KHz. Can be used to drive mechanical devices for which power is over 120 watt on continuous sine wave. Input 1 mW 600Ω. Output 100-120V or 200-240V. Additional matching transformers for other impedances are available. Price: £123 4s.

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WELLINGTON ACOUSTIC LABORATORIES. See Elstone Electronics Ltd.

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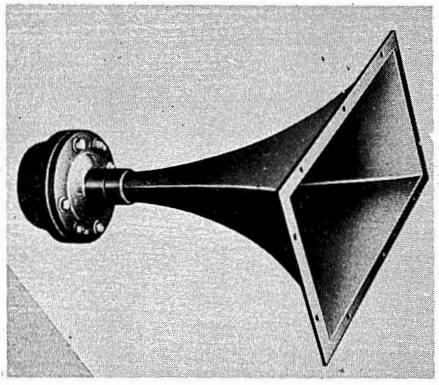
WHARFEDALE. Rank Wharfedale Ltd., Idle, Bradford, Yorkshire. Tel: Bradford 612552. Cables: Wharfdel, Idle, Bradford. Telex: 51407.

●**WHF-20.** Integrated all-transistor stereo amplifier. Inputs: PU (mag) 3·5 mV 47K, PU (cer) 50 mV 47K, tuner 100 mV 100K, mic 2 mV 30K, aux 100 mV 100K, tape 100 mV 100K. Controls: input selector, bass ±15 dB at 40 Hz, treble ±14 dB at 10 KHz, rumble filter −3 dB at 40 Hz, −18 dB at 20 Hz, filter slope variable 0-20 dB per octave above 7 KHz, balance +2 dB to zero on each channel, volume, tape switch, loudness switch, on-off switch. All-silicon transistors. Output: 20W RMS into 8 ohm load. HD <0·2% at rated output. FR 10 Hz-60 KHz −3 dB. Size: 15½ × 13½ × 5 in. Weight: 22½ lb. Mains: 100-250V 50/60 Hz. Finish: oiled teak veneer shelf-mounting cabinet. Price: £75.

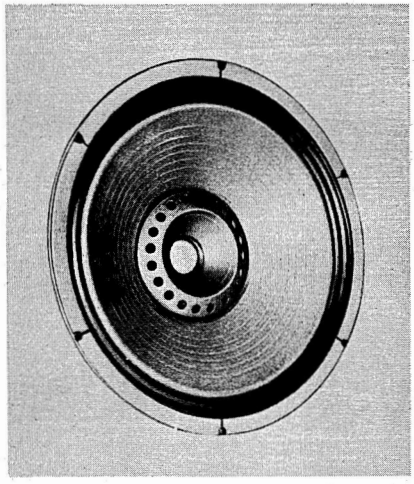
★

WYE ELECTRONICS LTD., Queen Street North, Chesterfield, Derbyshire. Tel: Chesterfield 51116.

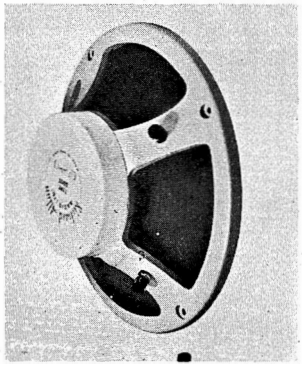
●**Stereo 500.** Transistorised integrated stereo amplifier. Inputs: tape, radio, ceramic pickup. Sensitivity: 50 mV into 1 megohm at 1 KHz for 10W output on all inputs. Output: 10W RMS per channel. Distortion: 1·5% at 10W into 4 ohms. Separation: 40 dB at 1 KHz and 10 KHz at 10W. Bass control +8 dB, −12 dB at 40 Hz. Treble control +3 dB, −8 dB at 12 KHz. FR 40 Hz-30 KHz ±3 dB (tone controls level). 14 transistors. Output impedance: 4-15 ohms. Finish: rosewood or teak veneered shelf mounting cabinet. Size: 15 × 9 × 3½ in. Price: £30 9s.



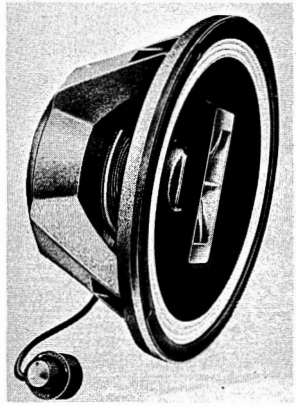
Acustica-Electronica R2T



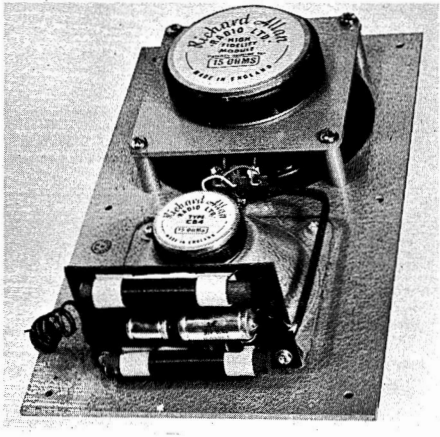
Acustica-Electronica 12DFC



Richard Allan CG 12T



Celestion CX2012 co-axial speaker



Richard Allan mid-range and HF module

Celestion Studio 12

DIRECTORY OF SPEAKERS AND ENCLOSURES

● This directory is divided into two parts. **Part 1** deals with the range of drive units which, by makers' specifications, are within the Hi-Fi classification. **Part 2** deals with complete speaker systems and enclosures. These, as a general rule, embody the drive units of Part 1. For economy of space the following abbreviations are used: **HC**=handling capacity; **FR**=frequency range; **c/o**=cut-off; **vci**=voice coil impedance; **rcf**=recommended crossover frequency (and in Part 2) **Rec**=recommended units; Height by Width by Depth are the order of printed dimensions.

PART 1—DRIVE UNITS

ACUSTICA-ELECTRONICA. Distributors: Britimpex Ltd., 16-22 Great Russell Street, London, W.C.1. Tel: 01-636 7600.

Roselson R1T. Horn tweeter. Copper voice coil. 8 or 15 ohms impedance. Gap flux 14,200 gauss. Total flux 34,000 maxwells. HC 10W RMS. FR 1·5-15 KHz. Size: $2\frac{3}{4} \times 5\frac{3}{4} \times 5$ in. Price: £2 19s. 6d.

Roselson R2T. Mid-range horn. Copper voice coil. 8 or 15 ohms impedance. Gap flux 11,300 gauss. Total flux 41,300 maxwells. FR 450 Hz-8 KHz. HC 12W RMS. Size: $5 \times 9 \times 10\frac{5}{8}$ in. Price: £3 19s. 6d.

Roselson 12 DFC. Bass and mid-range coaxial unit. 12 in. cone. $1\frac{1}{2}$ in. copper voice coil. 8 or 15 ohms. Gap flux 14,300 gauss. Total flux 113,300 maxwells. HC 12W RMS. FR 20 Hz-9·5 KHz. Price: £7 17s. 6d.

Roselson 12 3XL. Full-range triaxial unit. 12 in. cone. Copper voice coil. 8 or 15 ohms. Gap flux 14,300 gauss. Total flux 113,300 maxwells. HC 15W RMS. FR 20 Hz-15 KHz. Price: £15 4s. 6d.

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ADASTRA ELECTRONICS LTD., 167 Finchley Road, Swiss Cottage, London, N.W.3. Tel: 01-624 8164/5.

Top 20. 12 in. heavy duty cone speaker for guitars, electronic music or bass unit in multiple system. Impregnated fibre cone with corrugated surround. Aluminium voice coil, $1\frac{1}{2}$ in. diameter. Impedance 15 ohms. Gap flux 12,000 gauss. Total flux 80,000 maxwells. FR 20 Hz-10 KHz, level over 100 Hz-6 KHz. Bass resonance 80 Hz. Heavy diecast chassis. Dustproof centring device. Price: £5 5s.

Hi-Ten. 10 in. full-range cone speaker. Impedance 15 ohms. Gap flux 10,000 lines. Ceramic magnet. FR 40 Hz-10 KHz. Bass resonance 70 Hz. HC 10W. Price: £2 9s. 6d.

★

RICHARD ALLAN RADIO LTD., Bradford Road, Gomersal, Cleckheaton, Yorkshire. Tel: 0976-2 2442/3. Cables: Acoustics, Bradford.

460TC. 4 in. tweeter. Paper cone. Cambric surround. Voice coil $\frac{9}{16}$ in. Gap flux 6,000 gauss. Total flux 9,000 maxwells. HC 3W. vci 4-8 or 15 ohms. FR 2 KHz-17 KHz. rcf 5 KHz. Price: 19s. 6d. (plus 4s. 1d. PT).

CB8. 8 in. mid-range. Paper cone, doped cambric surround. Voice coil 1 in. Gap flux 12,000 gauss. Total flux 48,000 maxwells. HC 5W. vci 4-8 or 15 ohms. FR 50 Hz-10 KHz. Price: £3 12s. 6d. (plus 15s. 4d. PT).

CB8T. 8 in. paper cone plus tweeter inner. Doped cambric surround. Voice coil 1 in. Gap flux 12,000 gauss. Total flux 48,000 maxwells. HC 5W. vci 4-8 or 15 ohms. FR 50 Hz-15 KHz. Price: £3 15s. (plus 15s. 10d. PT).

CB4 Tweeter. 4 in. paper cone. Cambric surround. Voice coil $\frac{9}{16}$ in. Gap flux 10,000 gauss. Total flux 15,000 maxwells. HC 3W. vci 4-8 or 15 ohms. FR 2 KHz-17 KHz. ref 5 KHz. Price: £1 12s. 6d. (plus 6s. 10d. PT).

CB15. 15 in. paper cone. Doped cambric surround. Voice coil 2 in. Gap flux 14,000 gauss. Total flux 186,000 maxwells. HC 15W. vci 8 or 15 ohms. FR 20 Hz-5 KHz. Price: £15 10s.

CB15 HD. 15 in. paper cone and surround. Voice coil 2 in. Gap flux 14,000 gauss. Total flux 186,000 maxwells. HC 25W. vci 8 or 15 ohms. FR 60 Hz-5 KHz. Price: £15 10s.

CG8T. 8 in. paper cone, doped cambric surround plus tweeter inner. Voice coil 1 in. Gap flux 14,000 gauss. Total flux 56,000 maxwells. HC 6W. vci 4-8 or 15 ohms. FR 50 Hz-17 KHz. Price: £5 7s. 6d. (plus £1 2s. 8d. PT).

CG8. 8 in. paper cone, doped cambric surround. Voice coil 1 in. Gap flux 14,000 gauss. Total flux 56,000 maxwells. HC 6W. vci 4-8 or 15 ohms. Ceramic magnet. FR 45 Hz-10 KHz. Price: £5 5s. (plus £1 2s. 2d. PT).

CG10. 10 in. paper cone, doped cambric surround. Voice coil 1½ in. Gap flux 14,000 gauss. Total flux 105,000 maxwells. HC 10W. vci 4-8 or 15 ohms. FR 40 Hz-6 KHz. Price: £7 (plus £1 9s. 7d. PT).

CG10T. 10 in. paper cone, doped cambric surround plus tweeter inner. Voice coil 1½ in. Gap flux 14,000 gauss. Total flux 105,000 maxwells. HC 10W. vci 4-8 or 15 ohms. FR 40 Hz-15 KHz. Price: £7 5s. (plus £1 10s. 7d. PT).

CG12. 12 in. single paper cone. Doped fabric surround. Voice coil 1½ in. (copper). vci 4-8 or 15 ohms. Gap flux 14,000 gauss. Total flux 105,000 maxwells. Ceramic magnet. HC 10W. FR 25 Hz-9 KHz. ref 1 KHz. Price: £8.

CG12T. 12 in. paper cone plus tweeter inner. Doped fabric surround. Voice coil 1½ in. vci 4-8 or 15 ohms. FR 50 Hz-10 KHz. Price: £8 5s.

CG12 Super. 12 in. paper cone, doped cambric surround. Voice coil 2 in. Gap flux 14,000 gauss. Total flux 186,000 maxwells. HC 15W. vci 8 or 15 ohms. FR 25 Hz-5 KHz. Price: £10 10s.

CG12 Super HD. 12 in. paper cone and surround. Voice coil 2 in. Gap flux 14,000 gauss. Total flux 186,000 maxwells. HC 25W. vci 8 or 15 ohms. FR 60 Hz-5 KHz. Price: £10 10s.

CG15. 15 in. paper cone, doped cambric surround. Voice coil 2 in. Gap flux 17,000 gauss. Total flux 220,000 maxwells. HC 20W. vci 8 or 15 ohms. FR 20 Hz-5 KHz. Price: £17 10s.

CG15 HD. 15 in. paper cone and surround. Voice coil 2 in. Gap flux 17,000 gauss. Total flux 220,000 maxwells. HC 30W. vci 8 or 15 ohms. FR 60 Hz-5 KHz. Price: £17 10s.

CR5. 5 in. paper cone. Neoprene surround. Voice coil 1 in. Gap flux 14,000 gauss. Total flux 56,000 maxwells. HC 6W. vci 4-8 or 15 ohms. FR 30 Hz-10 KHz. Specially designed for use in small volume infinite baffle enclosure. Price: £4 12s. 6d. (plus 19s. 6d. PT).

Richard Allan mid-range and full-range speaker modules are included in Speaker Enclosure section.

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ALTEC LANSING. Distributors: Carston Electronics Ltd., Electra House, Wiggenhall Road, Watford, Herts. Tel: Watford 22272.

Altec Lansing 604E. Dual coaxial full-range speaker unit. 15 in. main cone with 3 in. voice coil, HF radiator with 1¾ in. voice coil. High compliance assembly with cloth surround. LF voice coil copper, HF voice coil aluminium. Impedance: 8 or 16 ohms. Gap flux: LF 13,000 gauss, HF 15,500 gauss. HC 35W (50W peak). FR 20 Hz-22 KHz. Crossover: built-in dual full section 1·5 KHz. Price: approximately £70.

★

AUDIO AND DESIGN LTD., 40 Queen Street, Maidenhead, Berks. Tel: Maidenhead 25204.

TCL Drive Unit. Titanium cone speaker module. 4 in. titanium piston with cantilever suspension. 1½ in. dia voice coil. Total flux 160,000 maxwells. Mean hemispherical power response substantially level to —15 KHz. Voice coil impedance: 7·5 ohms at 400 Hz. HC 15W RMS at and above the lower system limit (dependent upon loading conditions), 30W music rating, i.e. under normal use. Price: £18 15s.

★

BAKER REPRODUCERS LTD., Bensham Manor Road Passage, Thornton Heath, Surrey. Tel: Thornton Heath 1665.

Stalwart. Full range 12 in. cone speaker. Paper cone with roll surround. Voice coil 1½ in. Copper voice coil. Impedance 3 or 15 ohms. Gap flux 12,000 gauss. HC 15W. RMS. FR 45 Hz-13 KHz. Price: £5 5s.

Major. Full range 12 in. speaker with built-in tweeter cone. 14,000 gauss magnetic gap. FR 40 Hz-14·5 KHz. HC 20W RMS. Impedance 15 ohms. Cast aluminium chassis. Weight: 6 lb. Price: £8.

Deluxe Mk II. Full range 12 in. cone speaker. 15W RMS. Bass resonance 32-38 Hz. Gap flux 14,000 gauss. Copper voice coil 1½ in. diameter. Impedance 15 ohms. Paper cone with foam plastic surround. Built-in tweeter cone. FR 25 Hz-16 KHz. Cast aluminium chassis. Depth 6 in. Weight: 6 lb. Price: £9.

Superb Twelve. Full range 12 in. speaker with built-in tweeter cone. Rubber roll surround. Coil diameter: 1½ in. Impedance 15 ohms. Gap flux 16,500 gauss. HC 20W RMS. FR 20 Hz-17 KHz. Bass resonance 22-26 Hz. Aluminium speech coil. Diecast aluminium chassis. Weight: 10 lb. Price: £16.

Bass Auditorium 12. Medium range 12 in. cone speaker suitable for bass unit in multi-speaker system. HC 25W RMS. Bass resonance 36-45 Hz. Gap flux 15,000 gauss. Copper voice coil 1½ in. diameter. Impedance 15 ohms. FR 25 Hz-12 KHz. Paper cone with roll surround. Cast aluminium chassis. Depth 7 in. Weight: 10 lb. Price: £12 10s.

Bass Auditorium 15. High power 15 in. speaker suitable for bass unit in multi-speaker unit. HC 35W RMS. Similar specification to Auditorium 12 except 2 in. diameter voice coil and handling capacity 35W RMS. Depth: 8 in. Weight: 15 lb. Price: £18.

Laboratory Standard 12. Full range 12 in. speaker employing patented differential wave impedance cone. Resin-impregnated paper cone with central metallic ellipse. 1½ in. diameter aluminium voice coil. Rubber roll surround. Impedance 15 ohms. Gap flux 15,000 gauss. HC 15W RMS. FR 20 Hz-20 KHz. Bass resonance 22-27 Hz. Price: £22 10s.

Laboratory Standard 15. Medium range 15 in. speaker employing patented differential wave impedance cone. Resin-impregnated paper cone with central metallic ellipse. Foam plastic surround. 2 in. diameter copper voice coil. Impedance 15 ohms. Cast aluminium chassis. Gap flux 15,000 gauss. HC 20W RMS. FR 20 Hz-12 KHz. Bass resonance 18-25 Hz. Price: £28 10s.

Group 25. 12 in. cone speaker with heavy duty suspension for electronic music, guitars, etc. HC 25W RMS. Impedance 15 ohms. Bass resonance 80 Hz. FR 30 Hz-10 KHz. Gap flux 12,000 gauss. Voice coil 1½ in. Depth: 6 in. Weight: 5 lb. Price: £5 5s.

Group 35. 12 in. cone speaker with heavy duty suspension for electronic music, guitars, etc. HC 35W RMS. Impedance 15 ohms. Bass resonance 80 Hz. FR 30 Hz-10 KHz. Gap flux 14,000 gauss. Voice coil 1½ in. Depth: 6¼ in. Weight: 6 lb. Price: £8 18s. 6d.

Group 50. 15 in. cone speaker with heavy duty suspension for electronic music, guitars, etc. HC 50W RMS. Impedance 15 ohms. Bass resonance 80 Hz. FR 30 Hz-10 KHz. Gap flux 17,000 gauss. Voice coil 2 in. Depth: 8 in. Weight: 15 lb. Price: £18 18s.

★

BURNE-JONES & CO. LTD., 18 Brunswick Road, Sutton, Surrey.

B.J. Treble 20. Omni-directional multi-horn. One 4 in. unit. Crossover built-in. Response 1-18 KHz. Size: 6 × 5 in. Weight: 1½ lb. Price: £3.

B.J. Treble Twin. Omni-directional horn. Two 4 in. drive units. Crossover included. Response 900 Hz-18 KHz. Size: 9 × 4¾ × 6 in. Weight: 2 lb. Price: £5 10s.

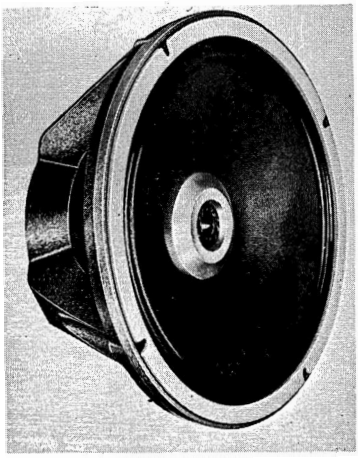
★

CELESTION LTD., Ferry Works, Thames Ditton, Surrey. Tel: 01-398 3402. Cables: Voicecoil, Thames Ditton.

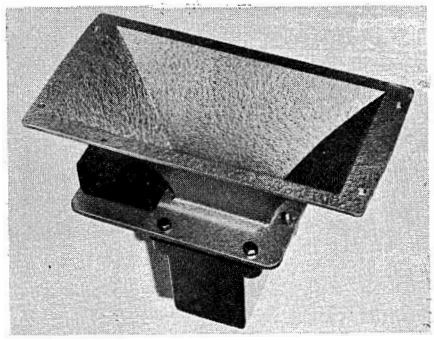
Studio Series CX1512. 12 in. coaxial unit comprising paper cone bass speaker and pressure driven tweeter. Plastaflex surround. Bass voice coil 1¾ in. diameter, treble voice coil ¾ in. diameter, both copper wound. Imp 15 ohms. Gap flux 13,000 gauss. Total flux 88,000 maxwells. HC 15W. FR 30 Hz-15 KHz. Price: £12 19s. 6d.

Studio Series CX2012. 12 in. coaxial unit comprising paper cone bass speaker and pressure driven tweeter. Hi-flex free surround. Bass voice coil 1¾ in. diameter copper wound, treble voice coil 1 in. diameter aluminium wound. Imp 15 ohms. Gap flux 17,000 gauss. Total flux 180,000 maxwells. HC 20W. FR 30 Hz-18 KHz. Price: £18 18s.

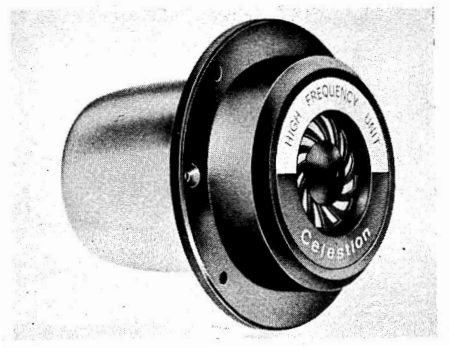
Studio 12. 12 in. bass drive designed specially for use with HF1300 Mk 2 and CO3K crossover. Paper cone with ultra compliant rubber surround. Voice coil diameter 1¾ in. Imp 15 ohms. Total flux 88,000 maxwells. HC 15W RMS. FR 30 Hz-5 KHz. Rec crossover 3 KHz. Rigid die-cast chassis. Enclosure details on request. Price: £10 17s. 6d.



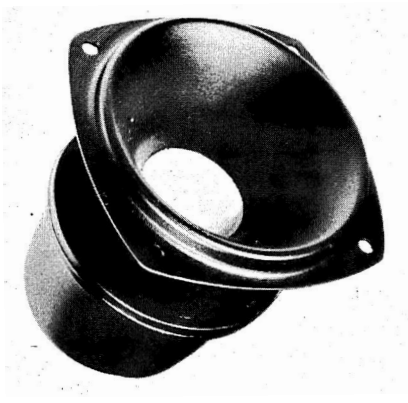
Celestion CX1512 co-axial speaker & tweeter



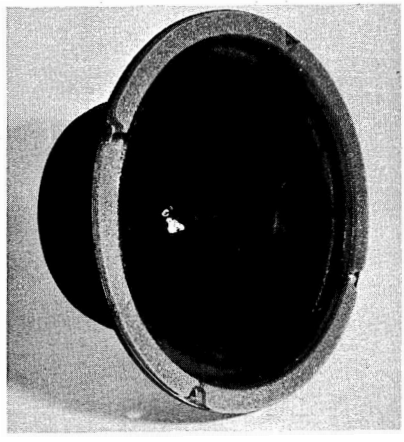
Decca DK30 ribbon speaker



Elac type 50/12



Eagle CT10 horn tweeter



Eagle FR8

HF1300 Mk 2. High frequency 3 in. tweeter. Impedance 15 ohms at 10 KHz. HC 5W RMS. Suitable for use with systems up to 20W. FR 2 KHz-15 KHz. Rec crossover 3 KHz. Styled with flange to give easy and accurate mounting. Phase correction plate for improved polar response. Self-aligning diaphragm. Contoured pole piece. Damped acoustic cavity to reduce fundamental diaphragm resonance. High flux magnet. Price: £5 18s. 6d.

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DECCA SPECIAL PRODUCTS, Ingate Place, Queenstown Road, London, S.W.8. Tel: 01-622 6677.

Decca DK30 Ribbon. Horn-loaded high frequency ribbon speaker. Size: $6\frac{1}{2} \times 3\frac{1}{2} \times 2$ in. Aluminium ribbon element. Impedance 8 ohms constant. HC 30W maximum. FR 2·5 KHz-25 KHz. rcf 2·5 KHz. Price: £12 12s.

Decca DK1/8 Bass Unit. Cone speaker designed for bass use. Size: $12\frac{3}{4} \times 6$ in. Impregnated paper cone. Impregnated fibre surround. 2 in. voice coil. Copper voice coil. Impedance 8 ohms at 400 Hz. Gap flux 14,000 gauss. Total flux 250,000 maxwells. HC 30W. FR 30 Hz-5 KHz. rcf 2·5 KHz. Price: £14.

Decca Mark Ten. Compact bass unit. 6 in. cone. Rigid piston diaphragm of expanded thermo-setting resin. Doped polyester concertina surround. 2 in. voice coil. Impedance 8 ohms. Gap flux 14,000 gauss. Total flux 25,000 maxwells. HC 15W. FR 20 Hz-3 KHz. Price: £12 12s.

Kelly LF driver Mk VII. 15 in. direct radiator. Curvilinear impregnated paper cone. Doped fabric concertina surround. Imp 15 ohms at 400 Hz. Gap flux 17,000 gauss. Total flux 350,000 maxwells. HC 50W. FR 30 Hz-5 KHz. rcf 2·5 KHz. Price: £20.

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EAGLE PRODUCTS. Distributors: B. Adler & Sons (Radio) Ltd., 32a Coptic Street, London, W.C.1. Tel: 01-636 9066/7. Cables: Reldab, London.

8CX.50. Twin unit comprising 8 in. woofer and horn tweeter. Roll surround. Imp 16 ohms, Woofer 10,500 gauss, tweeter 12,000 gauss. HC 15W. FR 30 Hz-22 KHz. Resonant frequency 30 Hz. Crossover 3 KHz. Price: £10 19s. 4d. (plus £2 0s. 2d. PT).

CT10 Horn Tweeter. $3\frac{1}{4}$ in. Aluminium cone and surround. Voice coil 1 in. (aluminium). vci 16 ohms. HC 10W. FR 1·5-18KHz. rcf 3 KHz. Price: £1 11s. 6d.

HT20 Rectangular Horn Tweeter. 4×2 in. Aluminium cone. Voice coil 1 in. (aluminium). vci 16 ohms. Gap flux 13,500 gauss. HC 20W. FR 1·5 KHz-18 KHz. rcf 3 KHz. Price: £4 15s.

FR.4. High-compliance full-range 4 in. unit. FR 40 Hz-16 KHz. Bass resonance 60-70 Hz. HC 5W RMS. Flux density: over 10,000 gauss. Impedance: 16 ohms. Baffle opening: $3\frac{1}{2}$ in. Depth: 2 in. Price: £2 19s. 5d. (plus 10s. 5d. PT).

FR.65. High-compliance full-range $6\frac{1}{2}$ in. unit. FR 30 Hz-18 KHz. HC 10W. Flux density: over 11,000 gauss. Impedance: 16 ohms, Baffle opening: $5\frac{3}{8}$ in. Depth: $2\frac{3}{4}$ in. Price: £4 12s. 10d. (plus 17s. 2d. PT).

FR.8. High-compliance full-range 8 in. unit. FR 30 Hz-20 KHz. Bass resonance 30-50 Hz. HC 15W RMS. Flux density: over 12,000 gauss. Impedance: 16 ohms. Baffle opening: $6\frac{3}{4}$ in. Depth: $3\frac{3}{8}$ in. Price: £5 9s. 6d. (plus £1 0s. 6d. PT).

HT.15. High frequency horn unit. FR 2 KHz-18 KHz. Impedance 16 ohms. HC 15W music. rcf 3 KHz. Flux density 13,000 gauss. Baffle hole required $2\frac{1}{8}$ in. Price: £2 19s. 6d.

Prices quoted for Eagle Products are approximate.

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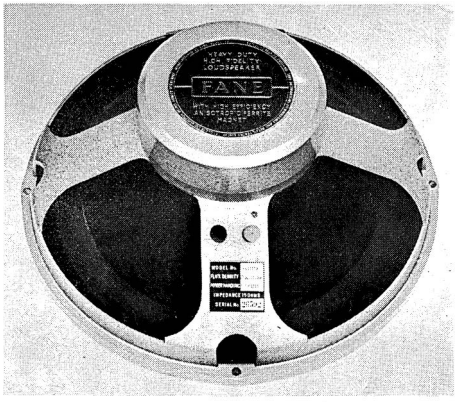
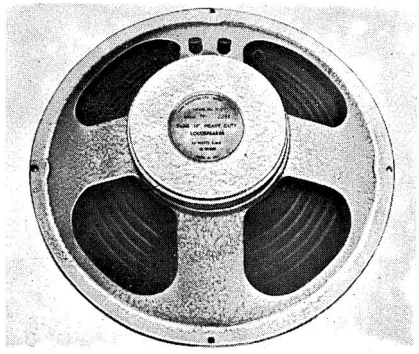
ELAC. Electro Acoustic Industries Ltd., Stamford Works, Broad Lane, Tottenham, London, N.15. Tel: 01-808 0505/9. Cables: Elac, London, N.15.

Elac Type 8N/148 (N/832). 8 in. Exponential paper cone. Paper surround, integral with cone. Voice coil 1 in. copper. vci 15 ohms. Gap flux 12,000 gauss. Total flux 48,300 maxwells. HC 5 watts. FR 55 Hz-11 KHz (loaded conditions). rcf (high frequency) 8 KHz. Price: £2.15s. (plus 10s. 6d. PT).

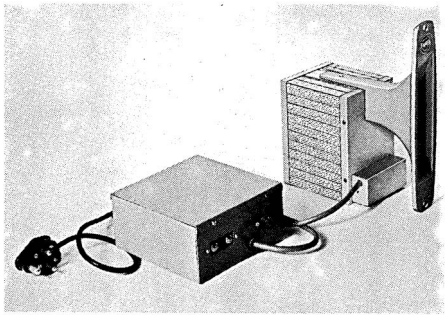
Elac 8N/148 Mk II (8N/185). Similar to type 8N/148 except frequency response 40 Hz-12 KHz. Price: £3 5s. (plus 13s. 11d. PT).



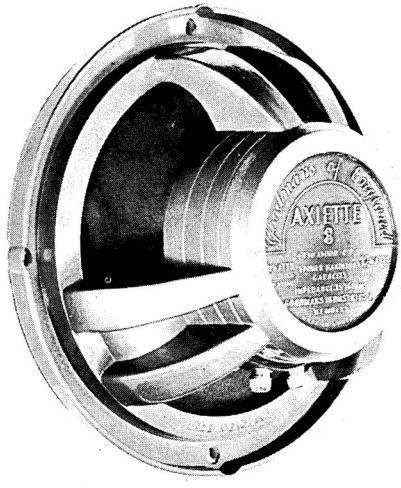
Fane 152/17A speaker



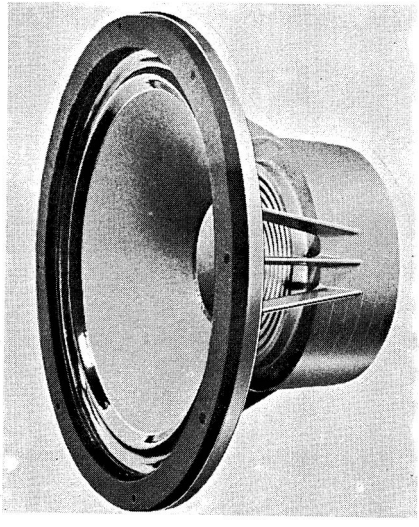
Fane model 152/17



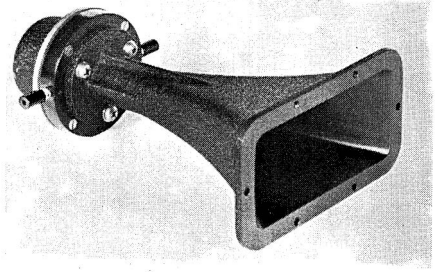
Fane Ionofane 601 HF driver



Goodmans Axiette 8



Goodmans Audiom 81



Goodmans Midax 650

Elac 50/12 (Ceramic magnet). 8 in. Exponential paper cone, plus inner cone. Paper-plasticised surround. Voice coil 1 in. copper. vci 3 ohms. Gap flux 10,000 gauss. Total flux 40,300 maxwells. HC 5 watts. FR 55 Hz-12 KHz. ref (high frequency) 8 KHz. Price: £3 9s. 2d. (including PT).

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ELECTROSTATIC TRANSDUCER MFG. CO. See L. G. Woollett & Co. Ltd.

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EMI SOUND PRODUCTS LTD., Hayes, Middlesex. Tel: 01-573 3888. Cables: Emisound, London.

92390 PAL. $13\frac{1}{2} \times 8\frac{1}{8}$ in. elliptical. Paper main-cone/aluminium centre-cone. Paper surround. Voice coil 1 in. copper wire. vci 3 ohms. Gap flux 11,000 gauss. Total flux 43,500 maxwells. HC 10W. FR 40 Hz-7 KHz. rcf 6 KHz. Price on application.

92390 PBL. Details as for PAL. vci 15 ohms.

92390 PEL. $13\frac{1}{2} \times 8\frac{1}{8}$ in. elliptical. Paper main cone/aluminium centre cone. PVC surround. Voice coil 1 in. copper wire. vci 3 ohms. Gap flux 13,000 gauss. Total flux 69,000 maxwells. HC 10W. (20W version also available.) FR 20 Hz-5 KHz. rcf 4·5 KHz. Price on application.

92390 PFL. Details as for PEL. vci 15 ohms.

Four other versions with impedances 3-15 ohms and handling capacity 10-20 watts.

92390 PE. Combination loudspeaker: $13\frac{1}{2} \times 8\frac{1}{8}$ in. elliptical with $3\frac{1}{2}$ in. dia tweeter. Paper main-cone/aluminium centre-cone/paper tweeter. PVC surround. Voice coil 1 in. copper wire. vci 3 ohms. Gap flux 13,000 gauss. Total flux 69,000 maxwells. HC 10W. FR 20 Hz-20 KHz. rcf 5 KHz. LC filter mounted on chassis. Price on application.

92390 PF. Details as for PE. vci 15 ohms. HC 20W.

Six other versions with impedances 3-15 ohms and handling capacity 10-20 watts. Details and prices on request.

97492 J. $2\frac{1}{2}$ in. hard PVC cone. Voice coil $\frac{1}{2}$ in. copper wire. vci 3 ohms. Gap flux 8,500 gauss. HF unit. FR 5 KHz-15 KHz. rcf 6 KHz. Price on application.

97492 E. Details as for Model J. vci 8 ohms.

97492 C. Details as for Model J. vci 15 ohms.

99110 N. $3\frac{3}{8}$ in. curved paper diaphragm. Paper surround. Voice coil $\frac{1}{2}$ in. copper wire. vci 3 ohms. Gap flux 10,000 gauss. HF unit. FR 3 KHz-20 KHz. rcf 4·5 KHz. Price on application.

99110 J. Details as for Model N. vci 8 ohms.

99110 M. Details as for Model N. vci 15 ohms.

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FANE ACOUSTICS LTD., Hick Lane, Batley, Yorks. Tel: Batley 2114. Cables: Fane, Batley.

301. 3 in. HF unit. Gap flux 17,000 gauss. Useful range 1·5 KHz-18 KHz. Impedance: 8-15 ohms. HC 15W instantaneous peak. Price: £4 10s.

501. 5 in. mid-range unit. Gap flux 15,000 gauss. Total flux 60,000 maxwells. HC 20W. 1 in. diameter aluminium voice coil. Impedance 15 ohms. Rigid cone with neoprene surround. FR 400 Hz-5 KHz. rcf 800 Hz and 3·5 KHz. Price: £5 5s. (plus £1 3s. PT).

505. Similar to 501 but with 11,000 gauss magnet and HC 15W. Price: £3 15s. (plus 16s. 5d. PT).

502. 5 in. full-range unit for small enclosures. Gap flux 15,000 gauss. Total flux 60,000 maxwells. HC 8W. 1 in. copper voice coil. Price: £5 5s. (plus £1 3s. PT).

506. Similar to 502 but with 11,000 gauss magnet and HC 7W. Price: £3 15s. (plus 16s. 5d. PT).

801. 8 in. full-range unit. 1 in. pole piece with 15,000 gauss magnet. Twin cone. Aluminium voice coil. Resonance 25 Hz. Response up to 15 KHz. Price: £5 12s. 6d. (plus £1 4s. 8d. PT).

802. 8 in. unit similar to 801 but with single cone and copper voice coil. Resonance 70 Hz. Response up to 10 KHz. Price: £5 2s. 6d. (plus £1 2s. 6d. PT).

805. 8 in. unit similar to 801 but with 11,000 gauss magnet. Price: £4 10s. (plus 19s. 9d. PT).

806. 8 in. unit similar to 802 but with 11,000 gauss magnet. Price: £4 (plus 17s. 7d. PT).

101/10. 10 in. ceramic magnet unit with 2 in. voice coil. HC 15W RMS. Impedance 15 ohms. Main resonance 60 Hz. Gap flux 10,000 gauss. Total flux 100,000 maxwells. Single cone, copper voice coil. FR 40 Hz-10 KHz. Price: £5 5s. (plus £1 3s. PT).

101/10a. Similar to 101/10 but with twin cone, aluminium voice coil and FR 40 Hz-15 KHz. Price: £5 15s. (plus £1 5s. 3d. PT).

101/12. Similar to 101/10 but with 12,000 gauss magnet. Price: £6 6s. (plus £1 7s. 8d. PT).

101/12a. Similar to 101/12 but with twin cone, aluminium voice coil and FR 40 Hz-15 KHz. Price: £6 16s. (plus £1 9s. 10d. PT).

101/14. Similar to 101/10 but with 14,000 gauss magnet. Price: £8 8s. (plus £1 16s. 10d. PT).

101/14a. Similar to 101/14 but with twin cone, aluminium voice coil and FR 40 Hz-15 KHz. Price: £8 18s. (plus £1 19s. 1d. PT).

1001. 10 in. full-range unit. 1 in. dia pole piece with 15,000 gauss magnet. Twin cone. Aluminium voice coil. Resonance 22 Hz. Response up to 15 KHz. HC 10W. Price: £6 6s. (plus £1 7s. 8d. PT).

1002. 10 in. unit similar to 1001 but with single cone and copper voice coil. Resonance 60 Hz. Response up to 10 KHz. Price: £5 15s. (plus £1 5s. 3d. PT).

1005. 10 in. unit similar to 1001 but with 11,000 gauss magnet. Price: £5 5s. (plus £1 3s. PT).

1006. 10 in. unit similar to 1002 but with 11,000 gauss magnet. Price: £4 15s. (plus £1 0s. 10d. PT).

122/10. 12 in. ceramic magnet unit with 2 in. diameter voice coil. HC 20W RMS. Impedance 15 ohms. Main resonance 40 Hz or 70 Hz as required. FR 30 Hz-5 KHz. Gap flux 10,000 gauss. Total flux 100,000 maxwells. Copper voice coil. Single cone. Price: £6 6s.

122/10a. Similar to 122/10 but with twin cone, aluminium voice coil and FR 30 Hz-15 KHz. Price: £6 16s. 6d.

122/12. Similar to 122/10 but with 12,000 gauss magnet. Price: £8 8s.

122/12a. Similar to 122/12 but with twin cone, aluminium voice coil and FR 30 Hz-15 KHz. Price: £8 18s. 6d.

122/14. Similar to 122/10 but with 14,000 gauss magnet and HC 22W. Price: £10 10s.

122/14a. Similar to 122/14 but with twin cone, aluminium voice coil and FR 30 Hz-15 KHz. Price: £11 0s. 6d.

122/17. Similar to 122/10 but with 17,000 gauss magnet, 25W handling capacity and FR 25 Hz-6 KHz. Price: £12 17s. 6d.

122/17a. Similar to 122/17 but with twin cone, aluminium voice coil and FR 30 Hz-17 KHz. Price: £13 8s.

152/12. 15 in. ceramic magnet unit with 2 in. diameter voice coil. HC 25W RMS. Impedance 15 ohms. Main resonance 32 Hz. Gap flux 12,000 gauss. Total flux 160,000 maxwells. Copper voice coil. Single cone. FR 25 Hz-2·5 KHz. Price: £13 13s.

Ionofane 601. Ionic high-frequency speaker unit. FR level 2·5 KHz-30 KHz. Will handle high note portion of 20W music signal. Impedance 15 ohms. Mains power required: 200/220/240V AC at 55W. Price: £29 8s.

152/12a. Similar to 152/12 but with twin cone, aluminium voice coil and FR 30 Hz-15 KHz. Price: £14 3s. 6d.

152/14. Similar to 152/12 but with 14,000 gauss magnet, HC 27W and FR 25 Hz-3·5 KHz. Price: £15 15s.

152/17. Similar to 152/12 but with 17,000 gauss magnet, HC 30W RMS, and FR 25 Hz-4 KHz. Price: £18 18s.

152/17a. Similar to 152/17 but with aluminium voice coil, twin cone and FR 30 Hz-17 KHz. Price: £19 8s. 6d.

153. 15 in. extra heavy duty unit with ceramic magnet and 3 in. diameter voice coil. Gap flux 14,500 gauss. Total flux 375,000 maxwells. HC 40W RMS. Copper voice coil. Single cone. FR 30 Hz-3·5 KHz. Impedance 15 ohms. Main resonance 40 Hz. Weight: 20 lb. Price: £21.

183. 18 in. extra heavy duty unit with ceramic magnet and 3 in. diameter voice coil. Gap flux 14,500 gauss. Total flux 375,000 maxwells. HC 60W. Copper voice coil. Single cone. FR

20 Hz-3 KHz. Impedance 15 ohms. Main resonance 30 Hz. Weight: 22 lb. Price: £25 4s.

Special low resonance versions of 10 in., 12 in., 15 in. and 18 in. speakers are available at slightly higher prices. These are intended for use as bass units in high fidelity bass systems. They have rigid moulded fibre cones with rubber surround allowing free axial movement. Must be used in suitable reflex or infinite baffle cabinets. Not recommended for use with electric guitars or with small open baffles.

★

GOODMANS LOUDSPEAKERS LTD., Axiom Works, Wembley, Middx. Tel: 01-902-1200. Cables: Goodaxiom, Wembley.

Axiette 8. 8 in. Paper cone. Plastic treated surround. Voice coil 1 in. Gap flux 13,500 gauss. Total flux 53,000 maxwells. HC 6W. vci 15 ohms. FR 40 Hz-15 KHz. Price: £5 15s. (plus £1 4s. 7d. PT).

Twin Axiette 8. 8 in. twin version of Axiette 8. FR 40 Hz-18 KHz. Mechanical crossover at 2 KHz. Other details as for Axiette 8. Price: £6 10s. (plus £1 7s. 10d. PT).

Axiom 10. 10 in. Paper cone. Plastic treated surround. Voice coil 1 in. Gap flux 13,500 gauss. Total flux 53,000 maxwells. HC 10W. vci 15 ohms. FR 40 Hz-15 KHz. Price: £6 16s. (plus £1 9s. 1d. PT).

Axiom 80. 9½ in. Twin Diaphragm paper cone, free edge surround. Voice coil 1 in. Gap flux 17,000 gauss. Total flux 62,000 maxwells. HC 6W. vci 15 ohms. FR 20 Hz-20 KHz. Price: £20 2s. (plus £4 6s. PT).

Trebax. Horn-loaded pressure tweeter. Aluminium diaphragm. Voice coil 1 in. HC suitable for inclusion in systems of up to 25W. vci 15 ohms at 10 KHz. FR 2·5 KHz-20 KHz. rcf 5 KHz. Price: £7 9s.

Trebax 5K/20XL. Horn loaded pressure tweeter. Built in L/C crossover (5 KHz) and attenuator. Suitable for inclusion in systems of up to 20W. Dispersion angle 90°. Price: £8 8s.

Midax 650. Horn loaded pressure unit. Resin impregnated linen diaphragm. Diecast horn. Voice coil 1½ in. HC suitable for systems up to 25W. vci 15 ohms. FR 650 Hz-8 KHz. rcf 950 Hz, 5 KHz. Price: £11 4s.

Audiom 51 bass. 12 in. Paper cone. Voice coil 1¾ in. (4·4 cm). vci 15-16 ohms. Gap flux 13,000 gauss. Total flux 87,500 maxwells. HC 15W. Fundamental resonance 35 Hz. Price: £11 6s.

The Audiom 51 is available in two versions: Audiom 51 Bass—details as above, for use as bass unit in high fidelity systems. Audiom 51 Standard (50 Hz) for PA, guitars and all arduous conditions. Same price as above.

Audiom 61 bass. 12 in. Paper cone. Voice coil 1¾ in. (4·4 cm). vci 15-16 ohms. Gap flux 16,500 gauss. Total flux 185,000 maxwells. HC 20W. Fundamental resonance 35 Hz. Price: £16 7s.

The Audiom 61 is available in two versions: Audiom 61 Bass—details as above, for use as bass unit in high fidelity systems. Audiom 61 Standard (50 Hz) for PA, guitars and all arduous conditions. Same price as above.

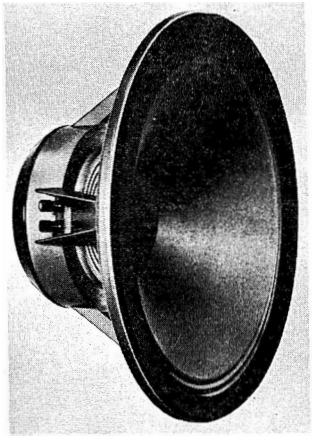
Axiom 201. 12 in. Twin diaphragm paper cone with pure plastic roll suspension. Voice coil 1¾ in. (4·4 cm) (aluminium). vci 15-16 ohms. Gap flux 13,000 gauss. Total flux 87,500 maxwells, HC 15W. FR 30 Hz-16 KHz. Built-in mechanical crossover at 5 KHz. Price: £12 10s.

Axiom 301. 12 in. twin diaphragm paper cone with pure plastic roll suspension. Voice coil 1¾ in. (4·4 cm) (aluminium). vci 15-16 ohms. Gap flux 16,500 gauss. Total flux 185,000 maxwells. HC 20W. FR 30 Hz-16 KHz. Built-in mechanical crossover of 5 KHz. Price: £17 18s.

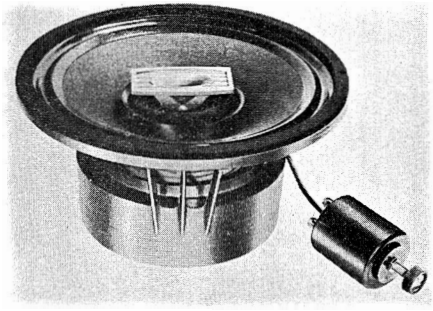
Triaxiom 1220C. Three-way speaker assembly comprising 12 in. bass cone, a mid-range radiator, and a pressure driven horn-loaded HF unit with independent magnet system. Bass cone paper with pure plastic edge, mid-range cone bakelised paper, HF unit aluminium horn. Bass voice coil 1¾ in. diameter copper wound, HF voice coil 1 in. diameter aluminium wound. Imp 15 ohms. Main gap flux 16,500 gauss. Total main gap flux 185,000 maxwells. HC 20W. FR 30 Hz-20 KHz. Built-in crossover at 2 KHz to mid-range unit and at 5 KHz to HF unit. Price: £21 15s.

Triaxiom 212C. Same specification as Triaxiom 1220C but with handling capacity 15W and total main flux 87,500 maxwells. Price: £16 18s.

Audiom 81 bass. 15 in. Paper cone. Pure plastic roll suspension. Voice coil 3 in. (7·6 cm). vci 15-16 ohms. Gap flux 14,000 gauss. Total

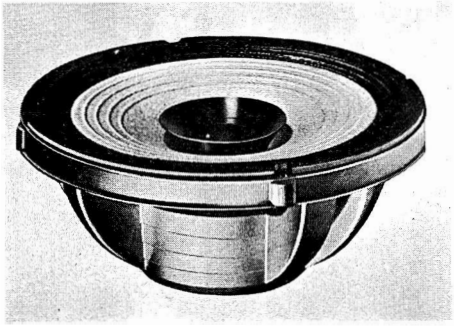


Goodmans Audiom 91 (18in.)

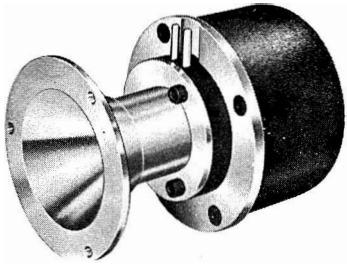


Goodmans Triaxiom 1220C

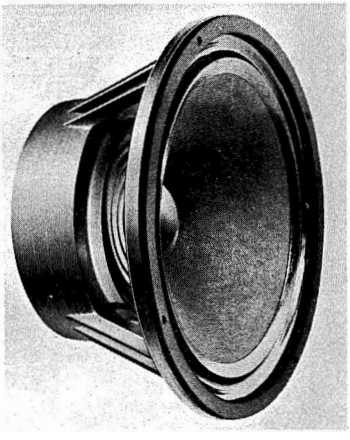
Goodmans Axiom 301



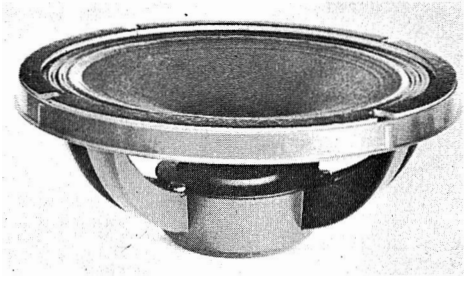
Goodmans Twin Axiette 8



Goodmans Trebax HF unit



Goodmans Audiom 51



Goodmans Axiom 10

flux 269,000 maxwells. HC 25W. Fundamental resonance 30 Hz. Price: £27 12s.

The Audiom 81 is also available in 60 Hz version for special purposes.

The Audiom 81 bass (details above) with 30 Hz fundamental resonance is specially designed for use as the bass unit in a multiple system (with Midax and Trebax). In this case it must be mounted in the correct size of enclosure.

Audiom 91 bass. 18 in. Paper cone. Voice coil 3 in. diameter. Imp 15-16 ohms. Gap flux 14,000 gauss. Total flux 269,000 maxwells. HC 50W. Fundamental resonance 30 Hz. Price: £31 5s.

The Audiom 91 is also available with a resonance of 55 Hz (Standard version) for especially arduous conditions, PA, bass guitars, etc. Price as above.

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GRAMPIAN REPRODUCERS LTD., Hanworth Trading Estate, Middx. Tel: 01-894 9141. Cables: Reamp, Feltham.

Grampian 1255/15. 12 in. Paper impregnated cone and surround. Voice coil $1\frac{3}{4}$ in. Gap flux 14,500 gauss. Total flux 130,500 maxwells. HC 10W. vci 15 ohms. FR 35 Hz-15 KHz. Price: £11 15s.

T.C.12. 12 in. twin cone. Paper cones with plastic treated surround. Voice coil $1\frac{3}{4}$ in. diameter. Long type voice coil. Imp 15 ohms. Gap flux 14,500 gauss. Total flux 130,500 maxwells. HC 10W. FR 35 Hz-15 KHz. Price: £12 10s.

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JORDAN-WATTS. Distributors: Boosey and Hawkes (Sales) Ltd., Sonorous Works, Deansbrook Road, Edgware, Middlesex. Tel: 01-952 7711.

Jordan-Watts Module Mk II. 6 in. square frame. Aluminium diaphragm with plastic surround. Voice coil $1\frac{1}{2}$ in. Ceramic magnet. Impedance 3-5 ohms and $7\frac{1}{2}$-16 ohms. HC 12W. FR 25 Hz-20 KHz. Price: £11.

★

KEF ELECTRONICS LTD., Tovil, Maidstone, Kent. Tel: Maidstone 57258. Cables: KEF, Maidstone.

B139. 13 × 9 in. Exp plastic and aluminium cone. Neoprene surround. Voice coil 2 in. (copper). vci 8-16 ohms. Gap flux 10,500 gauss. Total flux 137,000 maxwells. HC 15W. FR 30 Hz-4 KHz. rcf 1 KHz. Price: £11 10s.

T15 tweeter. $1\frac{1}{2}$ in. Melinex dome. Centre pole. Alcomax magnet. Melinex surround. Voice coil $1\frac{1}{2}$ in. (aluminium). vci 8-16 ohms. Gap flux 12,000 gauss. Total flux 43,000 maxwells. HC 15W. Treble only. FR 800 Hz-20 KHz. rcf 1 KHz. Price: £6.

B1814. 18 × 14 in. Exp plastic and aluminium cone. Plastic coated cloth surround. Voice coil 2 in. copper. vci 8-16 ohms. Gap flux 12,700 gauss. Total flux 165,000 maxwells. HC 25W. FR 20 Hz-2 KHz. rcf 500 Hz. Price: £19.

K2 Baffle. Two units. Baffle size $22\frac{1}{2} \times 13\frac{1}{2}$ in. Unit 1: 13 × 9 in.; plastic and aluminium cone; neoprene surround; voice coil 2 in. copper. Gap flux 10,500 gauss; total flux 137,000 maxwells. Unit 2: $1\frac{1}{2}$ in. Melinex dome; Melinex surround; voice coil $1\frac{1}{2}$ in. copper. Gap flux 12,000 gauss. Total flux 43,000 maxwells. Both units: vci 8-16 ohms. HC 15W. FR 30 Hz-20 KHz. rcf 1 KHz. Price: £24.

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KELLY. See Decca Special Products.

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LOWTHER MANUFACTURING CO., Lowther House, St Mark's Road, Bromley, Kent. Tel: 01-460 5225. Cables: Lowther, Bromley.

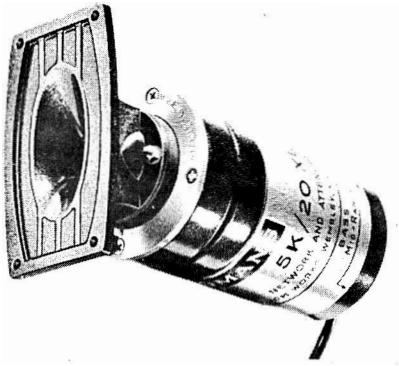
P.M.6. 6 in. Selected paper cone. Plastic surround. Voice coil 39 mm. Gap flux 17,500 gauss. Total flux 196,000 maxwells. HC 6W; 20W. programme material. vci 16 ohms. FR 30 Hz-20 KHz. Price: £20 10s.

P.M.6S. As P.M.6 but with stand mounting. Price: £20 10s.

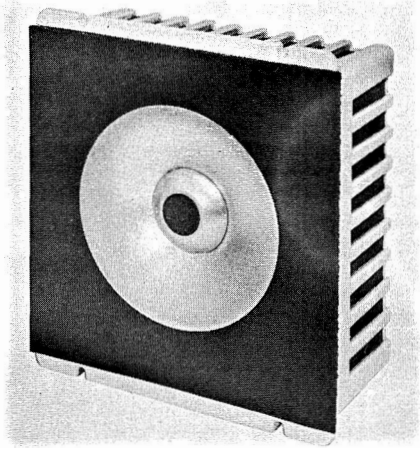
P.M.7. 6 in. Selected paper cone. Plastic surround. Voice coil 39 mm. Gap flux 19,650 gauss. Total flux 250,000 maxwells. HC 6W; 20W programme material. vci 16 ohms. FR 30 Hz-20 KHz. Price: £31.

P.M.7S. As P.M.7 but with stand mounting. Price: £31.

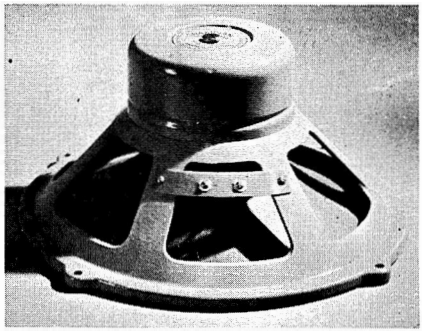
P.M.2 Mk I. 6 in. Selected paper cone. Plastic surround. Voice coil 39 mm. Gap flux 21,000 lines per sq cm. Total flux 281,000 maxwells. HC 6W; 20W programme material. vci 15 ohms. FR 30 Hz-20 KHz. Price: £32 5s.



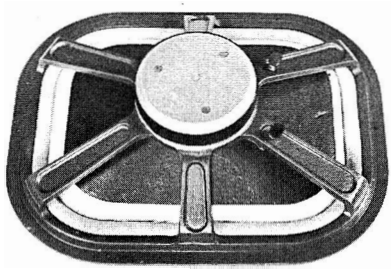
Goodmans Trebax 5K/20 XL



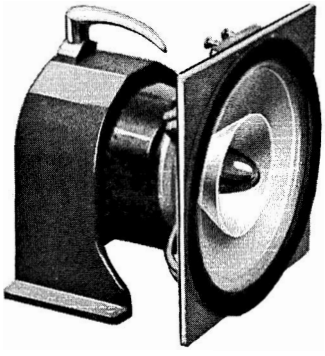
Jordan-Watts speaker drive module



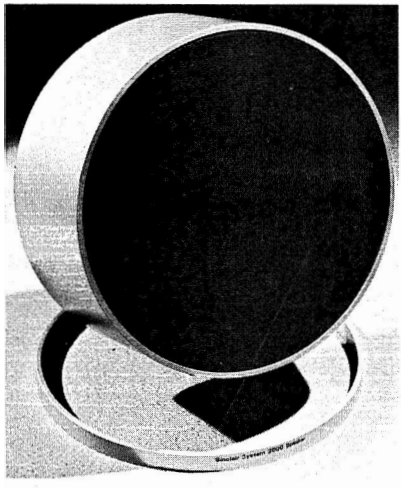
Grampian 1255/15



KEF B1814



Lowther PM6



Sinclair System 2000

P.M.2 Mk II. 6 in. Selected paper cone. Plastic foam surround. Voice coil 39 mm. Gap flux 23,000 gauss. Total flux 350,000 maxwells. HC 6W; 20W programme material. vci 15 ohms. FR 25 Hz-22 KHz. Price: £43.

P.M.4. 6 in. Selected paper cone. Plastic surround. Voice coil 37 mm. Gap flux 24,000 gauss. Total flux 385,000 maxwells. HC 6W; 20W programme material. vci 16 ohms. FR 25 Hz-24 KHz. Price: £53 15s.

Full stabiliser for any of Lowther drive units. Price: £1 17s. 6d.

★

PEAK SOUND (HARROW) LTD., 32 St Judes Road, Englefield Green, Surrey. Tel: Egham 5316.

Baxandall Equalised Speaker. Full-range elliptical unit with equalised response. Substantially flat 100 Hz-10 KHz. Size: 9×5 in. Paper cone. Corrugated surround. 1 in. voice coil. Copper speech coil. Impedance 15 ohms. Total flux 40,300 maxwells. HC 10W. FR 50 Hz-12 KHz. rcf: 100 Hz when additional bass unit used. Price: £3 7s. 7d. (plus 14s. 5d. PT).

M5 8-5 Speaker Kit. Matched pair comprising $4\frac{1}{2}$ in. bass driver, $3\frac{1}{8}$ in. treble unit and crossover. Paper cones. Bass unit PVC roll surround. Treble unit corrugated surround. Voice coil diameter: bass $\frac{3}{4}$ in., treble $\frac{1}{2}$ in. HC 8W. FR 60 Hz-20 KHz. rcf 6·5 KHz. £3 15s. (plus 16s. PT).

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PEERLESS. Distributors: C. E. Hammond & Co. Ltd., 90 High Street, Eton, Windsor, Berkshire. Tel: 0753 5 63388.

PABS 4-30. Three-way speaker system comprising four speakers and crossover network. FR 30 Hz-18 KHz (in 1·75 cu. ft. cabinet). HC 30W. Bass unit, mid-range radiator and two tweeters. Crossover: 500 Hz and 3·5 KHz. Suggested cabinet size: $24\frac{3}{4} \times 13\frac{3}{8} \times 9\frac{1}{4}$ in. inside. Price: £36 9s.

PABS 2-8. Two-way speaker system comprising two speakers and crossover. FR 50 Hz-18 KHz. Hc 8W. Crossover: 4 KHz. Suggested cabinet size: $15\frac{1}{2} \times 9\frac{5}{8} \times 6\frac{1}{2}$ in. inside. Price: £10 7s. (plus £2 6s. 6d. PT).

PABS 2-10. Two-way speaker system comprising two speakers and crossover. FR 50 Hz-18 KHz. HC 10W. Crossover: 3·5 KHz. Suggested cabinet size: $10 \times 6\frac{1}{4} \times 6\frac{1}{2}$ in. inside. Price: £11 5s. 10d. (plus £2 10s. 8d. PT).

PABS 3-15. Three-way speaker system comprising three speakers and crossover. FR 45 Hz-18 KHz. HC 15W. Crossover: 750 Hz and 4 KHz. Suggested cabinet size: $20\frac{3}{8} \times 8\frac{5}{8} \times 10\frac{1}{2}$ in. inside. Price: £15 1s. 8d. (plus £3 7s. 10d. PT).

PABS 3-25. Three-way speaker system comprising three speakers and crossover. FR 40 Hz-18 KHz. HC 25W. Crossover: 750 Hz and 4 KHz. Suggested cabinet size: $25 \times 15 \times 16\frac{1}{4}$ in. inside. Price: £22 11s.

Above speaker systems available in kit form comprising speaker units, crossover network, cabinet construction data and mounting instructions, but without baffle. Prices: (Kit 2-8) £5 19s. 10d. (plus 11s. 2d. PT); (Kit 2-10) £7 15s. 6d. (plus 19s. PT); (Kit 2-10a) £6 8s. 5d. (plus 13s. 1d. PT); (Kit 3-15) £10 0s. 5d. (plus £1 1s. 7d. PT); (Kit 3-25) £14 12s. 6d.; (Kit 4-30) £25 5s.

★

PHILIPS ELECTRICAL LTD., Century House, Shaftesbury Avenue, London, W.C.2. Tel: 01-437 7777. Cables: Phillamps, London.

9710M. 8 in. Dual cone. Paper corrugated surround. Voice coil 1 in. Gap flux 8,000 gauss. Total flux 97,600 maxwells. HC 10W RMS. vci 7 ohms. FR 40 Hz-19 KHz. Price: £4 19s. 6d. (plus £1 1s. 4d. PT).

AD5200M. 12 in. Dual cone. Paper corrugated surround. Voice coil $1\frac{1}{4}$ in. Gap flux 11,000 gauss. Total flux 134,000 maxwells. HC 20W. vci 7 ohms. FR 35 Hz-15 KHz. Price: £10 10s.

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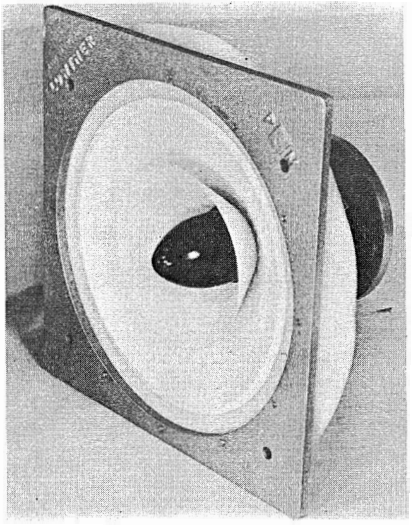
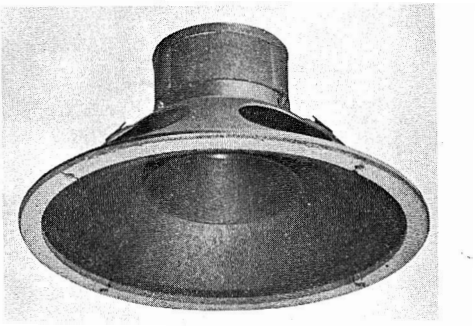
PIONEER. Distributors: Swisstone Ltd., 48a Station Road, Cobham, Surrey. Tel: 0932-6 2853/4214.

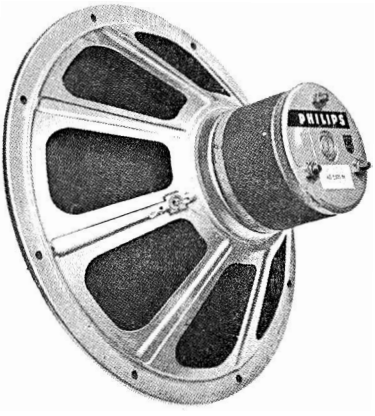
AS-303A. Kit of speakers and crossover networks for assembling bookshelf speaker system. Cabinet materials not included. Kit comprises: 12 in. bass unit, 5 in. mid-range unit, horn tweeter, crossover network, level control, sound absorbing material, terminal strip, wire and instructions. Specification when built: FR 40



Lowther PM2 Mk. I

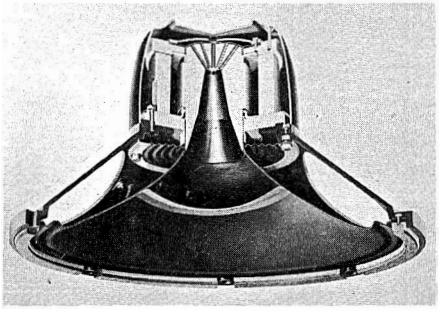


Philips 9710M

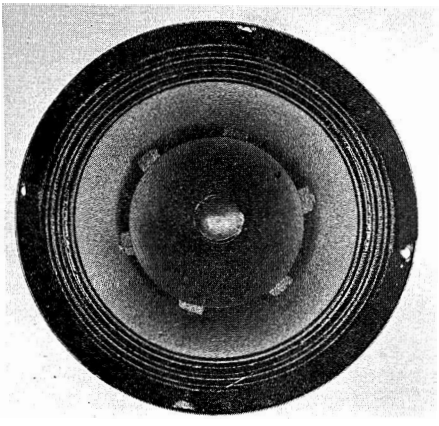


Philips AD 5200 M

Philips 9710 M



Tannoy 12-inch Gold Dual concentric.



Tripletone Twin cone 8 or 10 in

Hz-20 KHz, impedance 16 ohms, crossover 800 Hz and 6 KHz. HC 20W RMS. Size: $26 \times 15\frac{3}{8} \times 11\frac{3}{4}$ in. Full specification and price on request.

AS-305A. Kit of speakers and crossover networks for assembling hi-fi speaker assembly. Cabinet materials not included. Kit comprises: 12 in. bass unit, 5 in. mid-range unit, two cone tweeters, one horn tweeter, crossover network with level control, connecting cables, acoustic padding, mounting hardware and instructions. Specifications when built: FR 30 Hz-20 KHz, crossover 500 Hz and 3·5 KHz, impedance 8 ohms. HC 50W. Size: $26 \times 15\frac{3}{8} \times 11\frac{3}{4}$ in. Full specification and price on request.

★

STC LTD., Acoustic Sub-division, West Road, Harlow, Essex. Tel: Harlow 26811.

High Frequency Unit. High frequency pressure unit. FR 6 KHz-20 KHz ±3 dB. Substantially omni-directional. Impedance 15 ohms. Flux density: 14,000 gauss. Size: approximately $2\frac{5}{8} \times 1$ in. Price: £5 12s. 6d.

★

STENTORIAN. See Whiteley Electrical.

★

TANNOY PRODUCTS LTD., West Norwood, London, S.E.27. Tel: 01-670 1131. Cables: Tannoy, London.

Direct radiator. 12 in. Moulded fibre cone. Plastic treated surround. Voice coil 2 in. Gap flux 14,000 gauss. HC 15W. vci 20 ohms. FR 40 Hz-16 KHz. Price: £14 14s.

Monitor Gold III LZ. 12 in. dual concentric. Moulded fibre cone. Plastic impregnated surround. Gap flux (LF) 10,000 (HF) 15,000 gauss. HC 10W. FR 23 Hz-20 KHz, recommended crossover (supplied) 1·3 KHz. vci 15 ohms. Price: £31.

Monitor Gold "Twelve". 12 in. Moulded fibre cone. Plastic treated surround. Voice coils (HF and LF) 2 in. Gap flux (LF) 11,500 (HF) 15,000 gauss. HC 30W. FR 25 Hz-20 KHz, recommended crossover (supplied) 1·7 KHz. Price: £34 15s.

Monitor Gold "Fifteen". 15 in. Moulded fibre cone. Plastic treated surround. Voice coils (HF and LF) 2 in. Gap flux (LF) 13,500 (HF) 18,000 gauss. HC 50W. FR 23 Hz-20 KHz, recommended crossover (supplied) 1 KHz. Price: £40.

★

TRIPLETONE MANUFACTURING CO. LTD., 241a The Broadway, Wimbledon, S.W.19. Tel: 01-542 1189.

Tripletone 8 in. Full-range hi-fi unit. 8 in. Impedance: 2-3 ohms or 15 ohms. Flux density 12,000 lines/sq. cm. Bass resonance 60 Hz. Twin cone. HC 6W RMS. FR 30 Hz-17 KHz. Price: £4 (plus 17s. 9d. PT).

Tripletone 10 in. Full-range hi-fi unit. 10 in. Impedance: 2-3 ohms or 15 ohms. Flux density 12,000 lines/sq. cm. Bass resonance 55 Hz. Twin cone. HC 8W RMS. FR 30 Hz-17 KHz. Price: £4 6s. 9d. (plus 19s. 3d. PT).

★

VITAVOX LTD., Westmoreland Road, London, N.W.9. Tel: 01-205 8671. Cables: Vitavox, London, N.W.9.

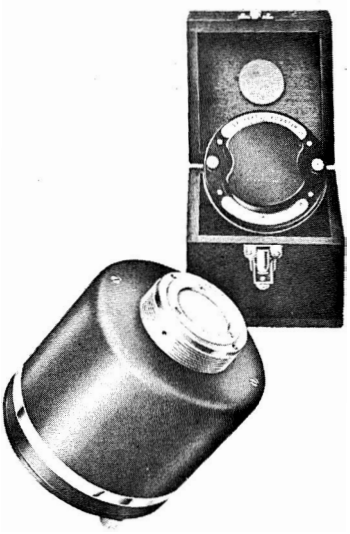
Duplex coaxial DU121. 12 in. paper cone. Plastic treated paper surround. 3 in. polyester film cone and surround. Voice coil (LF) 1·78 in. (HF) 0·65 in. Gap flux (LF) 16,000 gauss, (HF) 12,000 gauss. Total flux (LF) 180,000 maxwells, (HF) 15,000 maxwells. HC 15W. vci 15 ohms. FR 30 Hz-15 KHz. Price: on application.

AK123 Heavy Duty. 12 in. paper cone. Paper surround. Voice coil 1·78 in. Gap flux 16,000 gauss. Total flux 180,000 maxwells. HC 20W. vci 15 ohms. FR 50 Hz-8 KHz. Price: on application.

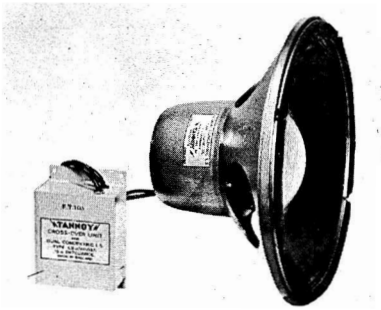
AK124. 12 in. paper cone. Paper surround. Voice coil 1·78 in. Gap flux 16,000 gauss. Total flux 180,000 maxwells. HC 15W. vci 15 ohms. FR 30 Hz-13 KHz. Price: on application.

K15/40. 15 in. paper cone. Paper surround. Voice coil $2\frac{1}{4}$ in. Gap flux 14,000 gauss. Total flux 260,000 maxwells. HC 40W nominal. FR 50 Hz-8 KHz nominal. (HC and FR determined by enclosure.) vci 15 ohms. Price: on application.

AK150. 15 in. paper cone. Treated paper surround. Bass resonance 30-35 Hz. Voice coil 2·25 in. Gap flux 14,000 gauss. Total flux 260,000 maxwells. HC 25W nominal. FR 30 Hz-5 KHz nominal. (HC and FR determined by enclosure.) vci 15 ohms. Price: on application.

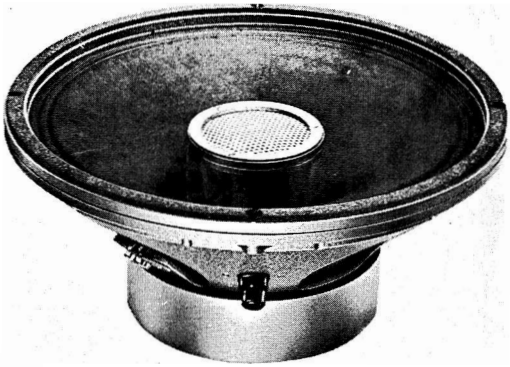


Vitavox S2



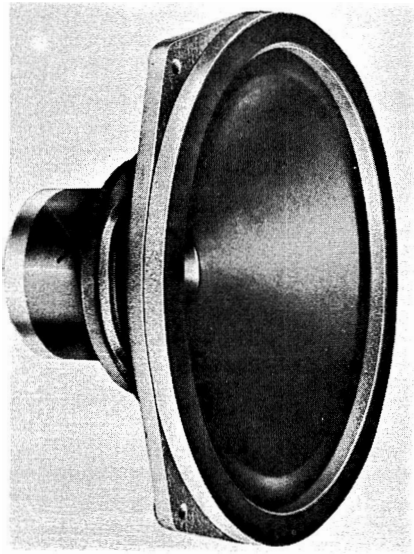
Tannoy Monitor Gold "Twelve"

Vitavox DU 121



Wharfedale Super 12/RS/DD

Wharfedale Super 8/RS/DD



Vitavox K15/40

AK151. Driver for bass horn of dual channel system. 15 in. paper cone, paper surround. Bass resonance 40-50 Hz. Voice coil 2¼ in. Gap flux 14,000 gauss. Total flux 260,000 maxwells. DC resistance of voice coil 5·5-6·5 ohms. HC and FR determined by associated horn characteristics. Price: on application.

AK152. Driver for bass horn of dual channel system. Treated paper surround. Bass resonance 30-35 Hz. Other details as for AK151. Price: on application.

S2 HF pressure unit. Diaphragm pressure-formed from lightweight aluminium alloy. Voice coil 3 in. diameter. Gap flux 16,000 gauss. Total flux 150,000 maxwells. HC above 200 Hz 10W. Nominal FR 200 Hz-16 KHz. Rec crossover 500 Hz. Price: on application.

HF Dispersive Horn. Designed for use with S2 pressure unit. Cast in aluminium alloy. Non-resonant. Cut-off frequency 300 Hz. Price: on application.

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WHARFEDALE. Rank Wharfedale Ltd., Idle, Bradford, Yorkshire. Tel: Bradford 612552. Cables: Wharfdel, Idle, Bradford. Telex: 51407.

Super 3. HF unit, 3 in, bakelised paper cone with fabric surround. Voice coil 1 in. (aluminium). Gap flux 14,500 gauss. Total flux 60,000 maxwells. HC 6W above 1 KHz. vci 2-3 and 8-15 ohms. FR 1 KHz-20 KHz. rcf 4 KHz. Price: £5 5s. (plus £1 3s. 3d. PT).

Super 5. HF unit. 5 in. bakelite cone with fabric surround. Voice coil 1 in. (aluminium). Gap flux 14,500 gauss. Total flux 60,000 maxwells. HC 6W RMS. FR 400 Hz-17 KHz. vci 8-15 ohms. Price: £5 10s. (plus £1 4s. 5d. PT).

8 in. Bronze/RS/DD. Full-range 8 in. unit. Paper cone with double diaphragm. Fabric roll surround. Voice coil 1 in. (aluminium). vci 8-15 ohms. Gap flux 10,500 gauss. Total flux 41,500 maxwells. HC 4W RMS. FR 50 Hz-20 KHz. Price: £3 10s. (plus 15s. 6d. PT).

Super 8/RS/DD. Full-range 8 in. unit. Paper cone with double diaphragm. Fabric roll surround. Voice coil 1 in. (aluminium). vci 8-15 ohms. Gap flux 14,500 gauss. Total flux 60,000 maxwells. HC 6W RMS, 12W peak. FR 40 Hz-20 KHz. Price: £6 (plus £1 6s. 7d. PT).

Super 10/RS/DD. Full-range 10 in. unit. Paper cone with double diaphragm. Fabric roll surround. Voice coil 1 in. Gap flux 16,000 gauss. Total flux 85,000 maxwells. HC 10W RMS. vci 8-15 ohms. FR 30 Hz-20 KHz. Price: £10 (plus £2 4s. 4d. PT).

W12/FRS. 12 in. unit with Flexiprene roll surround. vci 8-15 ohms. Voice coil 1¾ in. Gap flux 14,000 gauss. Total flux 156,000 maxwells. HC 15W RMS. FR 30 Hz-4 KHz. Bass resonance 23-28 Hz. Weight: 12 lb. Price: £11 15s.

Super 12/RS/DD. Full-range 12 in. unit. Paper cone with double diaphragm. Fabric roll surround. Voice coil 1¾ in. (aluminium). Gap flux 17,000 gauss. Total flux 190,000 maxwells. HC 20W RMS. vci 8-15 ohms. FR 25 Hz-20 KHz. Price: £17 10s.

W15/RS. 15 in. unit with paper cone and fabric roll surround. Voice coil 2 in. Gap flux 13,500 gauss. Total flux 180,000 maxwells. HC 20W RMS. vci 8-15 ohms. FR 25 Hz-2 KHz. rcf 800 Hz. Price: £18 15s.

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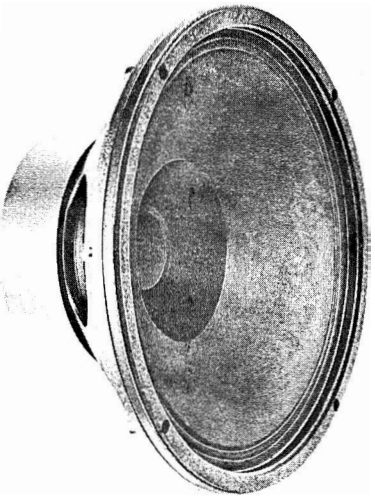
WHITELEY ELECTRICAL RADIO CO. LTD., Victoria Street, Mansfield, Notts. Tel: Mansfield 24762-5. Cables: Whitebon, Mansfield.

Stentorian HF.812. 8 in. Composite (paper and cambric) cone. Cambric surround. Voice coil 1 in. Gap flux 12,000 gauss. Total flux 47,400 maxwells. HC 5W. vci universal (3, 7·5 and 15 ohms). FR 50 Hz-12 KHz. Price: £4 5s. 3d. (plus 19s. 2d. PT).

H.F.816. 8 in. Composite (paper and cambric) cone. Cambric surround. Voice coil 1 in. Gap flux 16,000 gauss. Total flux 63,000 maxwells. HC 6W. vci universal 3, 7·5 and 15 ohms. FR 50 Hz-14 KHz. Price: £7 0s. 4d. (plus £1 11s. 6d. PT).

H.F.912. 9 in. Composite (paper and cambric) cone. Cambric surround. Voice coil 1 in. Gap flux 12,000 gauss. Total flux 47,400 maxwells. HC 7W. vci universal (3, 7·5 and 15 ohms). FR 40 Hz-13 KHz. Price: £4 9s. 11d. (plus £1 0s. 2d. PT).

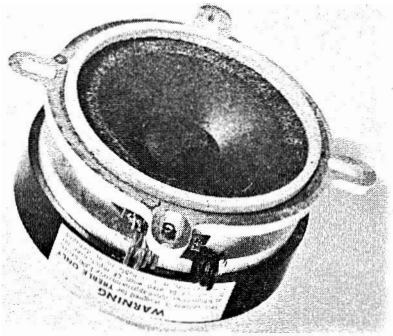
H.F.916. 9 in. Composite (paper and cambric) cone. Voice coil 1 in. Gap flux 16,000 gauss. Total flux 63,000 maxwells. HC 7W. vci universal (3, 7·5 and 15 ohms). FR 40 Hz-14 KHz. Bass



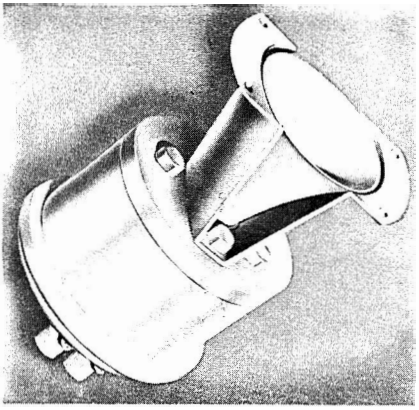
Vitavox AK124

Whiteley HF 1016

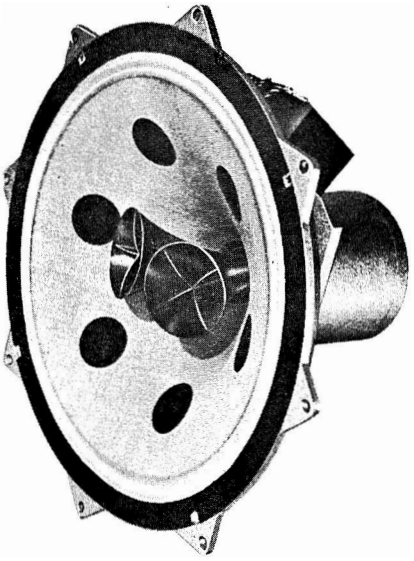
Whiteley T 359 HF unit



Wharfedale Super 3 HF unit



Whiteley T10 HF unit



Whiteley 15 in. concentric duplex

resonance 45 Hz. Price: £7 5s. 2d. (plus £1 12s. 7d. PT).

H.F.1012. 10 in. Composite (paper and cambric) cone. Cambric surround. Voice coil 1 in. Gap flux 12,000 gauss. Total flux 47,400 maxwells. HC 10W. vci universal 3, 7·5 and 15 ohms. FR 30 Hz-14 KHz. Price: £5 2s. 7d. (plus £1 3s. 1d. PT).

H.F.1016. 10 in. Composite (paper and cambric) cone. Cambric surround. Voice coil 1 in. Gap flux 16,000 gauss. Total flux 63,000 maxwells. HC 10W. vci 3, 7·5 and 15 ohms FR 30 Hz-15 KHz. Price: £8 3s. 9d. (plus £1 16s. 9d. PT).

H.F.1016 Major. 10 in. Paper cone. Cambric surround. Voice coil 1 in. (aluminium). vci 15 ohms. Gap flux 16,000 gauss. Total flux 64,000 maxwells. HC 10W. FR 60 Hz-16 KHz or 30 Hz-16 KHz (depending upon cabinet). Price: £10 10s. 10d. (plus £2 7s. 2d. PT).

10 in. Concentric Duplex. Composite (paper and cambric) cone. Cambric surround. Voice coil 1 in. Gap flux (LF) 12,000 (HF) 13,000 gauss. Total flux 47,400 maxwells. HC 10W. vci 15 ohms. FR 30 Hz-14 KHz. rcf 3 KHz built-in. Price: £13 16s. (plus £3 2s. PT).

H.F.1214. 12 in. Composite (paper and cambric) cone. Cambric surround. Voice coil 1·5 in. Gap flux 14,000 gauss. Total flux 106,000 maxwells. HC 15W. vci 15 ohms. FR 25 Hz-14 KHz. Price: £14 0s. 7d.

H.F.1216. Composite (paper and cambric) cone. Cambric surround. Voice coil 1½ in. Gap flux 16,000 gauss. HC 15W. FR 20 Hz-16 KHz. Price: £21 10s. 3d.

12 in. Concentric Duplex. Composite (paper and cambric) cone. Cambric surround. Series-gap Alcomax III magnet. LF gap flux 14,000 gauss. HF gap flux 17,000 gauss. Total flux 220,000 maxwells. vci 15 ohms. Built-in cross-over. FR 25 Hz-17 KHz. Bass resonance 35 Hz. HC 15W. Pressure die-cast Mazak chassis. HF metal diaphragm protected and loaded by central pressure horn. Price: £37 11s. 2d.

15 in. Concentric Duplex. Composite (paper and cambric) cone. Cambric surround. Voice coil 2 in. Gap flux (LF) 14,000 (HF) 17,000 gauss. Total flux 350,000 maxwells. HC 25W. vci 15 ohms. FR 20 Hz-18 KHz. rcf 3 KHz built-in. Price: £61 9s. 3d.

H.F.1514. 15 in. Composite (paper and cambric) cone. Cambric surround. Voice coil 2 in. Gap flux 14,000 gauss. Total flux 178,000 maxwells. HC 25W. vci 15 ohms. FR 25 Hz-5 KHz. rcf 1·5-3 KHz. Price: £35 10s.

T.10 Tweeter. Aluminium cone and surround. Voice coil 1 in. Gap flux 14,000 gauss. Total flux 44,000 maxwells. HC 5W. vci 15 ohms. FR 2-14 KHz. rcf 3 KHz. Price: £6 0s. 8d.

T.12 Tweeter. Aluminium cone and surround. Voice coil 1·5 in. Gap flux 17,000 gauss. Total flux 110,000 maxwells. HC 12W. vci 15 ohms. FR 2-17 KHz. rcf 3 KHz. Price: £18 1s. 3d.

T.816. 8 in. Paper cone and surround. Voice coil 1 in. Gap flux 16,000 gauss. Total flux 63,000 maxwells. HC 15W. vci 15 ohms. FR 1·5-17 KHz. rcf 1·5 KHz. Price: £6 12s. 11d. (plus £1 9s. 10d. PT).

T.359. 3½ in. Paper cone and surround. Voice coil 0·625 in. Gap flux 9,000 gauss. Total flux 14,900 maxwells. HC 15W with crossover. vci 5 or 15 ohms. FR 3-17 KHz. rcf 3 KHz. Price: £1 15s. 10d. (plus 8s. 1d. PT).

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L. G. WOOLLETT & COMPANY LTD., 21 Anerley Station Road, London, S.E.20. Tel: 01-778 9003.

12 in. L.R. Low resonance 12 in. dynamic unit. Paper cone with foam surround. HC 16W RMS. FR 20 Hz-5 KHz. Special unit for use with Woollett electrostatic treble speakers. Price: £12 15s.

Type C. Constant charge push-pull electrostatic. Impedance 16 ohms. HC 16W RMS. FR 1·5 KHz-20 KHz. Integral crossover. Attenuator, mains polariser. Rear sealed for mounting in bass behind horizontal 9 × 6½ in. aperture. Price: £15 10s.

DIRECTORY OF SPEAKER ACCESSORIES

RICHARD ALLAN RADIO LTD., Bradford Road, Gomersal, Cleckheaton, Yorkshire. Tel: 0976-2 2442/3. Cables: Acoustics, Bradford.

CN.54 Crossover Unit. Two-way quarter section. Recommended for use with CR5 bass unit and 460TC tweeter. Crossover frequency 5 KHz. 4-8 or 15 ohms. Price: £2.

CN.104 Crossover Unit. A two-way half-section parallel network. Crossover frequency 5 KHz. 4-8 or 15 ohms. Price: £2 10s.

CN.1284 Crossover Unit. A three-way cross-over with main crossover operating from half wave parallel network and subsidiary crossover capacity fed. Crossover frequencies 1,100 Hz and 5 KHz. 8 or 15 ohms. Price: £3 15s.

TM156. Matching transformer for matching 4-8 ohms to 15 ohms (or vice versa). HC 20W. Price to be announced.

★

CELESTION LTD., Ferry Works, Thames Ditton, Surrey. Tel: 01-398 3402. Cables: Voice-coil, Thames Ditton.

CO3K crossover. Designed specially for use with Studio 12 and HF1300 Mk 2 units but equally suitable for use with any efficient bass and treble combination. Air-tight terminal assembly with flange mounting. Full half-section filter network. 12 dB per octave cut-off at 3 KHz. Size: $3\frac{7}{8}$ in. long, $2\frac{7}{8}$ in. diameter of body, $3\frac{3}{4}$ in. diameter of flange. Price: £2 14s.

★

DECCA SPECIAL PRODUCTS, Ingate Place, Queenstown Road, London, S.W.8. Tel: 01-622 6677.

Kelly Crossover CO/1/15. Designed to feed power at correct levels and frequencies to the Kelly LF drive units and Mk II HF ribbon. Crossover frequency 2·5 KHz. Low pass slope 12 dBs per octave. High pass slope initially 12 dBs per octave and final slope 40 dBs per octave. Attenuation to frequencies below 700 Hz greater than 40 dB. Imp 15 ohms. Price: £3 3s.

Decca CO/1/8. Low pass section comprises standard constant impedance 12 dB/octave filter. High pass section is variable slope multi-stage network having initial slope of 12 dB/octave yet frequencies 200-700 Hz virtually suppressed. Price: £4 4s.

Kelly Acoustic Lens. For use with Kelly ribbon HF speaker Mk II to disperse high frequencies so that a stable stereo image is obtained over a wider area than normal. Up to 15 KHz sound pattern is constant to within 3 dBs over a 150 degree angle. From 15 KHz to 20 KHz this dispersion is maintained over an angle of 135 degrees. Price: £3 3s.

★

EAGLE PRODUCTS. Distributors: B. Adler & Sons (Radio) Ltd., 32a Coptic Street, London, W.C.1. Tel: 01-636 9606/7. Cables: Reldab, London.

CN.23 and CN.216. Two-way speaker cross-over networks. Cross-over frequency 3 KHz. CN.23 3 ohms. CN.216 16 ohms. Price: 16s. 6d.

★

EMI SOUND PRODUCTS LTD., Hayes, Middlesex. Tel: 01-573 3888. Cables: Emi-sound, London.

Crossover network 99970B. Combines any 3 ohm LF driver with two 15 ohm HF tweeters in parallel. Price on application.

Crossover network 99970F. Combines any 15 ohm LF driver with two 8 ohm HF tweeters in series. Price on application.

Networks available for all other speaker combinations. Separate chokes and capacitors for crossover networks. Prices and details on application.

★

FANE ACOUSTICS LTD., Hick Lane, Batley, Yorks. Tel: Batley 2114. Cables: Fane, Batley.

Model 2X1. Crossover unit for two-speaker system. Crossover frequency 2 KHz. 15 ohms. Cut-off 6 dB/octave. Size: $5\frac{5}{8} \times 3\frac{1}{4} \times 1\frac{1}{2}$ in. Price: £3.

Model 3X1. Crossover unit for three-speaker

system. Crossover frequencies 800 Hz and 5 KHz. Impedance 15 ohms. Cut-off 6 dB/octave. Size: $5\frac{5}{8} \times 3\frac{1}{4} \times 2\frac{1}{2}$ in. Price: £4.

Model 3X2. Crossover for three-speaker system. Similar to one used in Ionofane 602 and 603. Crossover frequencies 800 Hz and 3·5 KHz. Matching impedance 15 ohms. Cut-off 12 dB/octave. Size: $6 \times 5\frac{1}{4} \times 2\frac{3}{4}$ in. Price: £5 5s.

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GOODMANS LOUDSPEAKERS LTD., Axiom Works, Wembley, Middx. Tel: 01-902 1200. Cables: Goodaxiom, Wembley.

XO/5000-Crossover Unit. A two-way half-section crossover network, operating at 5 KHz. All terminations 15 ohms. Price: £2 6s.

XO/950-Crossover Unit. A two-way half-section, crossover network, operating at 950 Hz. All terminations 15 ohms. Price: £6 7s. 9d.

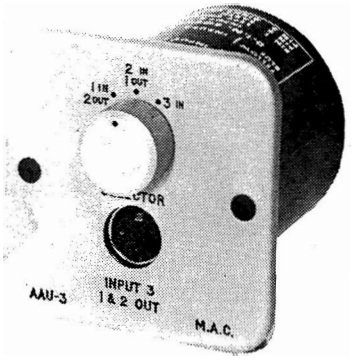
XO/950/5000. Crossover Network. A multiple crossover network comprising four half-section LC filters. Crossover frequencies are 950 Hz and 5 KHz. All attenuation rates are 12 dB/octave. All terminations 15 ohms. Price: £8 8s. 7d.

Attenuator. 12 dB, eight steps. Price: £3 1s. 4d.

ARU.172. For use with 12 in. range. Price: £3 17s. 8d.

ARU.180. For use with one Axiom 80. Price: £3 17s. 8d.

ARU.280. For use with two Axiom 80's or Audiom 81 bass. Price: £3 17s. 8d.



M.A.C. ELECTRONIC CO., Villacousta, Portsmouth Road, Ripley, Surrey. Tel: Ripley 3377.

AAU-1. Audio adaptor unit for providing necessary connections from cabinet-mounted hi-fi system to external stereo or mono recorder. Satin chrome facia panel with two DIN sockets. Colour coded links and provision for matching resistors. Colour-coded screened leads with phono plugs. Easily mounted by cutting $2\frac{1}{2}$ in. hole in panel. Complete with mounting panel, DIN plugs, fitting screws and instructions. Price: £3 12s.

AAU-3. Audio adaptor unit providing three stereo inputs (suitable for PU, tuner, mic, tape, etc.) that can be switched to common stereo input. Two internal inputs can be switched to feed external equipment. Satin chrome panel with DIN socket and selector switch. Colour coded sockets. Links for fitting matching resistors. Many applications. Easily mounted as for AAU-1. Price: £4 2s. 6d.

★

VITAVOX LTD., Westmoreland Road, London, N.W.9. Tel: 01-205 8671. Cables: Vitavox, London, N.W.9.

CN232 Crossover. Half section. Crossover 500 Hz. Attenuation 12 dB/octave. All terminations 15 ohms. Balance control giving 0-8 dB HF attenuation incorporated. Price: on application.

CN233 Crossover. Half section. Crossover 1 KHz. Attenuation 12 dB/octave. All terminations 15 ohms. Balance control giving 0-8 dB HF attenuation incorporated. Price: on application.

★

WHARFEDALE. Rank Wharfedale Ltd., Idle, Bradford, Yorkshire. Tel: Bradford 612552. Cables: Wharfdel, Idle, Bradford. Telex: 51407.

QS/800. Crossover frequency 800 Hz. $\frac{1}{4}$-section. Rate of attenuation 6 dB per octave. LS matching 7-16 ohms. Size: $5 \times 4 \times 2\frac{1}{4}$ in. Weight: 15 oz. Price: £3 5s.

HS/400/3. Crossover frequency 400 Hz and 5 KHz. $\frac{1}{2}$-section 3-way. Rate of attenuation 12 dB per octave. LS matching 7-16 ohms. Size: $7 \times 5 \times 3$ in. Weight: 2 lb. Price: £6 10s.

QS.3000. Crossover frequency 3 KHz. $\frac{1}{4}$-section. 15 ohms only. Rate of attenuation about 6 dB per octave. Price: £3 5s.

WMT1 Matching Transformer. Auto transformer for matching 10-16 ohms or 7-9 ohms speakers to sets with 2-5 ohms output or vice versa. Response 20 Hz-15 KHz $\pm$1 dB. Handling capacity 15W. Can also match speakers of different imps to crossover unit in 2 or 3 speaker systems. Size: $2\frac{7}{8} \times 2\frac{3}{4} \times 2\frac{3}{4}$ in. Weight: $12\frac{1}{2}$ oz. Price: 13s. 6d.

WMT2 Isolating and Matching Transformer. Similar to WMT1, but having separate windings with heavy insulation. Response 20 Hz-15 KHz $\pm$1 dB. HC 15W. Size: $2\frac{1}{4}$ in. high, $2\frac{7}{8}$ in. wide. Weight: $13\frac{3}{4}$ oz. Price: 13s. 6d.

★

WHITELEY ELECTRICAL RADIO CO. LTD., Victoria Street, Mansfield, Notts. Tel: Mansfield 24762-5. Cables: Whitebon, Mansfield.

CX500 Crossover Unit. A two-way half-section crossover network operating at 500 Hz. All terminations 15 ohms. Price: £1 17s. 8d.

CX1500 Crossover Unit. As CX500, but operating at 1·5 KHz. Price: £2 14s. 10d.

CX3000 Crossover Unit. As CX1500, but operating at 3 KHz. Price: £2 3s. 3d.

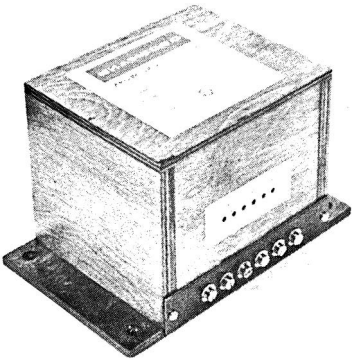
Constant impedance volume control. T-pad type attenuator having 10 steps of attenuation. Impedance presented by the load remains constant while the volume level is varied. In three versions for 3, 8 or 15 ohms. Price: £1 10s. 1d.

★

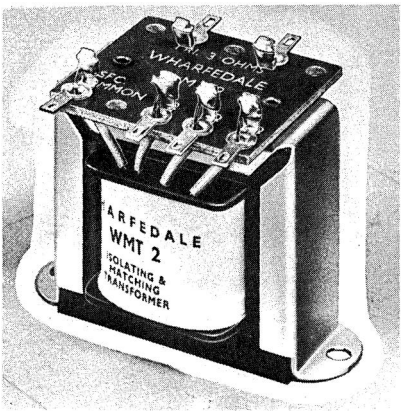
L. G. WOOLLETT AND COMPANY, LTD., 21 Anerley Station Road, London, S.E.20. Tel: 01-778 9003.

XS1. Speaker matching transformer. Converts 16 ohms to 8 ohms, and 8 ohms to 4 ohms. Bifilar wound. Grain orientated laminations. Ratio 1:0·707 auto. FR 16 Hz-30 KHz $\pm$0·6 dB. Price: £3 3s.

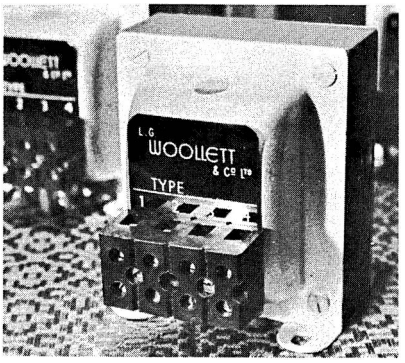
XS2. Speaker isolating and matching transformer. Converts 16 ohms to 4 ohms. Bifilar wound. Grain orientated laminations. Ratio 1:1 double wound. FR 16 Hz-100 KHz $\pm$0·6 dB. May be used to attenuate -6 dB and -12 dB while maintaining heavy damping on speaker and offering correct load to amplifier. Suitable for operating stereo system comprising dual electrostatic high-frequency units with common bass driver. *Note:* Not suitable for mains isolating in live chassis equipment. Price: £3 3s.



Goodmans XO/950



Wharfedale WMT2 isolating and matching transformer



Woollett XS1 and XS2

PART 2—SPEAKER ENCLOSURES

ABBOTT & RICHARDSON, 7 Agnew Road, Forest Hill, London, S.E.23. Tel: 01-699 1031.

R.A. Reflex Enclosure (GRA10). Complete system. Forward facing full range speaker with tapering depth. Two units: 10 in. bass, horn-loaded pressure unit for treble. Rec Goodmans Axiom 10, Goodmans Trebax 5K/20XL. Twin ¼-section crossover network. Finish: Walnut, oak, mahogany or teak. Size: 31 × 17½ × 10½ in. max to 7½ in. min. Price: (with specified units) £30; enclosure only £16.

R.A.8. Suitable for Axiette and Wharfedale 8 in. drive units. Finish: teak and mahogany. Size: 24 × 16¼ × 8 in. Price (with Axiette speaker): £18; enclosure only £14.

R.A.12. Based on Goodmans specifications and fitted with ARU. Available with 12 in. twin-cone drive unit and in two-way and three-way systems. Finish: Mahogany or teak. Size: 37½ × 21½ × 13 in. Price (with 12 in. twin-cone driver): £36.

Compact teak cabinet. Finished teak on four sides with green Vynair detachable front. Other finishes to order. Suitable for Richard Allan modules, EMI 250 and 850, Eagle 6 in. full-range unit, etc. Size: 12 × 9 × 6 in. Price: £6.

Standard teak cabinet. Finished teak on four sides with green Vynair detachable front. Other finishes to order. Suitable for good quality 8 in., 10 in., and 12 in. units. Size: 26 × 16 × 11 in. Price on request.

Enclosures built to customers own requirements. Home demonstrations in the London area. R.A. enclosures also available from Lee and Son (Development Company), 98 Lordship Lane, London, S.E.22, and Designwise, 7 Arran Road, Catford, London, S.E.6.

★

ACOUSTICAL MANUFACTURING CO. LTD., St Peter's Road, Huntingdon, Hunts. Tel: 0480 2561/2. Cables: Acoustical.

Quad Electrostatic Loudspeaker. Full range doublet covering 45 Hz-18 KHz. Attenuation outside band asymptotic to 18 dB/8ve. Total integrated radiation at max output equivalent to 95 phons in rooms of up to 5,000 cu ft with average reverberation. Dispersion approx 70 deg horizontal; 15 deg vertical. Imp 30-15 ohms, 40 Hz to 8 KHz, falling above 8 KHz. Designed for use with standard Quad II Amplifier. Suitable for AC supplies 100-120 or 200-250V 50-60 Hz. Free standing unit requires no enclosure or cabinet. Weight: 35 lb. Price: £57 complete.

★

ACUSTICA-ELECTRÓNICA. Distributors: Britimpex Ltd., 16-22 Great Russell Street, London, W.C.1. Tel: 01-636 7600.

Soprano. Infinite baffle. 8 in. main unit plus 4 in. tweeter. FR 60 Hz-13 KHz. HC 7W RMS. Standard finish: walnut. Size: 20½ × 12⅝ × 5¾ in. Price: £15 12s. 5d. (plus £3 4s. PT).

Soprano De Luxe. As above with walnut front. Price: £16 10s. 3d. (plus £3 10s. PT).

★

AKAI. Distributors: Pullin Photographic Ltd., 11 Aintree Road, Perivale, Greenford, Middlesex. Tel: 01-998 1541. Cables: Pullinfoto, Greenford, Middlesex.

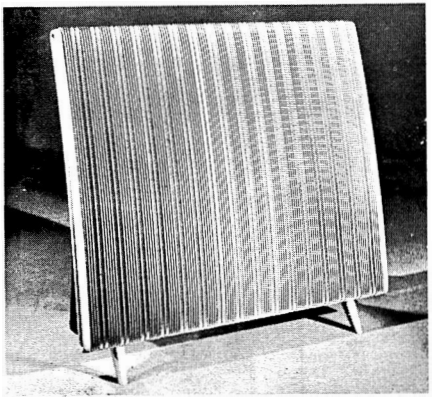
Akai SS30. Infinite baffle with unit. Impedance 8 ohms. FR 100 Hz-12 KHz. HC 3W. RMS. Wood cabinet covered dark grey Rexine. Size: 13½ × 14 × 3 in. Weight: 6½ lb. Price: £12 13s. 5d. (plus £2 17s. 8d. PT).

Akai SW130. Infinite baffle with two units and crossover. 12 in. bass driver, 4 in. tweeter. Impedance 8 ohms. FR 50 Hz-18 KHz. RMS. Size: 16½ × 23¼ × 12⅛ in. Weight: 25 lb. Price: £36.

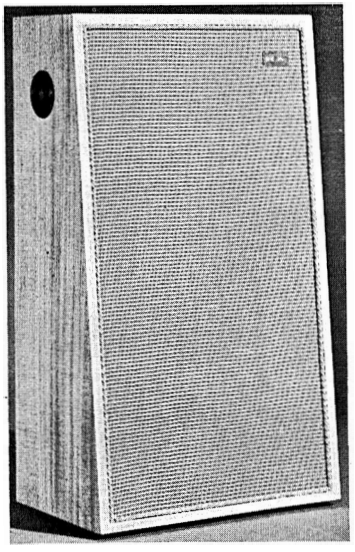
★

RICHARD ALLAN RADIO LTD., Bradford Road, Gomersal, Cleckheaton, Yorkshire. Tel: 0976-2 2442/3. Cables: Acoustics, Bradford.

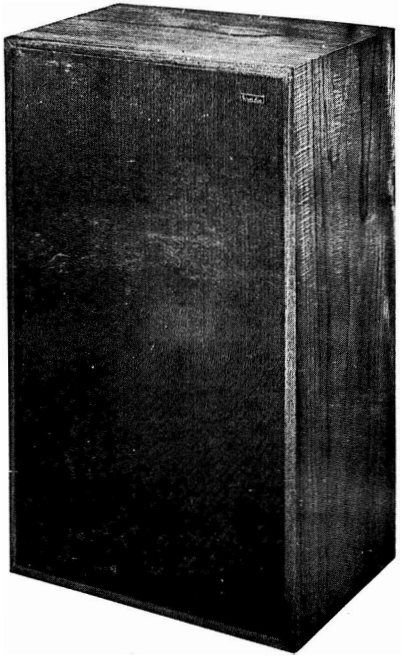
Minette. Infinite baffle bookshelf enclosure. 5 in. bass unit, 4 in. tweeter. FR 50 Hz-17 KHz. HC 10W. Size: 11½ × 7 × 6½ in. Weight: 9 lb. Price: £13 (plus £2 17s. 8d. PT) including units.



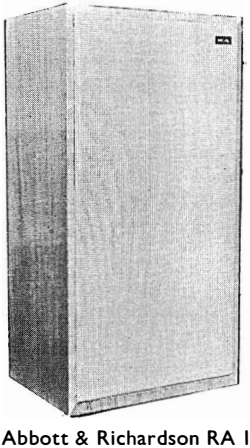
Quad electrostatic



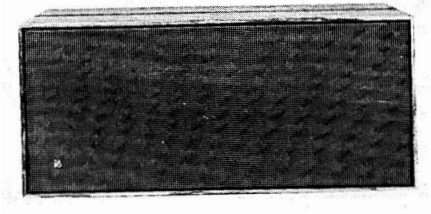
Abbott & Richardson GRA 10



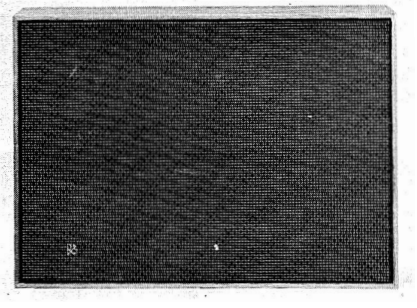
Richard Allan Sarabande



Abbott & Richardson RA 12



Beovox 1500



B & O 800

Sarabande. Full-range enclosure incorporating CB15 15 in. bass driver and mid-range/tweeter module (see details following). Enclosure: 4 cu ft. FR 30 Hz-17 KHz. HC 17W RMS. Size: 34 × 20 × 14 in. Price: £39 17s. 6d.

Mid-range and HF module. Integrated speaker assembly comprising 5 in. mid-range unit, 4 in. tweeter, crossover network and attenuator control. All mounted on aluminium alloy baffle 11 × 6½ in. For use with systems handling up to 20W RMS. Price: £8 (plus £1 13s. 9d. PT).

High Fidelity Module. Integrated speaker assembly comprising 5 in. bass unit, 4 in. tweeter and crossover network mounted on aluminium alloy baffle for direct mounting into small bookshelf enclosure. Price: £8 (plus £1 13s. 9d. PT).

Pavane. Full-range three-way system comprising 12 in. bass unit, 8 in. mid-range speaker and 4 in. tweeter. FR 30 Hz-17 KHz. HC 15W. Size: 25½ × 15½ × 12 in. Price: £30.

Chaconne. New speaker enclosure. Full details to be announced. Price: £15 15s. (plus £3 9s. 10d. PT).

★

ALTEC LANCING. Distributors: Carston Electronics Ltd., Electra House, Wiggenhall Road, Watford, Herts. Tel: Watford 22272.

Altec Lansing Bolero 890A. Horn enclosure with speakers and crossover. 10 in. bass driver and Altec 3000H multicellular horn and driver. Crossover: 3 KHz dual element with variable shelving control. FR 35 Hz-20 KHz. HC 20W RMS. 10 lb magnet on bass driver. Size: 14½ × 25¾ × 12 in. Finish: hand-rubbed walnut. Price: £77.

★

AMPHONIC ELECTRONICS LTD., 43B Hereford Road, London, W.2. Tel: 01-727 5096.

Minuette P.C.10. A small compact pressure chamber unit suitable for inexpensive hi-fi setup. FR 55 Hz-18 KHz. Handling capacity 10 watts. RMS dimensions: 12 × 9 × 8 in. Finished in teak, American walnut or Brazilian rosewood. Price on application.

Auditorium 15—R.E.15. A three-way monitor speaker designed to professional standards. At present available as standard, capable of handling 35 watts RMS. A 75-watt version to follow, price to be announced. Frequency response 20 Hz-20 KHz. Size: 38 × 24 × 15 in. Finish, teak or American walnut. Price: £75. This speaker can be supplied in other finishes—prices on application.

★

ARENA. Distributors: Highgate Acoustics Ltd., 71-73 Great Portland Street, London, W.1. Tel: 01-636 2901.

Arena HT7. Pressure chamber speaker system. One 8¼ in. bass unit, one 2 in. treble unit 4 or 16 ohms. HC 6W RMS. FR 50 Hz-20 KHz Built-in crossover. Cabinet in teak or Brazilian rosewood: Size: 20½ × 9⅞ × 10⅝ in. Price: £18 7s. 6d (including PT).

Arena HT9. Pressure chamber speaker system. One 12 in. bass unit, one 5 in. mid-range unit, one 2 in. treble unit, 4 or 16 ohms. HC 25W RMS. FR 30 Hz-20 KHz. Built-in crossover. Cabinet in teak or Brazilian rosewood. Size: 26¾ × 19¾ × 11⅞ in. Price: £32 11s.

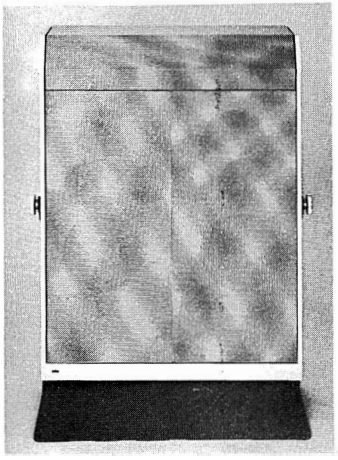
Arena HT10. Pressure chamber speaker system. One 8 in. unit, one 2 in. unit HC 8W RMS. FR 40 Hz-20 KHz. Teak or Brazilian rosewood. Size: 22¾ × 5⅛ × 16⅛ in. Price: £19 19s. (including PT).

Arena HT14. Pressure chamber speaker system. One 7 × 5 in. unit, one 2½ in. unit. HC 6W RMS. FR 60 Hz-20 KHz. Recommended for use with T1900F tuner/amplifier. Teak or Brazilian rosewood. Size: 6¼ × 10⅝ × 11 in. Price: £14 3s. 6d. (including PT).

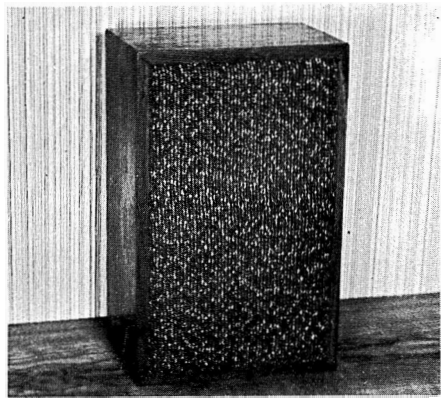
Arena HT17. Pressure chamber speaker system. One 5¾ in., one 2½ in. units. HC 8W RMS. FR 70 Hz-20 KHz. Teak, Brazilian rosewood or oak. Size: 12⅝ × 9⅞ × 4⅜ in. Price: £14 3s. 6d. (including PT).

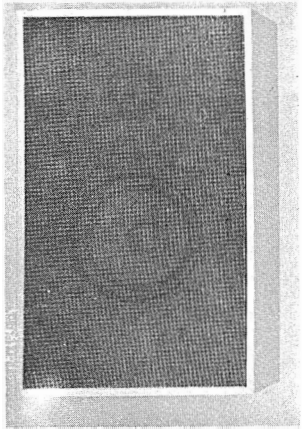
Arena HT18. Pressure chamber speaker system. One 5¾ in., one 2½ in. units. HC 25W RMS. FR 20 Hz-20 KHz. Teak or Brazilian rosewood. Size: 25 × 16 × 10¼ in. Price: £37 16s.

Arena HT20. Pressure chamber speaker system. 8¼ in. bass driver, 2½ in. tweeter. HC 15W RMS. FR 30 Hz-30 KHz. Crossover 4 KHz. Finish: Teak, rosewood or oak. Size: 16⅞ × 11 × 9½ in. Weight: 17¾ lb. Price: £29 8s. (including PT).



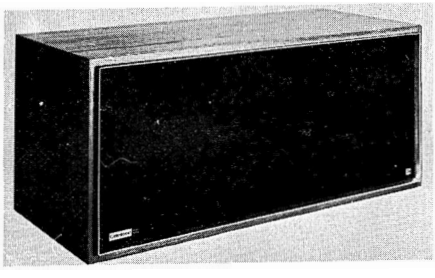
Braun L1000 13-unit infinite baffle



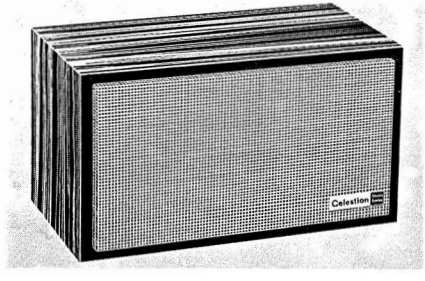


Braun L450 slim line infinite baffle

Arena HT20



Celestion Ditton 15



Celestion Ditton 10 enclosure

Arena HT21. Pressure chamber speaker system. Full specification and price on request.

★

AUDIO AND DESIGN LTD., 40 Queen Street, Maidenhead, Berks. Tel: Maidenhead 25204.

Titan-Minor. No-compromise bookshelf speaker system. Incorporates one TCL module. Cabinet designed as low friction phase inverter to provide optimum load to driver. HC 15W RMS over specified range (30W music rating). Finish: teak. Size: $17\frac{1}{2} \times 11 \times 8\frac{1}{4}$ in. FR 40 Hz-22 KHz. Weight: 20 lb. Price: £29 17s. 6d.

D15/30 Titan. Free-standing home speaker system. Incorporates one TCL module. Enclosure designed to match mechanical impedance of the module to the acoustical impedance of the air load. HC 15W RMS. FR 30 Hz-22 KHz. Finish: teak. Size: $28 \times 17\frac{1}{2} \times 7\frac{1}{2}$ in. Weight: 37 lb. Price: £39 15s.

D30/30 Titan-Major. Free-standing home speaker system. Designed for larger rooms. Electrical delay circuit to shape sound distribution. HC 30W RMS over specified range (60W music rating). FR 30 Hz-22 KHz. Finish: teak. Size: $33 \times 19\frac{1}{2} \times 9\frac{1}{2}$ in. Weight: 51 lb. Price: £66.

★

AUDIO ENGINEERING LTD. See Amplifier Section for details of QL.4 music monitor amplifier and speaker enclosure assembly.

★

BANG & OLUFSEN U.K. DIVISION, Eastbrook Road, Gloucester. Tel: 0542 21591.

Beovox 500. Pressure chamber with speakers and crossover. 4×6 in. bass driver, $2\frac{1}{2}$ in. tweeter. Crossover 5 KHz. FR 65 Hz-18 KHz. HC 5W. Impedance 4 ohms. Finish: teak or rosewood. Size: $11 \times 5\frac{7}{8} \times 9\frac{3}{4}$ in. Weight: $6\frac{1}{2}$ lb. Price: £12 13s. 3d. (plus £2 16s. 9d. PT).

Beovox 800. Pressure chamber with speakers and crossovers. No further details available at time of going to press. Price: £16 19s. (plus £3 16s. PT).

Beovox 1000. Pressure chamber with speakers and crossover. 6 in. bass driver, $2\frac{1}{2}$ in. tweeter Crossover 5 KHz. FR 65 Hz-16 KHz ± 5 dB HC 10W RMS. Impedance 4 ohms. Finish: teak or rosewood. Size: $18\frac{1}{2} \times 7\frac{1}{2} \times 9\frac{1}{2}$ in. Weight: 11 lb. Price: £16 19s. (plus £3 16s. PT).

Beovox 1500. Pressure chamber with speakers and crossover. 11×7 in. bass driver, 5 in. mid-range unit, $2\frac{1}{2}$ in. tweeter. Crossover (L/C) 800 Hz and 5 KHz. Impedance 4 ohms. Variable attenuator on mid-range. Finish: teak or rosewood. Size: $25 \times 11 \times 12$ in. Weight: $27\frac{1}{2}$ lb. Price: £27 15s. 3d. (plus £6 4s. 9d. PT).

Beovox 3000. Pressure chamber with speakers and crossovers. 8 in. bass driver, 5 in. mid-range unit, two 2 in. tweeters. Crossover (L/C) 800 Hz and 5 KHz. FR 38 Hz-18 KHz. HC 25W RMS. Mid-frequency and high-frequency attenuators. Finish: teak or rosewood. Size: $13\frac{3}{4} \times 25\frac{1}{2} \times 11$ in. Weight: 33 lb. Price: £49 10s.

Beovox 5000. Pressure chamber with speakers and crossovers. 12 in. bass driver, two 5 in. mid-range units, four 2 in. tweeters. Crossover 800 Hz and 5 KHz. FR 30 Hz-18 KHz ± 5 dB. Variable attenuators on mid and high frequencies. Socket for Beovox 2500 HF sound diffuser. HC 30W RMS. Finish. teak or rosewood. Size: $29 \times 18\frac{1}{2} \times 12\frac{1}{2}$ in. Weight: $50\frac{1}{2}$ lb. Price: £59 10s.

★

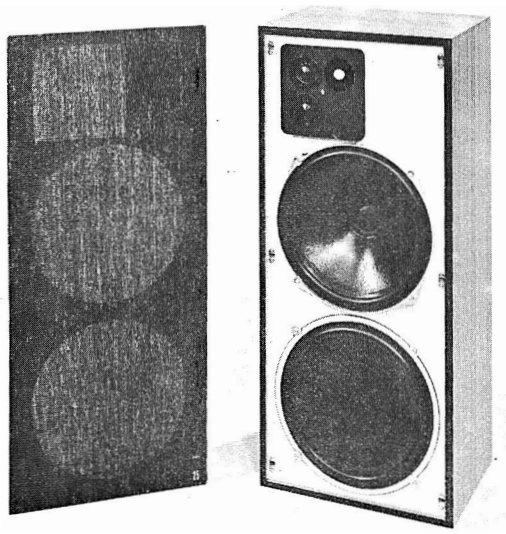
BRAUN AG. Distributors: Fi-Cord International, Charlwoods Road, East Grinstead, Sussex. Tel: East Grinstead 21351.

L25. Infinite baffle. Wide range twin-cone 7 in. driver. FR 70 Hz-18 KHz. Floor or wall mounting. Wood case finished laminated white plastic Anodised aluminium grille. Size: $19\frac{1}{4} \times 11\frac{1}{4} \times 5\frac{1}{4}$ in. Price: £22 6s. 1d. (including PT).

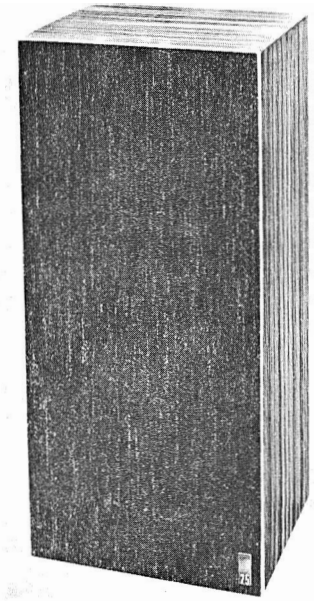
L40. Infinite baffle. $8\frac{3}{8}$ in. bass and mid-range unit. 4 in. tweeter. FR 50 Hz 18 KHz. Wood cabinet finished in white or dark grey laminated plastic. Anodised aluminium grille. Size: $22\frac{5}{8} \times 9\frac{7}{8} \times 11\frac{1}{4}$ in. 15 ft lead with plug supplied. Price: £31 8s. 8d. (including PT).

L250. Infinite baffle. FR 60 Hz-13 KHz. One $8\frac{1}{4} \times 3\frac{3}{4}$ in. unit. HC 10W DIN. Impedance: 4 ohms. Wall or shelf-mounting Finish: wood with white plastic walnut veneer, anodised aluminium grille Size: $11 \times 14 \times 4\frac{1}{4}$ in. Price. £23 9s. 7d (including PT).

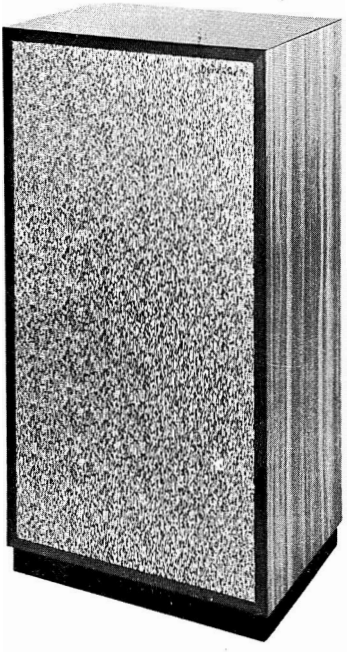
L300. Compact infinite baffle. FR 42 Hz to above upper audible limit. HC 20W RMS. Impedance 4 ohms. One $5\frac{1}{4}$ in. bass driver, one



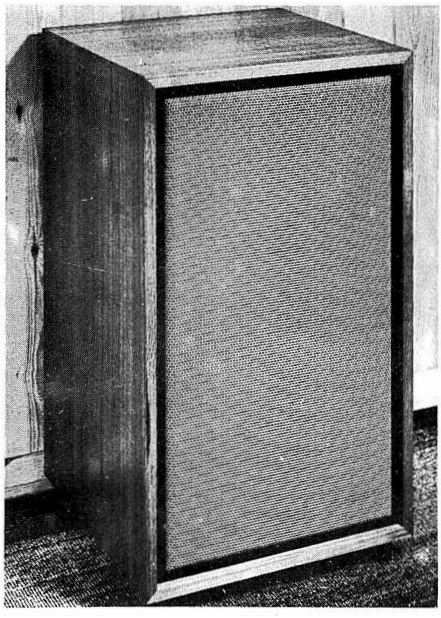
Celestion Ditton 25 (open)



Celestion Ditton 25



Dynastatic Mk II



Davies AD Folded Horn

$2\frac{5}{8}$ in. tweeter. Wood cabinet finished white laminated plastic or walnut veneer. Anodised aluminium grille. Provision for horizontal or vertical wall mounting. Size: $6\frac{3}{8} \times 9\frac{3}{8} \times 5\frac{5}{8}$ in. Price: £35 7s. 2d. (including PT).

L450. Slim-line infinite baffle incorporating two units. FR 35 Hz to beyond upper audible limit. HC 20W RMS. One $7\frac{1}{4}$ in. bass driver, one $3\frac{3}{8} \times 2\frac{5}{8}$ in. pressure chamber tweeter. Wood cabinet finished white or graphite laminated plastic or walnut veneer. Provision on back for horizontal or vertical wall mounting. Size: $18\frac{7}{8} \times 11\frac{1}{4} \times 4$ in. Price: £52 2s. 7d. (including PT).

L600. Infinite baffle enclosure. FR 30 Hz to beyond upper limit of audibility. Power handling: 30W (DIN Standard). Impedance: 4 ohms. One bass driver, one tweeter. Finish: wood finished in laminated white plastic or walnut veneer. Anodised aluminium front grille. Size: $17\frac{3}{4} \times 9\frac{5}{8} \times 8\frac{5}{8}$ in. Price: £77 13s. 4d. (including PT).

L700. Infinite baffle enclosure incorporating two units. FR 30 Hz to beyond upper audible limit. HC 40W RMS. Impedance 8-16 ohms. One 10 in. bass driver, one hemispherical calotte design tweeter. Wood cabinet finished white laminated plastic or walnut veneer. Anodised aluminium front grille. Optional screw-on stand for vertical or horizontal mounting. Size: $26 \times 14\frac{3}{8} \times 8\frac{7}{8}$ in. Price (enclosure with units): £78 14s. (including PT).

L800. Infinite baffle. FR 25 Hz to beyond upper limit of audibility. HC 40W DIN. Impedance 8 ohms. Three speaker units comprising: 10 in. bass driver, 4 in. mid-range unit and hemispherical tweeter. Finish: wood cabinet with walnut veneer or white plastic finish with perforated anodised aluminium grille. Set of legs (LF700) optional extra. Size: $25\frac{1}{2} \times 14 \times 11$ in. Price: £125 18s. 6d. (including PT).

L900. Infinite baffle. FR 25 Hz to beyond upper limit of audibility. HC 40W DIN. Impedance 8 ohms. Four speaker units comprising: two 10 in. bass drivers, one 4 in. mid-range radiator and one hemispherical tweeter. Finish: wood cabinet with walnut veneer or white plastic finish. Set of legs (LF80) optional extra. Size: $33\frac{1}{2} \times 16\frac{1}{2} \times 13$ in. Price: £202 11s. 5d. (including PT).

L1000. Infinite baffle acoustically damped enclosure of over 7 cu ft. Three bass drivers. Eight mid-range units (four adjustable for direction), two pressure chamber tweeters. Crossover: 500 Hz, 4 KHz. FR 20 Hz to beyond upper audible limit. HC 80W RMS. Impedance 8-16 ohms. Finish: wood cabinet finished white laminated plastic, perforated aluminium front grille. Size: $30 \times 40 \times 13\frac{1}{4}$ in. Price: £539 16s. 8d. (including PT).

★

BRIMHAM. See P. F. & A. R. Helme.

★

BURNE-JONES & CO. LTD., 18 Brunswick Road, Sutton, Surrey.

B.J. Treble 20. Omni-directional multi-horn. One 4 in. unit. Crossover built-in. Response 1-18 KHz. Size: 6×5 in. Weight: $1\frac{1}{2}$ lb. Price: £3.

B.J. Treble Twin. Omni-directional horn. Two 4 in. drive units. Crossover included. Response 900 Hz-18 KHz. Size: $9 \times 4\frac{3}{4} \times 6$ in. Weight: 2 lb. Price: £5 10s.

★

B. & W. ELECTRONICS LTD., Bowers and Wilkins Electronics Ltd., Littlehampton Road, Worthing, Sussex. Tel: 5142 30303.

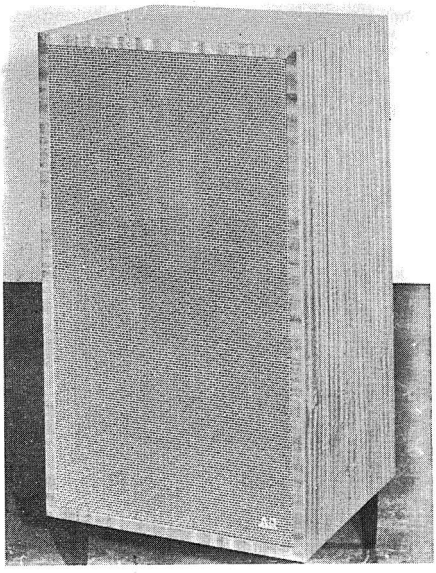
P2 Monitor. Floor-standing enclosure with two units. EMI special pen tested bass and mid-range unit, Ionic HF unit operating above 2·5 KHz. Variable bass loading, switched attenuator for HF unit. Crossover and filter network individually adjusted for each speaker. Vincor wound inductors. Each Monitor pen tested and curve supplied with enclosure. Finish: oiled teak, oiled walnut or rosewood veneers. Price: (all finishes) £84.

P2/H Monitor. Identical to P2 Monitor except has 50% increased power handling capacity. Price: (all finishes) £89.

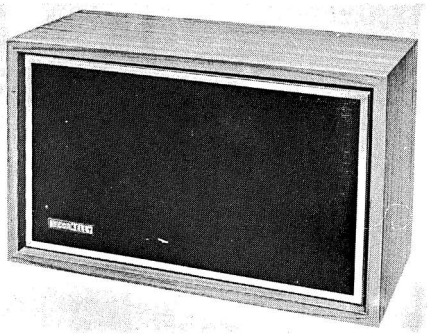
★

CELESTION LTD., Ferry Works, Thames Ditton, Surrey. Tel: 01-398 3402. Cables: Voicecoil, Thames Ditton.

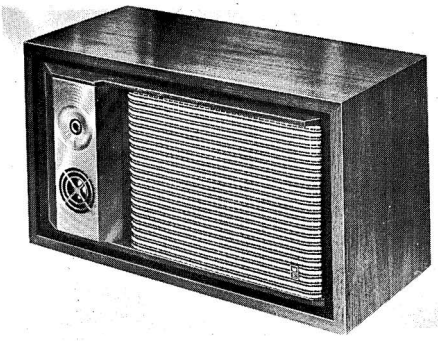
Ditton 10. Infinite baffle compact system. Long-throw 5 in. bass unit, HF1300 Mk 2 HF unit. Built-in half-section crossover 3·5 KHz. FR 35 Hz-15 KHz. HC 10W. Size: $12\frac{3}{4} \times 6\frac{3}{4} \times 8\frac{1}{4}$ in. Weight: 13 lb. Available in teak (3-4 ohms



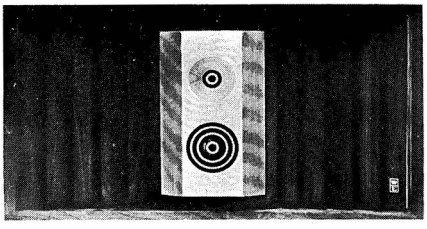
A. Davies bass reflex



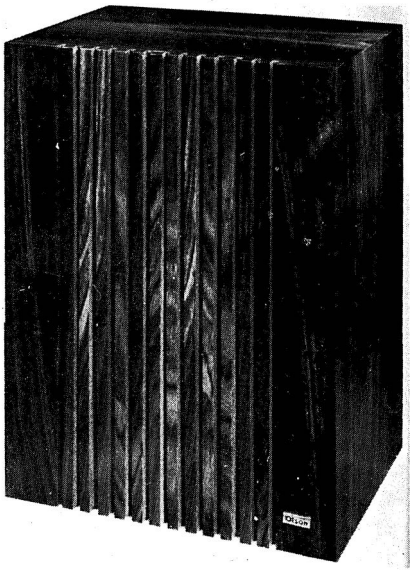
Decca-Kelly Mini



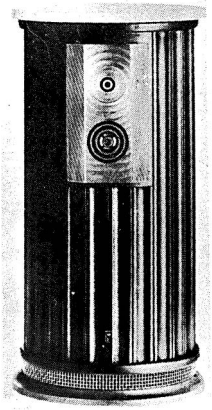
Empire 8200



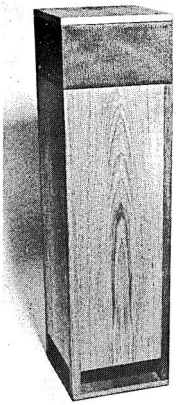
Empire Grenadier 8400



Eagle MS40



Empire Grenadier 8000



Expert Mk. III acoustic column

and 15 ohms) and walnut (15 ohms only). Price: £16 19s. 3d. (plus £3 16s. 3d. PT).

Ditton 15. Compact infinite baffle enclosure incorporating auxiliary bass radiator. Units: 8 in. middle/bass speaker, HF1300 Mk 2 treble radiator. FR 30 Hz-15 KHz. HC 15W RMS. Impedance: 4 ohms. Size: 21 × 9½ × 9¼ in. Weight: 20 lb. Finish: walnut or teak. Price: £25 (plus £5 12s. 4d. PT).

Ditton 25. Studio monitoring quality speaker enclosure with five drive units. 12 in. long-throw bass driver, two pressure type mid-range and HF units, pressure type ultra high frequency unit, 12 in. auxiliary bass radiator. HC 25W RMS. Impedance 4-8 ohms. Size: 32 × 14 × 11 in. Weight. 48 lb. Finish: teak or walnut. Price: £55 13s.

★

CENTRE OF SOUND, V. J. Monk Ltd., 140-141 Plumstead Road, London, S.E.18. Tel: 01-854 2369.

Paraline. Unique design by Rex Baldock. Size: 41 × 16 × 7 in. Made in left-hand or right-hand versions. Recommended drive units: Elac 8N/185 or Lowther PM6. Price: (in white wood) £5 5s.; (finished in teak or mahogany) £10 10s.

Paramid. Designed by Edward Michelsen as a vertical version of the Paraline. Performance, units and prices as for the Paraline.

Paraline Tweeter Kit. Comprising two Lorenz LPH65 tweeters, 2 mF capacitor, sealing-strip, wiring diagram and fitting template. Note: One kit is required for each Paraline. Price: £3 15s.

Variline. Folded column enclosure similar to the Paraline in performance having an adjustable reflector board which can be "tuned" to individual requirements. Rec unit Elac 8N/185. FR nominally 40 Hz-12 KHz. Finish: walnut, mahogany or teak beaumel (laminated plastic). Imp 15 ohms. HC 5W. May be wall mounted or free-standing. Size (closed): 36 × 22 × 5 in. Weight: 30 lb with unit. Price: Cabinet only £13 13s. with speaker £17 10s.

Variline Mk II. Specification as for standard Variline but with the addition of two Lorenz tweeters. Frequency range extended to 17 KHz. Variline Mk II has no reflector board. Cabinet finished back and front so the unit can be used as a reflecting system or forward facing. Price: £20.

A.C.E. Acoustic coupled enclosure, a new concept in column loading. Size: 36 in. high, 16 in. wide, 9½ in. deep. FR (with Elac 8N/185) 40 Hz-12 KHz; (with Lowther PM6) 40 Hz-17 KHz. HC 6W with high electro-acoustic efficiency. Layered damping. Full specification on request. Price: (in white wood) £8 8s.; (finished in teak) £12 12s.; diffuser unit for PM6 £1 6s.

Bookshelf Horn. Small enclosure designed to give performance near to that of the Paraline. Complete with Elac 8N/185. Price: (in white wood) £11 11s. (ready finished) £14 14s.

★

CONNOISSEUR. See A. R. Sugden and Co. Ltd.

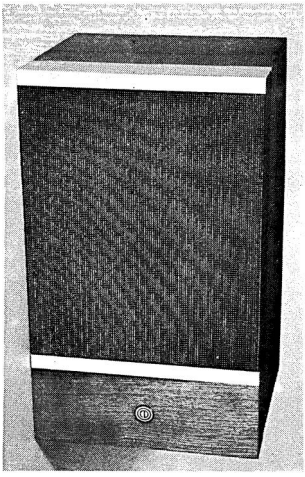
★

A. DAVIES & COMPANY, 3 Parkhill Place, off Parkhill Road, Hampstead, London, N.W.3. Tel: 01-485 5775.

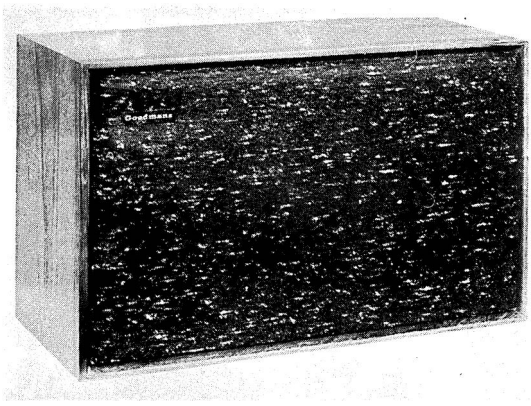
Sherwood type. Based on Goodmans design for Axiom speakers. Approved for Goodmans Axiom 201, Axiom 301 and Goodmans three-way system. Finish: Sapele, oak, walnut, teak. Full polish or satin finish. Size: 23½ × 29½ × 19½ in. Price (without units or ARU172): £18 14s. Extra for teak: £1.

Bass reflex. Suitable versions are made for good quality 8 in., 10 in. and 12 in. speakers. Cabinets lined with 1 in. acoustic felt. Finish: Sapele, walnut, oak, teak. Full polish or satin finish. Sizes: all cabinets are 34 in. high; 8 in. model 15 in. wide, 12 in. deep; 10 in. model 15¾ in. wide, 13½ in. deep; 12 in. model 17½ in. wide, 15½ in. deep. Prices: Standard finish, 8 in. £12 13s.; 10 in. £13 4s.; 12 in. £13 15s. (teak 10s. extra).

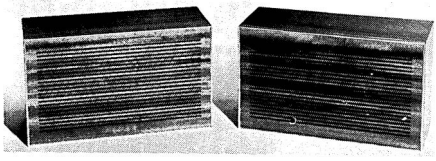
A.D. Sealed Folded Horn. Designed to house Goodmans three-speaker system; 12 in. bass, Midax and Trebax. Alternative speaker arrangements are Kelly ribbon tweeter and Goodmans Audiom 51 or Woollett electrostatic treble and Wharfedale W12/RS/PST. Suitable full-range single 12 in. speakers are Goodmans Triaxiom 1220C, 212C, Axiom 301, Axiom 201, Tannoy Monitor. Rear of cabinet ready cut for attenuators. Size: 31½ in. high, 18 in. × 18 in. Finish: teak or veneer of colour to choice. Front baffle sealed with black Formica (other colours to order) with neutral colour open-weave Tygan speaker grille. Price: £23; 15 in. loudspeaker version £28.



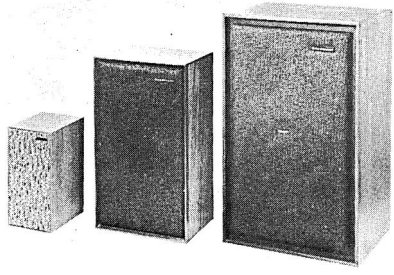
Expert Bookshelf Unit



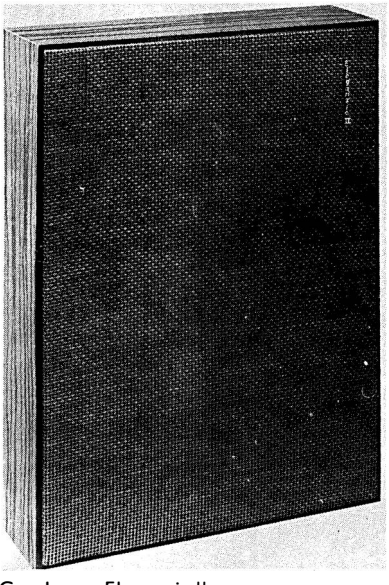
Goodmans Mezzo II



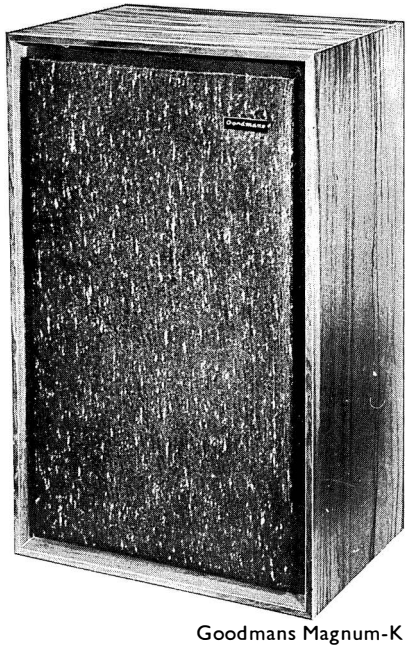
Ferguson 204SS



Goodmans Maxim, Mezzo and Magnum



Goodmans Eleganzia II



Goodmans Magnum-K

DECCA SPECIAL PRODUCTS, Ingate Place, Queenstown Road, London, S.W.8. Tel: 01-622 6677.

Decca Deram Enclosure. Two units; 13 × 8 in. bass driver, 3 in. tweeter. HC 8-10W. Size: 25 × 13¼ × 8 in. Impedance: 15 ohms. Finish: teak or rosewood. Price: (teak) £17 17s.; (rosewood) £18 18s.

Decca-Kelly Mini Enclosure. Infinite baffle miniature shelf-mounting enclosure. Solid piston direct radiator bass unit. Melinex diaphragm direct radiator HF unit. Crossover 2 KHz. FR 40 Hz-20 KHz flat to within 3 dB. HC 15W RMS. Matching of driving area to enclosure volume for high-efficiency and good bass response (British Patent 36994/64). Piston diaphragm of expanded thermo-setting resin. HF unit contoured to give omni-directional sound distribution up to 16 KHz. Suitable for amplifiers of 8-16 ohms output impedance. Standard finish: medium teak with tygan front. Size: 10 in. high, 16 in. wide, 7½ in. deep. Weight: 23 lb. Price: £21.

Decca Kardioid Thirty. Reflex enclosure with units. 12 in. bass driver, 30W high frequency ribbon unit, acoustic lens. Crossover: 2·5 KHz. High-pass variable slope multi-stage network. Initial slope 12 dB/octave. FR 30 Hz-25 KHz. HC 25W RMS. Exceptional horizontal dispersion due to acoustic lens and smoothness of HF ribbon. Finish: teak 'fine-line' with black Vynair front. Size: 21½ × 12 × 28 in. Weight: 64 lb. Price: £51 9s.

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DUODE LTD., Westfield Mills, Broad Lane, Leeds, 13. Tel: Pudsey 77536.

Duode-Janszen 3. Dynamic/electrostatic speaker of novel design. FR 30 Hz to over 30 KHz. Impedance 10 ohms. HC 60W. Bass unit: modified KEF B139. Treble units: two Janszen electrostatic speakers. Crossover: 500 Hz. Power requirement: 110-250V 40-60 Hz (negligible consumption). Finish: matt teak or sapele mahogany. Dimensions: 27 × 14 × 12 in. Price: £48 10s.

Duode-Janszen 6. Dynamic/electrostatic speaker of novel design. FR 20 Hz to over 30 KHz. Impedance 10 ohms. HC 85W. Bass units: two modified KEF B139. Treble units: four Janszen electrostatic speakers. Crossover: 500 Hz. Power requirements: 110-250V 40-60 Hz (negligible consumption). Cabinet: specially designed octagonal in choice of finish. Dimensions: 36 × 21 × 16 in. Price: £131 5s.

★

DYNA-STATIC. See Electrostatic Loudspeaker Manufacturing Co.

★

DYNATRON RADIO LTD., St Peter's Road, Furze Platt, Maidenhead, Berks. Tel: 0628 23331.

Dynatron LS.100. Infinite baffle wall or shelf-mounting system. 6½ in. special suspension bass unit, 3⅞ in. HF unit with high-pass filter. FR 20 Hz-40 KHz. Impedance: 3 ohms. Size: 13¾ 7½ × 10¼ in. Price: £10 18s. 11d. (plus £2 6s. 10d. PT).

Dynatron LS.200. Floor standing bass reflex enclosure. 8 in. bass unit with high-flux ceramic magnet, 3½ in. HF unit with high-pass filter. FR 20 Hz-40 KHz. Enclosure filled with bonded cellulose acetate fibre to prevent resonance. Impedance: 3 ohms. Size: 26¾ × 10¼ × 10½ in. Price: £16 17s. 10d. (plus £3 12s. 3d. PT).

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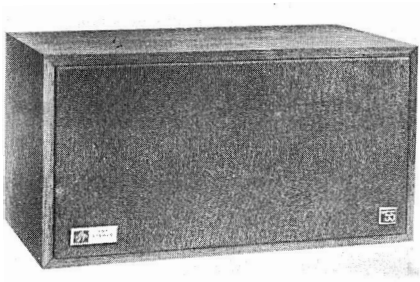
EAGLE PRODUCTS. Distributors: B. Adler and Sons (Radio) Ltd., 32a Coptic Street, London, W.C.1. Tel: 01-636 9606/7. Cables: Reldab, London.

MS.40. Infinite baffle enclosure. FR 40 Hz-16 KHz. HC 5W RMS. One 4 in. high-compliance unit. Impedance: 16 ohms. Size: 8⅞ × 6½ × 5 in. Finish: Rosewood with slotted front. Price: £7 19s. 11d. (plus £1 9s. 1d. PT).

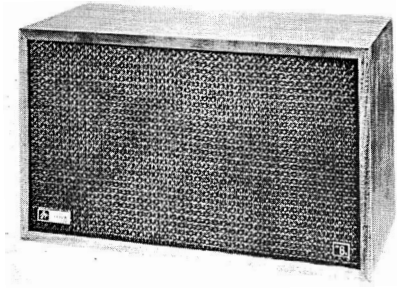
MS.65. Infinite baffle enclosure. FR 35 Hz-18 KHz. HC 10W RMS. One 6½ in. high-compliance unit. Impedance: 16 ohms. Size: 10⅜ × 7⅞ × 6¾ in. Finish: Rosewood with slotted front. Price: £11 19s. 10d. (plus £2 3s. 8d. PT).

MS.80. Infinite baffle enclosure. FR 50 Hz-20 KHz. HC 20W RMS. One 8 in. high-compliance unit. Impedance: 16 ohms. Size: 14½ × 10⅜ × 8 in. Finish: Rosewood with slotted front. Price: £13 14s. 9d. (plus £2 10s. 9d. PT).

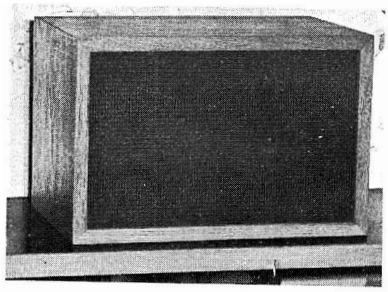
Prices quoted for Eagle products are approximate.



Fisher XP-55

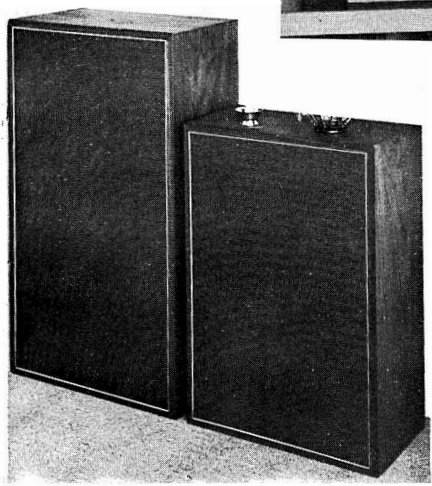


Fisher XP-6B

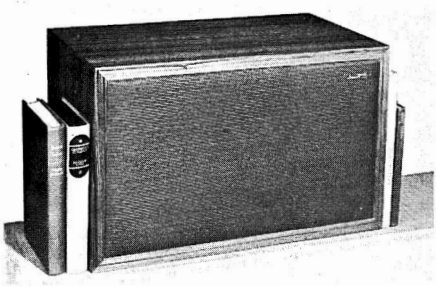


Howland-West Bergen

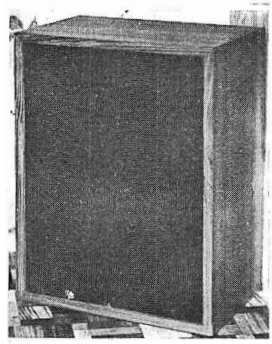
Brimham systems



Helme enclosures



Jordan Watts Juliet



Howland-West Narvik

EATON AUDIO FITMENTS, Leopold Street, Long Eaton, Nottingham. Tel: Long Eaton 2662/2818.

Trent 8. Corner reflex enclosure based on Goodmans design, suitable for any full-range 8 in. drive unit. ¾ in. acoustic chipboard. Veneered in walnut, mahogany, oak or teak. Supplied in kit form. Size: 25½ in. high, 21½ in. wide, 14 in. back to front. Price: (walnut, mahogany, oak) £8 18s. 6d.; (teak) £9 5s. Legs 7s. 6d. extra.

Trent 10. Similar to Trent 8 but designed for 10 in. units. Supplied in kit form. Size: 31½ in. high, 25 in. wide, 15½ in. back to front. Also suitable for Celestion CX1512 and CX2012. Price: £9 19s. 6d. (teak 6s. 6d. extra). Legs 7s. 6d. extra.

Derwent. Bass reflex enclosure based on Wharfedale design. Two cubic feet. Supplied as kit. Suitable for any 8 or 10 in. full range units and certain 12 in. dual systems. Size: 28 × 16 × 10½ in. Price: (walnut, mahogany, oak) £8 12s. 6d.; (teak) £9.

Erewash 8. One cubic foot enclosure based on Wharfedale design. Veneered on all sides. Supplied in kit form. Constructed from ½ in. material. Suitable any 8 in. full range unit and smaller dual systems. Produced in reflex, distributed port or infinite baffle version.

Cabinets built to customers' own designs and quotations given. Standard kits include eight enclosures (five free-standing and three bookshelf). Supplied in kit form accurately machined ready for simple assembly. All kits are complete with fret material, loose fret, bolts, screws and lagging material as required. Wood is veneered but unpolished.

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ELAC. Electro Acoustic Industries Ltd., Stamford Works, Broad Lane, London, N.15. Tel: 01-808 0505/9. Cables: Elac, London, N.15.

Elac E6-S. Infinite baffle compact enclosure with unit. Wide-range 6 in. speaker with long-throw suspension and moulded rubber surround of new design. FR 55 Hz-16 KHz. HC 10W. Impedance: 8 and 15 ohms. Size: 11 × 8 × 6 in. Weight: 7 lb. Finish: scratch resistant simulated teak or walnut. Price: £12 (plus £2 9s. 4d. PT).

ELECTROSTATIC LOUDSPEAKER MFG. CO., 82 East Barnet Road, New Barnet, Herts. 01-449 6605. Export agents: Metro-Sound (Export) Ltd.

Dyna-Static Doublet. Forward-facing units in special design doublet enclosure which provides both front and rear radiation. Two closely coupled 10 × 6 in. bass units, 12,000 gauss each. 2 in. dia. voice coil. Total flux 160,000 maxwells. Shackman electrostatic tweeter. Crossover approx 1 KHz. HC 20W RMS. FR 40 Hz-20 KHz. Impedance 8-16 ohms. Finish: walnut laminate with gold/brown Vynair front. Built-in mains unit for electrostatic unit. Standard version 200-250V AC, export model 110V if required. Size: 28 × 22 × 6 in. Weight: 40 lb. approx. Price: £39 18s.

Dyna-Static Mark II. Infinite baffle type enclosure. 12 in. bass unit. 2 in. dia voice coil. Total flux 160,000 maxwells. Shackman electrostatic tweeter. Crossover approx 800 Hz. HC 20W. Impedance 8-16 ohms. FR 30 Hz-20 KHz. Finish: walnut laminate with gold/brown Vynair front. Built-in mains unit for electrostatic unit. Standard version 200-250V AC, export model 110V if required. Size: 33 × 18 × 12 in. Weight: 60 lb. approx. Price: £52.

★

ELECTROSTATIC TRANSDUCER MFG. CO. See L. G. Woollett & Co. Ltd.

★

E.M.G. HANDMADE GRAMOPHONES LTD., 26 Soho Square, London, W.1. Tel: 01-734 4311.

DL/12T. Custom built enclosure with unit. Floor-standing. Size: 36 × 20 × 16 in. tapering to 10 in. Finish in choice of modern veneers. Full technical details and price on request.

★

EMPIRE SCIENTIFIC. Distributors: Howland-West Ltd., 2 Park End, South Hill Park, London, N.W.3. Tel: 01-794 6666.

Grenadier 8000. Divergent lens enclosure. 12 in. bass unit, mid-range direct radiator, domed HF tweeter. FR 30 Hz-20 KHz. Circular design gives completely omni-directional sound. Finish: Satin walnut. Size: 29 in. high, 15¼ in. diameter. Price: £115 10s.

Grenadier 8000P. Divergent lens enclosure. 12 in. bass unit, mid-range direct radiator, domed HF tweeter. FR 25 Hz-20 KHz. Circular design gives completely omni-directional sound. Finish: satin walnut, hand rubbed, with marble top. Handling capacity up to 100W music power. Size: 29 in. high, 16 in. diameter. Price: £136 10s.

Grenadier 8400. Features a louvered LF hyperbolic horn, 12 in. mass-loaded bass unit with floating suspension, diecast mid-frequency/high-frequency full dispersion acoustic lens, with mid-range radiator and domed HF tweeter. FR 25 Hz-20 KHz. Power handling capacity up to 100W music. Treble adjustment. Finish: satin walnut, hand rubbed. Size: $25 \times 13\frac{3}{4} \times 12\frac{3}{4}$ in. deep. Price: £127 1s.

Grenadier 8200. Similar to 8400 except frequency response 30 Hz-20 KHz and dimensions $24\frac{3}{4} \times 14 \times 12\frac{1}{8}$ in. deep. Price: £115 10s.

Grenadier 9000M. Divergent lens enclosure. 15 in. bass unit, mid-range direct radiator, domed HF tweeter. FR 20 Hz-20 KHz. Circular design gives completely omni-directional sound. Finish: Satin walnut. Size: 29 in. high, 22 in. diameter. Price: £173 5s.

★

EXPERT GRAMOPHONES (SERVICES) LTD., 30 Vincent Road, Kingston-upon-Thames, Surrey. Tel: 01-546 6011.

Expert Bookshelf Unit. Labyrinth enclosure with unit. One Richard Allan special 8 in. unit. FR 40 Hz-15 KHz ± 4 dB. HC 10W RMS. Smooth response, high efficiency and broad radiation pattern. Patented design enclosure. Size: $16 \times 9\frac{1}{2} \times 9$ in. Finish: rosewood with black Vynair grille, teak with black Vynair grille, elm with buff Vynair grille. Price: £15 5s. (plus £3 7s. 6d. PT).

Expert Bookshelf Major. Labyrinth enclosure with unit. One Richard Allan special 10 in. unit. FR 30 Hz-20 KHz with smooth roll off above and below. HC 12W RMS. Smooth response, high efficiency and broad radiation pattern. Patented design enclosure. Size: $20 \times 10 \times 10$ in. Finish: rosewood with black Vynair grille, teak with black or stone Vynair grille, elm with stone Vynair grille. Price: £17 15s. (plus £3 18s. 8d. PT).

Expert Mk III Acoustic Column. Column type enclosure with unit. One Richard Allan special 10 in. unit. FR 30 Hz-20 KHz with smooth roll-off above and below. HC 12W RMS. 360 degree radiation pattern, making for easier stereo positioning. Available in Burma teak, French walnut, oak or mahogany with Vynair grille to suit as standard. Also available in any finish, including painted, panelled, decorated, etc., to special order at slight additional cost. Available with Lowther PM6 or PM7, providing extended frequency range, at additional cost. Size: $12 \times 12 \times 44$ in. high. Price: £28 15s. (plus £6 7s. 6d. PT).

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FANE ACOUSTICS LTD., Hick Lane, Batley, Yorks. Tel: Batley 2114. Cables: Fane, Batley.

Ionofane 602. HF Ionophone unit combined with new 5 in. high flux mid-range unit and 12 dB/octave crossover. Mounted in compact veneered cabinet and designed to operate with existing bass unit. FR 800 Hz-50 KHz. Power handling above 800 Hz: 20W peak. Impedance: 15 ohms. Mains power 200/250V AC required. Size: $14 \times 9 \times 7\frac{1}{2}$ in. Price: £47 5s. (plus £9 6s. PT).

Ionofane 603. Full-range speaker comprising Ionofane 601 HF unit, 501 mid-range 5 in. unit, 152/17LR 15 in. low resonance bass unit and 12 dB/octave three-way crossover. Whole assembly mounted in veneered reflex cabinet. Finish walnut or sapele. FR 20 Hz-50 KHz. HC 20W RMS. Impedance 15 ohms. Mains power 200/250V AC required. Size: $35 \times 22\frac{1}{2} \times 14$ in. Price: £78 15s.

Ionofane 604. Full-range speaker system comprising Ionofane 601 high-frequency unit and 12 in. bass unit with 17,000 gauss magnet. HC 20W. FR 30 Hz-30 KHz. Finish: natural teak. Size: $31 \times 17 \times 12$ in. Price: £51 9s.

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FERGUSON. British Radio Corporation Ltd., 284 Southbury Road, Enfield, Middlesex. Tel: 01-366 1155.

Unit 204SS. Shelf-mounting enclosure with two units. $6\frac{1}{2}$ in. high compliance bass driver, $3\frac{1}{2}$ in. HF pressure unit. Crossover: LC unit 3 KHz. FR 30 Hz-15 KHz. HC 7W. Impedance: 8 ohms. Cabinet: extra thick particle board veneered in teak. Size: $8\frac{1}{2}$ in. wide, $16\frac{3}{4}$ in. high, $7\frac{1}{2}$ in. deep. Designed to match Ferguson Unit Audio system. Supplied with 11 ft cable and DIN plug. Price: £11 9s. 11d. (plus £2 9s. 1d. PT).

Unit 3402. Shelf or floor standing enclosure. Infinite baffle. One 8 in. bass driver, 2 in. HF pressure unit with wide dispersion angle. Capacity coupled tweeter. FR 40 Hz-16 KHz. HC 7W RMS. Size: 26 × 10 × 9 in. Weight: 18 lb. Finish: satin finish teak veneer. Designed to match Ferguson Unit Audio system. Price: £15 14s. 9d. (plus £3 7s. 3d. PT).

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FISHER RADIO CORPORATION, Long Island City 1, New York, U.S.A. Distributors: Getz Bros. and Co. Inc., 2 Harewood Place, London, W.1. Tel: 01-499 6901.

XP-55. Speaker enclosure. Free piston system. 8 in. bass driver, 2½ in. tweeter. HC 30W. FR 37 Hz-19 KHz. Size: 10 × 20 × 9 in. Can be used horizontally or vertically. Weight: 20 lb. Finish: walnut. Price: £34 13s.

XP-66. Speaker enclosure. Free piston system. 12 in. bass driver, 6 in. mid-range unit, 2½ in. tweeter. HC 60W. FR 30 Hz-19 KHz. Can be used horizontally or vertically. Weight: 40 lb. Size: 14 × 24½ × 12 in. Finish: walnut. Price: £57 15s.

XP-6B. Speaker enclosure. Free piston system. 10 in. bass driver, 2½ in. tweeter. HC 50W. FR 32 Hz-19 KHz. Can be used vertically or horizontally. Weight: 35 lb. Size: 13 × 23 × 10½ in. Finish: walnut. Price: £47 5s.

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GOODMANS LOUDSPEAKERS LTD., Axiom Works, Wembley, Middlesex, England. Tel: 01-902 1200. Cables: Goodaxiom, Wembley.

Eleganzia II. Acoustically sealed enclosure, exceptionally slim. Forward facing. Two units, 12 in. bass unit especially designed for this enclosure, employing Goodmans "Suprfoam" diaphragm, and one back-loaded mid-range and HF unit. Crossover unit 900 Hz. FR 35 Hz-15 KHz. HC 15 watts. Imp 15/16 ohms. Size: 27 × 20 × 6¼ in. Weight: 42 lb. Price: £30.

Maxim. Infinite baffle. Forward facing. Incorporates two units specially designed for this box. Crossover included. FR 45 Hz-20 KHz. HC 12W. Impedance: 8-16 ohms. Size: 10½ × 5½ × 7¼ in. Weight: approx 7 lb. Price: £16 7s. (plus £3 13s. 5d. PT).

Mezzo II. Infinite baffle containing two units. 12 in. bass unit with inductance/capacitance crossover at 2 KHz. Sealed back 4 in. treble unit. FR 40 Hz-20 KHz. HC 15W. Impedance 8 ohms. Bookshelf speaker enclosure. Finish: teak or walnut to order. Size: 12 × 19½ × 9 in. Price: £30 18s.

Magnum-K. Infinite baffle containing three units. 12 in. bass speaker, mid-range direct radiator, back-loaded direct HF radiator. Built-in multiple section crossover, 1·5 KHz and 6 KHz. FR 30 Hz-20 KHz. HC 25W. Air-cushion suspension to bass unit. Two attenuators allow sound tailoring to room acoustics. Classic styling in teak or walnut. Imp 4-8 ohms. Price: £40 2s.

★

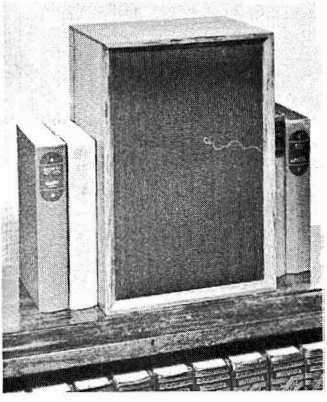
GRUNDIG (GREAT BRITAIN) LTD., Hi-Fi Division, 15 Orchard Street, London, W.1. Tel: 01-935 4898.

Box 30A. Infinite baffle enclosure incorporating six units. One 8 in. bass driver, one 7 × 5 in. mid-range unit, four 2¾ in. tweeters. Crossover: 1·5 and 7 KHz. FR 40 Hz-20 KHz. HC 30W nominal, 40W peak. Impedance: 5 ohms. Size: 23½ × 15 × 5 in. Weight: 33 lb. Volume: 0·7 cu ft. Finish: oiled teak, light walnut, or dark gloss. Price: £46 4s. (including PT).

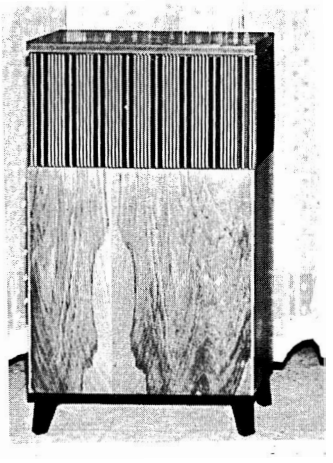
Box 40A. Similar specification to Box 30A but different size and finish. Size: 24 × 14 × 10 in. Weight: 33 lb. Volume: 1·4 cu ft. Finish: matt walnut or oiled teak with horizontal louvred front. Price: £55 13s. (including PT).

Box 80. Six-unit enclosure incorporating push-button frequency correction network. One 12 in. bass driver, one 6½ in. mid-range unit, four 2¾ in. tweeters. Crossover: 1·5 and 7 KHz. FR 35 Hz-20 KHz. HC 40W nominal, 50W max. Impedance: 5 ohms. Five-position tone correction network: treble level, treble boost, bass level, bass boost, bass cut. Size: 21 × 24½ × 13 in. Weight: 73 lb. Volume: 2·48 cu ft. Finish: Dark gloss, matt walnut or oiled teak. 9 in. black legs with teak cabinet, wood legs with other finishes. Price: £75 12s. (including PT).

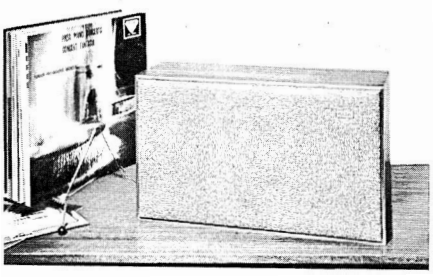
Box 204. Three unit enclosure. One bass driver, two tweeters. HC 15W nominal, 20W maximum. FR 50 Hz-20 KHz. Impedance 5 ohms. Crossover 4 KHz. Finish: light walnut or oiled teak. Size: 20 × 12½ × 3¼ in. Price: £31 10s. (including PT).



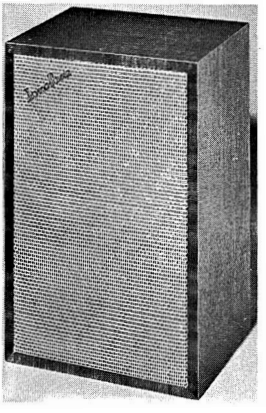
Jordan Watts Janet



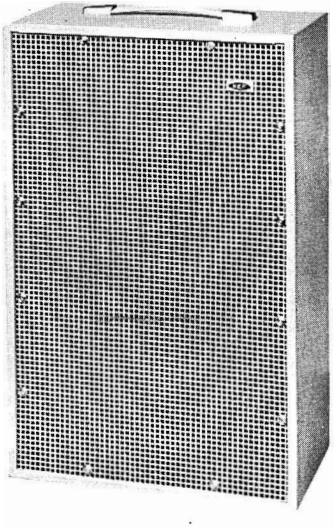
Kirkman Home Concert Hall



KEF Celeste



Ionofane 602 enclosure



KEF Portable Celeste

KEF Cresta

Box 205. Three unit enclosure. One bass driver, two tweeters. HC 15W nominal, 20W maximum. FR 50 Hz-20 KHz. Impedance 5 ohms. Crossover 4 KHz. Finish: dark walnut, light walnut or teak. Size: $6\frac{3}{4} \times 11 \times 8\frac{1}{4}$ in. Price: £26 15s. 6d. (including PT).

Box 425. Three unit enclosure. One bass driver, one mid-range unit, one tweeter. HC 30W nominal, 40W maximum. FR 40 Hz-20 KHz. Impedance 5 ohms. Crossover: 1·5 KHz and 7 KHz. Finish: light walnut or oiled teak. Size: $23 \times 9\frac{1}{2} \times 9$ in. Price: £45 3s. (including PT).

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C. E. HAMMOND & CO. LTD., 90 High Street, Eton, Windsor, Berks. Tel: Windsor 63388. Telex: 84316.

Hammond L.7. Infinite baffle enclosure. One $6\frac{1}{2}$ in. twin-cone unit. FR 45 Hz-18 KHz. Impedance 8 or 16 ohms. Finish: teak. Size: $20 \times 30 \times 4\frac{3}{4}$ in. Weight: 6 lb. Price: £11 0s. 6d.

★

THOMAS HEINITZ, 35 Moscow Road, Queensway, London, W.2. Tel: 01-229 2077.

C.Q. Junior. Controlled Q reflex enclosure. Units special Goodmans or Peerless 10×6 in. FR 45 Hz-15 KHz, depending on unit. Finishes: Teak, walnut, mahogany, all-white (others to order at no extra charge). Size: $16\frac{1}{2} \times 9\frac{1}{2} \times 10\frac{1}{4}$ in. Weight: 7 lb. Price: £8 18s. 4d.

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P. F. & A. R. HELME, Butcher Pasture, Summerbridge, Harrogate, Yorks. Tel: Darley 279.

Brimham Linnet 5-1. Infinite baffle enclosure with unit. 4 in. full range speaker. FR 50 Hz-16 KHz. HC 5W. Impedance 16 ohms. Finish (standard): natural mahogany. Size: $12 \times 8 \times 7$ in. Weight: 8 lb. Price: £11 (plus £2 5s. 5d. PT).

Brimham Swift 10-1/B. Infinite baffle enclosure with unit. 6 in. dual cone speaker. FR 50 Hz-16 KHz. HC 10W. Impedance 16 ohms. Finish (standard): natural mahogany. Size: $18 \times 10 \times 8$ in. Weight: 16 lb. Price: £12 10s. (plus £2 11s. 7d. PT).

Brimham Swift 10-1. Infinite baffle enclosure with unit. $6\frac{1}{2}$ in. dual-cone speaker. FR 40 Hz-18 KHz. HC 10W. Impedance 16 ohms. Finish (standard): natural mahogany. Size: $18 \times 10 \times 8$ in. Weight: 17 lb. Price: £15 (plus £3 1s. 11d. PT).

Brimham Swallow 15-1. Infinite baffle enclosure with unit. 8 in. full-range speaker. FR 30 Hz-20 KHz. HC 15W. Impedance 16 ohms. Finish (standard). natural mahogany Size: $20 \times 11 \times 8$ in. Weight: 19 lb. Bookshelf enclosure capable of handling 25W maximum. Price: £17 10s. (plus £3 12s. 3d. PT).

Brimham Concerto. Reflex enclosure with unit. 12 in. dual-cone speaker. FR 30 Hz-17 KHz. HC 25W. Impedance 16 ohms. Finish: natural mahogany. Size: $38\frac{1}{2} \times 22\frac{1}{2} \times 13\frac{1}{2}$ in. Price: £40.

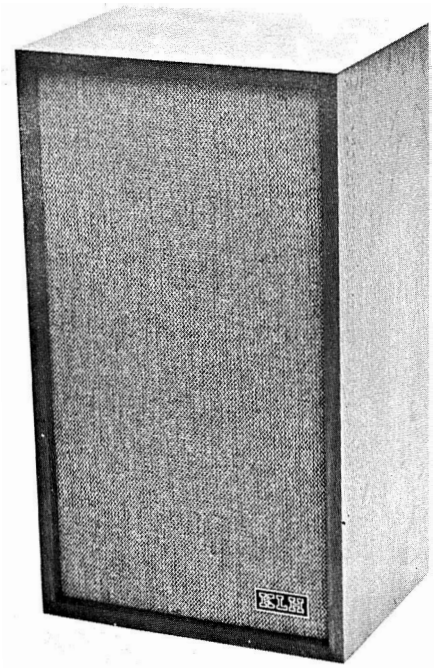
Brimham Wren. Infinite baffle enclosure with unit. 4 in. dual-cone speaker. FR 60 Hz-15 KHz. HC 5W. Impedance 16 ohms. Finish: teak or mahogany. Size: $7\frac{1}{2} \times 7 \times 6$ in. Weight: 5 lb. Price: (teak) from £9 10s. (plus £1 19s. 2d. PT); (mahogany) from £10 (plus £2 1s. 3d. PT).

Brimham Linnet 10-1. Infinite baffle enclosure with unit. 6 in. dual-cone speaker. FR 45 Hz-18 KHz. HC 10W. Impedance 16 ohms. Finish: teak and mahogany. Size: $12 \times 8 \times 7$ in. Weight: 9 lb. Price: (teak) £16 10s. (plus £3 8s. 6d. PT); (mahogany) £17 (plus £3 10s. 1d. PT).

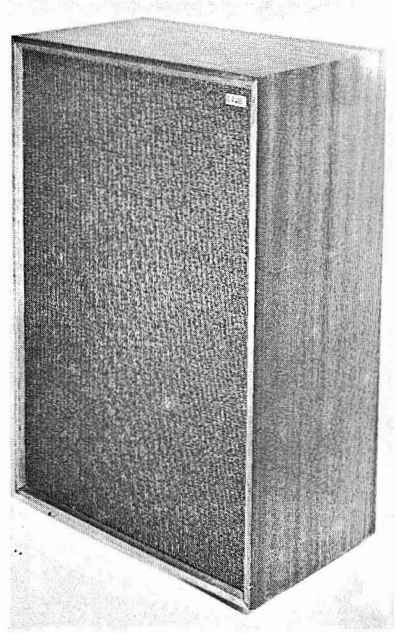
Brimham Swift 10-2. Infinite baffle enclosure with units. 6 in. bass driver and 3 in. horn tweeter. Crossover 2·5 KHz (four element quarter section 6 dB/octave). FR 40 Hz-18 KHz. Impedance 16 ohms. Finish: teak or mahogany. Size: $18 \times 10 \times 8$ in. Weight: 18 lb. Price: (teak) £25 10s. (plus £5 5s. 2d. PT); (mahogany) £26 (plus £5 7s. 3d. PT).

Brimham Swallow 15-2. Infinite baffle enclosure with units. 8 in. bass driver, 3 in. horn tweeter. Crossover 2·5 KHz (four element quarter section parallel 6 dB/octave). FR 30 Hz-20 KHz. HC 15W. Impedance 16 ohms. Finish: teak or mahogany. Size: $20 \times 11 \times 8$ in. Weight: 20 lb. Price: (teak) £28 (plus £5 15s. 6d. PT); (mahogany) £28 10s. (plus £5 17s. 7d. PT).

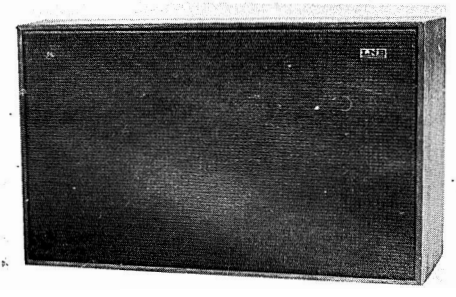
Brimham Treblette. Infinite baffle high-frequency system. 3 in. pressure horn tweeter. Crossover 2·5 KHz (four element quarter section parallel 6 dB/octave). FR 2·5 KHz-20 KHz. HC 10W. Impedance 16 ohms. Constant impedance attenuator. Finish: teak or mahogany. Size:



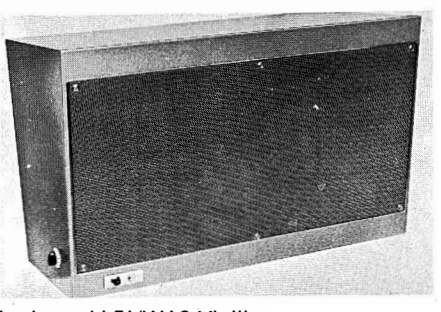
K.L.H. "Twenty Two"



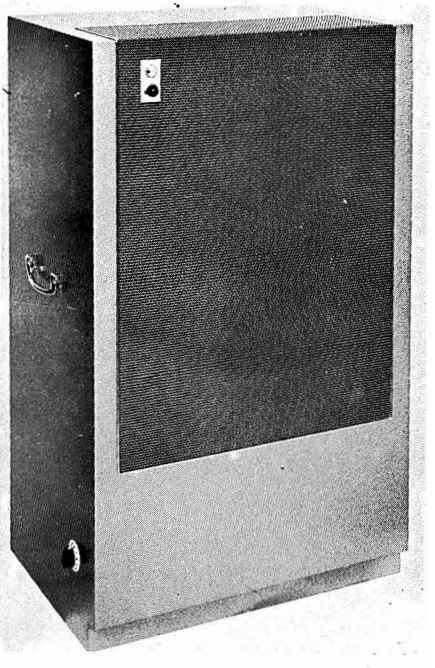
L.N.B. 8-in Labyrinth



LNB Charnwood



Lockwood LE1/WAS Mk III



Lockwood LE1/AS Mk III

$7\frac{1}{2} \times 7 \times 6$ in. Price: (teak) £11; (mahogany) £11 10s.

Brimham Oriole. Reflex enclosure with unit. Special 8 in. bass driver with integral horn tweeter. Crossover 3 KHz. FR 30 Hz-22 KHz. HC 15W. Impedance 16 ohms. Finish: teak or mahogany. Size: $29 \times 21 \times 9$ in. Weight: 40 lb. Price: (teak) £45 (plus £9 5s. 8d. PT); (mahogany) £46 (plus £9 9s. 9d. PT).

Helme Mini. Infinite baffle enclosure only. Suitable for 4-5 in. unit (list of recommended units on request). Finish: teak, mahogany, walnut. Size: $12 \times 8 \times 7$ in. Price: (mahogany) £7; (other finishes) £7 10s.

Helme Bookshelf. Infinite baffle enclosure only. For 6-$6\frac{1}{2}$ in. unit (list of recommended units on request). Finish: teak, mahogany, walnut. Size: $18 \times 10 \times 8$ in. Price: (mahogany) £8 10s.; (other finishes) £9.

Helme Large Bookshelf. Infinite baffle enclosure only. For 8 in. unit (list of recommended units on request). Finish: teak, mahogany, walnut. Size: $20 \times 11 \times 8$ in. Price: (mahogany) £10; (other finishes) £10 10s.

Helme Slimline. Reflex enclosure only. For 8 in. unit (list of recommended units on request). Finish: teak, mahogany, walnut. Size: $29 \times 21 \times 9$ in. Price: (mahogany) £15; (other finishes) £16.

Helme Major. Reflex enclosure only. For 10 in. unit (list of recommended units on request). Finish: teak, mahogany, walnut. Size: $30\frac{1}{2} \times 21\frac{1}{2} \times 12$ in. Price: (mahogany) £16 5s.; (other finishes) £17 5s.

Helme Console. Reflex enclosure only. For 12 in. unit (list of recommended units on request). Finish: teak, mahogany, walnut. Size: $38\frac{1}{2} \times 22\frac{1}{2} \times 13\frac{1}{2}$ in. Price: (mahogany) £20 15s.; (other finishes) £22.

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HOWLAND-WEST LTD., 2 Park End South, Hill Park, London, N.W.3. Tel: 01-794 6666.

Narvik. Infinite baffle enclosure with speakers. 12 in. bass driver, mid-range unit and tweeter. Crossover network included. FR 35 Hz-22 KHz., HC 25W. Size: $23\frac{1}{2} \times 17\frac{3}{4} \times 12$ in. Weight: $32\frac{1}{2}$ lb. Finish: teak. Price: £29 15s.

Bergen. Infinite baffle enclosure with speakers. $6\frac{1}{2}$ in. high compliance bass driver and tweeter. FR 50 Hz-22 KHz. HC 12W. Size: $13\frac{3}{4} \times 9 \times 8\frac{3}{8}$ in. Weight: $10\frac{1}{4}$ lb. Finish: teak. Price: £13 10s. (plus £2 19s. 10d. PT).

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ISOPHON-WERKE, Berlin-Templehof. U.K. Distributors: Britimpex Ltd., 16/22 Great Russell Street, London, W.C.1. Tel: 01-636 7600.

HSB45. Three-speaker system. Totally closed box damped internally. Forward-facing with control at the back adjusting level +3 −7 dB to room conditions. Three units (arranged angularly for wide radiation): 10 in. bass unit and two 3×5 in. midrange/HF speakers. HC 45W. Crossover 1·5 KHz. FR 25 Hz-20 KHz. Finish: walnut. Size: $25\frac{3}{8} \times 13\frac{1}{2} \times 11\frac{1}{4}$ in. Weight: $39\frac{3}{8}$ lb. Price (with units): £45 (plus £9 12s. PT).

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JORDAN-WATTS. Distributors: Boosey and Hawkes (Sales) Ltd., Sonorous Works, Deansbrook Road, Edgware, Middlesex. Tel: 01-952-7711.

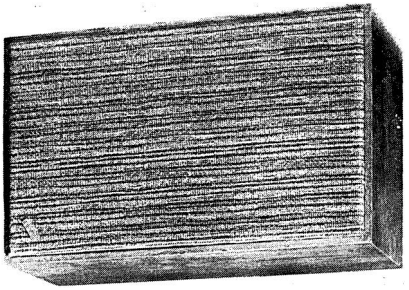
Jumbo. Infinite baffle. Power handling 12W. Forward facing. Shelf or wall mounting. Incorporates one Jordan-Watts modular unit. FR 80 Hz-20 KHz. Size: $16\frac{1}{2} \times 8 \times 3\frac{1}{2}$ in. Weight: 13 lb. Finish: teak. Price: £18 10s.

Janet. Infinite baffle. One full-range Jordan-Watts module. FR 70 Hz-20 KHz. HC 12W RMS. Compact shelf-mounting full range speaker system. Finish: teak with green Vynair. Size: $12 \times 8 \times 6\frac{1}{2}$ in. Weight: 13 lb. Price: £18 10s.

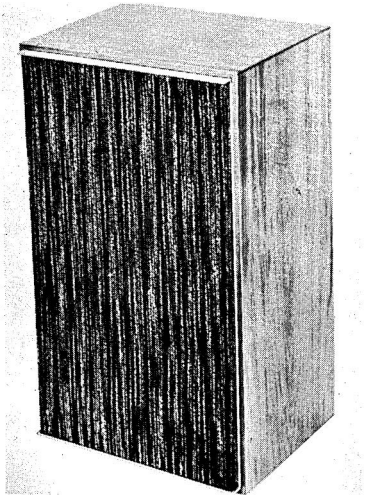
Juno. Reflex enclosure. Power handling 12W. Forward facing. Incorporates one Jordan-Watts modular unit. FR 40 Hz-20 KHz. Size: $24\frac{1}{2} \times 12\frac{1}{2} \times 6\frac{1}{2}$ in. Weight: 27 lb. Price: £25 10s.

Juliet. Reflex cabinet. One full-range Jordan-Watts module. FR 40 Hz-20 KHz. HC 12W RMS. Compact shelf-mounting full range speaker system. Finish: teak with green Vynair. Size: $16 \times 10 \times 9$ in. Weight: 28 lb. Price: £25 10s.

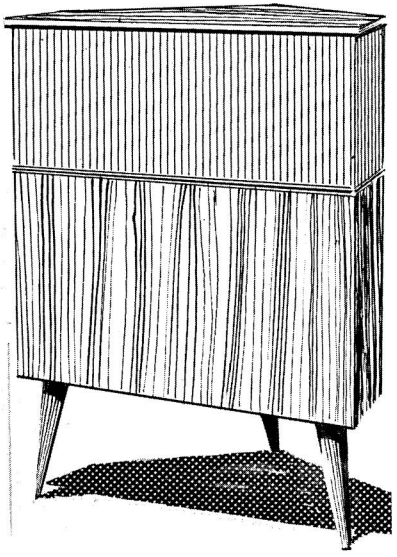
Gemini. Reflex enclosure. Power handling 25W. Forward facing. Incorporates two Jordan-Watts modular units. FR 40 Hz-20 KHz. Size: $30 \times 13\frac{1}{2} \times 7\frac{1}{2}$ in. Weight: 50 lb. Price: £39 15s.



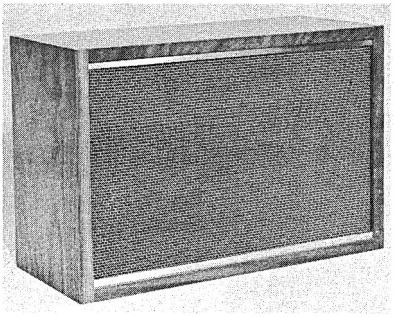
Leak Mini-Sandwich



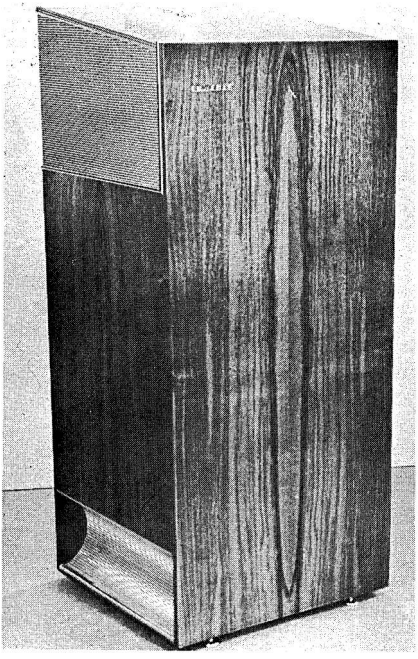
Leak Sandwich



Lowther TP1



Nichols Acoustical Derwent Mk II



Lowther Acousta Twin

Jupiter. Reflex enclosure. Power handling 25W. Forward facing. Incorporates two Jordan-Watts modular units. FR 20 Hz-20 KHz. Size: 34 × 15 × 10½ in. Weight: 70 lb. Price: £54 10s.

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KEF ELECTRONICS LTD., Tovil, Maidstone, Kent. Tel: Maidstone 57258. Cables: KEF, Maidstone.

Celeste Mk II. Totally enclosed. Forward facing. Two drive units; 13 × 9 in. and 1½ in. tweeter. Crossover 1 KHz. Size: 18 × 10¾ × 6¼ in. Weight: 21 lb. Price: £29.

Portable Celeste. Totally enclosed. Forward facing. Two drive units; 13 × 9 in., 1½ in. tweeter. Crossover 1 KHz. Size: 20 × 12½ × 7½ in. Weight: 26 lb. Price: £34.

Concord. Totally enclosed. Forward facing. Two units; B139 13 × 9 in., T15 1½ in. tweeter. Crossover 1 KHz half-section. FR 30 Hz-20 KHz. Size: 24 × 15 × 9⅞ in. Weight: 37 lb. Price: £43 10s.

Cresta. Totally enclosed. Forward facing. Two units; B110 bass driver, T27 HF unit. Crossover 4 KHz. FR 50 Hz-30 KHz. HC 15W. Impedance 4-8 ohms. Terminal connections. System resonance 59 Hz. Size: 13 × 9 × 7 in. Weight: 14 lb. Shelf-mounting. Finish: walnut or teak veneer with woven brown grille. Price: £18 (plus £3 6s. PT).

Concerto. Three-speaker system. Full details and price not available at time of going to press.

★

KIRKMAN (CRAWLEY) LTD., 40 The Broadway, Crawley, Sussex. Tel: OCY3-26670.

Home Concert Hall Mk 3. Isothermal tapered reflex enclosure with speakers and crossover. Two Richard Allan CR5 bass units and STC 4001E tweeter. Two ¼-section crossovers at 3 KHz and 4 KHz. FR 28 Hz −6 dB; 20 KHz −3 dB. HC 20W music. Omni-directional throughout frequency range in horizontal plane. Inside and outside of enclosure employed to maintain non-resonant closely controlled acoustic load. Finish: teak with bronze grille. Size: 31 × 18 × 8½ in. Weight: 44 lb. Price: £49 10s.

KIRKSAETER. Distributed by: Elstone Electronics Ltd., Hereford House, Vicar Lane, Leeds, 2. Tel: 0532 39834.

Scala. Four-unit enclosure. 12 in. bass driver, 6 in. mid-range unit, two 2½ in. tweeters. HC 50W. Adjustment provided to tailor response to suit room acoustics. Full specification and price on request.

Professional. Four-unit enclosure. 12 in. bass driver, 6 in. mid-range unit, two 2½ in. tweeters. HC 50W. Adjustment provided to tailor response to suit room acoustics. Full specification and price on request.

★

K.L.H. Distributors: P. J. N. Collaro Electronics Ltd., 1 Regent Street, London, S.W.1. Tel: 01-839 7571.

Seventeen. Two-unit enclosure. 10 in. bass driver, 1¾ in. cone tweeter. LCR crossover network. FR 40 Hz-12.5 KHz. HC 12W RMS. Impedance 8 ohms. Three-position switch controls HF response in 2.5 dB steps. Snap-on grille cloth panel. Constructed in ¾ in. wood throughout. Infinite baffle enclosure filled glass fibre. Size: 11¾ × 23⅛ × 9 in. Weight: 30 lb. Finish: dark walnut veneer. Price: on application.

Twenty-Two. Two-unit enclosure. 8 in. bass driver, 2 in. tweeter. Impedance 8 ohms. HC 12W RMS per channel. Infinite baffle. Size: 18 × 10¼ × 7⅜ in. Finish: dark walnut. Price: on application.

★

KLINGER CONTROLS LTD., 10 Friar Street, London, E.C.4. Tel: 01-236 1811. Cables: Klinkene, London.

KC.10. Infinite baffle enclosure heavily lagged. 5 in. high-compliance bass driver, solid-backed tweeter. FR 55 Hz-18 KHz. Impedance: 15 ohms. HC 5W RMS. Crossover 5 KHz. Size: 13 × 7 × 8 in. Finished on all sides for horizontal or vertical installation. Weight: 8 lb. Price: (teak) £8 (plus £1 14s. 3d. PT); (rosewood) £9 5s. (plus £1 19s. 7d. PT).

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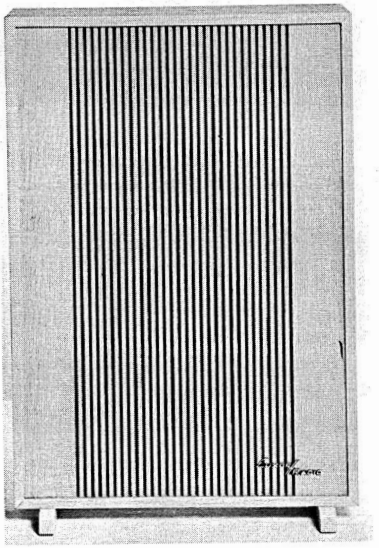
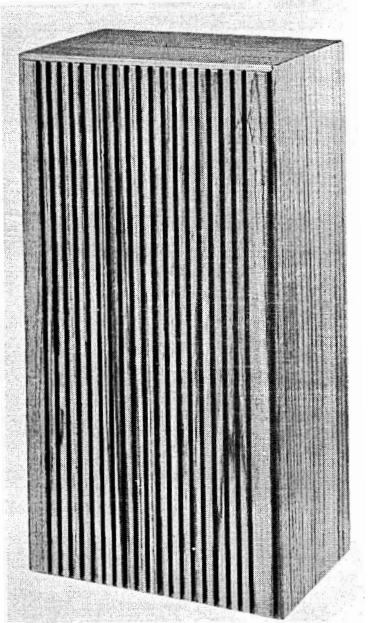
KORTING. Distributors: Europa Electronics Ltd., Howard Place, Shelton, Stoke-on-Trent. Tel: Stoke-on-Trent 29316.

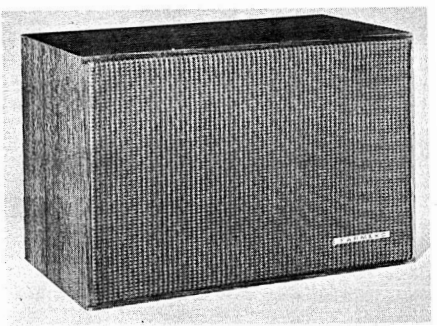
LSB 10 (27923). Infinite baffle system with



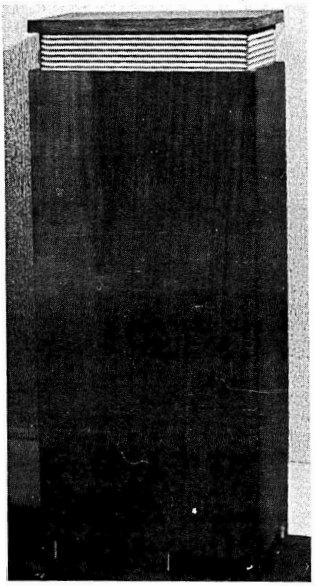
Luxor SH105



Luxor SH207



Parmeko S11



Monk A.C.E.

Parmeko S10

double cone unit. Speaker: 8 in. with treble cone. FR 40 Hz-16 KHz. HC 10W music power. Impedance: 4·5 ohms. Size: 24 × 11½ × 7 in. Finish: satin finish natural walnut. Supplied with 10 ft lead and plug. Price: on request.

LSB 20 (26921). Infinite baffle with bass and treble units. Speakers: 8 in. bass unit, 5 × 3 in. tweeter. FR 40 Hz-16 KHz. HC 15W music power. Impedance: 4·5 ohms. Size: 22 × 12 × 7 in. Finish: satin finish natural walnut. Supplied with 10 ft lead and plug. Price: on request.

LSB 30 (26951). Infinite baffle with bass and treble units. Speakers: 9½ in. bass unit, 7 × 5 in. mid- and upper-frequency unit. FR 30 Hz-20 KHz. HC 25W music power. Impedance: 4·5 ohms. Size: 26 × 14 × 7 in. Finish: satin finish natural walnut. Supplied with 10 ft lead and plug. Price: on request.

★

H. J. LEAK & CO. LTD., 57-59 Brunel Road, East Acton, London, W.3. Tel: 01-743 1173. Cables: Sinusoidal, Ealux, London.

Sandwich. Forward facing. Two units, bass 13 in., treble 3 in. Half-section crossover filter. Cabinet can be placed in vertical or horizontal position. The unique sandwich construction diaphragm behaves as a rigid piston, thus eliminating break-up distortion and resulting in a remarkably smooth frequency response. Impedance 15 ohms. Crossover 900 Hz. Six-element filter. Finish: Walnut, sapele mahogany or teak. Other finishes to order at slightly higher cost. Size: 26 × 15 × 12 in. Weight: 49·5 lb. Price: £43 10s.

Mini-sandwich. Forward facing. Two units, bass 12 in. elliptical, treble 3 in. Half-section crossover filter. Cabinet can be placed in vertical or horizontal position. Sandwich construction diaphragm behaves as a rigid piston, thus eliminating break-up distortion and providing a smooth frequency response. Performance indistinguishable from standard Sandwich except for the lowest octave. Size: 18½ × 11 × 7 in. Weight: 22 lb. Price: £29 15s.

★

L.N.B. AUDIO LTD., 25 Cambridge Street, Loughborough, Leics. Tel: 0509-3 61229.

Charnwood Mk II. Infinite baffle bookshelf system incorporating EMI high-flux 13 × 8 in. elliptical bass driver and Celestion 1300 Mk II HF unit. Five-element crossover. Special membrane pressure compensator minimises coloration and smooths response. FR 60 Hz-18 KHz. HC 15W music. Finish: afrormosia, walnut. Size: 19 × 11 × 8 in. Price: £23 10s.

Labyrinth 8 Mk III. Free-standing enclosure comprising 7 ft folded pipe designed to minimise resonance and extend response. Material: ½ in. chipboard in rigid tube construction. Recommended units: Wharfedale Bronze 8/RS/DD or Super 8/RS/DD. FR 40 Hz-20 KHz. Finish: afrormosia only. Price (enclosure only): £14 14s. (plus £1 4s. 6d. PT).

L.N.B. Compact. General-purpose bass reflex enclosure suitable for budget stereo. Recommended unit: Goodmans or Richard Allan 8 in. Size: 24 × 15 × 8 in. Finish: sapele, afrormosia. Price (enclosure only): £11 (including PT).

●**Wyneswold.** Infinite baffle bookshelf system in matched stereo pairs. Incorporates special Rola-Celestion 8 in. bass driver with 14,000-line magnet and Rola 4 in. tweeter. Five element crossover. Membrane compensator. Size: 15½ × 11 × 6 in. Finish: afrormosia/walnut. FR 60 Hz-16 KHz. HC 10W music. Price: £34 per pair (including PT).

★

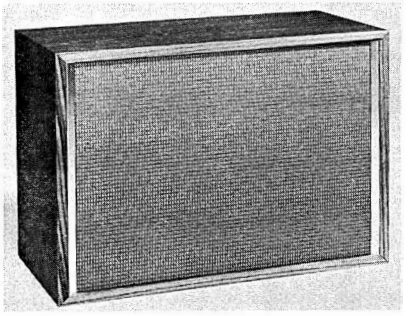
LOCKWOOD & CO. (WOODWORKERS) LTD., 63 Lowlands Road, Harrow, Middx. Tel: 422-3704.

Mini-slim. Reflex, forward facing. 12 in. units. Rec Tannoy 12 in. dual concentric, Tannoy III LZ dual concentric. Size: 27½ × 19 × 9⅛ in. Price (with specified units): £51 15s., £43 10s.

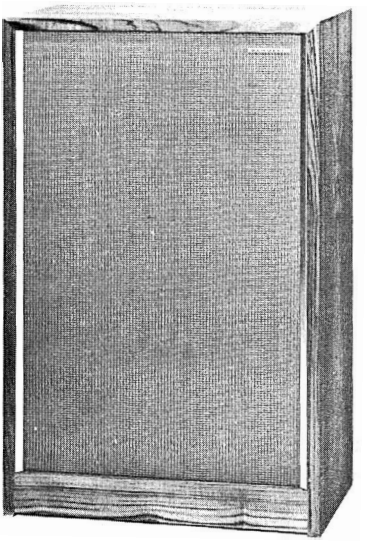
Minor Slim. Reflex, forward facing. 12 or 15 in. units. Rec Tannoy 12 or 15 in. dual concentric, and units listed for Mini-slim. Size: 33⅛ × 20 × 11¼ in. Price (with specified units): £62 10s., £55 15s., £48 10s.

Major Slim. Reflex, forward facing. 12 or 15 in. units. Rec Tannoy 12 in. and 15 in. dual concentric. Size: 38 × 24 × 11¼ in. Price: £61 15s., £68 10s.

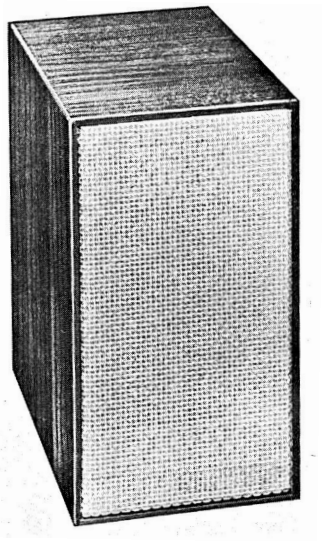
LEI/AS Mk III and LEI/WAS. Studio quality monitoring speakers. Full details and prices on request.



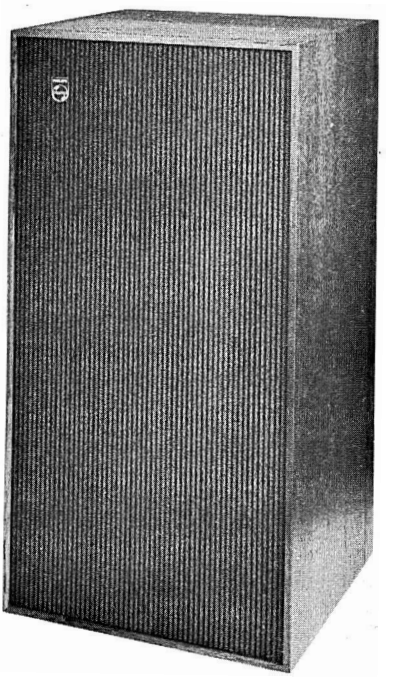
Parmeko S14



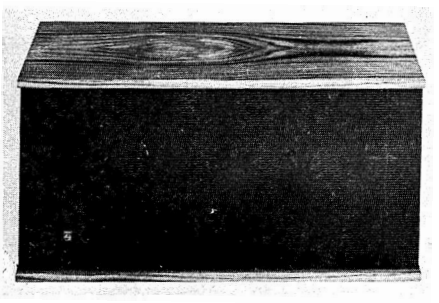
Parmeko S15



Peak Sound M5 8-5



Philips GL566



Philips GL.564

LOWTHER MANUFACTURING CO., Lowther House, St Mark's Road, Bromley, Kent, England. Tel: 01-460 5225. Cables: Lowther, Bromley.

Corner Reproducer TP1. Folded bass horn/direct HF horn type. One specially designed 6 in. pressure unit PM3. Acoustical crossover. Response 40 Hz-22 KHz. Size: 47 × 32 × 31 in. from corner. Weight: 70 lb. Price of Standard Model A and Model D: £127 15s.; Model B £151 10s.

Acousta Cabinet. Models FH/V, FH/H. Folded horn type, forward facing, with rear folded horn. Vertical on runners, or horizontal on 12 in. legs. One unit, 6 in. or 8 in. Rec Lowther PM6. Response 40-18,000 Hz. Size: 32 × 18¼ × 14½ in. Weight: 60 lb. Price without unit: £25 (plus £2 4s. 6d. PT).

Mini Acousta. Model FH/V (vertical) and FH/H (horizontal). Folded horn type. Forward facing with rear folded horn. Veneered all round. One 6-8 in. unit. Rec Lowther PM6 or PM7. FR 40 Hz-20 KHz. Size: 27 × 15 × 13 in. Price without unit: £27 5s. (plus £2 8s. 6d. PT).

Audiovector. Compound horn. Upward facing mid- and high-frequency horn with rear folded horn. One 6 in. unit. Acoustic crossover. Range 40 Hz-22 KHz. Rec PM2, PM2 Mk II or PM4. Size: 26½ × 19 × 34 in. Weight: 75 lb. Price: £68 (without unit).

Panoramic Twin Acousta. Dual folded horn. Side facing and rear folded horn system for mono and stereo reproduction. Two PM6, PM7 or PM2 Mk III 6 in. drive units. Acoustic crossover. FR 40 Hz-18 KHz. Size: 40 × 16½ × 18 in. Price without units: £51 (plus £4 10s. 10d. PT).

Dual Position Acousta. Folded horn. Rearward facing into corner or along wall at 45 degrees. Bass outlets coupling into corner of room or along wall. One 6 in. high flux unit. Rec Lowther PM6 or PM7. FR 40 Hz-18 KHz. Size: 32 × 9½ × 18 in. Price without unit: £27 5s. (plus £2 8s. 6d. PT).

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LUXOR. Distributors: Britimpex Ltd., 16/22 Great Russell Street, London, W.C.1. Tel: 01-636 7600.

SH105. Floor-standing console enclosure incorporating four units. One high-flux 10 in. bass driver, one 5 in. mid-range speaker, two 2½ in. HF tweeters. FR 50 Hz-18 KHz. Impedance 8 ohms. HC 8W RMS. Finish: teak or rosewood. Size: 25⅝ × 17¾ × 4¾ in. Price: £18 3s. 6d. (plus £3 17s. 6d. PT).

SH207. Compact floor or shelf mounting enclosure with specially designed 10 × 7 in. elliptical speaker. Impedance 4 ohms. Finish: teak, oak or mahogany. Price: £10 7s. 7d. (plus £2 4s. 5d. PT).

★

MEDLEY MUSICAL LTD., 4 Felltram Way, Charlton, London, S.E.7. Tel: 01-858 3426/7.

Medley Mini Musette. Compact single-unit enclosure. 8 in. high-flux dual-cone unit with plasticised surround. Power handling 8W RMS. Impedance: 3 and 8 or 15 ohms. FR 60 Hz-15 KHz. Developed specifically for high quality low level listening. Finish: teak (other finishes to order). Price: £8 17s. 6d. (plus £1 19s. 4d. PT).

Medley Musette. Twin unit enclosure. 8 in. high-flux bass unit with plasticised surround. 3·9 in. tweeter. Power handling 10W RMS. Impedance 3 or 15 ohms. FR 50 Hz-17 KHz. Crossover 5 KHz. Finished in oiled teak. Walnut and other finishes to order. Tygan front. Corner brackets fitted for horizontal or vertical wall mounting. Size: 30 × 10 × 7½ in. Price: £15 9s. 6d. (plus £3 8s. 6d. PT).

Medley Maestro. Twin unit enclosure. Bass driver has rigid moulded fibre cone with rubber suspension. Specially designed HF tweeter. Power handling 15W. Impedance 8-16 ohms. FR 40 Hz-18 KHz. Finish in teak or walnut to order. Size: 26½ × 16 × 12¾ in. Price: £36.

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MONK. See Centre of Sound.

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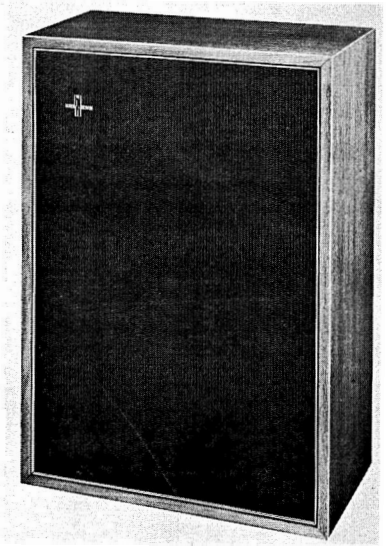
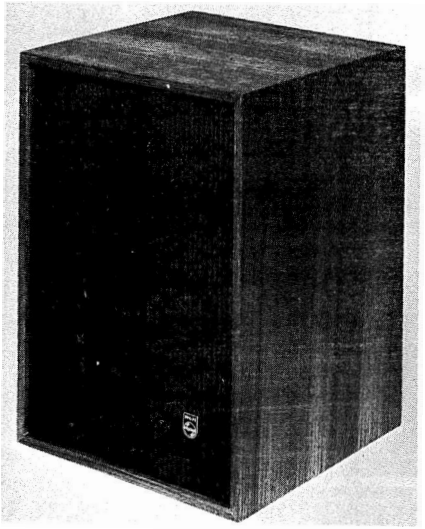
NICHOLS ACOUSTICAL FITMENTS, Church Street, Bubwith, near Selsby, Yorkshire. Tel: Bubwith 206.

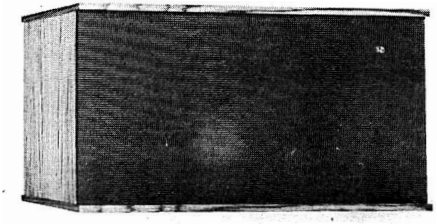
Derwent Gem. Small bookshelf enclosure only. Designed and approved for use with Richard Allan Hi-Fi module. Size: 13½ × 9 × 6 in. Internal volume: 380 cu. ins. Sealed back panel. Detachable grille fret. Constructed from ¾ in. hardwoods. Finish: afrormosia, mahogany or teak. Price: £5 16s.



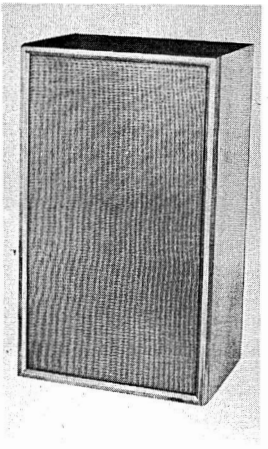
Philips RH480



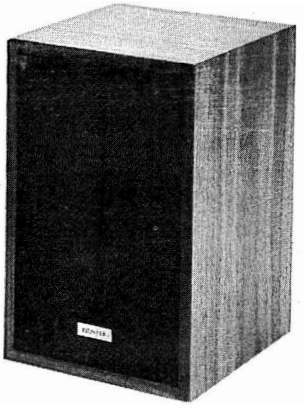
Philips GL.559



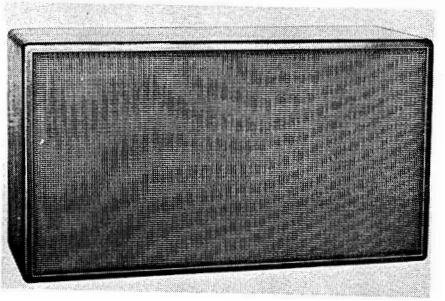
Philips GL.561



Radford Executive or Monitor



Pioneer C3-20



Radford bookshelf

Derwent Topaz. Medium bookshelf enclosure with units. Designed for high compliance 8 in. bass driver and 3 in. tweeter. Size: $17\frac{1}{2} \times 11 \times 8$ in. Internal volume: 1,083 cu. ins. Sealed back panel. Detachable grille. Constructed from $\frac{3}{4}$ in. afrormosia. Price: (with units) £14 1s. (including PT).

Derwent Opal Mk II. Large bookshelf enclosure only. Suitable for most 8 in. units and some 10 in. units, plus various treble combinations. Will also accept KEF B139 and T15. Size: $21 \times 13\frac{1}{2} \times 8$ in. Internal volume 1,550 cu. ins. Special baffle support and stiffening battens. Sealed back panel. Detachable baffle and grille fret. Constructed from $\frac{3}{4}$ in. solid afrormosia. Price: £8 15s. 6d.

Derwent Minor. Free-standing enclosure only. Designed for 12 in. driver and treble combinations. Size: $26 \times 17\frac{1}{2} \times 11$ in. (including 1 in. plinth). Internal volume 1·76 cu. ft. Sealed back panel. Detachable baffle and grille fret. Constructed from $\frac{3}{4}$ in. high-density chipboard. Finish: teak, with solid teak plinth and top lipping. Price: £12 10s. (carriage extra).

Derwent Major. Free-standing enclosure only. Designed for Celestion Studio Series Co-Axial speakers and approved by the makers. Suitable also for most 12 in. two/three way systems. Size: $31\frac{1}{2} + 18\frac{1}{4} \times 12$ in. (including 1 in. plinth). Internal volume 2·68 cu. ft. Sealed back panel. Detachable baffle and grille fret. Construction as for Derwent minor. Price: £16 15s. (carriage extra).

Derwent Minster. Free-standing enclosure only. Designed for large multi-speaker systems. Size: $35\frac{3}{4} \times 24\frac{1}{4} \times 14\frac{1}{2}$ in. (including 2 in. plinth). Internal volume 4·68 cu. ft. Made to special order only. Price according to work involved to meet individual requirements.

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PARMEKO LTD., Percy Road, Aylestone Park, Leicester, LE2 8FT. Tel: 0533-32287.

S11-P6012. Infinite baffle enclosure with units. $6\frac{1}{2}$ in. ceramic magnet bass driver, 3 in. treble unit. Single element crossover. FR 60 Hz-18 KHz. HC 10W RMS. Size: $14\frac{1}{2} \times 9\frac{1}{2} \times 7\frac{1}{2}$ in. Weight: 10 lb. Rigid construction. Packed with bonded acetate fibre. Finish: teak veneer with satin finish, green Vynair grille. Price: £10 5s. 4d. (plus £1 16s. 2d. PT).

S10-P6006. Infinite baffle enclosure with units. 5 in. ceramic magnet bass driver, 4 in. treble unit. Five-element crossover using ferrite cored inductors and reversible electrolytics. FR 45 Hz-18 KHz. HC 10W RMS. Size: $11\frac{1}{2} \times 7 \times 6\frac{1}{2}$ in. Weight: 9 lb. Rigid construction. Packed with bonded acetate fibre. Finish: teak veneer with satin finish, green Vynair grille. Price: £13 (plus £2 5s. 9d. PT).

S14-P6015. Infinite baffle enclosure with units. 13×9 in. bass driver, $1\frac{1}{2}$ in. treble unit. Four-element crossover. FR 35 Hz-20 KHz. HC 15W RMS. Size: $17\frac{3}{4} \times 12 \times 8\frac{1}{2}$ in. Weight: 26 lb. Rigid construction. Packed with bonded acetate fibre. Finish: teak veneer with satin finish, green Vynair grille. Price: £28 7s.

S15-P6005. Infinite baffle enclosure with units. 12 in. bass driver, 8 in. mid-range unit, 4 in. tweeter. Double-section, half-wave crossover at 1 KHz and 5 KHz. FR 35 Hz-18 KHz. HC 15W RMS. Size: $30 \times 19\frac{1}{2} \times 7\frac{3}{4}$ in. Weight: 44 lb. Rigid construction. Packed with bonded acetate fibre. Finish: teak veneer with satin finish, green Vynair grille. Price: £31 10s.

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PEAK SOUND (HARROW) LTD., 32 St Judes Road, Englefield Green, Surrey. Tel: Egham 5316.

● **M5 8-5.** Infinite baffle enclosure with speakers. $4\frac{1}{2}$ in. bass driver, $3\frac{1}{8}$ in. tweeter. LC crossover 6·5 KHz. FR 60 Hz-20 KHz. HC 8W. Impedance 5 ohms. Bass speaker features roll surround with pneumatic damping of voice coil. Finish: polished afrormosia. Size: $5 \times 9 \times 10$ in. Weight: $6\frac{1}{4}$ lb. Price: £10 10s. 1d. (plus £2 4s. 11d. PT). Also available in kit form.

● **M5 8-5.** Kit version of M5 8-5 speaker. Specification as for complete speaker except cabinet unpolished. Price: (speaker set) £3 15s. (plus 16s. PT); (cabinet set) £3 5s. 4d. (plus 5s. 2d. PT).

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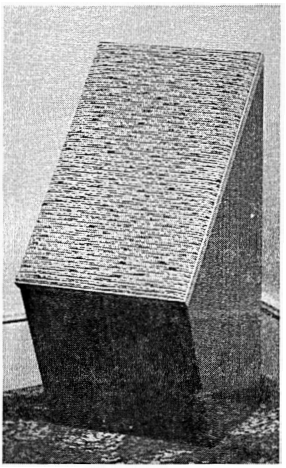
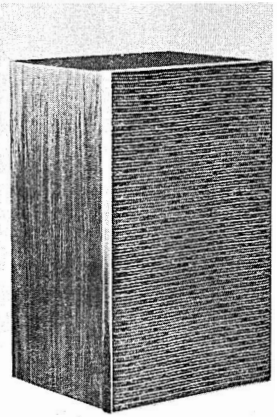
PEERLESS. Distributors: C. E. Hammond & Co. Ltd., 90 High Street, Eton, Windsor, Berks. Tel: Windsor 63388.

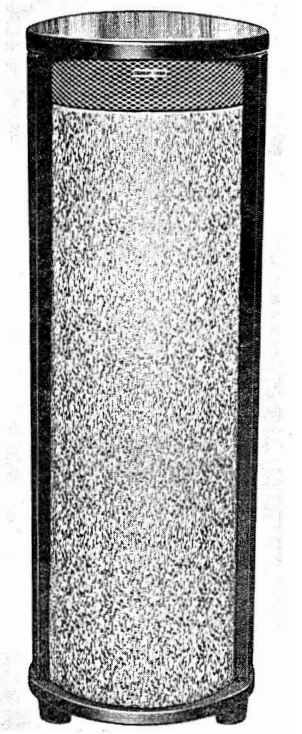
System 65-2. Compact two-speaker system in enclosure. One $5\frac{1}{4}$ in. bass driver, 2 in. closed back tweeter. Crossover 3·5 KHz. FR 50 Hz-18 KHz. HC 10W. Size: $10\frac{1}{4} \times 6\frac{1}{4} \times 8\frac{3}{8}$ in. Price: £20 10s. 4d. (plus £4 12s. 2d. PT).



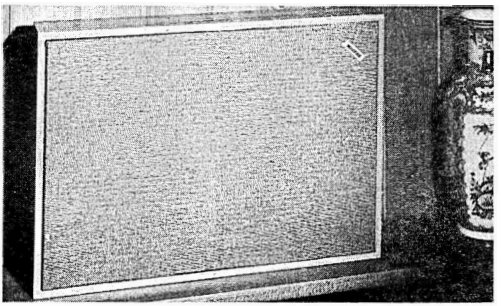
Rectavox Omni Mk. II



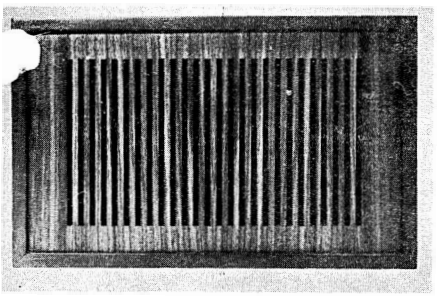
Rectavox Ambi enclosure



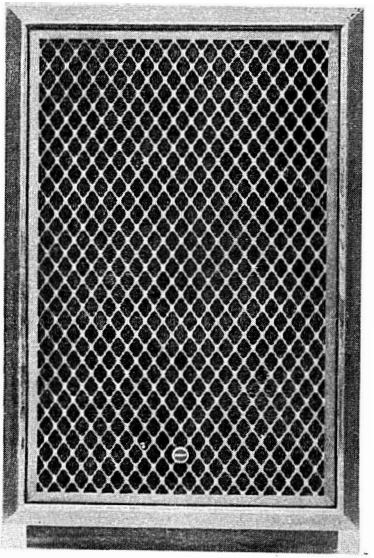
Sugden Craftsman Major



Rogers Wafer speaker



Sonotone Solent



Sansui SP30: SP50: SP100: SP200: SP300.

System 24-2. Medium size two-speaker system in enclosure. One $10\frac{1}{4} \times 6\frac{1}{2}$ in. bass driver, $2\frac{1}{2}$ in. tweeter. Crossover: 3·5 KHz. FR 40 Hz-18 KHz. HC 10W. Size: $19\frac{3}{4} \times 9\frac{7}{8} \times 10\frac{5}{8}$ in. Price: £23 3s. 5d. (plus £5 4s. 1d. PT).

System 50-4. Monitor three-way speaker system in enclosure. One 12 in. bass driver, 7×5 in. mid-range radiator, two $2\frac{1}{2}$ in. tweeters. Crossover: 500 Hz and 3·5 KHz. FR 30 Hz-18 KHz. HC 30W. Size: $25\frac{1}{2} \times 14\frac{1}{4} \times 11\frac{7}{8}$ in. Price: £68 19s.

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PHILIPS ELECTRICAL LTD., Century House, Shaftesbury Avenue, London, W.C.2. Tel: 01-437 7777. Cables: Phillamps, London.

GL.559. Shelf-mounting enclosure. One 5 in. unit (AD3501RM). FR 90 Hz-20 KHz. HC 6W. Impedance: 8 ohms. Size: $10\frac{1}{4} \times 7\frac{1}{2} \times 7\frac{1}{2}$ in. Weight: $4\frac{1}{4}$ lb. Teak cabinet with fabric front grille. Price: £8 19s. 8d. (plus £2 0s. 5d. PT).

GL.564. Compact floor or shelf-mounting enclosure with two units. One 7 in. bass driver with polystyrene cone, one 4 in. dual cone mid-range and treble unit. Crossover: 550 Hz. FR 60 Hz-20 KHz. HC 15W. Impedance: 8 ohms. Size: $17\frac{3}{4} \times 9\frac{7}{8} \times 7\frac{1}{2}$ in. Weight: 12 lb. Neat teak cabinet with fabric front grille. To match Audio Plan System. Price: £20 15s. 5d.

GL.561. Floor-standing enclosure with one unit. One $8\frac{1}{2}$ in. dual-cone unit. Impedance: 7 ohms. FR 70 Hz-17 KHz. HC 15W. Size: $23\frac{5}{8} \times 11\frac{3}{4} \times 8\frac{5}{8}$ in. Weight: 17 lb. Teak cabinet with fabric front grille. To match Audio Plan System. Price: £22 7s. 5d.

GL.562. Floor-standing enclosure with three units. One 12 in. bass driver with polystyrene cone, two 7×5 in. dual cone mid-range and treble units. Crossover: 800 Hz. HC 20W. FR 40 Hz-20 KHz. Size: $26 \times 14\frac{1}{8} \times 11\frac{3}{8}$ in. Weight: $38\frac{1}{2}$ lb. Teak cabinet with fabric front grille. To match Audio Plan System. Price: £39 18s.

GL565. Infinite baffle enclosure with units. 7 in. bass and mid-range driver, 5 in. dual cone HF unit. Crossover 900 Hz. HC 20W. FR 55 Hz-20 KHz. Impedance 8 ohms. Finish: teak veneer. Size: $12 \times 7 \times 8\frac{1}{2}$ in. Weight: $8\frac{3}{4}$ lb. Price: £14 18s. (plus £3 6s. 11d. PT).

GL566. Infinite baffle enclosure with units. 8 in. bass and mid-range driver, 7×5 in. dual cone HF unit. Crossover 800 Hz. Half-section cross-over. FR 50 Hz-20 KHz. HC 20W. Impedance 8 ohms. Finish: teak veneer. Size: $18 \times 9 \times 8\frac{1}{2}$ in. Weight: 12 lb. Price: £25 13s. 9d. (plus £5 15s. 5d. PT).

RH480. Infinite baffle enclosure with units. 10 in. bass driver, 5 in. dual cone mid-range unit, 2 in. horn tweeter. Crossovers: half-section 500 Hz and 4 KHz. FR 40 Hz-20 KHz. HC 40W. Impedance 8 ohms. Finish: teak veneer. Three-position switch for selecting level response or alternative characteristic to suit room acoustics. Size: $21\frac{1}{8} \times 15\frac{1}{2} \times 8$ in. Price: £39 (plus £8 15s. 2d. PT).

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PIONEER. Distributors: Swisstone Ltd., 48a Station Road, Cobham, Surrey. Tel: 0932-6 2853/4214.

CS-51. Miniature infinite baffle enclosure. One 5 in. unit, one $2\frac{1}{4}$ in. tweeter. FR 50 Hz-20 KHz. HC 20W music. Impedance 16 ohms. Size: $9\frac{7}{8} \times 5\frac{7}{8} \times 6\frac{1}{2}$ in. Weight: $8\frac{1}{2}$ lb. Oiled walnut finish with perforated metal grille. Supplied with wall mounting brackets. Full specification and price on request.

CS-A50. Infinite baffle five unit enclosure. One 12 in. bass unit, one 5 in. mid-range unit, two cone tweeters, one horn tweeter. Crossover frequencies 500 Hz and 3·5 KHz. FR 30 Hz-20 KHz. HC 40W. Size: $26 \times 15\frac{1}{4} \times 12\frac{3}{8}$ in. Weight: 34 lb. Oiled walnut finish with aluminium trim. Impedance 8 ohms. Full specification and price on request.

CS-20. Bookshelf enclosure with two units. $4\frac{3}{4}$ in. high compliance bass driver, $2\frac{1}{4}$ in. tweeter. FR 70 Hz-20 KHz. HC 15W. Impedance 8 ohms. Size: $13\frac{1}{8} \times 8 \times 8\frac{3}{8}$ in. Weight: $7\frac{1}{2}$ lb. Finish: oiled walnut with black net grille. Full specification and price on request.

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QUAD. See Acoustical Manufacturing Co. Ltd.

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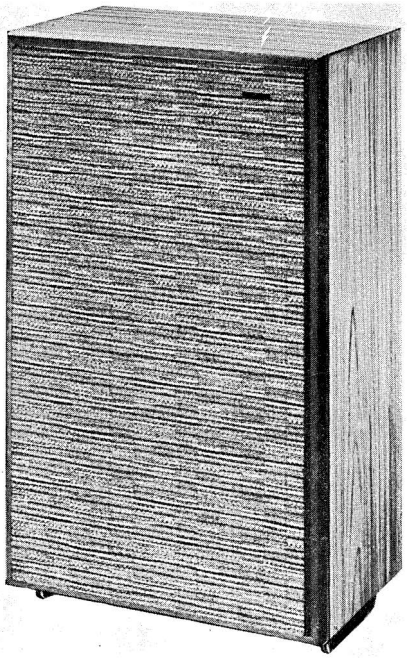
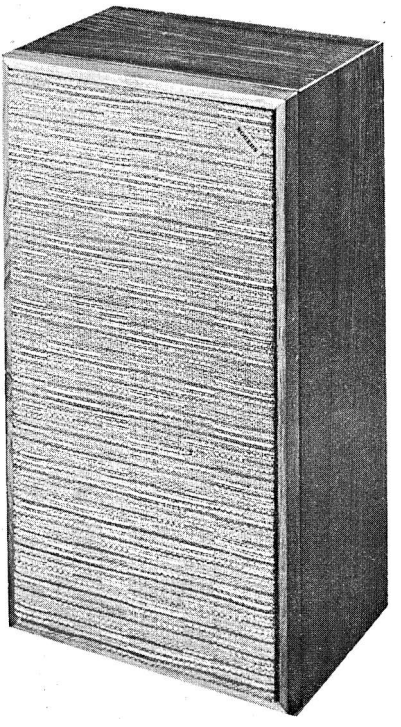
RADFORD. Radford Marketing Division, Eastbrook Road, Gloucester. Tel: OGL-2 21591.

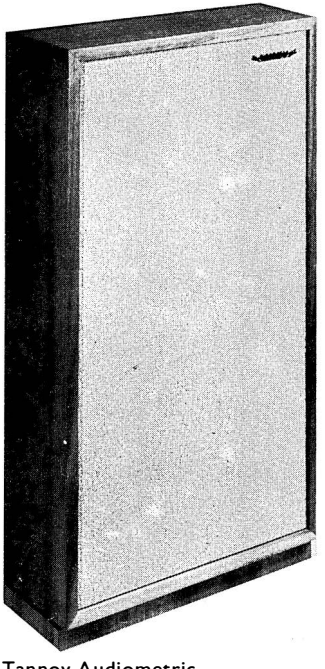
Bookshelf. Infinite baffle enclosure with units. 13×9 in. bass driver, 3 in. mid- and high-frequency unit. Crossover 2 KHz. FR 60 Hz-14 KHz. HC 30W. Impedance: 8-12 ohms. 1 in.



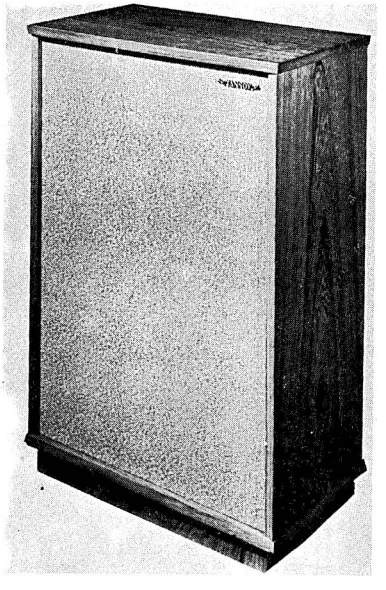
Rogers Ravensbourne Standard



Rogers Ravensbourne "Compact"



Tannoy Audiometric



Tannoy Lancaster 12 or 15

thick solid wood cabinet lagged with sheeps wool. Size: 21 × 12 × 8 in. Weight: 37 lb. Price: £31 10s.

Beaumonde. Infinite baffle enclosure with units. 13 × 9 in. bass driver, 3 in. mid- and high-frequency unit. Crossover 2 KHz. FR 60 Hz-14 KHz. HC 30W. Impedance: 8-12 ohms. 1 in. thick solid wood cabinet lagged with sheeps wool. Afrormosia finish. Size: 22 × 13 × 11½ in. Weight: 50 lb. Price: £38 10s.

Monitor. Infinite baffle enclosure with units. 13 × 9 in. bass driver, 3 in. mid-range unit, 1⅜ in. driver. Crossover: 500 Hz and 4·2 KHz. FR 35 Hz-14 KHz. HC 40W. Impedance: 8-12 ohms. 1 in. solid wood cabinet lagged with sheeps wool. Afrormosia finish. Size: 25¾ × 15 × 11½ in. Weight: 50 lb. Price: £55.

Studio. Four-speaker enclosure complete with units and crossovers. 13 × 9 in. bass driver, 3 in. mid-range unit, 1⅜ in. high-frequency unit, ¾ in. tweeter. Crossover: 500 Hz, 4·2 KHz, 10 KHz. HC 40W. Impedance: 8-12 ohms. 1 in. solid wood cabinet with sheeps wool lagging. Afrormosia finish. Size: 40 × 20 × 17 in. Weight: 112 lb. Price: £90.

Auditorium. Infinite baffle enclosure with units. 13 × 9 in. bass driver, 3 in. mid-range unit, 1⅜ in. HF unit, ¾ in. tweeter. Crossover: 500 Hz, 4·2 KHz, 10 KHz. FR 35 Hz-25 KHz. HC 40W. Impedance: 8-12 ohms. 1 in. solid wood cabinet lagged with sheeps wool. Size: 30 × 16 × 14 in. Weight: 90 lb. Afrormosia finish. Size: 30 × 16 × 14 in. Price: £70.

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RECORD HOUSING, Brook Road, London, N.22. Tel: 01-888 7487.

Folded Horn Enclosure. Forward facing free-standing. One 8 in. unit. Rec Richard Allan CG8 or Wharfedale Super 8. Size: 27½ × 16¼ × 10 in. Finish: walnut, mahogany or teak. Price (cabinet only): £12 19s.

Hi-flex 10/12. Reflex enclosure with slotted wood fascia. Two drive units (10 in. or 12 in.) with tweeter. Rec units: Celestion CX.15/12 and CX.20/12 or Wharfedale Super 12. Size: 32 × 17 × 10½ in. Finish: walnut, mahogany or teak. Price (cabinet only): £13 19s.

THE RECTAVOX COMPANY, Central Buildings, Wallsend, Northumberland. Tel: 0632 624845.

Omni 8. Specially shaped reflex enclosure providing unique versatility of positioning. Designed for 8 in. drive unit with provision for tweeter. Frequency range dependent on drive unit employed. Finish: Teak, walnut or mahogany laminated plastic veneers with satin chrome brass frame. Size: 24½ in. maximum dimension. Price: (enclosure only) £12. May be converted to Omni Mk II by adding tweeter and changing driver unit.

Omni Mk II. Reflex enclosure with special shape giving low resonant frequency and unique versatility of positioning. Units: K.E.F. B139 foil-stressed expanded polystyrene diaphragm bass and mid-range driver, K.E.F. T15 hemispherical dome tweeter. Crossover five-element ½-section 1 KHz. FR 30 Hz-20 KHz ±3 dB. Imp 15 ohms. HC 15W. Finish: Teak, walnut or mahogany laminated plastic wood grain veneers, Tygan fret material, satin-chrome brass frame. Size: 24½ in. maximum dimension, fret front 18¾ × 11⅝ in. Weight: 40 lb. Price: £30 19s. 6d. units; (enclosure only £18).

Comprehensive information available on matching to transistor amplifiers.

Ambi. Similar performance to the Omni but in a compact enclosure of more orthodox rectangular shape. Size: 18¾ × 11⅝ × 9¾ in. Weight: 35 lb. Price (with units): £29 8s.; (enclosure only): £10 10s.

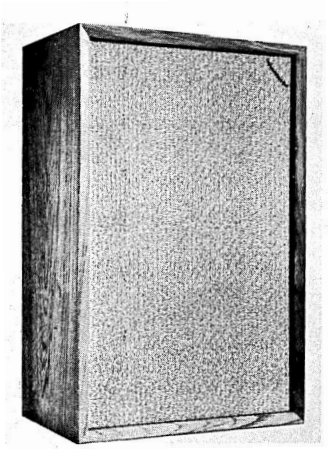
Comprehensive information available on request regarding matching to transistor amplifiers.

Wall brackets. Special wall fixing devices for Omni Mk II and Ambi. Price (set of four): 15s.

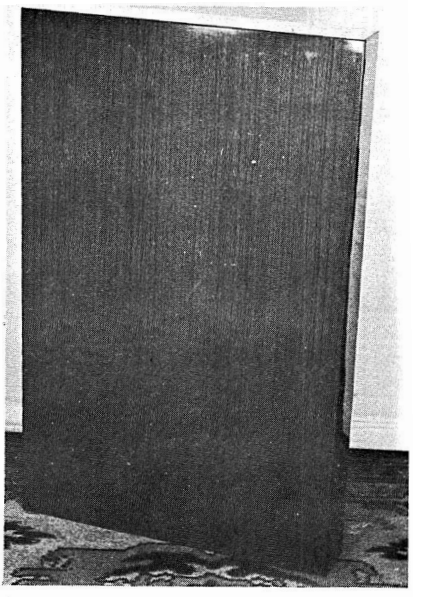
Matching transformer. Type AA2 20W. FR 25 Hz-20 KHz, zero dB down at 25 Hz. Price: £3 3s.

Bass corrector C60. Neutralises excessive corner gain and flattens impedance curve. Price: £3 10s.

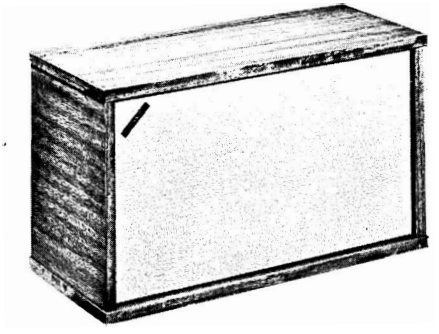
The Rectavox accessories listed above are designed specifically for use with Omni and Ambi speakers.



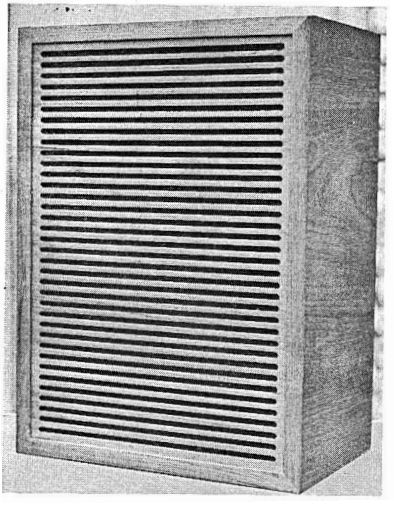
Tannoy Monitor III LZ



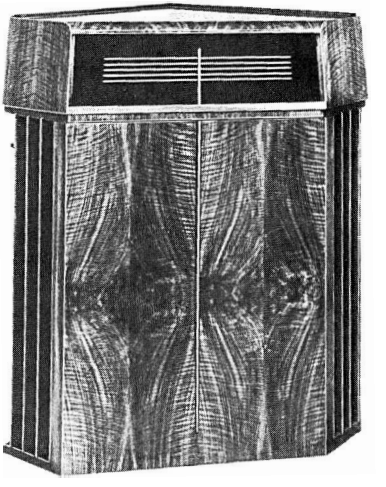
Variline folded column



Tannoy III LZC



Tripletone Concerto



Vitavox Klipschorn

ROGERS DEVELOPMENTS (ELECTRONICS) LTD., 4/14 Barmeston Road, Catford, London, S.E.6. Tel: 698-7424/4340. Cables: Rodevco, London, S.E.6.

Wafer speaker system. Infinite baffle. 5 in. unit plus tweeter. FR 40 Hz-16 KHz. HC 12W. Impedance 15 ohms. Solid afrormosia frame with black fret material. Size: $13\frac{1}{8} \times 16\frac{5}{8} \times 2\frac{1}{2}$ in. Price: £16 (plus £3 12s. 10d. PT).

Ravensbourne Compact. Infinite baffle enclosure with units. 8 in. high-flux bass driver, $3\frac{3}{4}$ in. HF1300 tweeter. Crossover 2·5 KHz. FR 50 Hz-14 KHz. HC 10-15W RMS. Finish: teak veneer. Size: $22 \times 11\frac{1}{2} \times 8\frac{5}{8}$ in. Price: £25 (plus £5 13s. 9d. PT).

Ravensbourne Standard. Infinite baffle enclosure with units. 12 in. high flux bass driver, $3\frac{3}{4}$ in. HF1300 tweeter. Crossover 2·5 KHz. FR 40 Hz-14 KHz. HC 10-25W RMS. Finish: teak veneer. Size: $30 \times 16\frac{1}{2} \times 10\frac{1}{2}$ in. Price: £39 10s.

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SANSUI. Sole UK importer: Technical Ceramics Ltd., Thorn Hill Southampton. Tel: 0703-48055. Distributors for Scotland, North and Midlands: Audio Distributors, 4 Lion Street Kidderminster. Tel: 0562-3293.

Sansui SP50. Horn type enclosure with units. 8 in. bass driver, 2 in. horn tweeter. Crossover 7 KHz. FR 50 Hz-20 KHz. HC 25W. Impedance 8 ohms. Dimensions: $12\frac{3}{4} \times 9\frac{3}{4} \times 19\frac{3}{4}$ in. Weight: 19·8 lb. Finish: American walnut, hand carved grille. Price: £33 10s. 1d. (plus £7 8s. 11d. PT).

Sansui SP100. Reflex enclosure with three units. 10 in. bass driver, 5 in. mid-range unit, 2 in. horn tweeter. Crossover: 1·5 KHz and 5 KHz. FR 45 Hz-20 KHz. Impedance: 8 ohms. HC 25W RMS. Three-position level control. Finish: American walnut. Size: $14\frac{1}{8} \times 11\frac{7}{8} \times 24\frac{1}{2}$ in. Weight: $34\frac{1}{2}$ lb. Price: on application.

Sansui SP200. Reflex enclosure with five units. 12 in. bass driver, two 5 in. mid-range units, two 2 in. horn tweeters. Crossover: 1·5 KHz and 5 KHz. FR 35 Hz-20 KHz. Impedance 8 ohms. HC 40W RMS. Three-position level control. Finish: American walnut. Size: $15\frac{1}{8} \times 12\frac{1}{2} \times 25\frac{3}{4}$ in. Weight: $40\frac{1}{2}$ lb. Price: on application.

Sansui SP300. Reflex enclosure with four units. 12 in. bass driver, 5 in. mid-range unit, two 2 in. horn tweeters. Crossover: 1·5 KHz and 6 KHz. FR 30 Hz-20 KHz. Impedance 8 ohms. Special pipe ducted bass reflex design. HC 50W RMS. Finish: American walnut. Size: $18 \times 27\frac{1}{2} \times 16\frac{1}{2}$ in. Weight: $78\frac{1}{2}$ lb. Price: on application.

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SINCLAIR RADIONICS LTD., 22 Newmarket Road, Cambridge. Tel: 0223 52996.

Q14. Compact sealed pressure chamber. FR 60 Hz-16 KHz. HC 14W. Impedance 15 ohms. Price: £6 19s. 6d.

System 2000. Compact speaker enclosure of contemporary design. FR 100 Hz-15 KHz. HC 10W RMS. Impedance 8 ohms at 1 KHz. Finish: solid aluminium. Size: $10\frac{1}{2} \times 8\frac{1}{2} \times 8\frac{1}{2}$ in. Price: £12 12s.

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SONOTONE. Technical Ceramics Ltd., Building 102, Cheyney Manor Estate, Swindon, Wilts. Tel: Swindon 6251.

Solent. Infinite baffle two-unit miniature enclosure. $6\frac{1}{2}$ in. bass unit with 1 in. diameter voice coil and 10,000 gauss magnet. $3\frac{3}{8}$ in. acoustically loaded tweeter. L/C crossover at $2\frac{1}{2}$ KHz. FR 40 Hz-20 KHz. Handling capacity 12W. Impedance 8 ohms (suitable for valve or transistor amplifiers with output 8-15 ohms). Matt walnut Scandinavian style cabinet with slotted front. Size: $14 \times 9 \times 8\frac{1}{2}$ in. Weight: $9\frac{3}{4}$ lb. Price: £18.

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STENTORIAN. See Whiteley Electrical.

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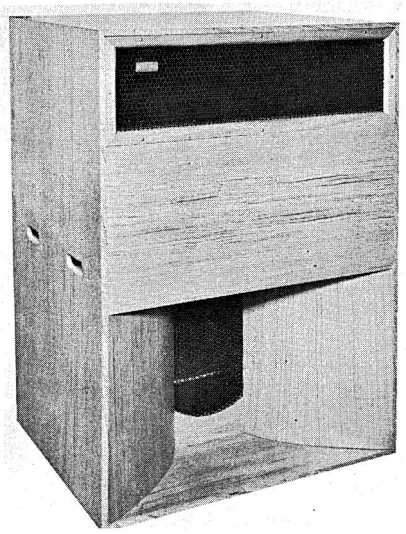
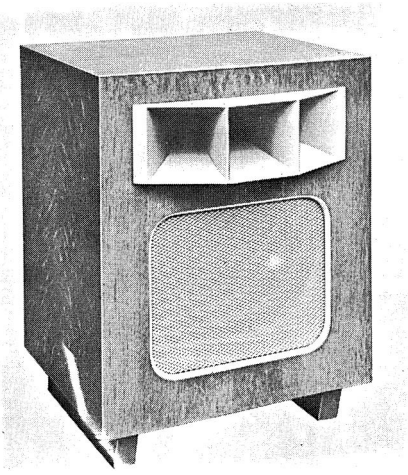
A. R. SUGDEN & CO. (ENGINEERS) LTD., Market Street, Brighouse, Yorks. Tel: Brighouse 2142. Cables: Connoisseur, Brighouse.

Connoisseur Craftsman Minor. Column reflex with upward facing ports. Omni-directional 360°. 15 ohms impedance at 400 Hz. One unit, 8 in. foam surround with HF dome, 812/FS recommended. Response 40 Hz-12 KHz. Size: $36 \times 11\frac{1}{2}$ in. max dia. Weight: 17 lb. Price: enclosure, £10 10s.; 812/FS 8 in. unit £2 15s. (plus 12s. 5d. PT).

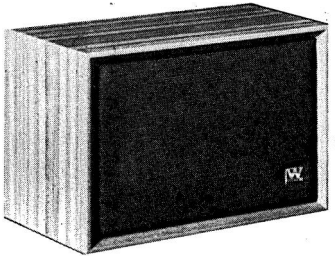
Connoisseur Craftsman Major. Column reflex with upward facing ports. Omni-directional 360°. 15 ohms impedance at 400 Hz. One 8 in. foam surround unit, one 3 in. tweeter. G8/FS and LPH/65 recommended. Capacitor filter.



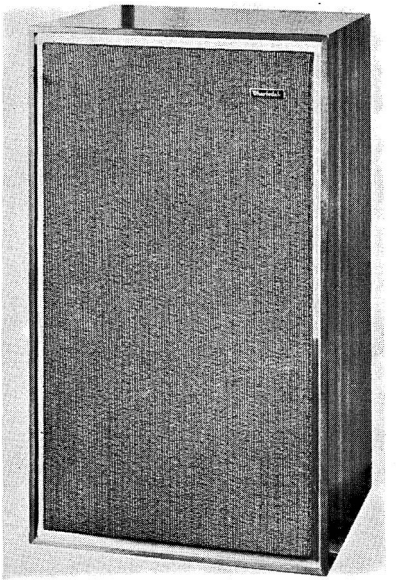
Vitavox Bi-tone Major



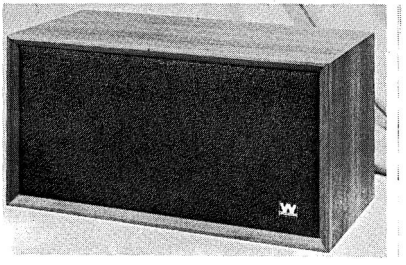
Vitavox Bitone 3200



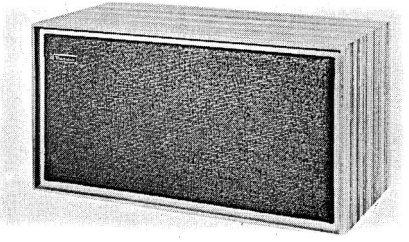
Wharfedale Denton



Wharfedale Dovedale



Wharfedale Super Linton



Wharfedale Linton

Response 30 Hz-17 KHz. Size: 43 × 14½ in. max dia. Price: enclosure only £15 10s. 9d.; G8/FS unit £3 7s. 6d. (plus 15s. 1d. PT). LPH/65 tweeter £2 (plus 8s. 10d. PT).

Connoisseur "Junior". Column reflex. Upward facing port, omni-directional 360°. One unit: 3 or 15 ohm available. 6½ in. foam surround. FR 50 Hz-12 KHz. Size: 26 × 9 in. max dia. Weight: 10 lb. Price: (with unit) £7 11s. 10d.

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TANDBERG. Distributors: Elstone Electronics Ltd., Hereford House, North Court, Vicar Lane, Leeds 2. Tel: Leeds 39834/6. Grams: Elstone, Leeds.

System 7. Enclosure with units. Bass driver 10 × 6 in., tweeter 2 in. Impedance 3 ohms. HC 8W. FR 60 Hz-16 KHz. Size: 20½ × 10 × 10¼ in. Finish: Siamese teak or rosewood. Price: (teak) £21 0s. 2d. (plus £4 14s. 4d. PT).

System 10. Enclosure with units. 6½ in. bass driver, 2 in. tweeter. Impedance 4 ohms. HC 8W. FR 60 Hz-16 KHz. Size: 7⅛ × 9⅛ × 9⅛ in. Finish: Siamese teak. Price: £13 14s. 5d. (plus £3 1s. 7d. PT).

System 11. Enclosure with units. 6½ in. bass driver, 2 in. tweeter. Impedance 4 ohms. HC 8W. FR 60 Hz-16 KHz. Size: 12⅝ × 6 × 8½ in. Finish: Siamese teak or rosewood. Price: (teak) £13 14s. 5d. (plus £3 1s. 7d. PT); (rosewood) £15 8s. 8d. (plus £3 9s. 4d. PT).

System 12. Enclosure with units. 6½ in. bass driver, 2 in. tweeter. Impedance 4 ohms. HC 8W. FR 50 Hz-16 KHz. Size: 17¼ × 7½ × 8½ in. Finish: Siamese teak or rosewood. Price: (teak) £15 8s. 8d. (plus £3 9s. 4d. PT); (rosewood) £17 3s. (plus £3 17s. PT).

System 13. Enclosure with units. 10 × 6 in. bass driver, 2 in. tweeter. Impedance 3 ohms. HC 8W. FR 60 Hz-16 KHz. Size: 25½ × 9¾ × 8¼ in. Finish: Siamese teak or rosewood. Price: (teak) £21 17s. 4d. (plus £4 18s. 2d. PT); (rosewood) £24 0s. 4d. (plus £5 7s. 8d. PT).

System 14. Enclosure with units. 10 in. bass driver, two 2 in. tweeters. Impedance 4 ohms. HC 15W. FR 45 Hz-16 KHz. Size: 27½ × 11 × 13¾ in. Finish: Siamese teak. Price: £30 0s. 4d. (plus £6 14s. 8d. PT).

TANNOY PRODUCTS LTD., West Norwood, London, S.E.27. Tel: 01-670 1131. Cables: Tannoy, London.

Audio Metric. Infinite baffle. Forward facing. One 12 in. bass and mid-range unit, single suspension small diaphragm presence unit. HC 15W RMS. Frequency response 40 Hz-16 KHz. Size: 32½ × 17 × 7 in. Price: £27 10s.

III.LZ Mk II. Infinite baffle forward facing. Monitor Gold III.LZ dual concentric unit with crossover network. FR 30 Hz-20 KHz. Size: 14 × 10¾ × 23¼ in. Price: £41.

Lancaster. Reflex (single port) forward facing. Free standing. One Monitor Gold 12 in. with crossover network. Size: 33½ × 21½ × 12½ in. (including 2 in. plinth). Price: £54.

Lancaster. Reflex (single port) forward facing. Corner placing. One Monitor Gold 12 in. with crossover network. Size: 33 × 25 × 16¾ in. (including 2 in. plinth). Price: £54.

Lancaster. Aperiodic free-standing enclosure. One Monitor Gold 15 in. with crossover network. Size: 33½ × 21½ × 12½ in. (including 2 in. plinth). Price: £60.

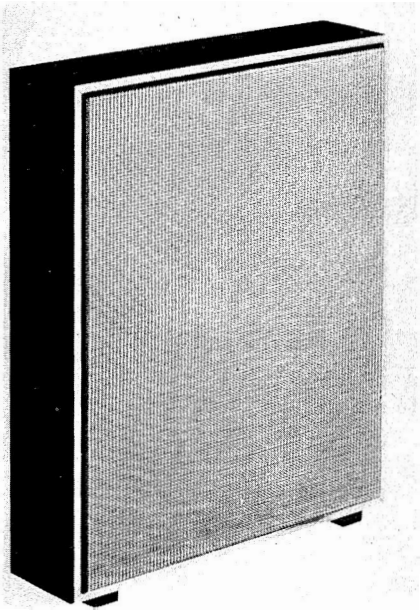
Lancaster. Aperiodic corner-standing enclosure. One Monitor Gold 15 in. unit with crossover. Size: 33 × 25 × 16¾ in. (including 2 in. plinth). Price: £60.

Rectangular York. Reflex (single port) enclosure. Forward facing. Complete with Monitor Gold 15 in. dual concentric unit with crossover. Crossover 1 KHz. FR 23 Hz-20 KHz. Size: 15 × 23½ × 42. Price: £77 10s.

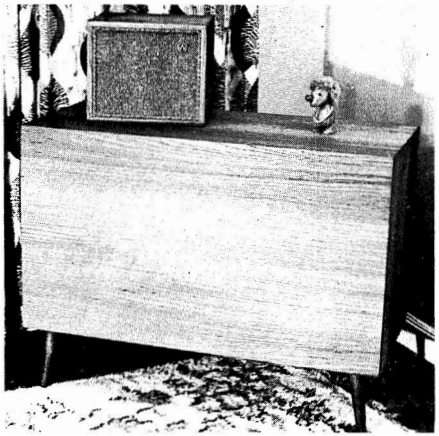
York. Reflex enclosure. Forward facing unit. Dual throated ports. Corner placing. One Monitor Gold 15 in. dual concentric unit with crossover. FR 35 Hz-20 KHz. Size: 45½ × 32 × 22½ in. Price: £77 10s.

Rectangular GRF. Single folded horn. Forward facing with front exits. Complete with one Monitor Gold 15 in. dual concentric unit. Crossover 1 KHz. FR 23 Hz-20 KHz. Size: 17¼ × 23½ × 42 in. Price: £107 10s.

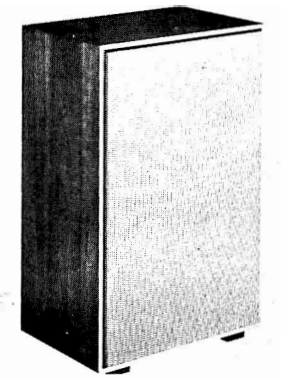
Corner GRF. Folded horn. Rear loaded horn, forward facing unit. Corner placing. One Monitor Gold 15 in. dual concentric unit. FR 20 Hz-20 KHz. Size: 48 × 38 × 29 in. Price: £124 10s.



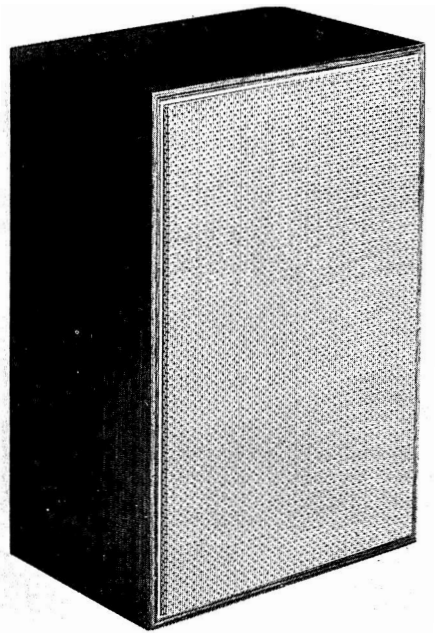
Whiteley LC94



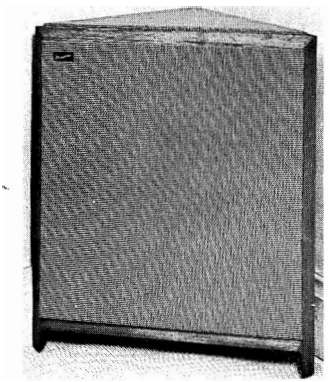
Woollett Frensham and electrostatic



Whiteley LC95



Whiteley LC93



Worden Panosona—three versions

Guy R. Fountain Autograph. Folded horn. Front and rear horn loaded unit. Corner placing. One Monitor Gold 15 in. unit with crossover. FR 20 Hz-20 KHz. Size: $58\frac{1}{2} \times 43 \times 26\frac{1}{2}$ in. Price: £167 10s.

★

TELETON. Teleton Electro (U.K.) Co. Ltd., 24-32 Kilburn High Road, London, N.W.6. Tel: 01-624 9102. Telex 21880.

SA-1003. Compact 5W enclosure. Impedance 4 ohms. Single unit. Full specification and price on request.

SB-1002. Compact 8W enclosure. Impedance 8 ohms. Two units. Full specification and price on request.

SB-1202. Compact 10W enclosure. Impedance 8 ohms. Two units. Full specification and price on request.

SB-1602. Slimline speaker enclosure. Impedance 8 ohms. Five units. Full specification and price on request.

SB-25. Speaker enclosure with two units. 15W RMS. Impedance 8 ohms. Specification and price on request.

SD-2100. Enclosure with three units. 12 in. bass driver. Impedance 8 ohms. Full specification and price on request.

★

TRIPLETONE MANUFACTURING CO. LTD., 241a The Broadway, Wimbledon, S.W.19. Tel: 01-542 1189.

Concerto. Bass reflex enclosure employing twin-cone full range 8 in. unit. FR 40 Hz-17 KHz. HC 10W RMS. Impedance: 15 ohms (2-3 ohms to order). Size: $19\frac{1}{2} \times 13\frac{1}{4} \times 9$ in. Weight: 19 lb. Finish: teak. Horizontal or vertical mounting. Price: £11 5s. (plus £2 10s. PT).

★

TRUVOX LTD., Hythe, Southampton. Tel: Hythe (0421-24) 3265.

LS120. Hermetically sealed infinite baffle compact enclosure. Special 5 in. bass unit, $1\frac{1}{2}$ in. pressure HF unit. Crossover: 3·5 KHz half-section four-element L/C network. FR 35 Hz-15 KHz. HC 12W RMS. Imp 15 ohms. Finish: teak. Size: $13 \times 8 \times 7$ in. Weight: 12 lb. Price: £17 1s. 6d. (plus £3 16s. 8d. PT).

Series 200. Infinite baffle enclosure with two units and crossover. 5 in. high compliance bass driver, $1\frac{1}{2}$ in. tweeter. FR 35 Hz-15 KHz. HC 12W RMS. Impedance 15 ohms. Crossover: half-section, four-element LC network. Crossover frequency: 3·5 KHz. Size: $17 \times 8 \times 5\frac{3}{4}$ in. Weight: 12 lb. Finish: teak. Can be mounted vertically or horizontally. Lagged with natural wool. Tough dustproof front grille. Complete with cable. Price: £21 19s. 2d. (including PT).

★

VIKING. Distributors: Transatlantic Music Tapes Ltd., 36 High Street, Salisbury, Wilts. Tel: 0722 3888.

Viking 4400. Speaker enclosure with two units and crossover. 8 in. high-flux high-compliance bass driver, $3\frac{1}{2}$ in. tweeter. Cabinets finished walnut with matching cane grill. Shelf or floor standing. Price: £23 10s.

Viking 4400 E. Similar to type 4400 but including 60W stereo power amplifier built-in. Price: £36 5s.

★

VITAVOX LTD., Westmoreland Road, London, N.W.9. Tel: 01-205 8671. Cables: Vitavox, London, N.W.9.

Klipschorn. Double channel horn system. Folded LF horn with AK152 drive unit. Forward-facing HF horn with S2 pressure unit. Filter network incorporated. Crossover 500 Hz. Response 30 Hz-15 KHz. High translational efficiency. Size: $51 \times 30 \times 27$ in. Weight: 210 lb. with drive units. Price: on application.

Bitone Series 3200. Double channel sound system comprising three-cell horn (distribution 60° wide × 20° high) with 12 in. LF driver in vented enclosure. Filter network 1 KHz crossover attenuation 12 dB per octave. HF balance control 0-8 dB attenuation. HC 20W. FR 50 Hz-15 KHz. Size: $24 \times 20 \times 19$ in. Weight: 70 lb. Price: on application.

Bitone Series 6200. Similar specification to 3200 but with six-cell horn giving distribution 60° wide × 40° high. Size: $29 \times 20 \times 20$ in. Weight: 78 lb. Price: on application.

Bitone Major. Double channel sound system comprising HF dispersive horn and S.2 HF pressure unit (distribution 90° wide × 20° high) with 15 in. LF driver in special reflex enclosure. Filter network 500 KHz. Crossover attenuation 12 dB/octave. HF balance control 0-8 dB attenuation. HC 30W. FR 35 Hz-16 KHz. Size: 42 × 30 × 24 in. Weight: 168 lb. Price: on application.

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WHARFEDALE. Rank Wharfedale Ltd., Idle, Bradford, Yorkshire. Tel: Bradford 612552. Cables: Wharfdel, Idle, Bradford. Telex: 51407.

Dovedale. Two-speaker floor-standing system, incorporating 12 in. Flexiprene-surround bass driver, Super 5 in. treble unit. Tuned reflex enclosure. Crossover 1 KHz. FR 25 Hz-17 KHz. Treble control at rear. Impedance 15 ohms. HC 15W RMS. Finish: polished walnut or oiled teak. Size: 24 × 14 × 12 in. Weight: 37 lb. Price: £31 10s.

Teesdale. Three-speaker floor-standing system, incorporating 15 in. bass unit, 5 in. mid-range unit, 3 in. treble unit. Acoustic suspension loading. Wide-angle high note reflectors. Crossover: 800 Hz and 3 KHz. FR 25 Hz-20 KHz. Mid-range and treble attenuator controls at rear. Impedance 15 ohms. HC 20W RMS. Size: $34\frac{1}{2} \times 18\frac{1}{2} \times 11\frac{1}{2}$ in. Weight: 51 lb. Finish: oiled walnut, polished walnut or oiled teak. Rosewood finish at slightly higher price. Price: (teak and walnut) £52 10s.; (rosewood) £55.

Airedale. Omni-directional three-speaker system, incorporating 15 in. bass driver, 8 in. mid-range radiator, 3 in. treble unit. Acoustic resistance loading. Crossover: 400 Hz and 3 KHz. FR 20 Hz-20 KHz. Mid-range and treble attenuator controls at rear. Impedance 15 ohms. Size: 39 × 27 × 14 in. Weight: 91 lb. HC 20W RMS. Finish: oiled walnut, polished walnut or oiled teak. Price: £69 10s.

Denton. Two-unit enclosure. 8 in. bass driver, 3 in. tweeter. Crossover: 1.75 KHz. FR 65 Hz-17 KHz. Impedance: 4-8 ohms. HC 15W RMS. Finish: oiled teak or polished walnut. Size: $9\frac{3}{4} \times 14 \times 8\frac{3}{4}$ in. Price: £13 6s. 3d. (plus £2 19s. PT).

Super Linton. Two-unit enclosure. 8 in. bass driver, 3 in. tweeter. Crossover: 1·75 KHz. FR 40 Hz-17 KHz. Impedance: 4-8 ohms. HC 15W RMS. Finish: oiled teak or polished walnut. Size: 19 × 10 × 10 in. Price: £16 17s. 3d. (plus £3 14s. 9d. PT).

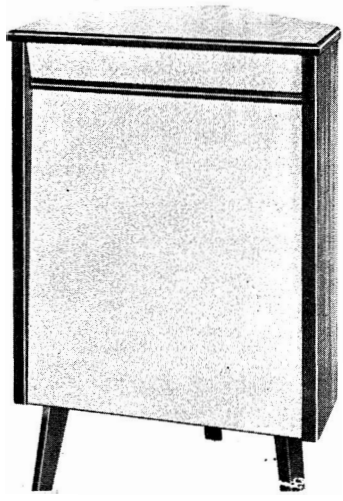
WHITELEY ELECTRICAL RADIO CO., LTD., Victoria Street, Mansfield, Notts. Tel: Mansfield 24763-5. Cables: Whitebon, Mansfield.

Model C3. Stentorian Junior Console. Bass reflex for corner position. 1 or 2 drive units. Rec HF816 or HF1012 with T10 tweeter, if required. Crossover 3 KHz. FR: (HF816) 50 Hz-14 KHz; (HF1012 and T10) 30 Hz-14 KHz. Size: 33 × $22\frac{1}{2} \times 18\frac{1}{2}$ in. Price without units: £14 19s. 2d. (plus £1 7s. PT).

Model C2. Stentorian Senior Corner Console. Bass reflex for corner position. 10 in. or 12 in. drive unit with tweeter, if required. Crossover 3 KHz. FR: (HF1012 and T10) 30 HZ-14 KHz; (HF1214 and T12) 25 Hz-17 KHz. Size: 35 × 30 × 19 in. Price without units: £18 10s. 7d. (plus £1 13s. 5d. PT).

Model C4. Corner Console. Similar design to Model C2 but suitable for smaller room. Designed for Stentorian HF810 or HF812. Size: $26 \times 17 \times 7\frac{1}{2}$ in. Price without unit: £8 2s. 7d. (plus 14s. 8d. PT).

Model C14. Thoresby Bass Reflex Corner Console. Designed to utilise acoustic properties of walls. Takes 8 in. or 10 in. units with provision for tweeter. Size: $31 \times 19\frac{3}{8} \times 17$ in. Choice of mahogany (C14) or walnut (C14A) finish. Price: (mahogany) £15 9s. 1d. (plus £1 7s. 11d. PT); (walnut) £15 15s. 6d. (plus £1 8s. 6d. PT). Cabinet only without speaker units.



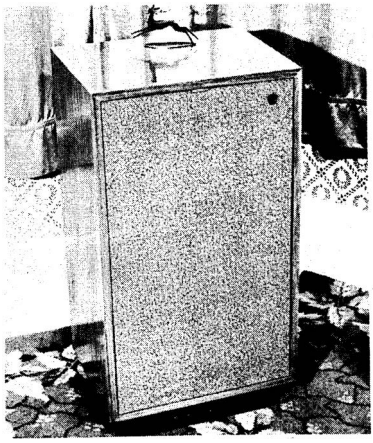
Whiteley Thoresby bass reflex

Model C15. Thoresby Bass Reflex Console. Designed for 8 in. or 10 in. units with provision for tweeter. Size: 31 × 19⅜ × 18 in. Choice of mahogany (C15) or walnut (C15A) finish. Prices: (mahogany) £16 14s. 10d. (plus £1 10s. 3d. PT); (walnut) £17 4s. 10d. (plus £1 11s. 1d. PT). Cabinet only without speaker units.

Stentorian LC93. Infinite baffle enclosure with unit. One 9 in. HF912-67 speaker unit. FR 60 Hz-20 KHz. HC 10W RMS. Impedance 15 ohms. Acoustically loaded cabinet. Speaker has graded melamined cone with silicon rubber-over-cambric suspension. Size: 19 × 12½ × 8½ in. Weight: 20 lb. Finish: teak or rosewood. Price: (teak) £12 7s. 6d. (plus £2 15s. 7d. PT); (rosewood) £13 6s. 8d. (plus £2 19s. 11d. PT).

Stentorian LC94. Labyrinth enclosure with unit. One 9 in. HF912/67 speaker unit. FR 45 Hz-20 KHz. HC 10W RMS. Impedance 15 ohms. Acoustic labyrinth with acoustic resistance incorporated in pipe. Special 9 in. speaker as fitted in LC93. Size: 29½ × 23¾ × 6⅛ in. Weight: 39 lb. Finish: oiled teak or rosewood. Price: (teak) £19 0s. 11d. (plus £4 5s. 7d. PT); (rosewood) £20 5s. 10d. (plus £4 11s. 2d. PT).

Stentorian LC95. Reflex enclosure with units. One 12 in. HF1214-67 bass driver, one 8 in. T812-67 mid- and upper-frequency speaker. Crossover: ¼ section L/C 1 KHz. FR 27 Hz-20 KHz. HC 15W RMS. Impedance 15 ohms. Acoustically loaded bass reflex cabinet. 12 in. unit melamine treated paper cone with cambric surround, 8 in. unit melamine treated paper ribbed cone and surround. Size: 31½ × 20¾ × 13½ in. Weight: 62 lb. Finish: oiled teak or rosewood. Price: (teak) £43 1s. 7d. (plus £9 13s. 6d. PT); (rosewood) £44 17s. 11d. (plus £10 1s. 8d. PT).



Woollett Kelsey

★

L. G. WOOLLETT & COMPANY LTD., 21 Anerley Station Road, London, S.E.20. Tel: 01-778 9003.

Leven. Electrostatic mid-range and HF system. Constant charge push-pull electrostatic unit. Crossover 1·5 KHz, —6 dB/octave. FR 1·5 KHz-20 KHz. HC 15W RMS. Impedance 16 ohms. Cabinet contains mains polarising unit, crossover, phase corrector for transistor amplifiers, depolarising circuit, pre-set treble attenuator (12 dB range). Mains 200-250V (100-125V to order). Finish: Veneered wood, with white/brown flecked gold Vynair. Size: 11½ × 8¾ × 8¼ in. Weight: 4 lb. 12 oz. Price: £18.

Kelsey Bass. Infinite baffle frontal-loaded enclosure intended for use as a bass speaker. Unit 12 in. foam surround. FR 20 Hz-5 KHz. HC 15W RMS. Imp 15 ohms. Finish: veneered wood. Size: 33¾ × 18 × 14 in. Weight: 52 lb. Price: £42.

Kelsey Full Range. Infinite baffle. Two units; constant charge push-pull electrostatic unit and 12 in. foam surround bass driver. Crossover ¼-section 1·5 KHz. FR 20 Hz-20 KHz. HC 16W RMS. Impedance 16 ohms. Phase corrected for transistor amplifiers. Mains: 200-250V AC (100-125V AC to order). Finish: veneered wood with brown flecked Vynair. Size: 33¾ × 18 × 14 in. Weight: 56 lb. Price: £55 15s.

Frensham Bass. Similar specification to Kelsey Bass but in horizontal cabinet on 6 in. legs. Cabinet size: 31 × 14¾ × 16 in. Price: £42.

Claremont. Similar specification to Leven but in rectangular cabinet 10 × 8½ × 8½ in. Price: £21.

Wisley Compact. Full range. Push-pull constant charge electrostatic and 12 in. bass. Differential mass, infinite baffle. FR 40 Hz-20 KHz. HC 16W RMS. Impedance 16 ohms. Mains: 200-250V AC (100-125V to order). Finish: veneered wood and Vynair. Size: 21 × 13½ × 8 in. Weight: 30 lb. Price: £46 15s.

WORDEN AUDIO DEVELOPMENTS LTD., 54 Chepstow Road, London, W.2. Tel: 01-229 4996.

Panosona Reproducer. Double horn with diffusing chamber. Corner reproducer, designed for near plane-wave distribution from one speaker unit. Available in three versions: (Model A) Size: 54 in. high, 24 in. wide, 14½ in. to corner. FR (with Lowther PM6 or PM7) 20 Hz to over 18 KHz. (Model B) Size: 48 in. high, 21½ in. wide, 12½ in. to corner. FR (with Richard Allan CG8T) 30 Hz-17 KHz; (Model C) Size: 27 in. high, 24 in. wide, 13 in. to corner. FR (with Richard Allan CG8T) 30 Hz-17 KHz. Prices: Model A (complete with Lowther PM6) £58 18s.; Model B (enclosure only) £34; Model C (enclosure only) £28. Lowther PM6 £18 18s., PM7 £28; Richard Allan CG8T £6 10s. 2d. All prices including PT where applicable.

Panosona Bookshelf Speaker. Designed in accordance with the principles of the Panosona Corner Reproducers. Size: 16 × 9 × 9½ in. Recommended drive units: Richard Allan CG8T £6 10s. 2d. tax paid) or Richard Allan CB8T (£4 10s. 10d. tax paid). Finish: light, medium or dark mahogany, teak, walnut or oak. Contrasting Tygan or Vynair front covering. Price: (enclosure only) £12 12s. including U.K. purchase tax.

WYE ELECTRONICS LTD., Queen Street North, Chesterfield, Derbyshire. Tel: Chesterfield 51116.

Stereo 500. Compact two-unit enclosure. 6½ in. high flux bass driver, 3⅜ in. tweeter. Rear mounted socket and 9 ft connecting lead. Finish: rosewood or teak. Size: 13¼ × 8½ × 8½ in. Price: £23 3s. 6d. (plus £4 11s. 9d. PT).

Stereo 138. New hi-fi speaker system. Full details not available at time of going to press. Price: £18 18s.

★

ZENITH RADIO CORPORATION. Distributors: United Mercantile Co. Ltd., 13/14 Queen Street, London, W.1. Tel: 01-499 4901. Cables: Ramsaco, Telex, London.

●**Stereo Speaker Kits.** Two sets of Zenith speakers, each set consisting of one 12 in., one horn, two 3½ in. units. Supplied complete with crossovers. Price: £93.

DIRECTORY OF TAPE RECORDERS

★The abbreviations used for the specifications in this directory are as follows: **FR**=frequency response; **i/s**=inches per second; **Psn**=power supply needed; <=better than; **ME**=magic eye; **W and F**=wow and flutter; **Replay char**=replay characteristic; **H and N**=hum and noise. ●=Stereo equipment.

PROFESSIONAL and SEMI-PROFESSIONAL

AKAI. Distributors: Pullin Photographic Ltd., 11 Aintree Road, Perivale, Greenford, Middlesex. Tel: 01-998 1541. Cables: Pullinfoto, Greenford, Middlesex.

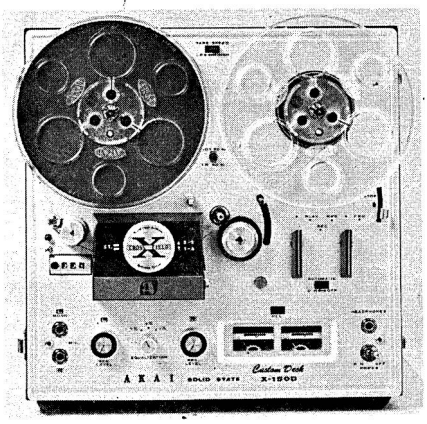
●**Akai X-355.** Professional ¼-track or ½-track transistorised mains recorder. Mono or stereo. Speeds: 15, 7½, 3¾ in./sec. Max spool 7½ in. (10½ with extra arms). W and F 15 i/s <0·06%, 7½ i/s <0·08%, 3¾ i/s <0·14%. H and N better than 50 dB at all speeds. FR 7½ i/s 30 Hz-24 KHz ±3 dB. Replay char NARTB. Professional VU meters (2). Rewind time 45 secs 1,200 ft. Inputs: mic 0·5 mV 10K, line 50 mV 100K. Output 17W RMS per channel. Speakers: two 6½ in. Outlets: line 1·22V 2K, ext speakers 8 ohms, phones. Own deck. Three motors: two-speed hysteresis for capstan drive, two four-pole induction for fast forward and rewind. Superimpose. Pause can be fitted. Four-digit tape counter. Straight-through amplifier. Monitoring. Input mixing. Printed circuit amplifiers. Facilities for automatic reverse, repeat and shut-off. Sound on sound. Sound with sound. Echo chamber effects. Vertical or horizontal operation. Remote control. Crossfield head. Mains 100-240V AC. Size: 17⅜×16×12 in. Weight: 62¾ lb. Price: £270 (plus £61 8s. 6d. PT).

●**Akai X300.** Studio type ¼, ½, or full-track mains recorder. Mono or stereo. Speeds: 15, 7½, 3¾ i/s. Max spool 10½ in. W and F 15 i/s <0·04%, 7½ i/s <0·05%, 3¾ i/s <0·15%. H and N better than 50 dB at all speeds. FR 7½ i/s 30 Hz-24 KHz ±3 dB, 3¾ i/s 30 Hz-18 KHz ±3 dB. Replay char NARTB. VU meter. Rewind time 45 secs 1,200 ft. Inputs: mic 0·5 mV 10K, line 50 mV 100K. Output: 17W RMS per channel. Speakers: two 6×4 in. Outlets: line 1·22V 2K, phones, ext speakers 8 ohms. Transistors. Three motors. One external-rotor motor for capstan drive, two induction motors for fast forward and reverse. Superimpose. Four-digit tape indicator. Monitoring. Input mixing. Built-in tape cleaner. Three heads (plus crossfield). Auto-stop. Biased and filtered for stereo multiplex radio. Mains 100-240V AC. Size: 13⅜×16⅛×9 in. Weight: 47 lb. Price: £215 (plus £48 18s. 3d. PT).

●**Akai M9.** Semi-professional ¼-track mains recorder. Solid state. Mono or stereo. Speeds: 15, 7½, 3¾, 1⅞ i/s. Max spool 7 in. W and F 7½ i/s 0·15%, 3¾ i/s 0·25%, 1⅞ i/s 0·35%. FR: 7½ i/s, 30 Hz-23 KHz ±3 dB; 3¾ i/s, 30 Hz-18 KHz ±3 dB; 1⅞ i/s, 30 Hz-9 KHz ±3 dB. Replay char NARTB. Two VU meters. Rewind time: 1½ mins 1,200 ft. tape. Inputs: mic 2 mV 500K, line 200 mV 1 megohm. Output: 12W RMS per channel. Speakers: two 4×4 in. Outlets: line 800 mV 3K, ext speaker 8 ohms. Own deck. One motor. Superimpose. Pause. Four-digit tape counter. Monitoring. Built-in tape cleaner. Horizontal and vertical operation. Crossfield head. Mains: 100-240V AC. Size: 20×13×9½ in. Weight: 41·8 lb. Walnut cabinet. Two stereo headphones sockets. Price: £159 (plus £36 3s. 5d. PR).

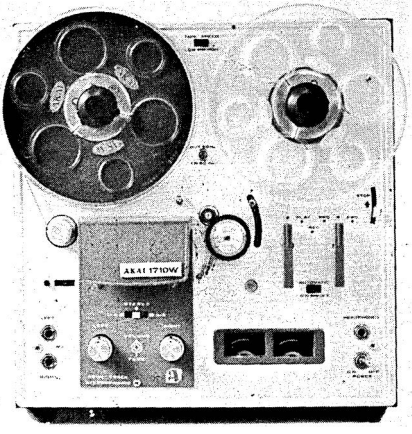
●**Akai X-V.** ¼ or ½-track mains/battery recorder. Mono or stereo. Speeds: 7½, 3¾, 1⅞ i/s (or 15/16 i/s). Max spool 5 in. (7 in. with extension arms). W and F: <0·15% at 7½ i/s, <0·17% at 3¾ i/s, <0·25% at 1⅞ i/s, <0·35% at 15/16 i/s. H and N: −50 dB at all speeds using mains adaptor, −45 dB at all speeds using rechargeable battery. FR: 7½ i/s, 40 Hz-20 KHz ±3 dB; 3¾ i/s, 40 Hz-17 KHz ±3 dB; 1⅞ i/s, 30 Hz-11 KHz ±3 dB, 15/16 i/s 30 Hz-5·5 KHz ±3 dB. Replay char NARTB. Two VU meters. Automatic recording level with manual over-ride. Mains unit. Records and plays back stereo from mains or battery. Ext speaker: 8-16 ohms. Mute switch. Output: 2W RMS per channel. Brushless AC motor. All transistor. Three-digit tape indicator. Monitoring. Mains: 100-240V AC. Size: 5⅛×11×12 in. Weight: 12 lb. Price: to be announced.

●**360D.** Mono/stereo tape recorder. ¼-track. Speeds: 1⅞, 3¾, 7½ i/s; 15 i/s optional. Max spool 7 in. W and F: 7½ i/s 0·05%, 3¾ i/s 0·08%, 1⅞ i/s 0·15%, 15 i/s 0·05%. H and N −50 dB. FR: 1⅞ i/s 30 Hz-11 KHz, 3¾ i/s 30 Hz-18 KHz, 7½ i/s 30 Hz-23 KHz, 15 i/s 30 Hz-23 KHz all ±3 dB. Replay char NARTB. Two VU meters. Rewind time 75 seconds for 1,200 ft. Inputs: mic (sensitivity not stated), line 1·23V. Outlets:



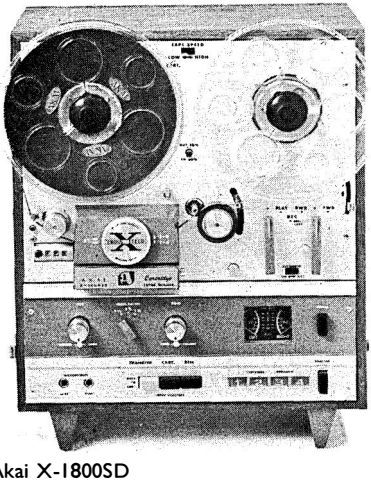
Akai X150D

Akai A360D

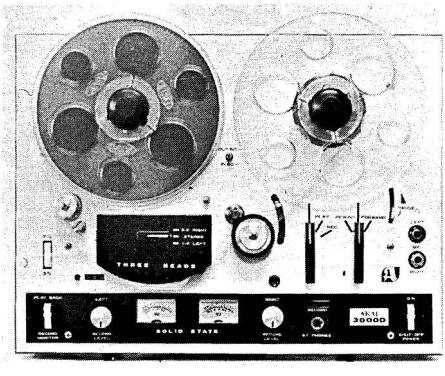


Akai 1710W

Akai 1800



Akai X-1800SD



Akai 3000D

line, stereo headphones. Output: 20W RMS. Two 5 in. monitor speakers. Transistors. Three motors. Own deck. Superimpose. Four-digit tape indicator. Straight-through amplifier. A-B monitoring. Input mixing. Magnetic braking system. Remote control. Automatic level control. FM multiplex filter. Size: $18\frac{1}{4} \times 16 \times 10$ in. Weight: 48 lb. Price to be announced.

●**1800.** Mono/stereo recorder with facility for playing 8-track stereo cartridge and 7 in. spools. Speeds: $7\frac{1}{2}$, $3\frac{3}{4}$ i/s. W and F: $7\frac{1}{2}$ i/s $<0{\cdot}18\%$. FR: $7\frac{1}{2}$ i/s 40 Hz-18 KHz, $3\frac{3}{4}$ i/s 40 Hz-14 KHz. S/N better than 50 dB. Inputs: mic 1 mV, line 60 mV. Output: 4W RMS per channel. NARTB equalisation. Rewind time 180 seconds for 1,200 ft. One motor. Two 4 in. monitor speakers. Five valves, four transistors, two diodes. Mains: 100-240V 50/60 Hz. Size: $15 \times 13\frac{1}{4} \times 9$ in. Weight: $35\frac{1}{4}$ lb. Price: £125 (plus PT).

●**X-1800SD.** Similar specification to 1800 but with Crossfield head. Speeds: $7\frac{1}{2}$, $3\frac{3}{4}$, $1\frac{7}{8}$ i/s. FR: $7\frac{1}{2}$ i/s 30 Hz-23 KHz ± 3 dB. Output: 6W RMS per channel. Twin type VU meter. 19 transistors, 13 diodes. Weight: $37\frac{1}{2}$ lb. Price: £157 (plus PT).

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AMPEX GREAT BRITAIN LTD., Acre Road, Reading, Berkshire. Tel: Reading 84411. Cables: Videotape, Reading.

Ampex AG-20. Compact, portable, professional recorder. Battery or mains operation. Full or half-track. Speeds: $3\frac{3}{4}$ and $7\frac{1}{2}$ i/s (other speed combinations available). Single motor. Digital servo control system. Spool size: 5 or 7 in. Uses $\frac{1}{4}$ in. tape. FR: 15 i/s, 50 Hz-16 KHz $\pm 1{\cdot}5$ dB; $7\frac{1}{2}$ i/s, 50 Hz-12 KHz $\pm 1{\cdot}5$ dB; $3\frac{3}{4}$ i/s, 50 Hz-9 KHz ± 2 dB; $1\frac{7}{8}$ i/s, 50 Hz-7 KHz ± 3 dB. NAB and CCIR equalisation available. H and N: full track 15 i/s and $7\frac{1}{2}$ i/s -60 dB; half track 15 i/s and $7\frac{1}{2}$ i/s -55 dB. W and F: 15 i/s and $7\frac{1}{2}$ i/s $<0{\cdot}15\%$; $3\frac{3}{4}$ i/s $<0{\cdot}2\%$; $1\frac{7}{8}$ i/s $<0{\cdot}4\%$. Full specification and price on application.

Ampex AG-300 Series. Transistorised professional mastering recorders. Console, portable or rack mounted versions. One to eight tracks. Speeds: 30 and 15 i/s or 15 and $7\frac{1}{2}$ i/s. Three motors. Spool 14 in. Accommodates tape up to 1 in. wide. FR: 15 i/s, 30 Hz-18 KHz ± 2 dB. Large scale VU meter. H and N -60 dB full track, -57 dB multi-track. W and F $<0{\cdot}07\%$ RMS at 15 i/s. Prices on application.

Ampex AG-440 Series. Transistorised professional recorders. Console, portable or rack mounted. Tape transport accommodates $\frac{1}{4}$ in. and $\frac{1}{2}$ in. tape. Modular construction allows mono machine to be built up to four-track $\frac{1}{2}$ in. unit. Speeds: $15/7\frac{1}{2}$ i/s and $7\frac{1}{2}/3\frac{3}{4}$ i/s. Three motors. $10\frac{1}{2}$ or $11\frac{1}{2}$ in. spools. FR 30 Hz-18 KHz ± 2 dB. H and N -68 dB (full track unweighted). W and F $<0{\cdot}08\%$ RMS. Eight-track versions on 1 in. tape available. Prices on application.

Ampex AG-600. Transistorised professional portable recorder. Speeds: $7\frac{1}{2}$ and $3\frac{3}{4}$ i/s. One motor. 7 in. spools. FR 40 Hz-10 KHz ± 2 dB. Large scale VU meter. H and N -60 dB full track, -55 dB half track. W and F less than $0{\cdot}15\%$. Size: $16\frac{1}{2} \times 13\frac{3}{4} \times 8$ in. Weight: 28 lb. Price on application.

●**Ampex AG-600-2.** Stereo version of Ampex AG-600. Size: $24\frac{1}{2} \times 13 \times 8$ in. Weight: 42 lb. Price on application.

●**AG-500.** Transistorised professional recorder. Stereo or mono versions. Full or half-track. $\frac{1}{4}$-track version available shortly. Speeds: 15 and $7\frac{1}{2}$ i/s or $7\frac{1}{2}$ and $3\frac{3}{4}$ i/s. W and F 15 i/s $0{\cdot}1\%$; $7\frac{1}{2}$ i/s $0{\cdot}13\%$; $3\frac{3}{4}$ i/s $0{\cdot}17\%$. H and N -60 dB at 15 and $7\frac{1}{2}$ i/s full track. FR: 15 i/s, 30 Hz-15 KHz ± 2 dB; $7\frac{1}{2}$ i/s, 30 Hz-12 KHz ± 2 dB. Replay char NAB/CCIR (15 i/s only) with plug-in equalisers. Various inputs by plug-in transformers and preamps. Outlet from preamp $+4$ dBm into 600 ohms. One motor. 7 in. spool. Rewind $1\frac{1}{2}$ mins. VU meter. Remote control. Size (transport): $19 \times 8\frac{3}{4} \times 6$ in.; (electronics): $19 \times 5\frac{1}{4} \times 5\frac{3}{8}$ in. Weight (unmounted): 44 lb; (in case) 53 lb. Price on application.

Ampex AG-1000. 16 and 24 channel professional recorders. 2 in. wide tape. Console mounted. Full details and prices on application.

See also Tape Units Section for other Ampex models.

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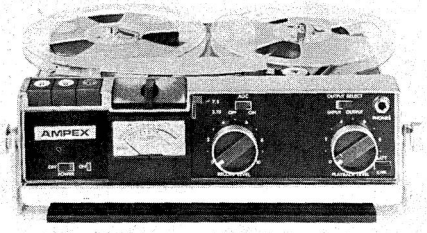
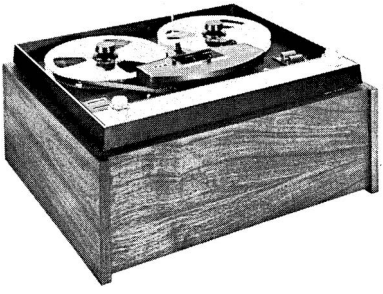
BANG & OLUFSEN U.K. DIVISION, Eastbrook Road, Gloucester. Tel: 0452 21591.

●**Beocord 2000K De Luxe.** All-transistor three-speed recorder. $\frac{1}{2}$-track record, $\frac{1}{4}$- and $\frac{1}{2}$-track playback. Speeds: $7\frac{1}{2}$, $3\frac{3}{4}$, $1\frac{7}{8}$ i/s. Max spool 7 in. Fast wind: $2\frac{1}{2}$ mins LP tape. Inputs: mic 50 mV 50-200 ohms, PU 2 mV 47K, PU 40 mV 4 megohms, radio 5 mV 47K, radio 100 mV 100K,

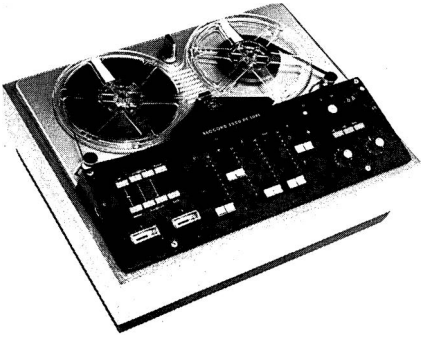
Akai X-V



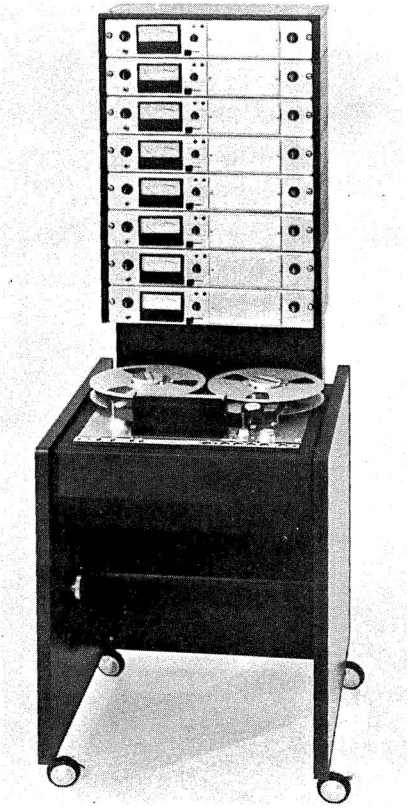
Ampex AG20



Ampex 753



Beocord 2000 De Luxe



Ampex AG440 (8 channel)

Brenell Mk. 5 type M Series 3 recorder

crystal mic pre-amplifier 0·5 mV 500K, line 250 mV 50K. Outlets: line 600 mV 10K, speakers 4 ohms, phones 100 ohms. Output: 8W RMS per channel. Output impedance 4 ohms. Available in portable carrying case or on plinth. Price: (portable) £150 1s. (plus £33 14s. PT); (plinth) £144 19s. (plus £32 11s. PT).

★

BRAUN AG. Distributors: Fi-Cord International, Charlwoods Road, East Grinstead, Sussex. Tel: East Grinstead 21351.

●**TG.60.** Semi-professional stereo tape recorder. Three motors. Automatic tape tension fine adjustment. Servo brakes. Capstan drive motor and head-support rigidly mounted on robust diecast bridge. ½-track record and playback. Three heads. Separate dual channel record and playback amplifiers. All transistor. Pushbutton operation via relays and magnetic circuits. Operates in any position. FR 20 Hz-16 KHz. Distortion at full recording level below 3%. SN better than 55 dB. W and F below 0·1%. Size: $16\frac{7}{8} \times 6\frac{3}{4} \times 11\frac{1}{4}$ in. Mains 220V 50 Hz. Price: £319 13s. 7d. (including PT).

●**TG502.** Half-track stereo unit. Full details and specification on request. Price: £404 16s. 11d.

●**TG504.** Quarter-track stereo unit. Full details and specification on request. Price: £404 16s. 11d.

●**TG502/4.** Half-track unit with additional quarter-track playback head. Full details and specification on request. Price: £404 16s. 11d.

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BRENELL ENGINEERING CO. LTD., 231-5 Liverpool Road, London, N.1. Tel: 01-607 8271 (5 lines).

Mk 5. Type M. Series 3. Speeds: 15, $7\frac{1}{2}$, $3\frac{3}{4}$, $1\frac{7}{8}$, i/s. Three motors. $8\frac{1}{4}$ in. spools. FR 15 i/s, 40 Hz-20 KHz; $7\frac{1}{2}$ i/s, 40 Hz-18 KHz; $3\frac{3}{4}$ i/s, 40 Hz-13 KHz; $1\frac{7}{8}$ i/s, 40 Hz-6 KHz. Level meter. H and N −45 dB. W and F $1\frac{7}{8}$ i/s, <0·25%; $3\frac{3}{4}$ i/s, <0·15%; $7\frac{1}{2}$ i/s, <0·1%, 15 i/s, <0·05%. Outlet from pre-amp. Mixing. Superimposing. Tape monitoring, Input monitoring. Size: 18 × 18 × 9 in. Weight: 40 lb. Price: £107 8s. (plus £24 8s. 8d. PT).

Mk 5. Series 3. 15, $7\frac{1}{2}$, $3\frac{3}{4}$ and $1\frac{7}{8}$ i/s. Three motors, $8\frac{1}{4}$ in. spools. FR 15 i/s, 40Hz-15 KHz ±2 dB; $7\frac{1}{2}$ i/s, 40 Hz-14 KHz; $3\frac{3}{4}$ i/s, 40 Hz-11 KHz; $1\frac{7}{8}$ i/s, 40 Hz-6 KHz ±3 dB. ME level ind (Meter available). H and N −45 dB. W and F 0·05% at 15 i/s. Hi-fi outlet 500 mV into 47K. Straight-through amp. Switched frequency correction. Pause control and monitoring. Size: 18 × 18 × 8 in. Weight: 38 lb. Price: £85 9s. (plus £19 8s. 9d. PT); (with meter) £91 5s. (plus £20 15s. 2d. PT).

●**STB2.** Stereo/mono recorder. See Tape Units

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CROWN INTERNATIONAL. Distributors: Carston Electronics Ltd., Electra House, Wiggenhall Road, Watford, Herts. Tel: 92 22272.

●**Crown International 800 Series.** ¼-track and ½-track mono and stereo professional recorders. Speeds: 15, $7\frac{1}{2}$, $3\frac{3}{4}$ i/s. Max spool: $10\frac{1}{2}$ in. W and F 15 i/s 0·06%, $7\frac{1}{2}$ i/s 0·09%, $3\frac{3}{4}$ i/s 0·18%. H and N 15 i/s better than 60 dB, $7\frac{1}{2}$ i/s better than 60 dB, $3\frac{3}{4}$ i/s better than 55 dB. FR 15 i/s 50 Hz-30 KHz ±2 dB, $7\frac{1}{2}$ i/s 30 Hz-20 KHz ±2 dB, $3\frac{3}{4}$ i/s 30 Hz-10 KHz ±2 dB. Replay char NAB or CCIR. Level indicator: 5 in. VU meter each channel. Rewind time: 1,200 ft 38 secs, 2,400 ft 58 secs. Inputs: line or high Z mic −25 dB (45 mV) 100K, high Z mic −70 dB 0·2 mV 100K, low Z mic −85 dB or 80 dB 50 ohms or 250 ohms. Outlets: line 0·7V 5K unbalanced, line +26 dBm 600 ohms bal or unbal, monitor +8 dBm 50 ohms. Audio output: 0·5W. Transistorised. Three AC torque capacitor motors. Superimpose. Inching. Input mixing. Treble and bass boost and cut each channel. Individual channel bias adjustment. A-B monitoring and source and tape mixing. Echo. Size: $17\frac{1}{2} \times 19 \times 8$ in. Weight: 50 lb. Mains: 117 or 230V 50 or 60 Hz. Consumption: 230W. Price: £550 to £1,300.

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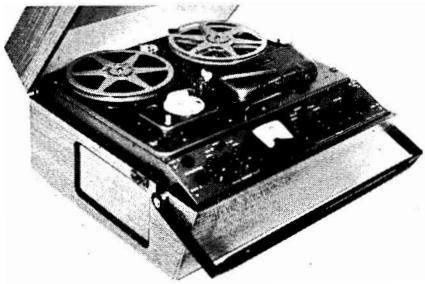
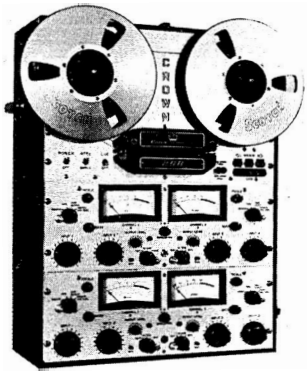
CHILTON. Magnetic Tapes Ltd., Chilton Walk, Garden Road, Richmond, Surrey. Tel: 01-979 1316.

●**100S.** Transistorised stereo ¼ or ½-track recorder. Speeds: $7\frac{1}{2}$, $3\frac{3}{4}$, $1\frac{7}{8}$ i/s. Inputs: mic 150 µV 50-200 ohms, gram 5 mV 47K (alternative input for ceramic or crystal PU). Outputs: two line at 1V 600 ohms, two 10W RMS at 8 ohms or two 7W RMS at 15 ohms. Full remote control. Two PPM calibrated in dBs. Solenoid operation by light touch buttons. Interlocked controls. Tension rollers. Auto-stop. Heavy flywheel. Stabilised power supply with automatic over-

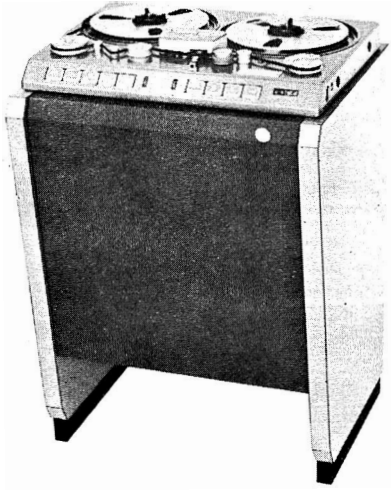


Clarke & Smith TR 634

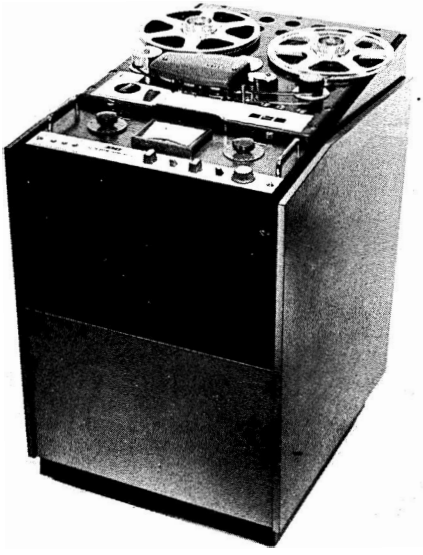
EMI L4



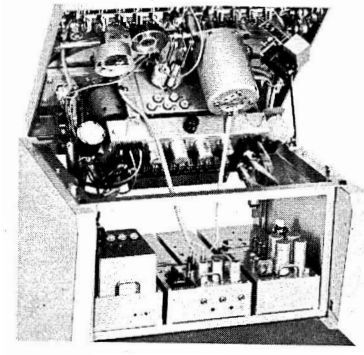
Crown 800



EMT Studer C37 Console



EMI BTR4



EMT Studer C37 (interior view)

load protection. Multiplay and echo facilities. Mains: 200-250V 50 Hz or 120-190V 60 Hz. Finish: oiled teak cabinet with satin chrome and grey deck. Price: £120 15s. (including PT).

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CLARKE & SMITH MANUFACTURING CO. LTD., Melbourne Works, Wallington, Surrey. Tel: Wallington 9252/7.

TR634. Transistorised mono recorder. ¼-track. Speeds 7½, 3¾, 1⅞ i/s. W and F 7½ i/s, 0·2%; 3¾ i/s, 0·3%. H and N 7½ i/s, −50 dB; 3¾ i/s, −48 dB. FR 7½ i/s, 50 Hz-15 KHz, 3¾ i/s, 50 Hz-9 KHz (±3 dB). Replay char CCIR. Inputs: 1½ mV, 15 μV, 60 mV. Outlet from preamp. Outputs: 10W into 15 ohms, 70V line and 1V at 5K. Three motors, 8¼ in. spools. Level meter. Mixing. Tone controls. Size: 17½ × 17 × 10 in. Weight: 45 lb. Price: £113 (plus PT).

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EMI ELECTRONICS LTD., Hayes, Middx. Tel: 01-573 3888. Cables: Emidata, London.

●**TR52/2CT.** Professional portable stereo/mono recorder. Speeds 7½ and 3¾ i/s. One motor, 7 in. spools. FR: 7½ i/s 50 Hz-10 KHz, 3¾ i/s 50 Hz-6 KHz (both speeds ±2 dB). W and F less than 0·25% at 7½ i/s. Crosstalk. −45 dB. VU meter. Size: 20 × 17½ × 13½ in. Weight: 80 lb. Price: on application.

●**Type BTR4.** Professional stereo/mono recorder. Full and half-track, mono and stereo.

Speeds 3¾/7½ or 7½/15 i/s, W and F 15i/s. better than 0·1%; 7½ i/s, 0·1%; 3¾ i/s, 0·15%. H and N (2% distortion) −60 dB unweighted, FR: −15 i/s 30 Hz-20 KHz, 7½ i/s 30 Hz-12 KHz, 3¾ i/s 40 Hz-8 KHz (all speeds ±2 dB). Replay char CCIR, NARTB, IEC. Input 10K bridging, and 200 or 600 ohm line. Balanced floating output at 35,200 or 600 ohms. Three motors, 11¼-in. spools (European). Rewind (NAB spool) 1¼ mins. VU meter. Size (deck): 19 × 17 × 12 in., 80 lb; (amplifier): 19 × 16¼ × 7 in., 32 lb. Price on application.

L4. Professional portable transistorised recorder in four versions. Type A ¼-track, Type B full-track, Types C and D adapted for film and sound sync. Spool 4¼ in. Speeds: 7½, 3¾ i/s. W and F better than 0·2% at 7½, 0·25% at 3¾. H and N better than 50 dB. FR: 7½ i/s 50 Hz-12 KHz ±2 dB, 3¾ i/s 50 Hz-5 KHz ±6 dB. Inputs: Two mic 50 μV 30-50 ohms, line 250 mV 20K. Outputs: line 600 ohms, LS 200 mW 65 ohms. Meter. Rewind time 2 min 4¼ in. standard tape. One motor. Own deck. Four heads. Remote control. Operates with lid closed. Power: 14V rechargeable lead acid accumulator. Size: 7 × 11¾ × 5¾ in. Weight: 10¾ lb. Price on application.

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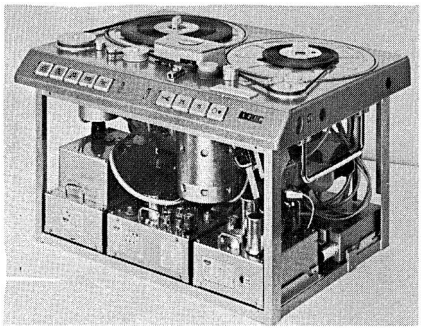
EMT WILHELM FRANZ GMBH, Switzerland. Sole U.K. Agents: F. W. O. Bauch Ltd., Holbrook House, Cockfosters, Herts. Tel: 01-440 3277.

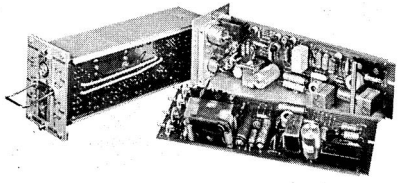
●**Studer A62.** Professional transistorised studio recorder. Stereo/mono. Full track or ¼-track. Speeds: 15, 7½ i/s. Replay char. CCIR or NARTB (either by request). Outlet from preamp. Three motors. Mains: 110, 117, 125, 150, 220 and 250V 50 or 60 Hz as ordered. Consumption: 130W maximum. Tape timer: calibrated in minutes and seconds. W and F: 7½ i/s ±0·1% peak, 15 i/s ±0·05% peak. Signal to noise: 7½ i/s −64 dB, 15 i/s −66 dB. Inputs: adjustable between 200 mV and 4·4V (−10 dB to +15 dB) balanced >20K. Output: adjustable between 700 mV and 4·4V into 200 ohms or greater. FR: 15 i/s, 30 Hz-15 KHz +1 dB, −2 dB; 7½ i/s, 40 Hz-15 KHz +1 dB, −2 dB. Spool size 10½ in. (cine or NAB). Rewind time 1½ minutes. Horizontal or vertical operation. No power amplifier or speaker. Size: 19 × 14 × 8¼ in. Weight: 61¾ lb. Price on application.

Studer C37. Professional studio recorder. Interchangeable head blocks: full-track, stereo and switchable. Erase head stereo, also available with pilot tone head. Speeds: 15, 7½ i/s. W and F 15 i/s ±0·015%, 7½ i/s ±0·025%. SN 15 i/s −68 dB RMS lin, 7½ i/s −64 dB RMS lin. FR 30 Hz-15 KHz +1 dB, −2 dB. Separate equalisation for 7½ and 15 i/s CCIR and NAB. Output from preamp. Three Papst motors. Rewind time: 2 mins for 2,400 ft. Input: adjustable 0·7 to 7·0V (−1 dB to +19 dB) balanced 16K. Equalisation: switchable from CCIR to NAB. Spool size: 12 in. (3,300 ft). Tape timer: calibrated in minutes and seconds. Spool adaptors for DIN, cine and NAB. No power amplifier or speakers. Size: 21 × 26 × 17 in. Weight: 172 lb. Price on application.

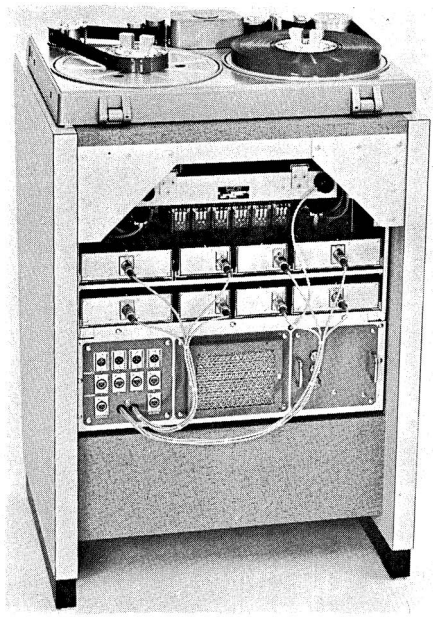
Studer J37. Professional studio recorder. ½ in. or 1 in. tape Interchangeable head blocks. Three-track or four-track. Speeds: 15, 7½ i/s. W and F (1 in. tape, weighted) 15 i/s ±0·075%, 7½ in. 0·1%. FR 15 i/s (CCIR) 30 Hz-15 KHz. 7½ i/s 45 Hz-12 KHz. Separate equalisation for



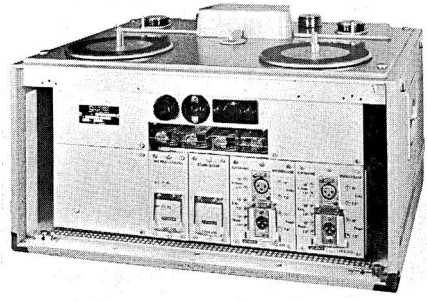
Studer C37



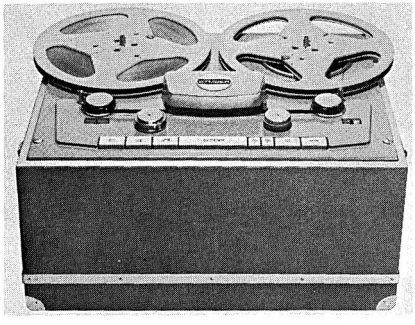
Studer A62 replay/record amplifier



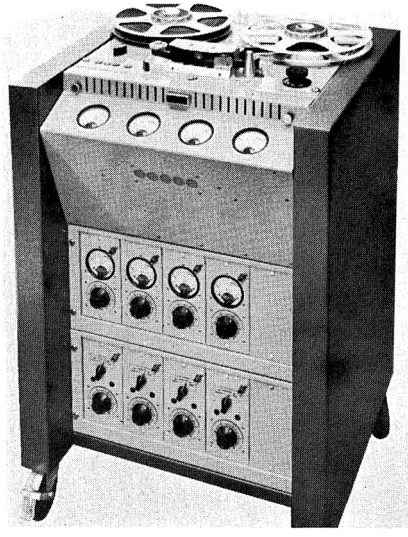
Studer J37



Studer A62



Studer A62



Leevers-Rich H444M

7½ and 15 i/s (CCIR and NAB). Three Papst motors. Guide track amplifier. Monitoring before and after recording. Four synchro playback amplifiers. Max spool 12 in. Rewind time: 3 mins 3,300 ft 1 in. tape. SN: 15 i/s, −65 dB RMS; 7½ i/s, −60 dB RMS. Inputs: adjustable 0·7 to 7·0V (−1 dB to +19 dB) balanced and greater than 15K. Outputs: 0·7 to 7·0V (−1 dB to +19 dB) into 200 ohms or greater, balanced. No power amplifier or speakers. Size: 27 × 25½ × 40 in. (high). Console style. Weight: 330 lb. Price on application.

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FERROGRAPH. The Ferrograph Co. Ltd., Simonside Works, Leam Lane, South Shields, Co. Durham. Tel: South Shields 2301. London office: 84 Blackfriars Road, London, S.E.1. Tel: 01-928 1981.

Ferrograph 713M. Semi-professional mains mono recorder. ½-track. Speeds: 7½, 3¾, 1⅞ i/s. Max spool 8¼ in. W and F: 7½ i/s 0·08%, 3¾ i/s 0·15%, 1⅞ i/s 0·2%. H and N: 7½ i/s better than 52 dB. FR: 7½ i/s 30 Hz-17 KHz ±2 dB, 3¾ i/s 40 Hz-14 KHz ±3 dB, 1⅞ i/s 50 Hz-7 KHz ±3 dB. Replay char DIN. VU meter (auxiliary PPM available). Rewind time less than one minute for 1,200 ft. Inputs: mic 150 μV to 15 mV at 250-2,000 ohms, line 75 mV to 10V at 2 megohms. Outlets: 600 ohms, 300 mV 10K, 8-16 ohms 10W. Output 10W RMS. Two 6 × 4 in. speakers. Transistorised. Three motors (synchronous hysteresis capstan motor and shaded pole spool motors). Pause. Four-digit gear driven tape indicator. Straight-through amplifier. Monitoring. Input mixing. Vertical or horizontal operation. Single knob control. Fast wind continuously variable in either direction. Remote start/stop of tape, also time-switch operation. Removable head block. Straight line tape loading. Automatic stop. Reel retainers. Retractable carrying handle. A-B comparison switch. Separate bass and treble controls with cut or lift. Meter indicates signal level on record and playback. Meter switchable to indicate bias. Bias continuously adjustable. Supplied in three styles. Suffix P: portable wood case leathercloth covered; Suffix W: wooden case, natural wood finish; Suffix S: chassis version. Mains: (Suffix U) 200-250V 50 Hz; (Suffix A) 117V 60 Hz. Price: approximately £135 (including PT).

Ferrograph 713H. Similar specification to 713M except tape speeds 15, 7½, 3¾ i/s. FR at 15 i/s 30 Hz-20 KHz ±2 dB. Price: approximately £141 (including PT).

Ferrograph 715H. Similar specification to 713H except is full-track professional machine. Price: approximately £172 (including PT).

●**Ferrograph 722M.** Similar specification to 713M except ½-track stereo version. Track to track transfer switch. Switchable echo. Records mono on upper or lower tracks. Channel separation: stereo approx 45 dB, mono better than 60 dB. Price: approximately £185 (including PT).

●**Ferrograph 722H.** Similar specification to 722M except tape speeds 15, 7½, 3¾ i/s. FR at 15 i/s 30 Hz-20 KHz ±2 dB. Price: approximately £191 (including PT).

●**Ferrograph 702M.** Similar specification to 722M except tape unit with preamps only. Additional low level output adjustable 0-300 mV. Price: approximately £160 (including PT).

●**Ferrograph 702H.** Similar specification to 702M except tape speeds 15, 7½, 3¾ i/s. FR at 15 i/s 30 Hz-20 KHz. Price: approximately £166 (including PT).

●**Ferrograph 724M.** Similar specification to 722M except ¼-track version. Price: approximately £185 (including PT).

●**Ferrograph 704M.** Similar specification to 702M except ¼-track version. Price: approximately £160 (including PT).

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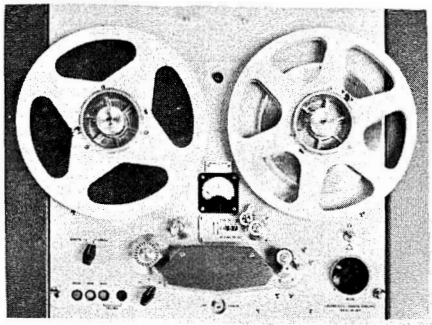
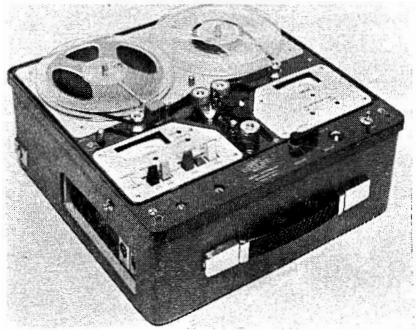
LEEVERS-RICH EQUIPMENT LTD., 319 Trinity Road, Wandsworth, London, S.W.18. Tel: 01-874 9054. Cables: Leemag, London, S.W.18.

Series E ¼ in. professional recorders. Available in rack mounting (R), console (M), or portable (P) versions.

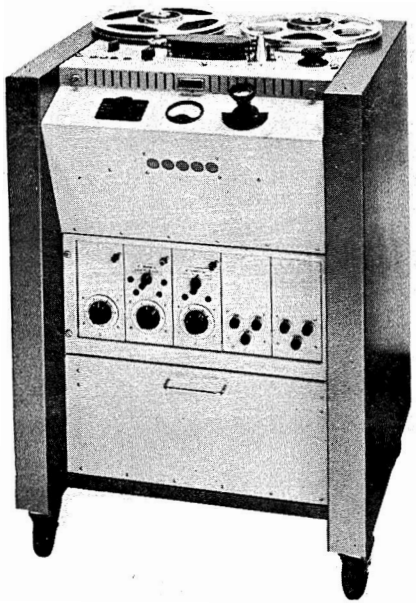
E141, E242. Speeds: 15 and 7½ i/s, or 30 and 15 i/s, or 7½ and 3¾ i/s. Spool 11½ in. Three motors. Full track, half track or dual track. FR 30 Hz-18 KHz ±2 dB at 15 i/s. Noise: full track −62 dB, half track −58 dB. W and F better than 0·1%. VU level meter, PPM to order. Plug-in record, replay and monitor amplifiers. Prices from £645.



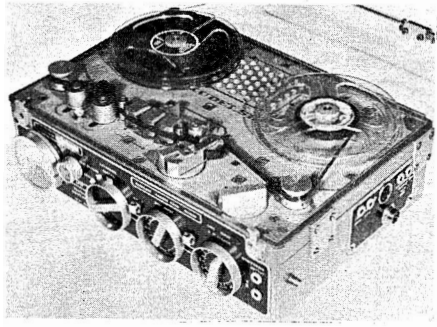
Leevers-Rich Basic E Series V deck



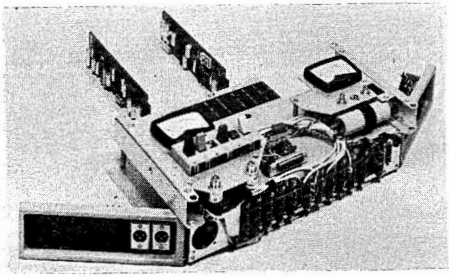
Leevers-Rich Q2



Leevers-Rich E141M console



Nagra III BH



Leevers-Rich Q2 amplifier nest

Revox

Series H ½ in. professional recorder.

H444. Four track heavy duty recorder suitable for high quality master recordings. Speeds: 15 and 7½ i/s. Spools 10½ in. NAB. Three motors. Four tracks. FR to BS 1568:1960. NAB to special order. Noise better than −55 dB. Cross-talk better than 45 dB below adjacent track level at 1 KHz. Input: 80 mV into 600 ohms (terminating) or 20K (bridging). Plug-in record, replay amplifiers. VU meter in each channel. Prices from £1,265.

Series G. Professional recorders. 4, 8, 12 or 16 tracks on 1 in. tape. Speeds: 15 or 7½ i/s. (other speeds to order). NAB 10½ in. spools. Three motors. FR to BS1568:1960. NAB to special order. Prices from £1,840.

Series Q. Portable battery recorder for full- or half-track. Twin track or synchropulse. Speed: 7½ i/s (other speeds to order). 7 in. spools. VU meter. W and F 0·08% RMS. Servo-controlled capstan. Prices from £350.

Models EC or HC. Auto-correlation recorders. Full details and prices on request.

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NAGRA. Distributed by: Hayden Laboratories Ltd., East House, Chiltern Avenue, Amersham, Bucks. Tel: 02405-6565.

Nagra III BH. Professional battery portable recorder. Mono. Full track. Speeds: 15, 7½, 3¾ i/s. W and F 7½ i/s, 0·08%. S/N ratio 15, 7½ i/s −70 dB weighted. FR 15 i/s, 30 Hz-18 KHz ±1 dB; 7½ i/s 40 Hz-15 KHz ±1·5 dB. Replay characteristic CCIR and NAB supplied. Inputs: mic 0·2-10mV, 200 ohms, or 0·1-5mV, 50 ohms; line 0·5-10V, 100K or 10mV-1V, 2·5K. Monitoring output. One motor. 5 in. spool (7 in. with lid raised). Level meter. Mixing of various inputs. Three heads. Monitor speaker. Batteries: 12 1·5V torch cells, life approx 20 hours continuous. Size: 8¾ × 12½ × 4¼ in. Weight: approx 15½ lb. Price: £379.

Nagra III PH. Similar to III BH but fitted with the "Neopilot" system which provides the additional capability of achieving lip sync in filming. The "Neopilot" head is used to record a 50 Hz or 60 Hz signal transversely on the tape. Price: £405.

NATIONAL. Distributed by: United Africa Mechanical and Electrical Ltd., P.O. Box 1, United Africa House, Blackfriars Road, London, S.E.1. Tel: 01-928 2070.

●**National RS-790S.** Semi-professional dual-capstan tape recorder. Speeds: 7½, 3¾, 1⅞ i/s. Max spool 7 in. ¼-track. W and F: 7½ i/s <0·09%, 3¾ i/s <0·18%, 1⅞ i/s <0·22%. FR: 7½ i/s 30 Hz-20 KHz, 3¾ i/s 30 Hz-14 KHz, 1⅞ i/s 30 Hz-9 KHz. Replay char DIN. Two level meters. Inputs: mic(2) −67 dB 20K, aux(2) −20 dB 100K. Outlets: speakers (2) 8 ohms, line(2) 10K, phones 8 ohms 15 mW. AC mains 100-250V 50/60 Hz. All transistor. Output 10W music per channel. Bias frequency 50 KHz. Signal-to-noise ratio >52 dB. Four-digit tape indicator. Sound-on-sound recording. Internal speaker 7 × 5 in. Automatic tape reversing. Size: 17 × 8½ × 16½ in. Full specification on request. Price: (machine only) £183 15s.; (with speakers) £235 4s. (including PT).

●**National RS-760S.** ¼-track three-speed transistorised stereo recorder. Tape speeds: 7½, 3¾, 1⅞ i/s. Max spool 7 in. Output: 4W music per channel. Bias frequency 53 KHz. VU meters. Rewind time 3½ mins 1,200 ft tape. W and F: 7½ i/s <0·1%, 3¾ i/s <0·2%, 1⅞ i/s <0·25%. FR: 7½ i/s 40 Hz-17 KHz, 3¾ i/s 40 Hz-10 KHz, 1⅞ i/s 50 Hz-5 KHz. Inputs: mic(2) −74 dB 10K, aux(2) −20 dB 680K. Outlets: line(2) 10K, speakers(2) 8 ohms, phones 8 ohms. Internal speakers: two 6 × 4 in. Size: 14 × 13½ × 7 in. Weight: 22 lb. Full specification on request. Price: (machine only) £102 18s.; (with speakers) £131 5s. (including PT).

●**National RS-761S.** ¼-track three-speed transistorised stereo recorder. Speeds: 7½, 3¾, 1⅞ i/s. Max spool 7 in. Output: 8W music per channel. Bias frequency 50 Hz. Two VU meters. Rewind time 3 mins 1,200 ft. W and F: <0·1% at 7½ i/s. FR: 7½ i/s, 30 Hz-18 KHz; 3¾ i/s, 30 Hz-13 KHz, 1⅞ i/s 30 Hz-6 KHz. SN ratio >52 dB. Inputs: mic(2) −74 dB 5·6K, line −20 dB 100K. Outputs: line(2) 10K, speakers(2) 8 ohms. Internal speakers: two 6½ in., two 2⅜ in. Size: 17¼ × 11¼ × 6½ in. Weight: 22 lb. Full specification on request. Price: £162 15s. (including PT).

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PHILIPS ELECTRICAL LTD., Century House, Shaftesbury Avenue, London, W.C.2. Tel: 01-437 7777. Cables: Phillamps, London.

●**4408.** ¼-track stereo mains recorder. Speeds: 7½, 3¾, 1⅞ i/s. Max spool 7 in. W and F ±0·2%.

SN >45 dB. FR 7½ i/s 40 Hz-18 KHz. Two level indicators (meters). Rewind time <180 secs 1,800 ft. Inputs: two mic 0·25 mV 2K, two radio 2 mV 20K, two PU 100 mV 500K. Outlets: radio 1V, phones 0-1·5V 1K, two speakers 6W 4-8 ohms. Output: 6W per channel. Own deck. One motor. Pause. Straight-through amplifier. Monitoring. Input mixing. Parallel track replay. Vertical or horizontal operation. Mains 110, 127, 200-250V AC. Size: 19 × 13 × 8¾ in. approx. Price: £110 5s. (plus £23 11s. 8d. PT).

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REVOX. Distributors: C. E. Hammond & Co. Ltd., 90 High Street, Eton, Windsor, Berks. Tel: Windsor 63388. Telex: 84316.

●**Series 77.** Silicon transistor stereo tape recorder available in various versions. ½-track or ¼-track. Speeds: 7½, 3¾ i/s. Max spool 10½ in. W and F: 7½ i/s 0·08%, 3¾ i/s 0·1%. FR: 7½ i/s 30 Hz-20 KHz +2 −3 dB, 3¾ i/s 30 Hz-16 KHz +2 −3 dB. Record char NAB, playback char NAB and IEC (switchable). Two VU meters. Inputs: mic 0·15 mV 50-600 ohms or 2 mV up to 100K (switchable), radio 2 mV 33K, aux 40 mV 1 megohm. Outlets: line 2·5V 600 ohms, 1·2V 2·5K. Output: 8W RMS per channel. HD better than 1%. Three-motor deck electronically governed. Electronic speed change. Vertical or horizontal operation. Plug-in printed circuit modules. Oscillator freq 120 KHz. Remote control for all functions. Output impedance (power amplifiers) 4-16 ohms. 54 transistors, 32 diodes, 4 silicon rectifiers. Mains: 110, 130, 150, 220, 240, 250V 50/60 Hz. Weight: approximately 34 lb. Prices and variations follow.

●**Model 77C/2.** Chassis only, no output amplifiers. ¼ or ½ track. Price: £140 14s. (plus PT).

●**Model 77CVV/2.** Chassis with output amplifiers. ¼ or ½ track. Price: £161 14s. (plus PT).

●**Model 77CS/2.** Chassis in teak surround, no output amplifiers. ¼ or ½ track. Price: £145 19s. (plus PT).

●**Model 77CSVV/2.** Chassis in teak surround with output amplifiers. ¼ or ½ track. Price: £166 19s. (plus PT).

●**Model 77K/2.** Complete recorder in suitcase with amplifiers and four speakers. ¼ or ½ track. Price: £173 5s. (plus PT).

SANYO. Distributed by: Electronic Equipment Department, Marubeni-Iida Co. Ltd., 164 Clapham Park Road, London, S.W.4. Tel: 01-720 1911.

●**Sanyo MR999.** Semi-professional mono/stereo tape recorder with external speakers. Speeds: 7½, 3¾, 1⅞ i/s. Max spool 7 in. W and F: 7½ i/s 0·15%, 3¾ i/s 0·2%, 1⅞ i/s 0·3%. FR: 7½ i/s 30 Hz-18 KHz, 3¾ i/s 30 Hz-10 KHz, 1⅞ i/s 30 Hz-6 KHz. Replay char CCIR. Two VU meters. Rewind time 125 secs 7 in. LP. Inputs: mic −66 dB 10K, PU (mag) 50K, line 100K. Outlets: line 1K, phones 10K. Outputs: 6W RMS per channel. External speakers: two 12 × 8 in. Superimpose. Pause. Tape position indicator. Monitoring. Input mixing. Parallel track replay. Own deck. Size: 20 × 10 × 16 in. Weight: 29 lb. Price: £120 (including PT).

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SONY (U.K.) LTD., 36-40 Wigmore Street, London, W.1. Tel: 01-935 3546.

●**TC260.** ¼-track semi-professional mains recorder. Speeds: 7½, 3¾ i/s. Max spool 7 in. W and F: 7½ i/s 0·19%, 3¾ i/s 0·25%. H and N: better than 50 dB. FR: 7½ i/s 30 Hz-18 KHz, 3¾ i/s 30 Hz-13 KHz. VU meter. Inputs: mic(2) 0·3 mV 250K-1 megohm, aux(2) 0·12V. Outlets: line(2) 0·775V, monitor 0·775V. Output: 5W RMS per channel. Speaker: two 8 × 4 in. Transistorised. Own deck. One motor. Digital tape position indicator. Straight-through amplifier. Monitoring. Pause. Mains: 110/125, 240/250, 50/60 Hz. Size: 21¼ × 15½ × 7⅞ in. Weight: 34 lb. Price: £165 (plus PT).

TC777M. Transistorised mono recorder. ½-track. Speeds: 7½, 3¾ i/s. W and F 7½ i/s, 0·15%. FR 7½ i/s, 30 Hz-17 KHz; 3¾ i/s, 30 Hz-10 KHz (±2 dB). Replay char NARTB. Inputs: mic low impedance, aux high impedance. Outlet from replay head. Three motors. 7 in. spools. VU meter. Three heads. Remote control. Size: 16⅛ × 10 11/16 × 18¾ in. Weight: 42 lb. Price: £225.

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TANDBERG. Distributors: Elstone Electronics Ltd., Hereford House, North Court, Vicar Lane, Leeds 2. Tel: Leeds 39834/6. Grams: Elstone, Leeds.

●**Tandberg Series 6.** Stereo tape unit in ¼- and

½-track versions. Speeds: 7½, 3¾, 1⅞ i/s. Max spool 7 in. W and F 7½ i/s <0·1%, 3¾ i/s <0·15%, 1⅞ i/s <0·25%. SN 7½ i/s 62 dB, 3¾ i/s 55 dB. FR 7½ i/s 30 Hz-20 KHz, 3¾ i/s 30 Hz-13 KHz, 1⅞ i/s 30 Hz-7 KHz. Two level indicators. Inputs: (each channel) mic 1·5 mV 5 megohms, radio/PU 50 mV 1 megohm, radio/PU 4 mV 100K. Outlets: cathode follower 1·5V at 2K, 0·5V at 50K. Centre channel output: 1V at 200 ohms. Nine valves, two rectifiers. Own deck. Hysteresis synchro-motor. Separate record, playback and erase heads. Bias frequency: 78 KHz±2 KHz. Off-tape monitoring. Sound-on-sound recording. No power amplifiers or speakers. Echo effects. Input mixing. Single joystick tape transport control. Four-digit tape indicator. Push-button controls. Pause. Auto-stop. Optional remote control. Size: 15¼ × 11⅞ × 6 in. approximately. Weight: 25 lb. Price: (62X) £117 11s. (plus £27 7s. PT); (64X) £117 11s. (plus £27 7s. PT).

●**Tandberg Series 12.** Stereo tape recorder in ¼-track and ½-track versions. Speeds: 7½, 3¾, 1⅞ i/s. Max spool 7 in. W and F 7½ i/s <0·15%, 3¾ i/s <0·2%, 1⅞ i/s <0·3%. H and N −55 dB. FR 7½ i/s 40 Hz-20 KHz, 3¾ i/s 40 Hz-12 KHz, 1⅞ i/s 40 Hz-7 KHz. Level indicators: two EAM86. Rewind time: 2 mins 1,200 ft. Inputs: two mics 1·5 mV 200 ohms, line 75 mV 1 megohm, line 7·5 mV 100K. Output: 10W RMS each channel. Outlets: amplifier 300 mV 10K (two), centre channel amplifier 750 mV 82 ohms. Speakers: two 7×4 in. (power on internal speakers limited to 3W each channel). 35 transistors. Erase and bias frequency 85·5 KHz. Stereo multiplex filter. Bass control: −12 dB at 80 Hz. Treble control: −15 dB at 15 KHz. All input connections parallel for British, American or Continental plugs. Size: 15⅜ × 11⅞ × 6⅞ in. Weight: 23 lb. Price: (Model 1221, 1241) £102 4s. 6d. (plus £23 15s. 6d. PT); (Model 1222, 1242) £108 3s. 9d. (plus £25 3s. 3d. PT).

Series 11. ½-track mono battery-operated semi-professional recorder. Battery 10-16V. Consumption 2-3W. 41 transistors, 10 diodes. Speeds: 7½, 3¾, 1⅞ i/s. Speed tolerance: better than 1%. FR 7½ i/s 30 Hz-20 KHz. W and F 7½ i/s better than 0·1%. Distortion <0·5%. S to N: 61 dB. Inputs: mic 0·1 mV 200 ohms, low level 5 mV 10K, high level 100 mV 200K. Outputs: line 600 ohms, headphones 200 ohms, 0·25W 20 ohms. Size: 13 × 4 × 10¼ in. Weight: 11½ lb (including batteries). Prices from £145 19s. (including PT).

TEAC. Distributors: B. H. Morris & Co. (Radio) Ltd., 84-88 Nelson Street, Tower Hamlets, London, E.1. Tel: 01-790 4824.

●**Teac 4010S.** Transistor ¼-track stereo semi-professional recorder. Speeds: 7½, 3¾ i/s. Max spool 7 in. W and F 7½ i/s 0·12%, 3¾ i/s 0·15%. Signal-to-noise ratio 50 dB. FR 7½ i/s 30 Hz-20 KHz, 3¾ i/s 40 Hz-12 KHz. Replay char NAB. VU meters. Rewind time: 90 secs for 1,200 ft. Four-digit tape indicator, PB reset. Three motors: one dual-speed hysteresis capstan drive, two six-pole outer-rotor reel drive. Automatic reverse play. Tape tension control. Auto shut-off. Inputs: mic 0·25 mV 10K, 140 mV 100K. Monitoring. Input mixing. Four heads. Mains 100, 117, 220-240V 50/60 Hz. Consumption: 110W. Size: 17½ × 17½ × 9¾ in. Weight: 48 lb. Price: £181 13s. (plus PT).

●**Teac Series 310.** Professional mains recorders. Speeds: 15, 7½, 3¾ i/s. Max spool 10½ in. SN better than 60 dB (full track), 55 dB (half track). FR 15 i/s 30 Hz-18 KHz ±3 dB, 7½ i/s 40 Hz-15 KHz ±3 dB. W and F better than 0·15% at 15 i/s, better than 0·2% at 7½ i/s. Large VU meter. Full remote control facilities. Price (R311 full-track mono): £422; (R313 half-track stereo) £522. At time of going to press PT is chargeable extra.

●**A-1500.** ¼-track stereo transistorised recorder. Max spool 7 in. Speeds: 7½, 3¾ i/s. W and F: 7½ i/s 0·12%. Fast wind: 90 secs for 1,200 ft. FR 7½ i/s 30 Hz-20 KHz. S to N 50 dB. Inputs: mic 1 mV 10K, line 100 mV 100K. Monitoring. Mains: 100 or 220V AC. Size: 16¾ × 15⅛ × 11½ in. Weight: 42 lb. Price: £161 14s. (plus PT).

●**A-1600.** ¼-track stereo transistorised recorder. Max spool 7 in. Tape speeds: 7½, 3¾ i/s. W and F 7½ i/s 0·12%. Fast wind 100 secs for 1,200 ft. FR 7½ i/s 30 Hz-20 KHz. S to N 50 dB. Inputs: mic 1 mV 10K, line 100 mV 100K. Outputs: line 1 V at 10K, 2W 8 ohms. Monitoring. Mains: 100, 117, 220V AC 50 or 60 Hz. Size: 16¾ × 15⅛ × 11¾ in. Weight: 48 lb. Price: £194 5s. (plus PT).

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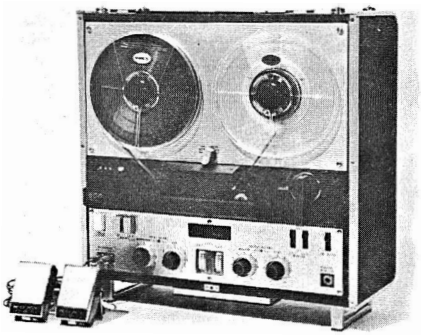
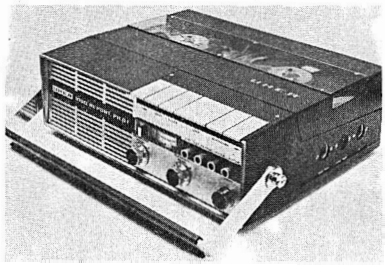
TRUVOX LTD., Hythe, Southampton, Hampshire. Tel: 0421-24 3265.

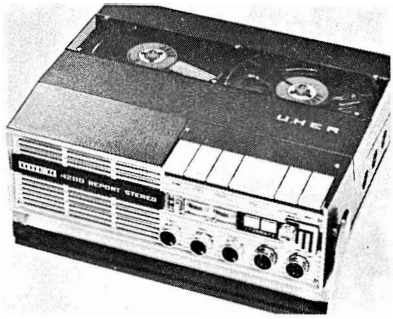
Series 200. Mono tape recorder in ¼- and ½-track versions and in portable or teak case. Speeds: 7½, 3¾, 1⅞ i/s. W and F better than 0·1% at 7½ i/s. Max spool 7 in. FR: 7½ i/s 30 Hz-18 KHz ±3 dB, 3¾ i/s 30 Hz-12 KHz



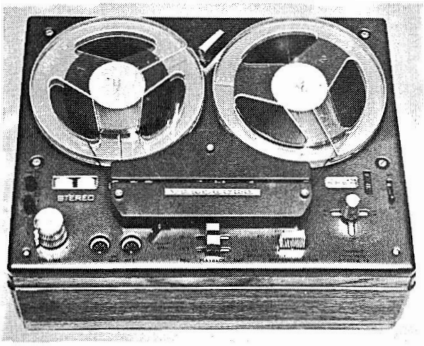
Sony TC600



Uher Pilot 1000



Uher 4200



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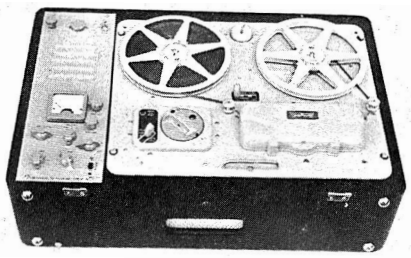

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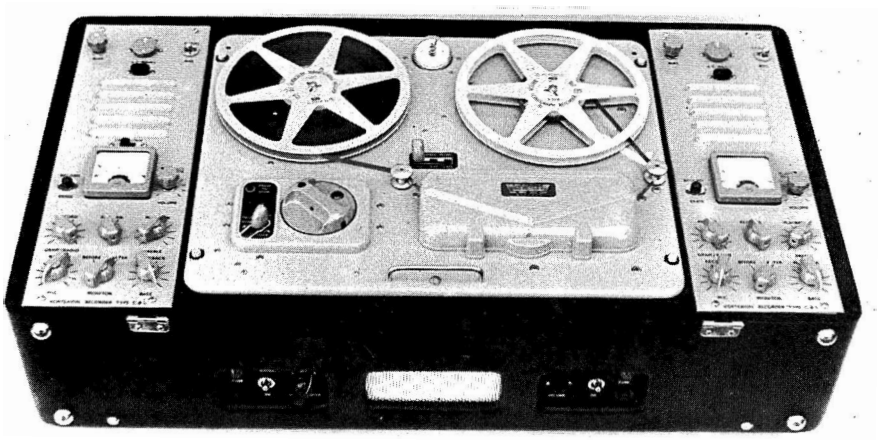

Vortexion C.B.L.

±2 dB, 1⅞ i/s 40 Hz-7 KHz ±3 dB. S to N: better than 50 dB (½ track), better than 48 dB (¼-track). Speaker: 8 × 5 in. VU meter. Equalisation new CCIR. Bias oscillator 90 KHz. Inputs: mic 1 mV 50K, radio/PU 50 mV 200K. Outputs: low Z 10W, line 0-1V variable. Microphone: moving coil, semi-cardioid. Rewind time: less than 120 secs for 1,200 ft. Mains: 200-250V 50 Hz (100-120V 50-60 Hz to order). Size: approximately 16 × 17¾ × 8½ in. Weight: approximately 35 lb. Three heads. Three motors, capstan motor outer rotor type. Off-tape monitoring. Mixing. Duo-play. Track-on-track recording. Four-digit tape indicator. Auto-stop. A-B test switch. Spool carrier hublocks. Inching and cue control. Vertical or horizontal operation. Price: £124 14s. 2d. (including PT).

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UHER. Distributors: Bosch Ltd., Rhodes Way, Radlett Road, Watford, Herts. Tel: 92 44233.

● **Uher 4200.** Transistorised mains/battery stereo tape recorder. ½-track. Speeds: 7½, 3¾, 1⅞, 15/16 i/s. Max spool 5 in. W and F: 7½ i/s 0·2%, 3¾ i/s 0·25%, 1⅞ i/s 0·35%, 11/16 i/s 0·5%. H and N: 7½ i/s −53 dB, 3¾ i/s −51 dB, 1⅞ i/s −47 dB, 15/16 i/s −43 dB. FR: 7½ i/s 40 Hz-20 KHz ±3 dB, 3¾ i/s 40 Hz-16 KHz ±3 dB, 1⅞ i/s 40 Hz-10 KHz ±3 dB, 15/16 i/s 40 Hz-4·5 KHz ±3 dB. Replay char NARTB. Level indicator: two meters. Rewind time: 3 mins for 900 ft. Inputs: mic 0·1 mV 2K, radio 2 mV 47K, PU 3 mV 1 megohm. Outlets: line 1V 15K, speaker 4 ohms. One motor. Pause. Digital position indicator. Monitoring. Input mixing. Parallel track replay. Size: 11 × 3 × 8 in. Weight: 6 lb. Supply: mains 110-250V AC, battery 6V, 12V or 24V DC. Price: £124 19s. plus PT.

● **Uher 4400.** ¼-track version of 4200. Specification almost identical. Price: £124 19s. plus PT.

● **Uher Royal de luxe.** Transistorised professional mains recorder. Mono/stereo. ¼-track and ½-track. Speeds: 7½, 3¾, 1⅞, 15/16 i/s. Max spool 7 in. W and F: 7½ i/s 0·05%, 3¾ i/s 0·1%, 1⅞ i/s 0·25%, 15/16 i/s 0·35%. H and N: 7½ i/s −54 dB, 3¾ i/s −54 dB, 1⅞ i/s −54 dB. FR: 7½ i/s 20 Hz-20 KHz, 3¾ i/s 20 Hz-15 KHz, 1⅞ i/s 20 Hz-9 KHz, 15/16 i/s 20 Hz-5 KHz. Replay char NARTB. Level indicators: two meters. Inputs: mic 0·2 mV-100 mV 200 ohms, radio 2 mV-1V 47K, PU(1) 50 mV 1 megohm, PU(2) 200 mV 50K. Outlets: line 775 mV 15K, speaker 4 ohms. Output: 10W RMS per channel. One Papst motor. Superimpose. Pause. Inching. Straight-through amplifier. Monitoring. Input mixing. Parallel track replay. Interchangeable head assemblies. Dia-pilot. Multiplay. Echo. Weight: 29½ lb. Price: £198 9s. plus PT.

Uher Pilot 1000. Transistorised professional mains/battery mono recorder. Full track. Speed: 7½ i/s. Max spool 5 in. W and F: 0·2%. H and N −52 dB. FR 20 Hz-20 KHz ±3 dB. Replay char: CCIR, NARTB. Meter level indicator. Rewind time 3 mins 900 ft. Inputs: mic 0·3 mV 200 ohms balanced, 1-10V line. Output 1W RMS. Brushless DC motor. Pause. Digit tape indicator. Straight-through amplifier. Monitoring. Input mixing. Pilot tone input. Mains: 110-250V AC or 6V, 12V or 24V DC battery. Size: 11 × 3 × 8 in. Weight: 6 lb. Price: £278 5s.

4000 Report L. Transistorised mono battery portable recorder. ¼-track. Speeds: 7½, 3¾, 1⅞, 15/16 i/s. W and F 7½ i/s, ±0·15%. H and N −55 dB. FR: 7½ i/s 50 Hz-20 KHz, 3¾ i/s 50 Hz-17 KHz, 1⅞ i/s 50 Hz-10 KHz, 15/16 i/s 50 Hz-4·5 KHz. Replay char NARTB. Inputs: mic 0·1 mV, 2K; radio 1·3 mV, 47K; gram 25 mV, 1 megohm. Outlet direct from pre-amp. One motor. 5 in. spool. Means of operation: mains, car battery, 1·5V cells, rechargeable accumulator. Size: 10½ × 8½ × 3¼ in. Weight: 7 lb. Price: £103 19s. plus PT. Combined mains unit and battery charger. Price: £13 7s.

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VORTEXION LTD., 257/263 The Broadway, Wimbledon, London, S.W.19. Tel: 01-542 6242/3/4 and 2814. Cables: Vortexion, London, S.W.19.

Vortexion Series 7. Professional recorder with solenoid start/stop with provision for remote control and voice operated control. All silicon version provides 10-15W output per channel with less than 0·1% distortion at 10W. Low-noise FET's at all inputs for low intermodulation distortion. Full specification and prices on request.

SEMI-PROFESSIONAL DECKS

BRENELL ENGINEERING CO. LTD., 231/5 Liverpool Road, London, N.1. Tel: 01-607 8251 (5 lines).

Mark 5 Series 3. G.P. tape deck, 15, $7\frac{1}{2}$, $3\frac{3}{4}$ and $1\frac{7}{8}$ i/s. Three motors. $8\frac{1}{4}$ in. spools. W and F 0·1% at $7\frac{1}{2}$ i/s accommodates up to four heads. Size: $15 \times 11\frac{1}{2} \times 5$ in. Weight: 16 lb. Price: £41 16s. (plus £9 10s. 3d. PT) with two heads.

Mark 510 Series 2. Deck mechanism. $\frac{1}{2}$- or $\frac{1}{4}$-track. Speeds: 15, $7\frac{1}{2}$, $3\frac{3}{4}$, $1\frac{7}{8}$ i/s. W and F 15 i/s, <0·05%; $7\frac{1}{2}$ i/s, <0·1%; $3\frac{3}{4}$ i/s, <0·15%; $1\frac{7}{8}$ i/s, <0·25%. Three motors (synchronous type for capstan). $10\frac{1}{2}$ in. NAB spools, 60 secs per 1,200 ft rewind. Pause. Accommodates 4 heads. Size: $15 \times 11\frac{1}{2} \times 6$ in. Weight: 16 lb. Price (less heads): £51 5s. (plus £11 10s. 11d. PT). (Prices with heads on application.)

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PLANET PROJECTS LTD., Goodman Works, Belvue Road, Northolt, Middlesex. Tel: 01-845 1775.

●**C.D.2.** Tape deck. Speed: $3\frac{3}{4}$ i/s ($1\frac{7}{8}$ i/s to special order). W and F Less than 0·2% at both speeds. Miniflux heads. $\frac{1}{2}$-track mono or $\frac{1}{4}$-track stereo. Two heads, one for each track. FR dependent on speed and heads. Papst hysteresis motor. Spool size 7 in. Automatic track change and reversal of tape direction at end of spool, no fast rewind required. Uses standard $\frac{1}{4}$ in. tape. Single knob control. Provides over $8\frac{1}{2}$ hours uninterrupted playing at $1\frac{7}{8}$ i/s. Mains 220-230V 50 Hz. Size: $14\frac{3}{4} \times 11\frac{3}{4} \times 6$ in. Weight approximately: 10 lb. Price: £68 5s. (ex works).

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SCOPETRONICS LTD., Crown Works, Church Road, Kingston-upon-Thames, Surrey. Tel: 01-546 1275/4135.

Scopetronics 825. General purpose mains tape transport. Speeds: $7\frac{1}{2}$, $3\frac{3}{4}$ i/s. Max spool $8\frac{1}{4}$ in. W and F 0·15% at $7\frac{1}{2}$ i/s, 0·2% at $3\frac{3}{4}$ i/s. Three motors. Capstan motor Papst. Superimpose. Pause. Inching. Three-digit tape indicator. Takes up to four Scopetronics heads. Size: $16\frac{3}{4} \times 14$ in. Price: on application.

Scopetronics Tape Heads. Full-track, $\frac{1}{2}$-track, stereo $\frac{1}{2}$-track, stereo $\frac{1}{4}$-track. All heads same size and fixing. Impedances to suit customers' requirements. Also commercial heads for drum and ciné use. Prices and further details on application.

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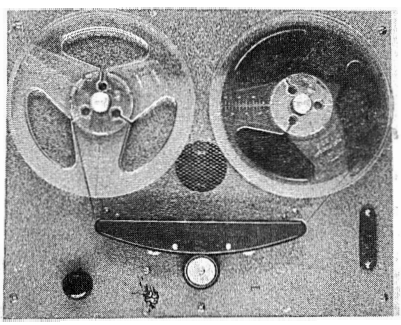

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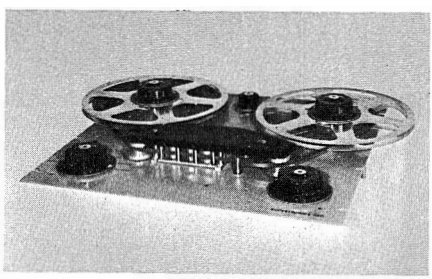

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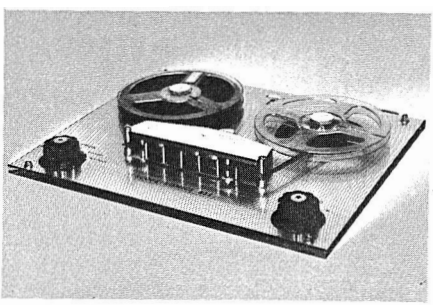

Scopetronics 825

TAPE RECORDER DEVELOPMENTS LTD., 7 King George Avenue, Bushey, Herts. Tel: 01-950 2331.

●**TRD.1 Series.** Four-speed mono or stereo tape decks. W and F 15 i/s 0·05%, 7½ i/s 0·08%, 3¾ i/s 0·13%, 1⅞ i/s 0·2%, 15/16 i/s 0·35%. Mains operated. ¼- or ½-track. Accommodation for four Bogen heads. Drive motors: Papst hysteresis synchronous. Rewind motors: Papst R.O.T. Spool capacity: 3 in. cine to 10½ in. NAB. Four-digit tape position indicator. Silicon transistor tape pre-amplifier/oscillator unit available (see Tape Units section).

●**TRD.1/S.** Specification as above. Speeds: 7½, 3¾, 1⅞, 15/16 i/s. Solenoid operation.

●**TRD.1/V.** Specification as above. Speeds: 15, 7½, 3¾, 1⅞ i/s. Mechanical operation. Variable speed spooling.

●**TRD.1/VR.** Specification as above. Speeds: 7½, 3¾, 1⅞, 15/16 i/s. Mechanical operation. Variable speed spooling.

●**TRD.1/S/15.** Specification as above. Speeds: 15, 7½, 3¾, 1⅞ i/s. Solenoid operation.

●**TRD.1/VR/15.** Specification as above. Speeds: 15, 7½, 3¾, 1⅞ i/s. Mechanical operation. Variable speed spooling.

●**TRD.1/S/30.** To special order only. Specification as above. Speeds: 30, 15, 7½, 3¾, i/s. Solenoid operation.

●**TRD.1/S/15P.** To special order only. Specification as above. As TRD.1/S/15 but for ½ in. tape.

●**TRD.1/VR/15P.** To special order only. Specification as above. As TRD.1/VR/15 but for ½ in. tape.

Full specifications and prices of TRD decks and electronic units on request.

TEAC. Distributors: B. H. Morris & Co. (Radio) Ltd., 84-88 Nelson Street, Tower Hamlets, London, E.1. Tel: 01-790 4824.

●**Teac 4000.** ¼-track stereo semi-professional tape deck. Speeds: 7½, 3¾ i/s. Max spool 7 in. W and F 7½ i/s 0·12%, 3¾ i/s 0·15%. Signal-to-noise ratio 50 dB. FR 7½ i/s 30 Hz-20 KHz, 3¾ i/s 40 Hz-12 KHz. Replay char NAB. VU meters. Rewind time 90 secs for 1,200 ft. Four-digit tape indicator, PB reset. Three motors: one dual speed hysteresis capstan drive, two six-pole outer-rotor reel drive. Automatic reverse play. Tape tension control. Auto shut-off. Four heads. Price: £122 17s. (plus PT).

Teac Series 310. Professional tape deck. Speeds: 15, 7½ i/s. Max spool 10½ in. W and F better than 0·15% at 15 i/s, better than 0·2% at 7½ i/s. Full remote control facilities. Full specification on request. Price: (TD321C) £322 (plus PT).

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WRIGHT AND WEAIRE LTD., 84 Blackfriars Road, London, S.E.1. Tel: 01-928 1981. Cables: Writewea, London, S.E.

Series 7. Semi-professional tape deck. Speeds: 15, 7½, 3¾ i/s or 7½. 3¾, 1⅞ i/s. Mono or stereo. ¼-track or ½-track. Max spool 8¼ in. W and F 0·08% at 15 i/s, 0·08% at 7½ i/s, 0·15% at 3¾ i/s, 0·2% at 1⅞ i/s. Rewind time: less than one minute for 1,200 ft. Three motors, synchronous hysteresis capstan motor, shaded pole reel motors. Pause facility. Single knob control. Vertical or horizontal operation. Fast wind continuously variable in either direction. Remote start/stop facility. Removable head block. Automatic stop at end of reel. Reel retainers fitted to spindles. Various head arrangements. Full specification and prices on application.

TAPE UNITS

AKAI. Distributors: Pullin Photographic Ltd., 11 Aintree Road, Perivale, Greenford, Middlesex. Tel: 01-998 1541. Cables: Pullinfoto, Greenford, Middlesex.

Akai X-150D. $\frac{1}{4}$-track transistorised tape unit. Mono or stereo. Speeds: 15, $7\frac{1}{2}$, $3\frac{3}{4}$, $1\frac{7}{8}$ i/s. Max spool $7\frac{1}{2}$ in. W and F $7\frac{1}{2}$ i/s $<0{\cdot}15\%$, $3\frac{3}{4}$ i/s $<0{\cdot}25\%$, $1\frac{7}{8}$ i/s $<0{\cdot}35\%$. H and N $7\frac{1}{2}$ i/s 45 dB. FR $7\frac{1}{2}$ i/s, 40 Hz-21 KHz ± 3 dB; $3\frac{3}{4}$ i/s, 40 Hz-18 KHz ± 3 dB; $1\frac{7}{8}$ i/s, 40 Hz-10 KHz ± 3 dB. Replay char NARTB. Two VU meters. Rewind time $1\frac{1}{2}$ mins 1,200 ft. Inputs: mic 2·0 mV 500K, line 200 mV 1 megohm. Outlets: amplifier 800 mV 3K, phones. Own deck. One motor. Pause. Three-digit tape indicator. Monitoring. Built-in tape cleaner. Auto-stop. Crossfield head. Horizontal or vertical operation. Mains 100-240V AC. Size: $13\frac{1}{2} \times 13\frac{1}{2} \times 9$ in. Price: £106 (plus £24 2s. 4d. PT).

Akai 3000D. $\frac{1}{4}$-track transistorised tape unit. Mono or stereo. Speeds: $7\frac{1}{2}$, $3\frac{3}{4}$ i/s. Max spool 7 in. W and F $0{\cdot}15\%$ at $7\frac{1}{2}$ i/s, $0{\cdot}25\%$ at $3\frac{3}{4}$ i/s. H and N better than 50 dB. FR $7\frac{1}{2}$ i/s, 30 Hz-20 KHz ± 3 dB; $3\frac{3}{4}$ i/s, 30 Hz-14 KHz ± 3 dB. Replay char NARTB. Two VU meters. Rewind time $2\frac{1}{2}$ mins on 1,200 ft tape. Inputs: mic 0·5mV. line 50mV. Stereo headphone socket. Pause. Separate volume controls. Own deck. One motor. Three-digit tape indicator. Monitoring. Built-in tape cleaner. Auto-stop. Horizontal and vertical operation. Mains: 100-240V AC. Size: $11\frac{7}{8} \times 15\frac{3}{4} \times 5\frac{1}{2}$ in. Price: £86 (plus £19 11s. 4d. PT).

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3000D. Mono/stereo $\frac{1}{4}$-track tape unit with preamps. Speeds: $7\frac{1}{2}$, $3\frac{3}{4}$ i/s. Max spool 7 in. W and F: $7\frac{1}{2}$ i/s $0{\cdot}15\%$, $3\frac{3}{4}$ i/s $0{\cdot}22\%$. H and N: better than -50 dB. FR: $7\frac{1}{2}$ i/s 30 Hz-21 KHz ± 2 dB, $3\frac{3}{4}$ i/s 30 Hz-14 KHz ± 3 dB. Replay char NARTB. Meter indicator. Rewind time 150 seconds for 1,200 ft. Inputs: line 50 mV 33K, mic 0·5 mV 30K, aux 20 mV 100K. Outlets: line 1·2V 1·5K, aux 250 mV 600 ohms, phones 30-40 mV 8 ohms. Transistors. One motor. Own deck. Pause. Tape position indicator. A-B monitoring. Input mixing. Size: $11\frac{7}{8} \times 15\frac{3}{4} \times 5\frac{1}{2}$ in. Weight: $25\frac{1}{4}$ lb. Mains: 100-240V 50/60 Hz. Price to be announced.

AMPEX GREAT BRITAIN LTD., Acre Road, Reading, Berkshire. Tel: Reading 84411. Cables: Videotape, Reading.

Ampex 700 Series. Model 753. Stereo tape unit comprising deck with preamps only. Speeds: $7\frac{1}{2}$, $3\frac{3}{4}$, $1\frac{7}{8}$ i/s. $\frac{1}{4}$-track. FR 40 Hz-15 KHz ± 2 dB. Signal-to-noise: better than 50 dB. W and F $7\frac{1}{2}$ i/s $0{\cdot}15\%$. Off-tape monitoring. Sound on sound. Sound with sound. Echo control. Straight-line threading. Dual capstan drive. Transistorised. Three heads. Price from 91 gns.

Ampex 1100 Series, Model 1153. Stereo tape unit comprising deck with pre-amps only. Speeds: $7\frac{1}{2}$, $3\frac{3}{4}$, $1\frac{7}{8}$ i/s. $\frac{1}{4}$-track. FR 30 Hz-18 KHz ± 2 dB. Signal to noise -52 dB. W and F $7\frac{1}{2}$ i/s $0{\cdot}01\%$. Automatic threading. Automatic reverse. Dual capstan drive. Three heads. Transistorised. Price: £149 10s.

Ampex 1100 Series, Model 1163. Portable recorder with 6W power amplifiers in each channel. Specification as for 1153. Price: £169 10s.

Ampex 1100 Series, Model 1165-3. As 1163 but in walnut case. Prices on application.

Ampex 2100 Series, Model 2153. Stereo tape unit comprising deck with pre-amps only. Speeds: $7\frac{1}{2}$, $3\frac{3}{4}$, $1\frac{7}{8}$ i/s. $\frac{1}{4}$-track. FR 30 Hz-20 KHz ± 2 dB. Signal to noise -54 dB. W and F $7\frac{1}{2}$ i/s $0{\cdot}001\%$. Automatic tape threading. Dual capstan drive. Four heads. Transistorised. Rack mounting. Suitable for operation with PA systems. Input mixing. Operates in any position. Fully tropicalised. Price: £190.

Ampex 2100 Series, Model 2163. Portable recorder with 6W power amplifiers in each channel. Specification as for 1153. Price: £235.

Ampex 2100 Series, Model 2165-3. As model 2163 but in walnut case. Price on application.

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BANG & OLUFSEN U.K. DIVISION, Eastbrook Road, Gloucester. Tel: 0452 21591.

Beocord 1500 De Luxe. Transistorised stereo tape unit in $\frac{1}{2}$-track record and playback, $\frac{1}{4}$-track

playback only versions. Speeds: $7\frac{1}{2}$, $3\frac{3}{4}$, $1\frac{7}{8}$ i/s. Spool size 7 in. W and F 0·075% at $7\frac{1}{2}$, 0·11% at $3\frac{3}{4}$, 0·18% at $1\frac{7}{8}$. H and N $\frac{1}{2}$-track −55 dB, $\frac{1}{4}$-track −50 dB. FR 40 Hz-16 KHz at $7\frac{1}{2}$ i/s, 40 Hz-12 KHz at $3\frac{3}{4}$ i/s, 50 Hz-6 KHz at $1\frac{7}{8}$ i/s. Replay char CCIR. Inputs: radio 1 mV 47K, radio 50 mV 100K, microphone 1 mV 47K. Output: line 800 mV. Rewind time 3 mins 1,800 ft. One Papst motor. Own deck. Superimpose. Pause. Position indicator. Two VU meters. Mains 110-240V 50 Hz. Size: $17\frac{3}{4} \times 13\frac{1}{4} \times 8\frac{5}{8}$ in. Weight: 33 lb. Price: £110 0s. 9d. (plus £24 14s. 3d. PT).

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BRENELL ENGINEERING CO. LTD., 231/5 Liverpool Road, London, N.1. Tel: 01-607 8271 (5 lines).

●**STB2.** Stereo/mono deck mechanism with pre-amplifiers. 2/2 and 2/4 playback heads. Speeds: 15, $7\frac{1}{2}$, $3\frac{3}{4}$, $1\frac{7}{8}$ i/s. W and F 15 i/s, <0·05%; $7\frac{1}{2}$ i/s, <0·1%; $3\frac{3}{4}$ i/s, <0·15%; $1\frac{7}{8}$ i/s, 0·25%. Outlet from pre-amp. Three motors, $8\frac{1}{4}$ in. or $10\frac{1}{2}$ in. NAB spools to order. Two illuminated level meters. Twin record and replay pre-amps. Tape monitoring facilities. Price: ($8\frac{1}{4}$ in. spools) £165 (plus £37 10s. 9d. PT); ($10\frac{1}{2}$ in. spools) £187 (plus £42 10s. 10d. PT).

●**STB2.** Monitor amplifier for use with STB2 tape unit. 3W per channel. Response 40 Hz-25 KHz ±3 dB. Noise level −60 dB. Input: 1V for 3W output. Transistorised. Bass and treble controls. Output impedance 15 ohms. Complete with two 5×3 in. speakers. Price: £27 10s. (plus £6 5s. 2d. PT).

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DUAL ELECTRONICS LTD., Radnor House, London Road, Norbury, S.W.16. Tel: 01-764 9465/6.

●**Dual TG.27-CV.** Stereo tape unit. $\frac{1}{4}$-track. Transistorised. Speeds: $7\frac{1}{2}$, $3\frac{3}{4}$ i/s. Max spool 7 in. Sound-on-sound recording. Mono/stereo record and playback. Inputs: two mics, pickup, radio. Outputs: stereo amplifier, stereo receiver, phones. Input mixing. Synchronous and independent channel level controls. Automatic monitoring reset while recording. Teak or rosewood plinth with cover. Price: (chassis only) £69 6s. (including PT); (complete with plinth and cover) £82 19s. (including PT).

EAGLE PRODUCTS. Distributed by: B. Adler and Sons (Radio) Ltd., 32a Coptic Street, London, W.C.1. Tel: 01-636 9606/7. Cables: Reldab, London.

●**TC.450H.** $\frac{1}{4}$-track transistorised stereo record and playback tape unit. Speeds: $7\frac{1}{2}$, $3\frac{3}{4}$ i/s. FR: $7\frac{1}{2}$ i/s 30 Hz-17 KHz ±3 dB, $3\frac{3}{4}$ i/s 30-12 KHz ±3 dB. S to N: better than 50 dB per channel. W and F: <0·19% at $7\frac{1}{2}$ i/s, <0·25% at $3\frac{3}{4}$ i/s. HD 1% at 0 dB line output. Bias frequency: 72 KHz. Inputs: mic (two) 300 μV 50K, radio/PU (two) 60 mV at 1 megohm. Output: 0-1V adjustable at 300 ohms. Separation better than 40 dB. Equalisation CCIR. Two VU meters. Eight transistors. Max spool 7 in. Mains: 240V AC. Size: 15×13×$6\frac{1}{2}$ in. Price: £58 16s. (plus £13 3s. 1d. PT).

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HEATHKIT. See Constructional Kit Section.

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NATIONAL. Distributed by: United Africa Mechanical and Electrical Ltd., P.O. Box No. 1, United Africa House, Blackfriars Road, London, S.E.1. Tel: 01-928 2070.

●**National RS-766US.** Four-track stereo tape deck with built-in two-channel preamplifiers. Speeds: $7\frac{1}{2}$, $3\frac{3}{4}$, $1\frac{7}{8}$ i/s. Two VU meters. Four-pole motor. Automatic switch-off. See Tape Recorder Section for full details of facilities. Full specification on request. Price: £86 2s. (including PT).

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PLANET PROJECTS LTD., Goodman Works, Belvue Road, Northolt, Middlesex. Tel: 01-845 1775.

C.D.2.P.A. This comprises model C.D.2. tape deck (see Tape Deck section) with built-in pre-amplifier and power supply. Power supply provides correct voltages for operating both relays and also a stabilised supply for the pre-amplifier. Pre-amplifier is three-stage direct coupled block using high frequency silicon planar transistors. Equalisation and stability is achieved with multiple feedback loops operating down to DC. Average output: 250 mV. Output impedance: 200 ohms to be fed into a load not less than 2·5K. FR 30 Hz-12 KHz +3 dB. HD not greater than 3 dB. Signal-to-noise ratio 50 dB. Price: £80 (ex works).

SCOPETRONICS LTD., Crown Works, Church Road, Kingston-upon-Thames, Surrey. Tel: 01-546 1275/4135.

●**Scopetronics 1150.** Professional mains tape unit with pre-amps. Mono or stereo. ¼-track or full-track. Speeds: 7½, 15 i/s. Max spool 11½ in. W and F 0·08% at 15 i/s, 0·14% at 7½ i/s. FR: 15 i/s 40 Hz-15 KHz ±3 dB, 7½ i/s 40 Hz-15 KHz ±3 dB. Replay char NARTB and CCIR. Broadcast type peak programme meter. Rewind time 1¾ mins for 2,400 ft NAB spool. Input: record input +8 dB or 1 mW at 600 ohms. Output: 1 mW at 600 ohms. H and N 7½ i/s −54 dB, 15 i/s −57 dB. Valves. Three motors (ext rotor type). Superimpose. Pause. Inching. Straight-through pre-amplifier. Monitoring. Variable speed spooling. Removable head bridge. Drop-in loading. Mains 250V 50 Hz. Price: on application.

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SONY (U.K.) LTD., 36-40 Wigmore Street, London, W.1. Tel: 01-935 3546.

●**Sony TC350.** ¼-track mains-operated stereo tape unit. Speeds: 7½, 3¾ i/s. Max spool 7 in. W and F 7½ i/s <0·17% RMS, 3¾ i/s <0·25% RMS. FR 7½ i/s, 30 Hz-20 KHz, 50 Hz-15 KHz 3 dB. Replay char: new CCIR. Two VU meters fitted. Inputs: mic 0·19 mV (−72 dB) 250-1,000 ohms, aux 60 mV (−22 dB) 100K, integrated record/playback connector 6-15 mV (−42 dB) 100K. Outlets: line 0·775V 100K, binaural monitor 0·692V 10K (for headset), integrated record/playback connector 0·775V 500K. Transistorised. One motor. Own deck. Pause. Monioring. Sound-on-sound recording. Three heads. Mains 110-240V. Consumption 50W. Size: 15¾ × 13 × 6¼ in. Weight: 17 lb. Price: £88 0s. 3d. (plus £19 19s. 9d. PT).

●**TC250A.** ¼-track mains operated transistorised stereo tape unit. Speeds: 7½, 3¾ i/s. Spool 7 in. W and F less than 0·19% at 7½ i/s, less than 0·25% at 3¾ i/s. FR 30 Hz-18 KHz at 7½ i/s, 30 Hz-13 KHz at 3¾ i/s. Replay char CCIR. Low impedance inputs −72 dB, high impedance inputs −12 dB. Output: 1V at 600 ohms. VU meter. Rewind time 3½ mins 1,800 ft. One motor. Own deck. Pause. Position indicator. Mains 110-240V 50 c/s. Size: 14¼ × 6¼ × 11½ in. Weight: 16½ lb. Price: £79 10s. (plus £14 11s. 6d. PT).

●**TC350.** ¼-track stereo transistorised tape unit. Speeds: 7½, 3¾ i/s. W and F: 7½ i/s 0·17%, 3¾ i/s 0·25%. H and N: better than 50 dB. FR: 7½ i/s 30 Hz-20 KHz, 3¾ i/s 30 Hz-14 KHz. Two VU meters. Replay char NAB. Rewind time: 2 mins 1,200 ft. Inputs: mic(2) 0·19 mV 250-1K, aux 0·6V 100K, int/record playback connection 6·15 mV 100K. Outlets: line 775 mV 100K, monitor 0·692 mV 10K. One deck. One motor. Superimpose. Pause. Digital tape position indicator. Size: 15¾ × 6¼ × 13 in. Weight: 17 lb. Price: £109.

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TANDBERG. Distributors: Elstone Electronics Ltd., Hereford House, North Court, Vicar Lane, Leeds 2. Tel: Leeds 39834/6. Grams: Elstone, Leeds.

●**Tandberg Series 6.** See Tape Recorder Section.

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TAPE RECORDER DEVELOPMENTS LTD., 7 King George Avenue, Bushey, Herts. Tel: 01-950 2331.

●**TRD Stereo tape unit.** See Tape Deck section and Tape Amplifier section for full specification.

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TEAC. Distributors: C. Hammond and Co. Ltd., High Street, Eton, Windsor, Berks. Tel: Windsor 63388.

●**A-1200.** ¼-track stereo tape unit. Max spool 7 in. Speeds: 7½, 3¾ i/s. Three motors. W and F 7½ i/s 0·12%. Fast wind 100 secs 1,200 ft. FR 7½ i/s 30 Hz-20 KHz. S to N 50 dB. Inputs: mic 1 mV 100K, line 100 mV 100K. Output: 1V 100K. Monitoring. Mains: 100, 117, 220V AC 50/60 Hz. Size: 16¾ × 17⅛ × 11½ in. Weight: 46 lb. Price: £136 10s. (plus PT).

●**A-6010.** ¼-track stereo tape unit. Max spool 7 in. Tape speeds: 7½, 3¾ i/s. Three motors. W and F 7½ i/s 0·08%. Fast wind 90 secs for 1,200 ft. FR 7½ i/s 30 Hz-20 KHz. S to N 55 dB. Inputs: mic 0·5 mV 10K, line 100 mV 300K. Output: 0-1V 10K. Mains: 100/117V 50/60 Hz. Consumption 100W. Size: 20¾ × 17⅛ × 6⅞ in. Weight: 46 lb. Price: £227 4s. (plus PT).

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TRUVOX LTD., Hythe, Southampton. Tel: Hythe (0421-24) 3265.

●**PD104.** ¼-track transistorised stereo tape unit. Speeds: 7½, 3¾, 1⅞ i/s. Spool 7 in. W and F

<0·1% at 7½, 0·15% at 3¾, 0·25% at 1⅞. H and N −50 dB. FR 7½ i/s 30 Hz-17 KHz ±2 dB, 3¾ i/s 40 Hz-10 KHz ±2 dB, 1⅞ i/s 60 Hz-8 KHz ±3 dB. Replay char new CCIR. Inputs: mic 1 mV 50K, rad/PU 50 mV 100K. Outputs: two 1V across 100 ohms. Two level meters. Rewind time 1,200 ft 1 min. Three motors, capstan motor outer-rotor type. Own deck. Pause. Four-digit position indicator. Straight-through pre-amplifier. Source-tape monitor. Three heads. Mixing. Track-to-track copying. Mains 200-250V AC. Size: 16×16⅝×8 in. Weight: 28 lb. Price: £110 5s. (plus £24 15s. 2d. PT).

PD102. ½-track transistorised stereo tape unit. Specification as for PD104. Price: £110 5s. (plus £24 15s. 2d. PT).

● **200 Series.** Stereo tape unit in ¼- and ½-track versions and in teak cabinet. Speeds: 7½, 3¾, 1⅞ i/s. W and F better than 0·1% at 7½ i/s. Max spool 7 in. FR 7½ i/s 30 Hz-18 KHz. ±3 dB. Signal to noise better than 50 dB. VU meter. Equalisation new CCIR. Bias oscillator 90 KHz. Inputs: mic 1 mV 50K, radio/PU 50 mV 200K. Output: 0-1V variable via emitter follower. Rewind time less than 120 secs for 1,200 ft. Mains: 200-250V 50 Hz (100-120V 50/60 Hz to order). Size: 16×16½×8 in. Weight: 28 lb. Full stereo record and playback. Separate record and replay amplifiers. Compatible with all multiplex systems. Three heads. Three motors. Off-tape monitoring. Mixing. Duo-play. Track to track transfer. Four-digit tape indicator. Auto-stop. Inching/cueing control. Vertical or horizontal operation. Price: £147 17s. 4d. (including PT).

★

VIKING. Distributors: Transatlantic Music Tapes Ltd., Bristol and West House, 36 High Street, Salisbury, Wilts. Tel: 0722 3888.

● **Viking 433.** Three-speed transistorised stereo tape unit. Speeds: 7½, 3¾, 1⅞ i/s. FR: 40 Hz-18 KHz ±3 dB at 7½ i/s. F and W: 7½ i/s 0·2%. Max spool 7 in. Rewind time 70 seconds for 1,200 ft. H and N: −54 dB at 7½ i/s. Inputs: high impedance mic, high level line. Output: IV per channel, stereo phones. Size: 14⅜×15¾×8¾ in. Weight: 30 lb. Price: £220 (plus £73 6s. 8d. PT).

● **Viking 423.** Three-speed transistorised stereo tape unit. Speeds: 7½, 3¾, 1⅞ i/s. FR: 7½ i/s 50 Hz-15 KHz ±3 dB. F and W: 7½ i/s 0·2%. Max spool 7 in. Rewind time 70 seconds for 1,200 ft. H and N: −50 dB. Inputs: high impedance mic, high level line. Output: 1V per channel. Size: 12⅝×15¾×8¾ in. Weight: 29 lb. Price: £149 (plus £49 13s. PT).

TAPE AMPLIFIERS AND MIXER UNITS

AMPEX GREAT BRITAIN LTD., Acre Road, Reading, Berkshire. Tel: Reading 84411. Cables: Videotape, Reading.

● **Ampex AM-10.** Transistorised stereo mixer unit. Inputs: six mics or four mics and two lines. Mics 200 ohms, line 100K bridging. Gain −67 dBm mic, −27 dBm line will produce 1V output. Up to four mixers may be coupled to give 12 input and two output channels. Output: 1V normal, 30V maximum unbalanced. FR 40 Hz-15 KHz. Signal-to-noise 65 dB for inputs of −55 dBm. Controls: six potentiometers, two-gang master gain key switches, Line/Mic AC line switch, mixer couple switch. Key switches, channel A, B or both. Four channels in, two out. Self-powered 105-125V, 30W. Size: 5 7/32 × 19 × 5 3/16 in. Price on application.

ASSOCIATED ELECTRONIC ENGINEERS LTD., 10 Dalston Gardens, Stanmore, Middlesex. Tel: 01-907 4474/6.

● **Series 1700.** Transistorised stereo/mono mixer. Inputs arranged as required. Sensitivities: mic 50 mV 30 ohms, PU 120 mV 2 megohms, radio 150 mV 270K, tape 150 mV 270K. Output: 700 mV at 2K or 700 mV at 600 ohms. Controls: mic volume, bass cut, music volume, bass, treble, master gain. Indicator lamps. Level meters fitted if required. Mains 200-250V AC or 12V DC. Speaker, phones or meter monitoring as required. Size: 8×7½× up to 36 in, according to facilities required. Full details and prices on request.

★

BINSON. See Modern Electrics Ltd.

BRENELL ENGINEERING CO. LTD., 231/5 Liverpool Road, N.1. Tel: 01-607 8271 (5 lines).

Mk 5 Series 3 Record/playback amplifier. Inputs: mic 2 Series 2 mV, radio/gram 75 mV, both high imp. Outputs: 500 mV into 47K. and 3W into 15 ohms for direct connection to loudspeaker. Headphone monitoring ME level ind. or meter if required. Price: £26. Meter: £5 5s. extra.

Brenell Mixer Unit. Three channel unit. High imp sources. There are 4 sockets for jack plugs for the three inputs and the output lead, each input having a volume control. Price: £2 18s.

●**Hi-Fi Tape Link.** Stereo tape pre-amplifier and oscillator unit. 9 valves. Input (record): 75 mV stereo, 100 mV mono, into 1 megohm. Input (playback): 1·5 mV. Output: variable up to 1V at 47K. FR 40 Hz-14 KHz at tape speed $7\frac{1}{2}$ i/s ± 3 dB. Equalisation to new CCIR at all speeds. Two level meters. H and N -50 dB. Controls: Tape speed compensation switch, variable bias, record track selector, monitor original/tape, record gain, playback gain, function. Separate mains unit 110-250V. DC heater supply. Suitable for Brenell three-head stereo decks, $\frac{1}{4}$- or $\frac{1}{2}$-track. Sizes: tape link $13\frac{3}{4} \times 4 \times 8\frac{3}{4}$ in., front panel $15\frac{1}{2} \times 4\frac{1}{2}$ in. Power unit $6\frac{1}{2} \times 4 \times 4$ in. Weight: 18 lb. including power unit. Separate record and playback pre-amplifiers. Price: £50 12s. (plus £11 10s. 3d. PT).

●**STB2 Monitor amplifier.** See Tape Units section.

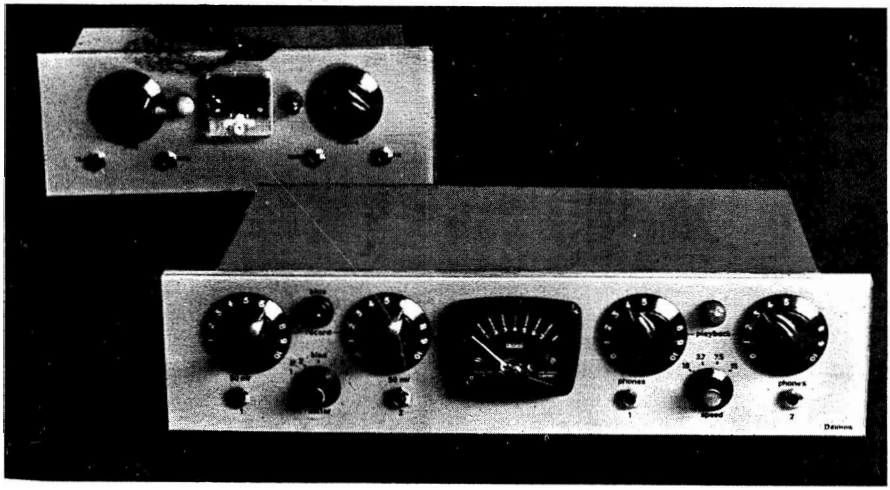
★

DEIMOS LTD., 8 Corwell Lane, Hillingdon, Middx. Tel: 01-573 3561.

●**Deimos Tape Amplifier.** Stereo/mono Flexible tape amplifier system available with many alter-

Eagle MM.4 microphone mixer

Binson Echorec Mk.2



Deimos tape amplifier

native features to suit various decks and tape heads. Separate playback and record amplifiers. Basic input sensitivity: radio 50 mV, mic 0·5 mV. Cathode follower output. Equalisation for any standard speed or playback characteristic. Level indicator optional, meter or ME. Separate power supply available. Full details and prices on request.

★

ELECTRONIC & SCIENTIFIC INSTRUMENTS (WORTHING) LTD., Distributors: Shirley Laboratories Ltd., 23 Ripley Road, Worthing, Sussex. Tel: Worthing 49098.

Esimix Major. Four-channel electronic mic and signal mixer. FR at full gain: 15 Hz-20 KHz ±2 dB. H and N better than −50 dB. Channels 1 and 2 (mic): 2 mV input for 200 mV output; channels 3 and 4 (radio, etc): 100 mV input for 200 mV output. Cathode-follower output, permitting the use of long connecting lines without risk of hum. Self-powered. 230-250V AC. Price: £19 19s.; (4 mic version): £21.

★

GRAMPIAN REPRODUCERS LTD., 19 Hanworth Trading Estate, Feltham, Middlesex. Tel: 01-894 9141/3. Cables: Reamp, Feltham.

Grampian 18/4. Four channel pre-amplifier mixer. Transistors. Inputs: 0·2 mV 25 ohms, 0·8 mV 600 ohms, 10 mV high impedance, 100 mV high impedance. Output: 0·775V. Output impedance: 600 ohms floating. Distortion <1·5%. Bass control: −8 dB at 100 Hz on mic, ±8 dB at 100 Hz on aux. Treble control: +8 dB −25 dB at 10 KHz. FR 100 Hz-10 KHz ±3 dB (tone controls level). Noise: −60 dB. Supply: PP9 (or equivalent) 9V battery. Consumption: average 18 mA. Jack socket outlet at rear. Size: $11\frac{3}{8} \times 7 \times 2\frac{7}{8}$ in. Weight: $4\frac{1}{2}$ lb. Price: £30.

Grampian 16/6. Six-channel pre-amplifier mixer for professional sound engineers. Six independently controlled microphone inputs. On-off key switch for each input permits gain control to be preset if desired. Master gain control normally controls all channels but there is provision for some inputs to operate independently. Sensitivity: 0·2 mV input for 0·775V output. Output meter scaled for 1V with overload warning on scale, 1 mW indicated by red marker at 0·775V. Specially damped movement. Output impedance: 600 ohms floating. Distortion: <0·1% for 0·775V output. FR 100 Hz-15 KHz ±2 dB with tone controls level. Bass cut: −10 dB at 100 Hz. Treble cut: −12 dB at 10 KHz. Treble lift: +6 dB at 10 KHz. H and N better than −65 dB. Input impedances from 200 μV at 25 ohms to 100 mV at high impedance to order. Mains: 200-250V AC. Size: $19\frac{1}{4} \times 7\frac{1}{8} \times 6\frac{3}{8}$ in. Weight: $12\frac{1}{4}$ lb. Price and full specification on request.

★

GRUNDIG (GREAT BRITAIN) LTD., Newlands Park, Sydenham, London, S.E.26. Tel: 01-778 2211.

●**422.** Transistorised stereo mixer for four inputs. Three coarse level controls, directional control and control for reverberation unit. Four microphone preamplifier fitted. Channel separation 50 dB (mic), 35 dB (PU). Response: 40 Hz-20 KHz ±2 dB. Powered by two 9V batteries. Size: $13\frac{1}{4} \times 2\frac{1}{4} \times 7\frac{1}{2}$ in. Price: £39 18s.

★

LEEVERS-RICH EQUIPMENT LTD., 319 Trinity Road, Wandsworth, London, S.W.18. Tel: Vandyke 9054/6. Cables: Leemag, London, S.W.18.

LeeRaser. Junior ER30A; Standard ER31B; Senior ER32B. Ultra rapid demagnetisers for spools of tape and accessories. Price: £7 10s.; £10; £20.

6 Band Audio Equaliser Model 46X. Wide range equaliser covering spectrum in 6 separately adjustable and overlapping bands, suitable for use in transcription to match widely differing recordings to a common quality standard. Price: £166.

★

THE LOWTHER MANUFACTURING CO., St Mark's Road, Bromley, Kent. Tel: 01-460 5225. Cables: Lowther, Bromley.

Companion Supply Unit No. 2. HT and LT power supply suitable to power radio tuners. Pre-amp and tape bias amplifier. Output: 250V at 40 mA, 6·3V at 3 amps. Price: £8 15s.

Companion Supply Unit No. 3. HT and LT power supply suitable to power radio tuners. Pre-amp and tape bias amplifier. Output: 350V at 35 mW, 6·3V at 3 amps. Price: £8 15s.

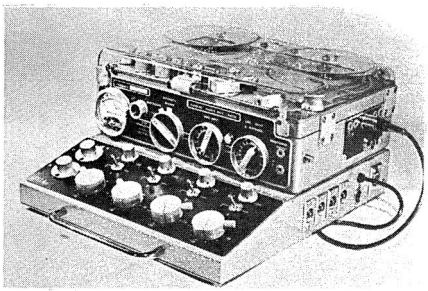
LUSTRAPHONE LTD., St George's Works, Regent's Park Road, London, N.W.1. Tel: 01-722 8844.

●**Lo-Noise.** Transistorised mono and stereo four-way mixer. Each input switchable 50 ohms, 300 ohms, 2 megohms. Sensitivity: 25 μV at 50 ohms, 62·5 μV at 300 ohms, 25 mV at 2 megohms. Two outlets. Each outlet (0 dBm) 775 mV 600 ohms. Controls: treble cut and lift, bass cut and lift, input selector, channel selector, gain. Indicator lamps. Level meters optional extras. Supply: 240V AC mains or 12V DC battery. Size: $9 \times 6\frac{1}{2} \times 19\frac{1}{2}$ in. Headphone outlet for monitoring. Price on application.

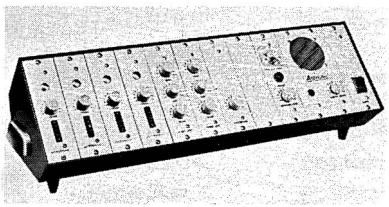
★

MODERN ELECTRICS (RETAIL) LTD., 120 Shaftesbury Avenue, London, W.1. Tel: 01-437 9692. Cables: Modcharex, W.1.

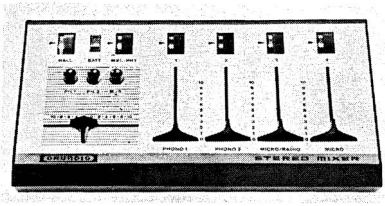
Binson Echorec Mark 2. Pre-amplifier and echo unit. Enables echo to be imposed on any audio signal in a wide choice of timing. Facilities for the imposition of swell and reverberation.



Sela 2880 mixer (under Nagra recorder)



Astronic 1700 mixer



Grundig 422 stereo mixer

Three channels which can be selected as required. Completely portable. Operates from AC Mains supply. An exclusive design of magnetic wheel with transistorised circuitry. Price: £188 6s.

Binson Echorec Export. Simplified version of the Mark 2, for echo and swell. Price: £123 6s.

★

POLY-SOUND LTD., A. R. Franklin (audio engineer), 34 Surrey Street, Croydon, Surrey.

Transistorised mixers and amplifiers built to order. Quotations on request.

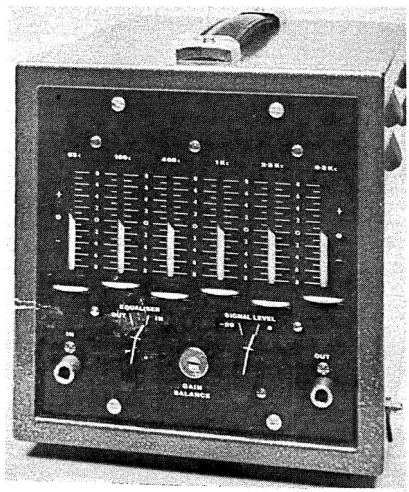
★

SANSUI. Sole UK importer: Technical Ceramics Ltd., Thorn Hill Southampton. Tel: 0703-48055. Distributors for Scotland, North and Midlands: Audio Distributors, 4 Lion Street Kidderminster. Tel: 0562-3293.

●**Sansui MX10.** Audio mixer-preamplifier. Transistorised. Full specification on request. Price: £61 19s.

SELA. Carston Electronics Ltd., Electra House, Wiggenhall Road, Watford, Herts. Tel: Watford 22272.

Type 2880. Transistorised high quality mono mixer. Four inputs. Each input 50-200 ohms. Outlets: 1·5V 500 ohms, 3V 10 ohms. Controls: filter. Power requirements: 10·5V DC at 60 mA. Headphone monitoring facilities. Size: $14\frac{1}{2} \times 13 \times 2$ in. Full details on request. Price: £225.



Leevers-Rich six-band equaliser

SHIRLEY LABORATORIES LTD., 23 Ripley Road, Worthing, Sussex. Tel: Worthing 49098.

TW/PA4. Recording amplifier for use with high quality power amplifier. Inputs: 1·5 mV and 60 mV. Bias and erase oscillator. Full corrections. Valve voltmeter modulation level ind. For use with Wearite or Ferrograph tape decks (TW/PA4U for Planet decks), can be supplied to order for any deck. Size: $10 \times 5\frac{1}{2} \times 5\frac{1}{4}$ in. Psn from main amp or power pack can be supplied at £6 16s. 6d. Price: £34 13s.

●**TWA/1515HG.** Complete stereo record and replay amplifier. Inputs: radio 50 mV, gram. 5 mV (RIAA), mic 2 mV, tape 3 mV. Output: 12W per channel (17W peak). FR 45 Hz-25 KHz ±1 dB on radio input. Low distortion bias and erase oscillator included. Valve voltmeter level indicator. H and N −85 dB. Controls: bass, treble, vol., pre-set balance, meter pre-set, bias pre-set, sel, rec/replay, equalisation, mono/stereo. Heavy duty power pack on separate chassis. Size (control unit): $23 \times 7\frac{1}{2} \times 7$ in.; (power unit): $10 \times 8 \times 7\frac{1}{2}$ in. TWP/1515HG for Planet decks. TWA/1515HG for Ferrograph decks. TWH/1515HG for Brenell and similar decks. Price: £115 10s.

★

SOUND NEWS PRODUCTIONS, 10 Clifford Street, New Bond Street, London, W.1. Tel: 01-734 2745.

Unimixer 1. 3 channel unit. Channels 1 and 2 have independently controlled duplicate sockets for low or high imp mics 30 ohms or 400K approx. Recommended load imp not less than 500K ohms. FR from 30 ohm input 50 Hz-10 KHz ±3 dB. Price: £9 9s.

Unimixer 2. 3 channel unit. Inputs as above but high imp is 5 megohms in channels 1 and 2. Power supply needed 200/300V DC at 5 mA, 6·3V at 0·3 amps balanced. Special connectors available to obtain power supplies direct from Ferrograph or Vortexion recorders without any alteration. Price: £15 15s.

★

TAPE RECORDER DEVELOPMENTS LTD., 7 King George Avenue, Bushey, Herts. Tel: 01-950 2331.

●**TRD. DPA1 Tape Unit.** High quality stereo tape record and playback unit with self-contained oscillator and power pack. Output: +10 dB above 0 600 ohms. Inputs: two mics (low impedance), two 600 ohm 10K bridging repeater sockets at rear. Can be 70 mV into 500K to order. Input mixing. Variable bias readable on meter. Peak programme meter. Four-speed frequency correction on front panel. FR: 15 i/s 40 Hz-25 KHz ±2 dB, $7\frac{1}{2}$ i/s 40 Hz-17 KHz ±2 dB, $3\frac{3}{4}$ i/s 40 Hz-9 KHz ±2 dB, $1\frac{7}{8}$ i/s 40 Hz-4·5 KHz ±2 dB. SN (unweighted) 54 dB below normal maximum record level. HD 1% at maximum record level. Replay char. DIN 45513. Record and replay on upper or lower tracks, or both together. Output level control. $\frac{1}{4}$-track replay head can be fitted in fourth position to order (switchable). Supplied fitted with deck types TRD.1/S, TRD.1/VR, TRD.1/S15, TRD.-1/UK15.

★

TELE-RADIO (1943) LTD., 189 Edgware Road, London, W.2. Tel: 01-723 4455.

●**Master Mixer.** Mono or stereo. Four-channel mono or two-channel stereo self-powered electronic mixer. Four inputs at high impedance: 3 mV in, 250 mV output. Cathode follower output. FR 20 Hz-20 KHz. All connections at rear by GPO type jack sockets. Mono/stereo switch. Valves: ECC83's and EZ81. Special input and output impedances (i.e. mag/ceramic PU, 30-50 or 600 ohms, etc) to order at from £3 10s. per channel. Size: $14\frac{3}{4} \times 3\frac{3}{4} \times 9$ in. Finish: hammer grey case, black/gold perspex front panel. Cabinet mounting or free-standing. Price: (basic high impedance version) £26 5s.

★

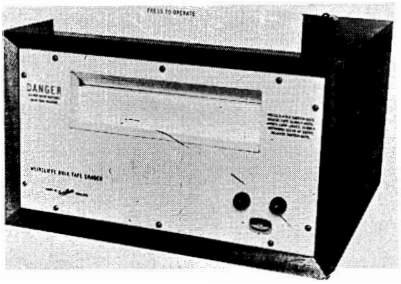
UHER. Distributors: Bosch Ltd., Rhodes Way, Radlett Road, Watford, Herts. Tel: 92 44233.

●**A121.** Stereo/mono mixer unit. Input 0·1 mV 2K. Output approx 30 mV. FR 20 Hz-20 KHz. Five glider controls. Five channels. Transistorised. Power supply needed: 9V battery. Price: £52 2s. 9d.

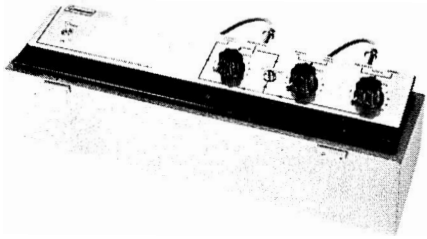
★

VORTEXION LTD., 257/263 The Broadway, Wimbledon, London, S.W.19. Tel: 01-542 6242/3/4 and 2814. Cables: Vortexion, London, S.W.19.

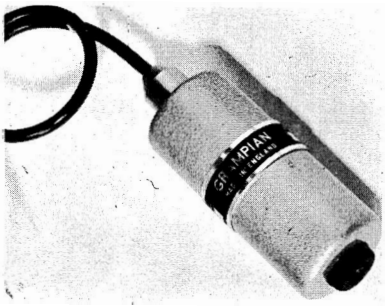
Electronic mixers. Various types of mixers available: 3-channel with accuracy within 1 dB. Peak programme meter. 4- 6- 8- 10- and 12-channel mixers. Also twin 5- 4- 3- 2-channel stereo. Tropicalised controls. Built-in screened supplies. Balanced line mic inputs. Outputs: 0·5V at 20K, or alternative 1 mW 600 ohms, balanced, unbalanced or floating. Prices on application.



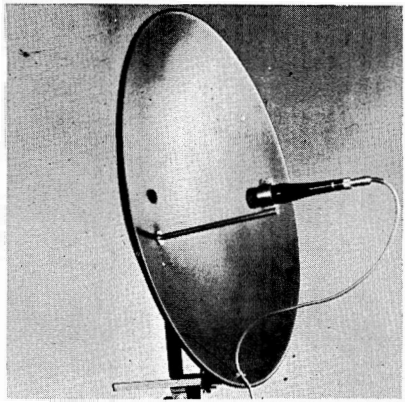
Weircliffe bulk eraser



Grampian reverberation unit

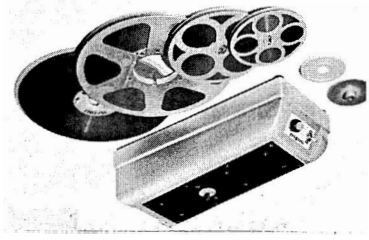


Grampian G7 matching unit

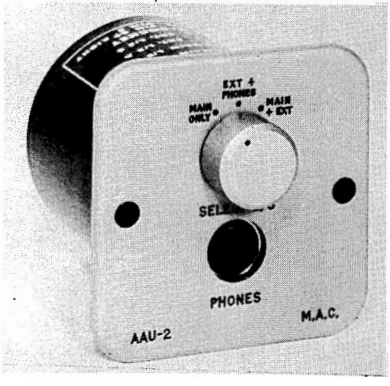


Grampian Parabolic reflector

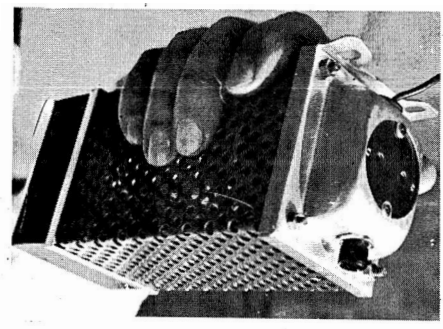
Wearite Defluxer



Leevers-Rich Leeraser ER32B



M A.C. Adapter Units



Valradio type 12/35T DC converter

TAPE ACCESSORIES and COMPONENTS

AMOS OF EXETER LTD., Weircliffe Court, Exwick, Exeter. Tel: Exeter 72132. Cables: Amos, Exeter.

Weircliffe Bulk Erasers. Models 6, 7, and 8. Model 6 accepts reels up to 8½ in. diameter of ¼-1 in. tape. Capacity 180-400 reels per hour. Model 7 accepts 8 × 8 in. cassettes of ¼ in. tape. Model 8 accepts reels of up to 14½ in. diameter containing tape from ¼ in. audio up to 2 in. video including ½ in. and 1 in. instrument tape and 16 and 35mm film. Capacity 100-400 reels per hour. (NATO catalogue No. 5835-99-972-5371). Sizes (Models 6 and 7): 11½ × 12¼ × 7½ in. Weight: 43 lb. Size (Model 8): 20½ × 20½ × 10½ in. Weight: 92 lb. Prices: Models 6 and 7 £32 (ex works), Model 8 £90 (ex works). Models available for 115V 60 c/s.

★

FERROGRAPH CO. LTD., Ferrograph House, 84 Blackfriars Road, London, S.E.1. Tel: Waterloo 1981.

Head lift transformers. Suitable for FP17, FR7A and CL7 heads. Price: £2.

Defluxer. For depolarising heads, capstans and guides. Ensures maximum signal/noise ratio. Prevents hiss and protects tapes from cumulative background noise. Price: £3.

★

GRAMPIAN REPRODUCERS LTD., Hanworth Trading Estate, Feltham, Middx. Tel: 01-894-9141. Cables: Reamp, Feltham.

Grampian G.7. Matching units, consisting of double wound transformer in a Mu-metal case with jack socket on the primary and a screened lead on the secondary. Dimensions: 3⅝ × 1¼ in. diameter. Versions available for matching 15/30 ohms, 600 ohms and 50,000 ohms or greater. Price: £3 10s.

Grampian Parabolic Reflector. Diameter 24 in., depth 5 in. Gain 14 dB over range of 500 c/s to 5,000 c/s. To take Grampian DP4 and DP6 mics. Weight: 4¾ lb. Price: £6 10s.

Grampian Reverberation Unit. Self-contained portable unit, transistorised and operated from internal dry batteries. Independent input channels, low level and high level. Output 1V, 600 ohms. Size (including detachable lid): 17½ × 5¼ × 6¼ in. Weight: 12 lb. Price: £52 (batteries extra). Mains unit available.

★

M.A.C. ELECTRONIC COMPANY, Villacousta, Portsmouth Road, Ripley, Surrey. Tel.: Ripley 3377.

Audio Adaptor Units, providing input and output connections for tape recorders, etc. Satin chrome front panel measuring 3 by 3 ins, depth 3 ins.

AAU-1. Front panel fitted with 2 DIN sockets, for record/replay. Four 24-in. screened leads fitted with phono plugs.

AAU-4. Audio Adaptor Unit providing stereo connections for tape recorders both internal and external to hi-fi cabinet. Most details as for other units. Full specification on request. Price: £4 7s. 6d.

★

VALRADIO LTD., Browells Lane, Feltham. Middlesex. Tel: 01-890-4837/4242. Service agents: Vibro Supply, 57 Fortess Road, London, N.W.5. Tel: Gulliver 5165.

D.C. converters. Designed for operating tape recorders and similar mains equipment from ship's supply 110V DC and/or 220V DC. Prices from £14 14s. 6d.

Transverter B12/35T. Input 12V DC. Output: 230V 40 c/s at 30W. Suitable for negative or positive earthed input. Built-in switch socket. Supplied complete with input lead. Size: 8 × 2⅝ × 3¼ in. Weight: 4½ lb. Price: £9 16s. 6d.

Transverter B12/120S. Input: 12V DC. Output: 115-230V 50 c/s ±¼ c/s sine wave at 120W. Price: £47 2s.

Transverter B12/200S. Input: 12V DC. Output: 115-230V 50 c/s ±¼ c/s sine wave at 200W. Price: £67 12s.

Resonator X1. Synchroniser for incorporating into S type transverters to provide frequency regulation of better than 0·005%. Price: £35.

DIRECTORY OF MAGNETIC TAPE

AGFA-GEVAERT LTD., 27 Great West Road, Brentford, Middlesex. Tel: 01-560 2131. Cables: Artoveg, Hounslow.

Agfa Magneton PE31. Long Play. 4 in. spool 450 ft 14s.; 4¼ in. spool 600 ft £1; 5 in. spool 900 ft £1 6s.; 5¾ in. spool 1,200 ft £1 13s.; 7 in. spool 1,800 ft £2 7s.; 8¾ in. spool 2,400 ft £3 5s.; 10 in. spool 3,280 ft £4 5s.; 10½ in. spool 4,200 ft £5 7s. 6d.

Agfa Magneton PE31K. As PE31 but supplied in Novodur plastic library boxes. In the following sizes only: 3 in. 8s; 4¼ in. £1 2s. 6d.; 5 in. £1 8s. 6d.; 5¾ in. £1 15s. 6d.; 7 in. £2 9s. 6d.

Agfa Magneton PE31R. As PE31 but supplied in round clear plastic pack. In the following sizes only: 5 in. £1 3s. 6d.; 5¾ in. £1 10s. 6d.; 7 in. £2 4s. 6d.

Agfa Magneton PE41. Double Play. 4 in. spool 600 ft £1 4s.; 4¼ in. spool 900 ft £1 13s.; 5 in. spool 1,200 ft £2; 5¾ in. spool 1,800 ft £2 14s.; 7 in. spool 2,400 ft £3 14s.; 8¾ in. spool 3,280 ft £5 15s.; 10 in. spool 4,600 ft £7.

Agfa Magneton PE41K. As PE41 but supplied in Novodur plastic library cases. In the following sizes only: 3 in. 13s.; 4¼ in. £1 15s. 6d.; 5 in. £2 2s. 6d.; 5¾ in. £2 16s. 6d.; 7 in. £3 16s.

Agfa Magneton PE41R. As PE41 but supplied in round clear plastic pack. In the following sizes only: 5 in. £1 17s. 6d.; 5¾ in. £2 11s. 6d.; 7 in. £3 11s. 6d.

Agfa Magneton PE65. Triple Play. 4 in. spool 900 ft £1 16s.; 4¼ in. spool 1,200 ft £2 5s.; 5 in. spool 1,800 ft £3; 5¾ in. spool 2,400 ft £4; 7 in. spool 3,600 ft £5 5s.

Agfa Magneton PE65K. As PE65 but supplied in Novodur plastic library cases. In the following sizes only: 3 in. £1; 4¼ in. £2 7s. 6d.; 5 in. £3 2s. 6d.; 5¾ in. £4 2s. 6d.; 7 in. £5 7s. 6d.

Agfa Magneton PE65R. As PE65 but supplied in round clear plastic pack. In the following sizes only: 5 in. £2 17s. 6d.; 5¾ in. £4 2s. 6d.; 7 in. £5 7s. 6d.

Agfa Magneton PE31S. Special sound editing tape. 5 in. spool 600 ft. Price: £1 5s.

Agfa Magneton PE31G. Endless tape loop 200 ft. Price: £2 18s.

Agfa Magneton PE41G. Endless tape loop. 300 ft. Price: £3.

Agfa Magneton Compact Cassettes. (Fit Philips type deck). C60 19s. 6d.; C90 £1 7s. 6d.

Agfa Magneton International Cassettes. (DC International System). DC90 £1 9s. 6d.; DC120 £1 12s. 6d.

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BASF UNITED KINGDOM LTD., 5a Gillespie Road, London, N.5. Tel: 01-226 2011.

LGS52. Standard Play. In round pack. 5 in. spool 600 ft 18s. 6d.; 5¾ in. spool 900 ft £1 5s. 6d.; 7 in. spool 1,200 ft £1 12s. 6d.

LGS52. Standard Play. In plastic swivel box. 5 in. spool 600 ft £1 1s.; 5¾ in. spool 900 ft £1 8s.; 7 in. spool 1,200 ft £1 15s.

LGS35. Long Play. In round pack. 3 in. spool 210 ft 7s. 4d.; 4 in. spool 450 ft 12s.; 4¼ in. spool 600 ft 18s. 6d.; 5 in. spool 900 ft £1 5s. 6d.; 5¾ in. spool 1,200 ft £1 12s. 6d.; 7 in. spool 1,800 ft £2 7s. 6d.

LGS35. Long Play. In plastic swivel box. 4 in. spool 450 ft 14s. 6d.; 4¼ in. spool 600 ft £1 1s.; 5 in. spool 900 ft £1 8s.; 5¾ in. spool 1,200 ft £1 15s.; 7 in. spool 1,800 ft £2 10s.

LGS26. Double Play. In round pack. 3 in. spool 13s.; 4 in. spool 600 ft £1 2s. 6d.; 4¼ in. spool 900 ft £1 7s. 6d.; 5 in. spool 1,200 ft £1 19s. 6d.; 5¾ in. spool 1,800 ft £2 12s. 6d.; 7 in. spool 2,400 ft £3 15s.

LGS26. Double Play. In plastic swivel box. 4 in. spool 600 ft £1 5s.; 4¼ in. spool 900 ft £1 10s.; 5 in. spool 1,200 ft £2 2s.; 5¾ in. spool 1,800 ft £2 15s.; 7 in. spool 2,400 ft £3 17s. 6d.

PES18. Triple Play. In round pack. 3 in. spool 450 ft £1 1s.; 3½ in. spool 600 ft £1 9s. 6d.; 4 in. spool 900 ft £1 16s. 6d.; 4¼ in. spool 1,200 ft £2 6s. 6d.; 5 in. spool 1,800 ft £3 3s. 6d.; 5¾ in. spool 2,400 ft £4 7s. 6d.; 7 in. spool 3,600 ft £5 12s. 6d.

PES18. Triple Play. In plastic swivel box. 4 in. spool 900 ft £1 19s.; 4¼ in. spool 1,200 ft £2 9s.; 5 in. spool 1,800 ft £3 6s.; 5¾ in. spool 2,400 ft £4 10s.; 7 in. spool 3,600 ft £5 15s.

PES35.LH. Low-noise high-output tape. 5 in. spool 900 ft. £1 13s.; 5¾ in. spool 1,200 ft £2 1s.; 7 in. spool 1,800 ft £2 18s. 6d.; 8¼ in. spool 2,400 ft £4 5s.; 8¾ in. spool 2,400 ft £5 5s.; 10 in. spool 3,600 ft £5 11s.; 10½ in. spool 4,200 ft £6 5s.

Tape Library box. Holds three tapes in separate swivel-open sections.

With one LGS35 LP tape. 5 in. £1 11s.; 5¾ in. £1 18s. 6d.; 7 in. £2 15s.

With one LGS26 DP tape. 5 in. £2 5s.; 5¾ in. £2 18s. 6d.; 7 in. £4 2s. 6d.

Library boxes without tape. 5 in. 12s. 6d.; 5¾ in. 15s.; 7 in. 17s. 6d.

Compact Cassette (Philips pattern). C60 (30 minutes each track): 19s. 6d.; C90 (45 minutes each track): £1 7s. 6d.; C120 (60 minutes each track): £1 13s. 6d.

Letter Tape. 2¼ in. spool with 150 ft long play tape. Complete with mailing container. Total weight less than 2 oz. Price: 5s. 6d.

BASF Special Tape. A range of standard play, long play and double play tapes in spool sizes from 4 in. to 10½ in. is available for special requirements. Full details and prices on application.

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C.B.S. TAPES. Distributors: Denham and Morley Ltd., Denmore House, 175 Cleveland Street, London, W.1. Tel: 01-387 3656.

CIP Standard Play. Acetate base. 3 in. spool 150 ft 6s. 6d.; 5 in. spool 600 ft £1 1s.; 5¾ in. 900 ft £1 8s.; 7 in. 1,200 ft £1 13s.

CMXP Double Play. Mylar base. 3 in. spool 300 ft 12s. 6d.; 5 in. spool 1,200 ft £1 16s.; 5¾ in. spool 1,800 ft £2 10s.; 7 in. spool 2,400 ft £3 8s.

CMT36 Triple Play. 7 in. spool 3,600 ft £5 5s.

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DE VILLIERS (ELECTRONIC WORLD) LTD., 16-20 Strutton Ground, Westminster, London, S.W.1. Tel: 01-222 5960.

Standard Play. PVC base. 3 in. spool 150 ft 4s. 6d.; 4 in. spool 300 ft 6s. 6d.; 5 in. spool 600 ft 13s.; 5¾ in. spool 900 ft 16s.; 7 in. spool 1,200 ft 19s.

Long Play. Polyester base. 3 in. spool 225 ft 5s. 6d.; 4 in. spool 450 ft 10s. 6d.; 5 in. spool 900 ft 17s. 6d.; 5¾ in. spool 1,200 ft £1 4s.; 7 in. spool 1,800 ft £1 11s.

Double Play. Pre-stressed polyester base. 3 in. spool 375 ft 10s.; 4 in. spool 600 ft 15s.; 5 in. spool 1,200 ft £1 7s.; 5¾ in. spool 1,800 ft £1 15s.; 7 in. spool 2,400 ft £2 5s.

Triple Play. Pre-stressed polyester base. 3 in. spool 500 ft 12s. 6d.; 3¼ in. spool 700 ft 16s.; 4 in. spool 900 ft £1 5s.; 5 in. spool 1,800 ft £1 15s.; 5¾ in. spool 2,400 ft £2 5s.; 7 in. spool 3,600 ft £3 8s. 6d.

An economy range of tapes suitable for recordings which do not need the extended frequency response of the "Electronic World" tapes listed above is offered under the brand name "Manx". These tapes are supplied without leaders or tails.

Manx Standard Play. Polyester base. 5 in. spool 600 ft 8s. 3d.; 5¾ in. spool 900 ft 11s.; 7 in. spool 1,200 ft 14s. 6d.

Manx Long Play. Polyester base. 5 in. spool 900 ft 11s. 6d.; 5¾ in. spool 1,200 ft 14s. 9d.; 7 in. spool 1,800 ft £1 0s. 6d.

Manx Double Play. Pre-stressed polyester. 5 in. spool 1,200 ft 14s. 9d.; 5¾ in. spool 1,800 ft £1 0s. 6d.; 7 in. spool 2,400 ft £1 6s. 6d.

All "Electronic World" and "Manx" tapes are sold by mail order direct from De Villiers Ltd. Packing and postage per order: U.K. 3s., Europe 6s. 6d., Commonwealth 4s. 6d.

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E.M.I. TAPE LTD., Blythe Road, Hayes, Middlesex. Tel: 01-573 3888. Cables: Emitape, London.

"88" Standard Play. PVC base. 3 in. spool 175 ft 7s. 6d.; 3¼ in. spool 175 ft 7s. 6d.; 4 in. spool 300 ft 10s. 6d.; 5 in. spool 600 ft £1 1s.; 5¾ in. spool 900 ft £1 8s.; 7 in. spool 1,200 ft £1 15s.; 8¼ in. spool 1,800 ft £2 17s. 6d.; 10½ in. spool £3 18s. 9d.; 11½ in. spool £3 13s. 6d.

"99" Long Play. PE base. 3 in. spool 210 ft 9s.; 3¼ in. spool 210 ft 9s.; 4 in. spool 450 ft

14s. 6d.; 5 in. spool 900 ft £1 8s.; 5¾ in. spool 1,200 ft £1 15s.; 7 in. spool 1,800 ft £2 10s.; 8¼ in. spool 2,400 ft £3 12s. 6d.; 10½ in. spool £5 10s.

"100" Double Play. Polyester base 3 in. spool 300 ft 14s.; 3½ in. spool 300 ft 14s.; 4 in. spool 600 ft £1 5s.; 5 in. spool 1,200 ft £2 2s.; 5¾ in. spool 1,800 ft £2 15s. 6d.; 7 in. spool 2,400 ft £2 17s. 6d.

"300" Triple Play. Polyester base. 3 in. spool 450 ft £1 2s.; 4 in. spool 900 ft £1 18s.; 5 in. spool 1,800 ft £3 16s.

Emitape Type 60 Cassette. 60 minutes playing time. Designed for use with Philips Compact and similar tape decks. Price: 19s. 6d.

H.M.V. Voice-Letter V2/2. 3 in. lightweight spool in special mailing pack. 40 mins playing time on ¼-track recorder at 3¾ i/s. Price: 5s.

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GEVAERT. See Agfa-Gevaert Ltd.

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GRUNDIG (GREAT BRITAIN) LTD., Newlands Park, London, S.E.26. Tel: 01-778 2211.

GT11. Triple play. 4½ in. spool 1,200 ft £2 7s. 6d.

GL15. Long Play. 5¾ in. spool 1,200 ft £1 15s.

GD15. Double Play. 5¾ in. spool 1,800 ft £2 12s. 6d.

GL18. Long Play. 7 in. spool 1,800 ft £2 15s.

GD18. Double Play. 7 in. spool 2,400 ft £3 17s. 6d.

DC90. Cassette. 90 minutes playing time. £1 9s. 6d.

DC120. Cassette. 120 minutes playing time. £1 12s. 6d.

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ILFORD LTD., 201/3 Wardour Street, London, W.1. Tel: 01-734 8731.

Zonatape. Standard Play. PVC base. 3 in. spool 150 ft 5s. 9d.; 3½ in. spool 175 ft 7s. 6d.; 4 in. spool 300 ft 10s. 6d.; 5 in. spool 600 ft £1 1s.; 5¾ in. spool 900 ft £1 8s.; 7 in. spool 1,200 ft £1 15s.; 8¼ in. spool 1,800 ft £2 17s. 6d.; 10½ in. spool 2,400 ft £3 18s. 6d.

Zonatape. Extra Play. Polyester base. 3 in. spool 225 ft 9s.; 3¼ in. spool 300 ft 12s.; 4 in. spool 450 ft 14s. 6d.; 5 in. spool 900 ft £1 8s.; 5¾ in. spool 1,200 ft £1 15s.; 7 in. spool 1,800 ft £2 10s.; 8¼ in. spool 2,400 ft £3 12s. 6d.; 10½ in. spool 3,600 ft £5 8s.

Zonatape. Double Play. Polyester base. 3 in. spool 300 ft 13s. 6d.; 3½ in. spool 400 ft 17s.; 4 in. spool 600 ft £1 5s.; 5 in. spool 1,200 ft £2 5s.; 5¾ in. spool 1,800 ft £2 17s. 6d.; 7 in. spool 2,400 ft £3 17s. 6d.; 8¼ in. spool 3,600 ft £6.

Zonatape. Triple Play. Polyester base. 3 in. spool 450 ft £1 2s.; 3½ in. spool 600 ft £1 7s. 6d.; 4 in. spool 900 ft £1 19s.; 5 in. spool 1,800 ft £3 6s.; 5¾ in. spool 2,400 ft £4 10s.

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KODAK LTD., Kodak House, Kingsway, London, W.C.2. Tel: 01-405 7841.

T100. Standard play. Triacetate base. 5 in. spool 600 ft 18s.; 5¾ in. spool 900 ft £1 4s. 6d.; 7 in. spool 1,200 £1 10s.

P150. Long play. Pre-stretched polyester base. 3¼ in. spool 300 ft 11s.; 5 in. spool 900 ft £1 8s.; 5¾ in. spool 1,200 ft £1 15s.; 7 in. spool 1,800 ft £2 10s.

P200. Double play. Pre-stretched polyester base. 3½ in. spool 400 ft 17s.; 4 in. spool 600 ft £1 4s. 6d.; 5 in. spool 1,200 ft £2 5s.; 5¾ in. spool 1,650 ft £2 15s.; 7 in. spool 2,400 ft £4.

P300. Triple play. Pre-stretched polyester base. 3 in. spool 450 ft £1 1s. 6d.; 3¼ in. spool 600 ft £1 7s. 6d.; 4 in. spool 900 ft £1 18s. 6d.; 5 in. spool 1,800 ft £3 5s. 6d.; 5¾ in. spool 2,400 ft £4 10s.; 7 in. spool 3,600 ft £5 15s.

P400. Quadruple play. Pre-stretched polyester base. 3 in. spool 600 ft £1 13s. 6d.; 3¾ in. spool 800 ft £2 2s.; 4 in. spool 1,200 ft £2 18s. 6d.

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LEDA TAPES, 30 Baker Street, London, W.1. Tel: 01-935 0441/2.

Standard Play. PVC base. 3 in. spool 150 ft 2s 3d.; 4 in. spool 300 ft 3s 9d.; 5 in. spool 600

ft 8s. 3d.; 5¾ in. spool 900 ft 10s.; 7 in. spool 1,200 ft 12s. 3d.

Long Play. PVC base. 3 in. spool 225 ft 3s.; 4 in. spool 450 ft 5s.; 5 in. spool 900 ft 9s. 9d.; 5¾ in. spool 1,200 ft 12s. 3d.; 7 in. spool 1,800 ft 17s. 3d.

Double Play. Polyester base. 3 in. spool 300 ft 4s. 3d.; 4 in. spool 600 ft 8s. 3d.; 5 in. spool 1,200 ft 15s. 3d.; 5¾ in. spool 1,800 ft 19s. 3d.; 7 in. spool 2,400 ft £1 1s. 9d.

Triple Play. Polyester base. 3 in. spool 600 ft 8s. 9d.; 4 in. spool 900 ft 12s. 6d.; 5 in. spool 1,800 ft £1 2s. 6d.; 5¾ in. spool 2,400 ft £1 8s. 6d.; 7 in. spool 3,600 ft £1 18s. 6d.

Leaders, trailers and stop foils fitted to all tapes of 5 in. and above.

Leda Tapes are supplied direct to users from the above address.

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MAGNETON. See Agfa-Gevaert Ltd.

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MASTERTAPE (MAGNETIC) LTD., Colnbrook, Slough, Bucks. Tel: 0281-22431.

"Master-Stik" leaders are fitted to all Mastertapes except the Mini Voice Letter and Sendamessage tapes.

Standard. 3 in. spool 150 ft 6s.; 4 in. spool 300 ft 10s.; 5 in. spool 600 ft 17s.; 5¾ in. spool 900 ft £1 2s. 6d.; 7 in. spool 1,200 ft £1 11s. 6d.

Long Play. 3 in. spool 225 ft 8s. 6d.; 4 in. spool 450 ft 12s. 6d.; 5 in. spool 900 ft £1 5s.; 5¾ in. spool 1,200 ft £1 11s.; 7 in. spool 1,800 ft £2 2s.; 8¼ in. spool 2,400 ft £3 12s. 6d.

Double Play. 3 in. spool 300 ft 12s. 6d.; 4 in. spool 600 ft £1 1s.; 5 in. spool 1,200 ft £1 19s.; 5¾ in. spool 1,800 ft £2 9s.; 7 in. spool 2,400 ft £3 9s.

Triple Play. 3 in. spool 600 ft £1 2s.; 4 in. spool 900 ft £1 18s. 6d.; 5 in. spool 1,800 ft £3 6s.; 5¾ in. spool 2,400 ft £4 10s.; 7 in. spool 3,600 ft £5 15s.

Mini Voice Letter. 3 in. spool 100 ft standard tape. With box and two labels. 1 oz. Price: 3s. 3d.

Sendamessage. 1¾ in. spool 100 ft triple play tape. Special two-way envelope. Weight: under ½ oz. Price: 3s.

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MINNESOTA MINING AND MANUFACTURING COMPANY LTD., 3M House, Wigmore Street, London, W.1. Tel: 01-486 5522. Cables: Minnesota, London.

Scotch 111. Standard Play. Acetate base 4 in. spool 300 ft 9s.; 5 in. spool 600 ft 18s.; 5¾ in. spool 850 ft £1 4s. 6d.; 7 in. spool 1,200 ft £1 10s.

Scotch 175. Standard Play. Polyester base. 5 in. spool 600 ft £1 1s.; 5¾ in. spool 850 ft £1 8s.; 7 in. spool 1,200 ft £1 15s.

Scotch 215. Long Play. Polyester base. 3 in. 300 ft 9s. 6d.; 4 in. spool 450 ft 14s. 6d.; 5 in. spool 900 ft £1 8s.; 5¾ in. spool 1,200 ft £1 15s.; 7 in. spool 1,800 ft £2 10s., 8¼ in. spool 2,400 ft £3 12s. 6d.

Scotch 220. Double Play. Tensilised polyester base. 3 in. spool 400 ft 16s. 6d.; 4 in. spool 600 ft £1 5s.; 5 in. spool 1,200 ft £2 2s.; 5¾ in. spool 1,800 ft £2 15s. 6d.; 7 in. spool 2,400 ft £3 17s. 6d.

Scotch 290. Triple Play. Tensilised polyester base. 3 in. spool 600 ft £1 4s. 9d.; 4 in. spool 900 ft £1 19s.

Scotch Dynarange 202. Standard Play. Polyester base. 5 in. spool 600 ft £1 4s.; 5¾ in. spool 850 ft £1 12s. 3d.; 7 in. spool 1,200 ft £2 1s.

Scotch Dynarange 203. Long Play. Polyester base. 5 in. spool 900 ft £1 12s. 3d.; 5¾ in. spool 1,200 ft £2 0s. 6d.; 7 in. spool 1,800 ft £2 17s. 6d.; 8¼ in. spool 2,400 ft £4 3s. 6d.

Scotch One-Five Special. Letter tape on 3 in. spool in handy pack ready for posting. Up to 30 minutes. Price: 5s. 3d.

Scotch 271. C-60 Compact cassette with Scotch low noise tape treated with "Superlife". Price: 17s. 6d.

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PHILIPS ELECTRICAL LTD., Electro-acoustics Division, Century House, Shaftesbury Avenue, London, W.C.2. Tel: 01-437 7777. Cables: Phillamps, London.

Audio Letter. 3 in. spool 200 ft standard play

tape. Price: 6s.

Philips Hi-Fidelity Low Noise tapes:

Standard Play (Green). 4 in. spool 300 ft 10s. 6d.; 5 in. spool 600 ft £1 1s.; 5¾ in. spool 900 ft £1 8s.; 7 in. spool 1,200 ft £1 15s.

Long Play (Red). 3 in. spool 210 ft 9s.; 4 in. spool 450 ft 14s. 6d.; 5 in. spool 900 ft £1 8s.; 5¾ in. spool 1,200 ft £1 15s.; 7 in. spool 1,800 ft £2 10s.

Double Play (Blue). 3 in. spool 300 ft 14s.; 4 in. spool 600 ft £1 5s.; 5 in. spool 1,200 ft £2 2s.; 5¾ in. spool 1,800 ft £2 15s. 6d.; 7 in. spool 2,400 ft £3 17s. 6d.

Triple Play (Grey). 3 in. spool 450 ft £1 2s.; 4 in. spool 900 ft £1 19s.; 5 in. spool 1,800 ft £3 6s.

All types of Philips tape on 5 in., 5¾ in. and 7 in. spools packed in free library box.

CE.10 Endless Loop. Approximately 195 ft. Playing time 40 mins at 15/16 i/s. Price: £3 10s.

C.30 Compact Cassette. Playing time ½ hour. Price: 10s. 6d.

C.60 Compact Cassette. Playing time 1 hour. Price: 17s. 6d.

C.90 Compact Cassette. Playing time 1½ hours. Price: £1 5s.

C.120 Compact Cassette. Playing time 2 hours. Price: £1 13s. 6d.

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R.C.A. GREAT BRITAIN LTD., Lincoln Way, Windmill Road, Sunbury-on-Thames, Middlesex. Tel: 0932-7 5511.

Vibrant Series Audio Tape. Standard Play. Acetate base. 5 in. spool 600 ft 15s. 6d.; 5¾ in. spool 900 ft £1; 7 in. spool 1,200 ft £1 4s.

Vibrant Series Audio Tape. Standard Play. Mylar base. 5 in. spool 600 ft £1 5s. 6d.; 5¾ in. spool 900 ft £1 15s.; 7 in. spool 1,200 ft £2 1s.

Vibrant Series Audio Tape. Long Play. Acetate base. 5 in. spool 900 ft 19s.; 7 in. spool 1,800 ft £1 15s. 6d.

Vibrant Series Audio Tape. Long Play. Mylar base. 5 in. spool 900 ft £1 2s.; 5¾ in. spool 1,200 ft £1 11s.; 7 in. spool 1,800 ft £2.

Vibrant Series Audio Tape. Double Play. Tensilised Mylar base. 5 in. spool 1,200 ft £1 15s.; 5¾ in. spool 1,800 ft £2 8s.; 7 in. spool 2,400 ft £3 1s.

Professional low noise tapes in ¼ in., ½ in. and 1 in. widths. Full details and prices on application.

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RECOTAPE. Distributors: Transatlantic Music Tapes Ltd., Bristol and West House, High Street, Salisbury, Wilts. Tel: Salisbury 3888.

Standard Play. Polyester base. 5 in. spool 600 ft 19s.; 5¾ in. spool 900 ft £1 4s.; 7 in. spool 1,200 ft £1 10s.

Long Play. Polyester base. 5 in. spool 900 ft £1 4s.; 5¾ in. spool 1,200 ft £1 10s.; 7 in. spool 1,800 ft £2 2s.

Double Play. Polyester base. 5 in. spool 1,200 ft £1 17s. 6d.; 5¾ in. spool 1,800 ft £2 11s.; 7 in. spool 2,400 ft £3 3s.

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SYNCHROTAPE. Sole distributors: Adastra Electronics Ltd., 167 Finchley Road, Swiss Cottage, London, N.W.3. Tel: 01-624 8164.

Standard Play. PVC base. 3 in. spool 150 ft 4s. 9d.; 5 in. spool 600 ft 15s.; 5¾ in. spool 900 ft 18s. 6d.; 7 in. spool 1,200 ft £1 2s. 6d.

Long Play. PVC base. 2⅜ in. spool 200 ft 5s. 9d.; 3 in. spool 225 ft 6s. 3d.; 4 in. spool 450 ft 12s.; 5 in. spool 900 ft 18s. 6d.; 5¾ in. spool 1,200 ft £1 2s. 6d.; 7 in. spool 1,800 ft £1 8s. 6d.

Double Play. Tensilised polyester base. 2⅜ in. spool 300 ft 8s 9d.; 3 in. spool 300 ft 8s. 9d.; 4 in. spool 600 ft 18s.; 5 in. spool 1,200 ft £1 8s. 6d.; 5¾ in. spool 1,800 ft £1 16s.; 7 in. spool 2,400 ft £2 8s.

Triple Play. Tensilised polyester. 3 in. spool 450 ft 13s. 9d.; 4 in. spool 900 ft £1 7s.; 5 in. spool 1,800 ft £2 5s.; 5¾ in. spool 2,400 ft £2 17s. 6d.; 7 in. spool 3,600 ft £3 15s.

Except for 2⅜ in. and 3 in. spools, all Synchrotape tapes have leader, trailer and double metallic stop-foils.

TAPE 70. Distributors: Leda Tapes, 30 Baker Street, London, W.1. Tel: 01-935 0441/2.

Standard Play. PVC base. 3 in. spool 150 ft 3s. 3d.; 4 in. spool 300 ft 6s. 6d.; 5 in. spool 600 ft 11s. 6d.; 5¾ in. spool 900 ft 14s. 6d.; 7 in. spool 1,200 ft 17s. 6d.

Long Play. PVC base. 3 in. spool 225 ft 4s. 3d.; 4 in. spool 450 ft 7s. 6d.; 5 in. spool 900 ft 14s. 6d.; 5¾ in. spool 1,200 ft 17s. 6d.; 7 in. spool 1,800 ft £1 5s.

Double Play. Polyester base. 3 in. spool 300 ft 6s. 6d.; 4 in. spool 600 ft 12s.; 5 in. spool 1,200 ft £1 2s. 6d.; 5¾ in. spool 1,800 ft £1 9s. 6d.; 7 in. spool 2,400 ft £1 17s. 6d.

Triple Play. Polyester base. 3 in. spool 600 ft 13s.; 4 in. spool 900 ft 17s. 6d.; 5 in. spool 1,800 ft £1 15s.; 5¾ in. spool 2,400 ft £2 8s. 6d.; 7 in. spool 3,600 ft £3 2s. 6d.

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TELEFUNKEN. Distributors: A.E.G. (Great Britain) Ltd., Lonsdale Chambers, 27 Chancery Lane, London, W.C.2. Tel: 01-242 9944. Cables: Allgem, London.

Telefunken. Long Play. PVC base. 5 in. spool 900 ft £1 12s.; 5¾ in. spool 1,200 ft £1 17s. 6d.; 7 in. spool 1,800 ft £2 12s. 6d.

Telefunken. Double Play. PVC base. 5 in. spool 1,200 ft £2 4s.; 5¾ in. spool 1,800 ft £2 17s. 6d.; 7 in. spool 2,400 ft £4.

Telefunken Endless Tape Cassette. Price: £3 7s. 3d.

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TONEMASTER TAPES. Messrs Chart Edge Ltd., 18/21 Jermyn Street, London, S.W.1. Tel: 01-734 1443.

Standard Play. PVC base. 3 in. spool 150 ft 2s. 3d.; 4 in. spool 300 ft 5s.; 5 in. spool 600 ft 6s. 6d.; 5¾ in. spool 900 ft 8s.; 7 in. spool 1,200 ft 9s. 9d.

Long Play. PVC base. 3 in. spool 225 ft 2s. 8d.; 4 in. spool 450 ft 5s. 6d.; 5 in. spool 900 ft 9s. 5¾ in. spool 1,200 ft 11s. 3d.; 7 in. spool 1,800 ft 13s. 9d.

Double Play. Polyester base. 3 in. spool 300 ft 5s.; 4 in. spool 600 ft 7s. 3d.; 5 in. spool 1,200 ft 13s. 3d.; 5¾ in. spool 1,800 ft 17s. 9d.; 7 in. spool 2,400 ft £1 1s. 9d.

Triple Play. Polyester base. 3 in. spool 600 ft 9s. 6d.; 4 in. spool 900 ft 13s.; 5 in. spool 1,800 ft £1 5s.; 5¾ in. spool 2,400 ft £1 15s.; 7 in. spool 3,600 ft £2 5s.

Leaders and stop foils on LP, DP and TP 5 in. to 7 in. All Tonemaster Tapes are British made and supplied sealed in individual boxes. 2s. 9d. postage on orders up to £3; over £3 post free. By-return postal service.

★

ZONATAPE. See Ilford Ltd.

DIRECTORY OF TEST TAPES & DISCS

AMPEX GREAT BRITAIN LTD., Acre Road, Reading, Berkshire. Tel: Reading 84411. Cables: Videotape, Reading.

31334-01. 3¾ i/s, 200 μSec characteristic tape.

31331-01. 3¾ i/s. 120 μSec characteristic tape.

31321-01. 7½ i/s. NAB characteristic tape.

31321-04. 7½ i/s. NAB characteristic tape, for four-track recorders.

31323-01. 7½ i/s. CCIR characteristic tape.

31336-01. 3¾ i/s. flutter test tape.

31326-01. 7½ i/s. flutter test tape.

All these tapes are priced at £10 15s. each.

★

BASF UNITED KINGDOM LTD., 5a Gillespie Road, London, N.5. Tel: 01-226 2011.

Calibration Tape 19. 7½ i/s, 100 μSec characteristic. Azimuth alignment section included, also an unrecorded section for adjustment of bias, etc. Price: £11.

Calibration Tape 9. 3¾ i/s, 120 μSec (high) and 3·180 μSec (low) characteristics. Other details as for Tape 19. Price: £11.

Calibration Tape 38. 15 i/s. 35 μSec. characteristic. Other details as for Tape 19. Price: £11.

★

EMI ELECTRONICS LTD., Installation and Maintenance Division, Hayes, Middlesex. Tel: 01-573 3888. Cables: Emidata, London.

Type TBT.1A. Full track tape, 7½ i/s, 100 μSec. CCIR characteristic. Range 40 Hz-10 KHz. Price: £4.

Type TBT.2A. Full track tape, 3¾ i/s, 120 μSec. CCIR characteristic. Range 40 Hz-8 KHz. Price: £4.

★

EMI RECORDS (The Gramophone Co. Ltd.), EMI House, 20 Manchester Square, London, W.1. Tel: 01-486 4488.

TCS 101. 12 in. stereo (45/45) frequency test disc covering the range 30 Hz to 20 KHz, with fixed bands on alternate left and right channels. Follows RIAA curve, with level reduced by 6 dB above 10 KHz. Both sides identical. Price: £1 17s. 6d.

TCS 102. 12 in. stereo (45/45) frequency test disc covering same range as TCS 101, but with gliding tone. Side A, left channel; side B, right channel. Price: £1 17s. 6d.

TCS 104. 12 in. mono (lateral) frequency test disc covering same range as TCS 101, with fixed bands on one side and gliding tone on the other. Price: £1 17s. 6d.

TCS 105. 12 in. vertical-cut frequency test disc covering same range as TCS 101, with fixed bands on one side and gliding tone on the other. Price: £1 17s. 6d.

POLYDOR RECORDS LTD., 17-19 Stratford Place, London, W.1. Tel: 01-493 7401.

●**EP.101 497.** Extended play test record for setting up stereo equipment. Price: 8s. 3½d. (including PT).

★

TUTCHINGS ELECTRONICS LTD., 14 Rook Hill Road, Friars Cliff, Christchurch, Hants. Tel: Highcliffe 2019.

Test Tape No. 1. Pure tones 40 Hz-10 KHz with voice identification of each band. Recorded to new CCIR 70 μSec characteristic at 7½ i/s. Track 2 carries continuous 7·5 KHz tone for azimuth alignment.

Test Tape No. 2. Pure tones 40 Hz-7·5 KHz with voice identification of each band. Recorded to new CCIR 140 μSec characteristic at 3¾ i/s. Track 1 carries four identical frequency runs. Track 2 is recorded with continuous 5 KHz tone for azimuth alignment.

Test Tape No. 3. White noise, one third octave bands 40 Hz-10 KHz with voice identification of each band. Recorded to new CCIR 70 μSec characteristic at 7½ i/s.

Test Tape No. 4. White noise, one octave bands 100 Hz-6·4 KHz centre frequencies with voice identification of each band. Track 2 carries full range unfiltered white noise. Recorded to new CCIR 70 μSec characteristic at 7½ i/s.

Test Tape No. 5. Azimuth and vertical head alignment tape. Full track unfiltered white noise with track 3 blank. Can be used without test equipment at all tape speeds on two- or four-track recorders.

All tapes on 3 in. spools. Price: £1 10s. each including postage.

Full-track recordings of any single frequency can be supplied with low wow and flutter content at £1 5s. per 3 in. reel.

HI-FI HEADPHONES

AKAI. Distributors: Pullin Photographic Ltd., 11 Aintree Road, Perivale, Greenford, Middlesex. Tel: 01-998 1541. Cables: Pullinfoto, Greenford, Middlesex.

●**Stereo Headphones ASE-9.** Lightweight comfortable headphones specially designed for use with Akai recorders. Price: £6 15s.

●**Electrostatic Headphones AEH-10.** Matching impedance 8 ohms. Maximum input 10W. FR 40 Hz-25 KHz. Price: £20.

★

A.K.G. (Akustische und Kino-Gerate GmbH). Distributors: Politechna (London) Ltd., 182-184 Campden Hill Road, Kensington, London, W.8. Tel: 01-727 0711/3 and 5008.

●**K.20.** Lightweight moving coil headphones. Lightly sprung headband. Comfortable soft earpads. FR 30 Hz-16 KHz. Wired for stereo or mono. Impedance: 75 or 600 ohms. Price: £6.

●**K.50.** Lightweight moving coil headphones. Elastic headband maintains tension. Snug-fitting earpieces. FR 20 Hz-20 KHz. Maximum power 250 mW. Normal power 1 mW. Impedance 75 ohms or 400 ohms. Wired for mono or stereo. Price: £8 5s.

●**K.60.** High quality comfortable moving coil headphones. Double headbands and ear contoured foam earpads. FR 16 Hz-20 KHz. Impedance: 75 ohms or 600 ohms. Wired for mono or stereo. Stereo channels colour coded. Fully adjustable. Price: £13 10s.

★

AMPLIVOX LTD., Beresford Avenue, Wembley, Middlesex. Tel: 01-902 8991. Cables: Amplivox, Wembley.

Amplivox Jetlite. High quality moving coil headphones. FR 50 Hz-15 KHz. Impedance 200 ohms. Wired for mono or stereo. Price on application.

BEYER. Distributed by Fi-Cord International, Charlwoods Road, East Grinstead, Sussex. Tel: East Grinstead 21351.

DT49. Moving coil single headphone. FR 30 Hz-13 KHz. Impedance 15 ohms. Maximum power 0·4W. Moulded handset in black, grey or ivory. Foam rubber earpad. Supplied with 2½ ft lead. Price: (black) £9 13s.; (coloured) £9 19s. 10d.

DT48. Moving coil high quality headphones. FR 16 Hz-18 KHz. Impedance: 5 ohms or 25 ohms. Peak power: 0·2W. 5 ft lead. Available mono or stereo. Suitable for studios, research and hi-fi listening. Price: £31 15s. 11d.

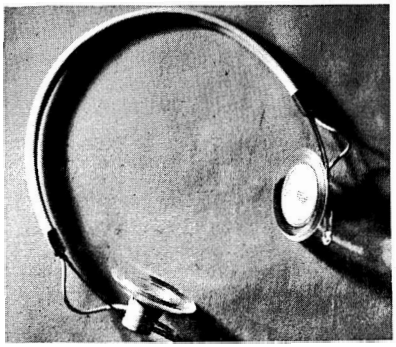
DT48S. Similar electrical specification to DT48. Comfortable headband incorporating head cushion. Circumaural earcups exclude external noise. Recommended for domestic hi-fi listening. Price: £32 11s. 11d.

DT96A. Lightweight moving coil headphones. FR 30 Hz-17 KHz. Impedance: 50 ohms or 400 ohms. Peak power: 100 mW. Plug-in interchangeable cables providing mono and stereo wiring, also series or parallel connections. Cable length: 5 ft. Fully adjustable. Rubber ear muffs and circumaural noise cancelling earpads. Price: £10 3s. 1d.

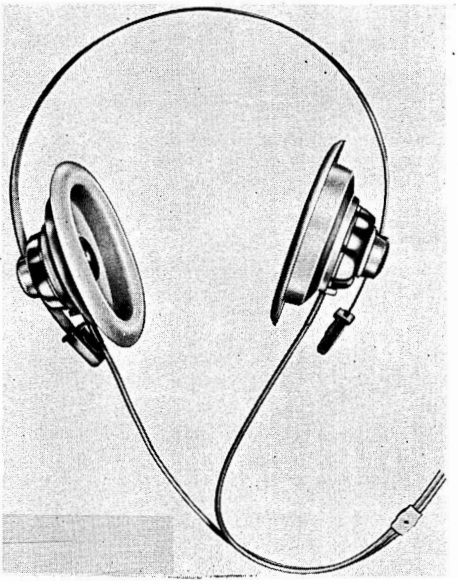
DT96V. Similar to DT96A except fitted with induction loop amplifier. Eliminates trailing cables. Ideal for language laboratories, etc. Detailed information available on request. Price: £21 4s. 2d.

DT98 a/b. Combination high fidelity headphone with noise-cancelling cardioid microphone. Electrical specification of phones as for DT96. Interchangeable plug-in cables. Microphone specification: FR 40 Hz-15 KHz. Impedance 200 ohms. Output: approximately 2 mV. Price: £18 18s.

DT509. Miniature twin moving coil stethoscope headset. FR 20 Hz-12 KHz. Peak power 100 mW. Impedance: 5, 50, 200 or 800 ohms. 5 ft cable. Mono or stereo. Price: £7 1s. 3d.



AKG K50 headphones

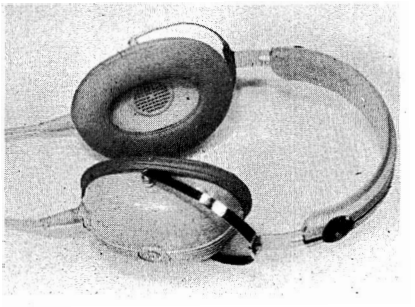


A.K.G. K20

A.K.G. K60

S. G. Brown dynamic headset

Amplivox Jetlite JL26



S.G.Brown HA10A

S. G. BROWN LTD., King George's Avenue, Watford, Herts. Tel: 92-23301. Cables: Radiolink, Watford.

Dynamic 3C1100. High quality moving coil headphones. Response 20 Hz-20 KHz. Price: £6 6s.

Type K. High quality moving coil watch type receivers. Impedance 26 ohms each earpiece. Fully adjustable polished duralumin headband. Swivel earpieces. Sponge rubber earpads. Price: £6 9s.

Super K. As for type K but with plastic-covered headband and plastic noise-excluding earmuffs. Price: £7 3s. 9d.

Diplomat 3C606. Lightweight contemporary-designed mono or stereo headset. Comfortable to wear and with high degree of ambient noise exclusion. Impedance: 22 ohms, 300 ohms or 75K per receiver. Price: £6 10s. 3d.

Type F 3C400. Lightweight, very sensitive, headphones for monitoring low voltage outputs. Impedance: 16 ohms to 12,000 ohms. Price: £3 7s. 2d.

Diplomat Personal Auditorium 3C700. Complete assembly comprising headset and control unit housed in neat zip-topped case. Facilities include independent channel volume control, channel mixing for stereo, selection of input impedance. Case available in black, pigskin or ivory. Price: £12 10s. 6d.

Canada HA10A. High quality moving coil headphones. Standard impedance 8 ohms per receiver. Response 20 Hz-20 KHz. Fitted liquid-seal ear cushions for exclusion of ambient noise. Price: £19 2s.

Canada HA8A. Similar to HA10A but fitted with sponge ear cushions. Price: £10 15s.

★

CORAL. Distributors: Denham and Morley Ltd., Denmore House, 173/5 Cleveland Street, London, W.1. Tel: 01-387 3656.

●**Coral E-102.** Moving coil stereo headphones. Impedance: 16 ohms (matches to 1-30 ohms). Power input: 0·25W. FR over all audible range. Damperless moving coil cone units with flexible surround. Two yards four-core cable with jack plug. Weight: 0·85 lb. Price to be announced.

●**Coral E-103.** Similar specification to E-102 phones but with independent acoustic volume control on each earpiece. Price: £7 17s. 6d.

★

DUODE LTD., Westfield Mills, Broad Lane, Leeds, 13. Tel: Pudsey 77536.

●**Stax S.E.2.** Electrostatic stereo headphones. FR 25 Hz to over 25 KHz. Impedance 8 ohms. Complete with matching unit. Price: £24 10s.

★

EAGLE PRODUCTS. Distributors: B. Adler & Sons (Radio) Ltd., 32a Coptic Street, London, W.C.1. Tel: 01-636 9606/7. Cables: Reldab, London.

S.E.1. Professional Stereo Headphones. FR 25 Hz-14 KHz. 3 in. dynamic speakers. Isolated right and left channels. "Flexifoam" seals. Dual Impedance 15 ohms. Price: £4 15s.

S.E.21. Professional Two-way Stereo Headphones. FR 25 Hz-18 KHz. Each headphone contains $2\frac{1}{2}$ in. LF unit and $\frac{5}{8}$ in. treble unit. Level controls and built-in attenuator to protect ears. Impedance 16 ohms. Stereo cable and plug. Adjustable headband. Foam rubber earpads. Price: £9 9s.

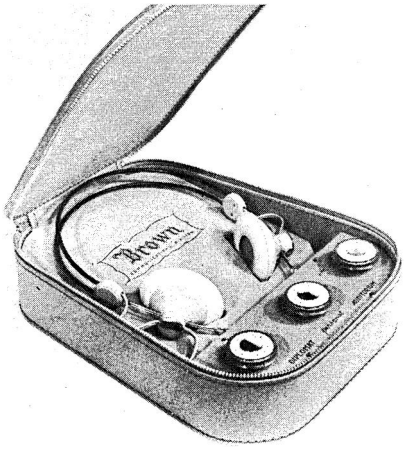
HMA.209. Moving coil headphones with lightweight microphone on boom. Headphones: 16 ohms; FR 20 Hz-14 KHz; max input 200 mW. Microphone: moving coil; 200 ohms; FR 200 Hz-8 KHz. Sensitivity: —75 dB. Separate cords with jack plugs for phones and mic. Price: £9 9s.

★

GRUNDIG (GREAT BRITAIN) LTD., Newlands Park, London, S.E.26. Tel: 01-778 2211.

●**211.** High quality stereo headphones. Fitted with J21 plug for connection to Grundig tape recorders. FR 30 Hz-20 KHz. Distortion factor 1% at 1 mW, 3% at 90 mW. Impedance 400 ohms per system. Supplied with $5\frac{1}{2}$ ft cable. Price: £11 11s.

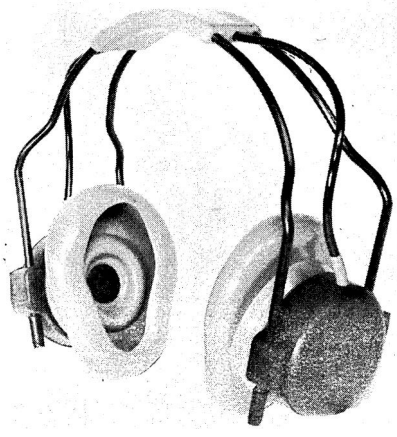
●**220.** High quality stereo headphones. Fitted with $5\frac{1}{2}$ ft of cable and J21 plugs. FR 16 Hz-20 KHz. Distortion factor less than 0·3% at intensities of 120 phon. Fluid-sealed ear covers. Padded headband. Impedance 400 ohms per system. Price: £19 19s.



S.G.Brown Diplomat Auditorium

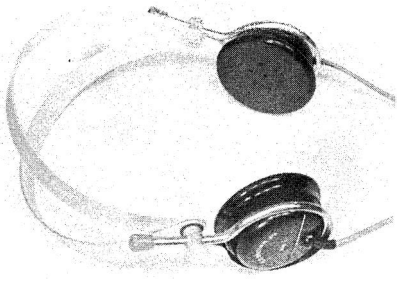
S.G.Brown Diplomat

Eagle SE1 stereo headphone



S.G.Brown Super K

Eagle HMA209



S.G.Brown Type F

KIRKMAN (CRAWLEY) LTD., 40 The Broadway, Crawley, Sussex. Tel: OCY3-26670.

●**Stereo headphone unit.** Supplied in chassis form for mounting on panel or shelf (teak case will be available later). Signal from each channel is delayed and fed to opposite channel to simulate natural stereo. Three-position switch; loudspeakers, headphones, attenuated headphones. Jack sockets for two pairs of phones. Impedance to amplifier 8 ohms resistive. Suitable for headphones 8-600 ohms. Size: $2\frac{5}{8}$ in. wide, $3\frac{1}{4}$ in. high, $10\frac{1}{4}$ in. deep. Price: to be announced.

★

KOSS. Distributors: Tape Music Distributors Ltd., 11 Redvers Road, London, N.21. Tel: 01-888 0152.

●**SP3X.** Stereo headphones. Response 10 Hz-15 KHz. Impedance 4-16 ohms. Moving coil. Sponge foam earpads. Distortion less than 1% at maximum audio output. 8 ft 4-way lead. Weight: 15 oz. Supplied with adaptor plate to facilitate use with mono and stereo systems. Colour: dark brown with beige ear and head cushions. Price: £11 15s.

●**PRO-4.** Professional quality stereo headphones. Response 30 Hz-20 KHz. Impedance 4-50 ohms. Moving coil. Fluid-filled ear cushions. Boom mic attachment. Distortion less than 1% at maximum audio output. 8 ft 4-way lead. Weight: 19 oz. Ear cushions removable for washing. Colour: grey-green cups with green ear cushions. Price: £23.

●**T-5.** Remote control listening station. The T-5 box can be placed in the most convenient spot and separate gain controls for each channel enable balance and volume to be set precisely at the listening position. Switch to cut off speakers and jacks for stereophones. Size: $5\frac{7}{8} \times 3\frac{1}{8} \times 2\frac{7}{8}$ in. Weight: 14 oz. Price: £4 10s.

●**KO-727.** Sensitive stereo headphones. Will accept up to 60W (music) per channel. Suitable for 4, 8 or 16 ohms output. Removable foam-filled ear cushions. Eight-foot coiled cord for added convenience. Distortion $<1\%$ at maximum output. Fully adjustable earpieces. Price: £16 10s.

●**T-1.** Matching unit comprising neat moulded case containing matching transformers for monitoring 600-10,000 ohm outputs. Jacks for two sets of Koss stereophones. Price: £4 10s.

●**EC-20.** Extension cord fitted with stereo jack-plug and socket. Adds 20 ft to the length of normal stereophone lead. Price: £3.

★

MB ELECTRONIC. Distributors: Denham and Morley Ltd., Denmore House, 173/5 Cleveland Street, London, W.1. Tel: 01-387 3656. Cables: Denmorl, London, W.1.

●**K64.** Dynamic headphone for mono or stereo. FR 20 Hz-17 KHz. Impedance 200 ohms. Power requirements 60 mV/system. Weight: 5 oz. Round or oval earpads. Connection: two single screened leads 5 ft 9 in. long. Price: £7 7s.

●**K65.** Dynamic headphone for mono or stereo. Similar specification to K64 but with the addition of boom mounted moving coil mic. K84N. Price: £13 2s. 6d.

●**K85.** Dynamic headphone for mono or stereo. Standard model 200 ohms. Other impedances available 50, 100, 700 and 1,500 ohms. FR 20 Hz-17 KHz. Power requirements 60 mV/system. Weight: 5 oz. Round or oval earpads. Price: £14 14s.

MB-K600. High quality studio type moving coil headphones. Price: £22 1s.

★

PEARL. Distributors: C. E. Hammond & Co. Ltd., 90 High Street, Eton, Windsor, Berks. Tel: Windsor 63388. Telex: 84316.

●**D42.** High quality moving coil headphones. Steel headband coated with grey plastic. Soft washable rubber earpads. Supplied with $6\frac{1}{2}$ ft cable. Wired for stereo and mono. FR 30 Hz-20 KHz. Impedance (per earphone) 200 ohms. Normal listening power: 0·3 mW. Weight: $6\frac{1}{2}$ oz. Price: £8 2s.

★

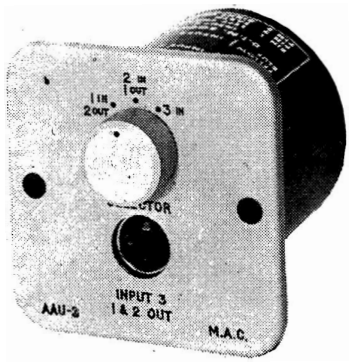
PHILIPS ELECTRICAL LTD., Century House, Shaftesbury Avenue, London, W.C.2. Tel: 01-437 7777. Cables: Phillamps, London.

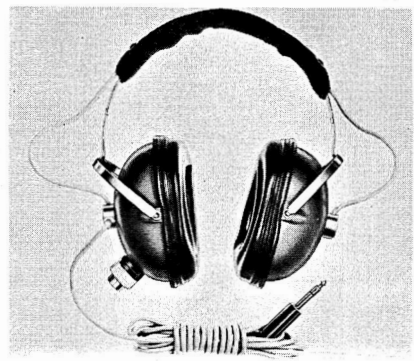
EL3775/85. Mono headphones. FR 300-3,000 Hz. Sensitivity: 30 mW at 1 KHz. Impedance: 1,000 ohms. Price: £3 12s. 6d.

●**EL3775/38.** Stereo version of EL3775/85. Price: £5 15s.

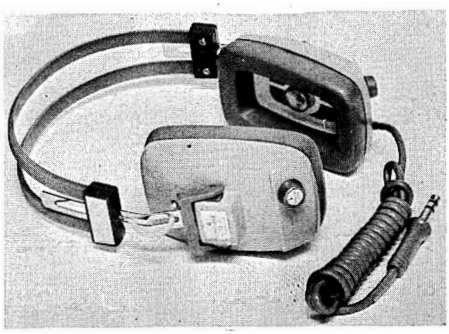
M.A.C. AAU- Hi-Fi unit

Koss SP3X stereo phones

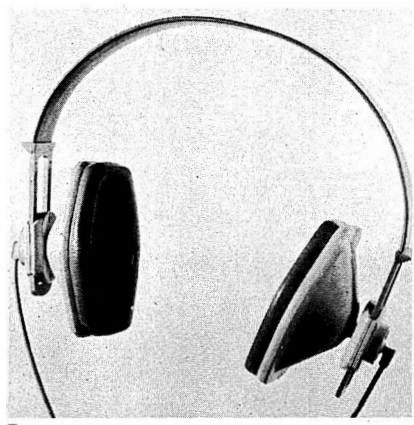




Koss PRO-4 stereo phones



Pioneer SE-21 P headphones



Sennheiser HD.110

M.A.C. ELECTRONIC COMPANY, Villacousta, Portsmouth Road, Ripley, Surrey. Tel.: Ripley 3377.

AAU-TV Provides a ready means of connecting various items of Hi-Fi equipment to a Television Receiver with complete safety. Built-in Isolating Transformer, tapped 3-8-15 ohms, for matching external speaker. Switchable output attenuator for matching input of amplifier or tape recorder. Switching circuit enables the TV speaker to be switched on or off as required. Unit housed in a Solid Teak Case. Price 7 guineas.

AAU-2. Audio adaptor unit with three-way switch and socket for headphones. Screw connections for two main speakers and two extension speakers. Satin chrome facia. Switch gives: main speakers only, extension speakers and phones, main and extension speakers. Colour coded four-way connecting cable. Easy-mounting as for AAU-1. Price: £3 19s. 6d.

★

PIONEER. Distributors: Swisstone Ltd., 48a Station Road, Cobham, Surrey. Tel: Cobham 2853 and 4214.

SE-30. Moving coil stereo headphones. Matching impedance 4-16 ohms. FR 20 Hz-20 KHz. HC 0·5W per earpiece. Acoustically designed casing to improve bass response. Soft circumaural earpads. Easily cleaned. Adjustable headband. Wired for stereo with 8 ft. cable. Weight: 13½ oz. Price on request.

★

SANSUI. Sole UK importer: Technical Ceramics Ltd., Thorn Hill Southampton. Tel: 0703-48055. Distributors for Scotland, North and Midlands: Audio Distributors, 4 Lion Street Kidderminster. Tel: 0562-3293.

Sansui SS2. High quality stereo headphones. Full specification and price on request.

★

SENNHEISER ELECTRONICS. Distributors: Audio Engineering Ltd., 33 Endell Street, London, W.C.2. Tel: 01-836 0033.

HD.110 Stereo Headphones. Wired for mono and stereo. Robust design. Removable washable ear cushions. Easily replaceable cable. FR 20 Hz-20 KHz. Impedance: 200 ohms ±15% per earpiece. Output: 1 mW per capsule produces 98 dB (16 μbar) at 1 KHz. Maximum output: 120 dB (200 μbar) for 1% distortion. Weight: 258 gms. Price: £23 2s. 6d.

SHURE ELECTRONICS LTD., 84 Blackfriars Road, London, S.E.1. Tel: 01-928 6361.

Jensen HS2 headset. High quality headset. Fully adjustable. Wired for stereo or mono. Full details on request. Price: £14 14s.

★

STC LTD., Acoustic Sub-Division, West Road, Harlow, Essex. Tel: Harlow 26811.

Stereo Headset. FR 30 Hz-15 KHz ±4 dB. Sensitivity 1 dyne/volt + 50 dB. Impedance 300 ohms. Foam rubber earpads. Price: £7 7s.

★

TELEX. Distributors: Transatlantic Music Tapes Ltd., 36 High Street, Salisbury, Wilts. Tel: 0722 3888.

Combo. Stereo headphones with 3½ in. earpieces. Moving coil. Wide foam-padded headband. Fully adjustable. Vinyl ear cushions. FR 10 Hz-12 KHz. Impedance 3-16 ohms. Maximum input 8W. Distortion less than 1%. Weight: 12 oz. Price: £11 10s.

Adjustatone. Similar to Combo but with fixed foam cushions and "forward sound" feature to simulate concert hall listening. Price: £8 15s.

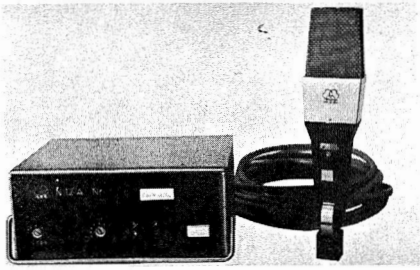
ST20. Stereo headphones. FR 16 Hz-15 KHz. Impedance 3-16 ohms. Maximum input 2W. Distortion less than 2%. Weight: 12 oz. Price: £16 10s.

Serenata. High quality stereo headphones with exclusive features. Moving coil. Electronic tone control built-in. Adjustable pressure. Liquid-filled ear cushions. Coiled cord. Extra long cable. FR: 20 Hz-20 KHz. Impedance 3-16 ohms or 600 ohms. Maximum input 2W. Distortion less than 0·2%. Weight: 16 oz. Carrying caddy included. Price: £27 10s.

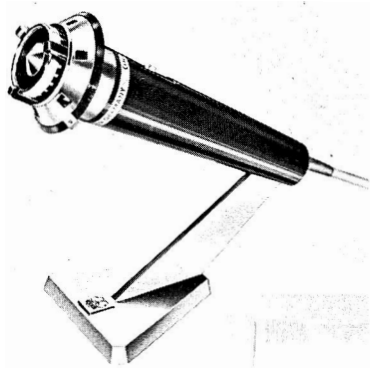
★

WYNDSOR RECORDING CO. LTD. (inc. Magnetic Recording Co.), Wyndsor Works, 2 Bellevue Road, Friern Barnet, London, N.11. Tel: 01-368 2226/7. Cables: Wyndreco, London.

Headphones WB/10. High impedance headphones designed for use with the Wyndsor Vanguard but equally suitable for monitoring with other makes and models of recorder. Supplied complete with lead and jack plug. Price: £3 10s.

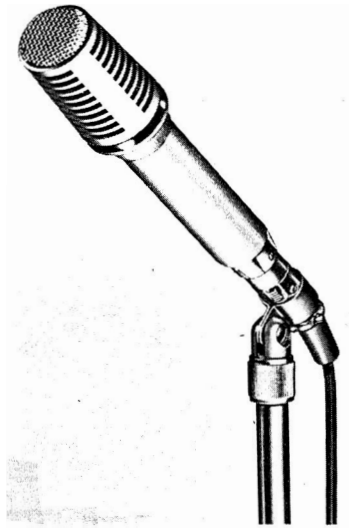


AKG C12A professional condenser

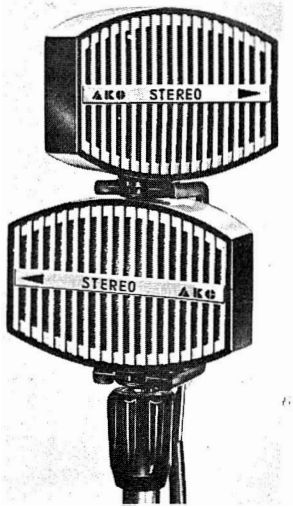


A.K.G. D11D-HL

AKG D119CS cardioid dynamic



AKG D200E



AKG D66 stereo moving coil

AKG D109

AKG D202 moving coil

DIRECTORY OF MICROPHONES

A.K.G. (Akustiche und Kino-Gerate GmbH.). Distributors: Politechna (London) Ltd., 182-184 Campden Hill Road, Kensington, London, W.8. Tel: 01-727 0711/3 and 5008.

C12A. Professional condenser microphone. Variable polar diagram covering cardioid, omni, figure-of-eight and six intermediate positions. FR 10 Hz-20 KHz. Sensitivity −68 dB. Impedance 50 and 200 ohms. Rec load >150 and 500 ohms. Fitting: $\frac{3}{8}$ in. Whit, $\frac{1}{2}$ in. 26 tpi, $\frac{5}{8}$ in. 27 tpi. Metal case finished matt silver. Price: £130.

●**C24.** Stereo condenser. Sensitivity 1 mV/bar. Imp 200 or 500 ohms. Response 30 Hz-20 KHz. Omni-directional cardioid; bi-directional, hyper-cardioid. Plus 5 intermediate patterns. Sensitivity approx 1 mV per microbar (at 200 ohms output terminals) −33 dB re 1 milliwatt at a sound pressure of 10 dynes/cms. Crosstalk between channels <40 dB throughout entire range. Imp <200 ohms when delivered. 50 ohms by changing solder connections. N.24 power supply unit. Remote control unit. Twin remote control cable. Price: £250.

C28C. Condenser studio. Cardioid or omni-directional. Response 30 Hz-30 KHz. Sensitivity (with CK28 cardioid capsule) −58 dB (with CK26 omni-capsule), −60 dB. Imp 50 ohms or 200 ohms, from built-in transformer. Low noise, professional standards. Variations C29C, C30C. Price (including N28A power unit, 22 yds microphone cable, 2 yds power cable, and wood carrying case): C28C £106; C30C £133; C28/29/30C £144.

C61. Cardioid or omni condenser microphone. FR 20 Hz-18 KHz ±2·5 dB. Sensitivity −64 dB. Impedance 50 and 200 ohms. Rec load ≥150 and 500 ohms. Stand fitting: $\frac{3}{8}$ in. Whit, $\frac{1}{2}$ in. 26 tpi, $\frac{5}{8}$ in. 27 tpi. Supplied with stabilised power supply, 22 yds microphone cable, 2 yds power cable. Metal case finished matt silver. Price: £85.

D11D-HL. Moving coil cardioid microphone. Incorporates adaptor to change polar response from cardioid to super- and hyper-cardioid. FR 80 Hz-15 KHz. Front-to-back ratio: 16 dB. Impedance: 500 ohms or 50K. Sensitivity: 72·5 dB at 500 ohms, 54 dB at 50K. Price: £7 15s.

D12. Moving coil with cardioid directional pattern. Response 40 Hz-12 KHz ±4 dB. Front to back ratio 15 dB. Sensitivity −77 dB. Imp 60 ohms, or to order. Price: £30.

D14. Dynamic cardioid microphone. Imp 60-40,000 ohms. Response 50 Hz-15 KHz. On/off switch swivel joint fits all stand threads. Supplied with $5\frac{1}{2}$ yds two-core screened lead. Weight: 8 oz. Price: £10 15s.

D19C. Moving coil with cardioid directional pattern and bass cut switch. Response: 40 Hz-16 KHz. 16 Kc/s. Impedance: 60 or 200 ohms. Price: £18.

D19E. Moving coil with cardioid directional pattern. Response 40 Hz-16 KHz. Built-in transformer provides 3 different impedances: 50, 200 ohms, 50K. Price: £22 10s.

D58. Moving coil, close-talk microphone. Response 50 Hz-12 KHz. Sensitivity 0·1 mV/bar. Imp 60 or 200 ohms. Price: £11 15s.

●**D66.** Stereo moving coil. Cardioid diagram. FR 50 Hz-15 KHz ±4 dB. Sensitivity −73 dB. Impedance 200 ohms. Rec load ≥400 ohms. Stand fitting $\frac{3}{8}$ in. Whit. Supplied with two desk stands. Microphones can be detached and used separately. Moulded cases. Price (complete with stands): £12 15s.

D109. Omni-directional moving coil. FR 50 Hz-15 KHz ±3·5 dB. Sensitivity −98 dB. Impedance: 60 and 200 ohms. Rec load ≥400 ohms. Hand and lavalier type. Supplied with lavalier cord. Higher frequencies boosted when lavalier attached. Metal case nickel plated. Price: £12.

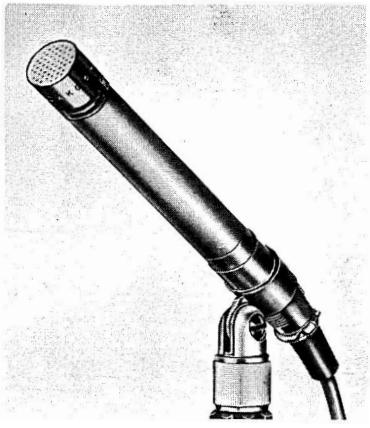
D119CS. Dynamic cardioid microphone. "Sophisticated" version of D19C. Black finish with chrome stripes. Higher sensitivity. On/off switch. Imp 200 ohms. Response 40 Hz-16 KHz. Front-to-back ratio better than 15 dB at 180 degrees sound incidence at KHz. Price: £22.

D119ES. Same specification as D119CS but with built-in transformer for 60-200 ohms and high impedance. Sand blast finish. Price: £26.

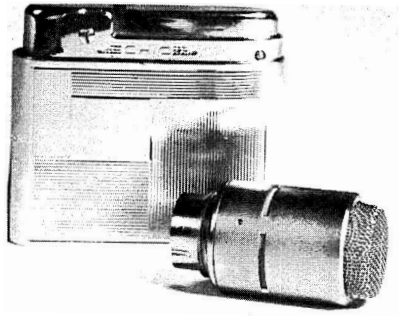
DX11A. Dynamic cardioid microphone with built-in reverberation unit (Echo microphone). Reverb effect can be controlled during pick up

AKG D19E moving coil

A.K.G. D1000C



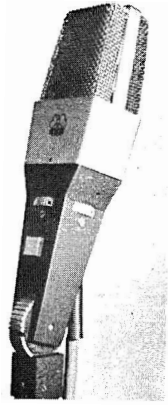
AKG C61 condenser



AKG D58 moving coil

AKG D501 cardioid moving coil

AKG D14 cardioid



AKG C124

from 0 to 2½ seconds. Connects to low and high impedance amplifiers. 9V Ever Ready battery recommended for built-in amplifier. Supplied with 5½ yds three-core cable. Weight: 14 oz. Price: £30 10s.

D202ES. Moving coil microphone with marked cardioid response (−20 dB minimum). FR 30 Hz-15 KHz ±2 dB. Sensitivity −53 dB. Impedance 200 ohms. Rec load ≥400 ohms. Stand fitting swivel adaptor, ⅜ in. Whit, ½ in. 26 tpi, ⅝ in. 27 tpi. On-off switch and variable bass control providing 0 to −20 dB at 50 Hz. Strong black metal case with sintered bronze grille. Price: £32.

D501. Moving coil cardioid and omni-directional microphone. FR Hz-15 KHz ±3·5 dB. Sensitivity −73 dB. Impedance 60 or 200 ohms. Rec load. ≥400 ohms. Hand or stand type. Fitting: ⅜ in. Whit, ½ in. 26 tpi, ⅝ in. 27 tpi. Omni/cardioid switch. Remote control switch. Built-in windshield. Quick release adaptor. Leatherette carrying bag. Moulded case with metal grille. Price: £13 10s.

D503. Moving coil cardioid stand microphones. FR 50 Hz-15 KHz ±3·5 dB. Sensitivity −73 dB. Impedance: 200 ohms or 60 ohms. Rec load ≥400 ohms. Fitting: ⅜ in. Whit, ½ in. 26 tpi, ⅝ in. 27 tpi. Supplied with attached flexible shaft. Moulded case with metal grille. Price: £16.

D505. Moving coil omni-directional hand microphone. FR 50 Hz-15 KHz ±3·5 dB. Sensitivity −74 dB. Impedance: 200 ohms. Rec load ≥300 ohms. Fitting: ⅜ in. Whit, ½ in. 26 tpi, ⅝ in. 27 tpi. Remote control switch. Anti-noise. Quick release adaptor. Moulded case with metal grille. Price: £13 10s.

D507. Moving coil omni-directional stand microphone. FR 50 Hz-15 KHz ±3·5 dB. Sensitivity −74 dB. Impedance: 200 ohms. Rec load ≥300 ohms. Fitting as for D505. Anti-noise. Supplied with attached flexible shaft. Moulded case with metal grille. Price: £16.

ST200. Microphone floor stand. Telescopic. Height: 42 to 77 in. Three collapsible feet with main support locking device. Anti-vibration characteristics. Microphone may be clamped to face any direction. Price: £15.

K58 Microphone headset. Incorporates microphone D58 and headset K50 (see Headphone Section). Price: £14 10s.

D200C. Two-system cardioid microphone. Incorporates two moving coils, one covering the low and the other the high frequencies. FR 40 Hz-16 KHz. Sensitivity 0·16 mV/microbar. Imp 200 ohms. Price: £23.

D.202E1. Similar specification to D.202ES except it is supplied without on/off switch and has three-position bass attenuation step switch (0, −7 dB and −20 dB) instead of potentiometer. Individually calibrated frequency response curve supplied with each microphone. Price: £37 10s.

D.1000. Moving coil cardioid microphone with three-position switch giving three different sounds. Developed especially for electronic musicians where feedback is important. Impedance 60 or 200 ohms. FR: position 1, 40 Hz-16 KHz; position 2, 70 Hz-16 KHz; position 3, 100 Hz-16 KHz. Front-to-back ratio: 20 dB. Sensitivity: −78 dB at 60 ohms, −72 dB at 200 ohms. Various finishes offered including studio grey and 24 carat gold. For high impedance inputs a lead with line transformer is available. Sensitivity at high impedance: −50 dB. Price: from £29 according to requirements.

★

AMPLIVOX LTD., Beresford Avenue, Wembley, Middlesex. Tel: 01-902 8991. Cables: Amplivox, Wembley.

Amplivox Elite. Hand or stand pencil type moving coil microphone. Omni-directional. FR 50 Hz-15 KHz ±5 dB. Sensitivity −82 dB. Imp 400 ohms. Rec load 400 ohms or higher. Clip-on stand. Light grey moulded case. Available without switch or with various switching arrangements. Prices on application.

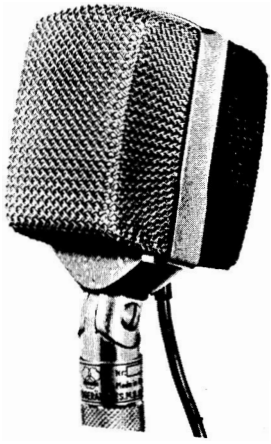
★

BANG & OLUFSEN U.K. DIVISION, Eastbrook Road, Gloucester. Tel: 0452 21591.

MD8. Moving-coil omni-directional. FR 50 Hz-17 KHz ±5 dB. Sensitivity: 80 dB below 1V/microbar. Imp 200 ohms at 1 KHz. Supplied with desk stand and lavalier cord. Can be used as hand microphone. Price: £9 9s.

BM6. Pressure gradient ribbon microphone. Figure-of-eight. Three-position switch for speech, music and off. Impedance 180 ohms. FR 30 Hz-13 KHz ±2·5 dB. Size: 7 in. high, 1 in. diameter. Price: £13 2s. 6d.

AKG D503 moving coil cardioid

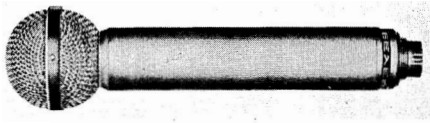


AKG D12 moving coil

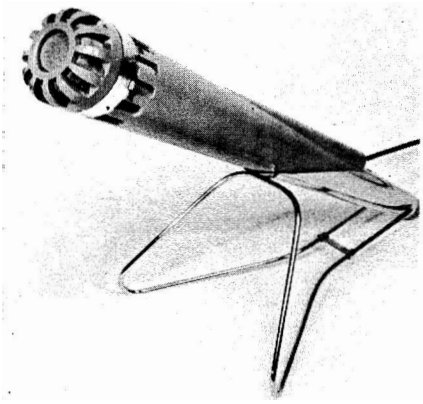
Amplivox Elite with switch

Bouyer cardioid moving coil

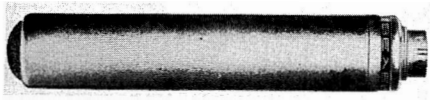
AKG C24 stereo



Beyer M160 double ribbon



S. G. Brown dual-function



Beyer M100 moving coil

Beyer M260 ribbon

BM7. Adding the BM7 microphone converts the BM6 to a BM5 mono/stereo microphone. Records in both MS and A-B method. Size: 10½ in. high, 1 in. diameter. Price: £11 0s. 6d.

●**BM5.** Stereo microphone comprising BM6 and BM7. FR 30 Hz-13 KHz ±2·5 dB. Imp 200 ohms per channel. Price: £23 2s.

★

BEYER. Distributors: Fi-Cord International, Charlwoods Road, East Grinstead, Sussex. Tel: East Grinstead 21351.

M.23. Dynamic microphone. Directional. 200 ohms. Price: £8 18s. 3d.

M.64. Dynamic microphone. Directional. 37·5 and 200 ohms. Price: £10 6s. 11d.

M.64SH. Dynamic microphone. Directional. 37·5 and 200 ohms. Price: £14 6s. 8d.

M.67. Dynamic microphone. Directional. 200 ohms. Price: £29 5s. 9d.

M.68. Dynamic microphone. Directional. (M.64 with SH128 gooseneck). Price: £15 18s. 5d.

M.69. Dynamic microphone. Directional. 37·5 and 200 ohms. Price: £23 12s. 1d.

M.88. Dynamic microphone. Directional. 37·5 and 200 ohms. Price: £57 9s. 5d.

M.100. Dynamic microphone. Omni-directional. 37·5 and 200 ohms. Price: £57 4s. 8d.

M.119. Dynamic microphone. Omni-directional. 200 ohms. Price: £15 2s. 5d.

M.130. Dynamic ribbon microphone. Figure-of-eight pattern. 200 ohms. Price: £58 18s. 4d.

M.160. Dynamic double ribbon. Directional. 37·5 and 200 ohms. Price: £67 13s. 4d.

M.260. Dynamic single ribbon. Directional. 37·5 and 200 ohms. Price: £24 12s. 6d.

M.320. Dynamic ribbon. Directional. 200 ohms. Price: £29 13s. 1d.

M.360. Dynamic ribbon. Directional. 200 ohms. Price: £88 7s. 1d.

M.610. Dynamic microphone. Directional. 37·5 and 200 ohms. Price: £21 0s. 6d.

Soundstar XI Version N. Moving coil. Directional. 200 ohms. Price: £19 18s.

Soundstar XI Version HLM. Moving coil. Directional. Impedance selector switch: 200 ohms, 500 ohms, 25K. Price: £23 1s. 11d.

M.55HL. Dynamic microphone with lead. Omni-directional. 200 ohms and 80K. Price: £8 18s. 4d.

M.57. Dynamic microphone with lead. Hand microphone. 200 ohms. Price: £12 5s. 3d.

M.57V. Dynamic microphone. Directional. Built-in amplifier. 200 ohms. Price (including lead): £15 18s. 6d.

M.80HL. Dynamic microphone with lead. Directional. 200 ohms and 80K. Price: £11 6s. 2d.

M.110. Dynamic microphone with lead. Directional. Lavalier type. 200 ohms. Price: £25 3s.

M.410. Dynamic microphone with lead. Directional. Supplied with MVK N(T) lead. 200 ohms. Price: £17 9s. 9d.

M.410S. Dynamic microphone. Directional. Supplied with MVK N(T) lead and on/off switch. 200 ohms. Price: £18 5s. 6d.

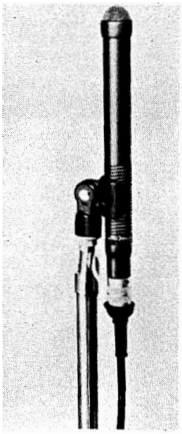
M.410SRL. Dynamic microphone with lead. Directional. Switch for relay. 200 ohms. Price: £15 2s. 5d.

●**M.808HL.** Dynamic microphone with lead. Directional. Stereo system. 200 ohms and 50K. Price: £22 18s. 7d.

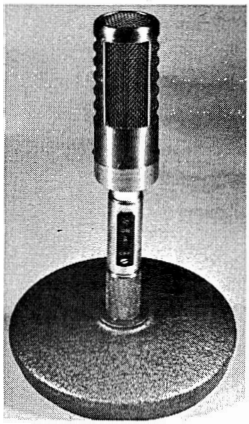
M.808-500. Dynamic microphone. Directional. Designed for tape recorders with transistor input. 500 ohms. Price: £21 9s. 10d.

Microphone Stands. ST260 table stand. Price: £2 10s. 10d.; ST201/1 standard adjustable. Price: £7 0s. 3d.; ST201A/1 heavy duty. Price: £8 9s. 2d.; ST199 portable, telescopic. Price: £5 17s. 7d. SCH211 boom arm. Price: £4 9s. 6d. SH126 gooseneck, 8¼ in. lightweight with plug. Price: £4 18s. 1d. SH127 gooseneck, 16 in. heavy duty with plug. Price: £6 19s. 6d. KV24 adaptor clamp. Price: 8s. 1d. KV24 adaptor clamp, spring-loaded. Price: 19s. 2d.

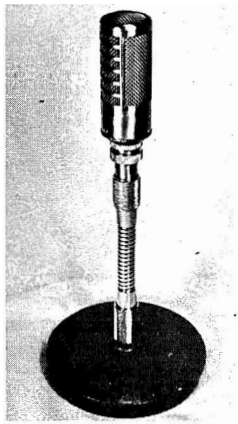
Wide range of microphone leads from 4½ ft to 30 ft. With plugs and built-in line transformers. Full details on request.



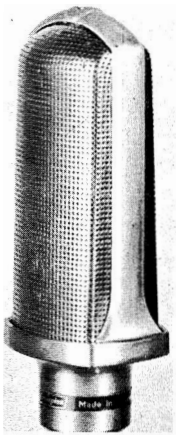
Electro-Voice 655C



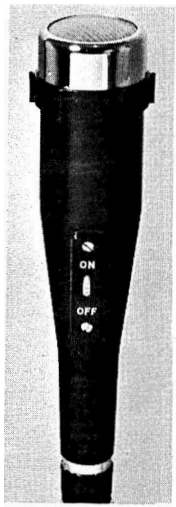
Film Industries M8S ribbon on S.6 desk stand



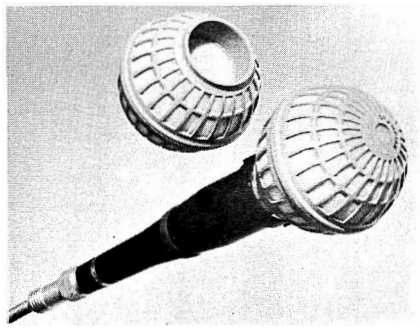
Film Industries M8 ribbon on S.6 desk stand



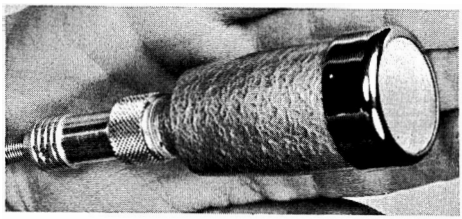
Grampian GR2 ribbon



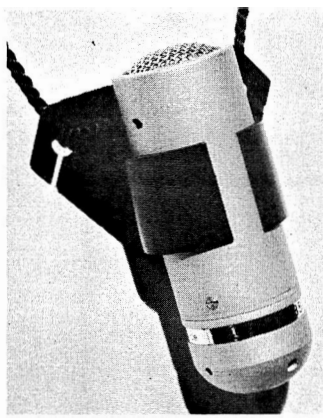
Grampian DP8



Grampian DP4 and windshield



Grampian DP6



Lem DO35 moving coil

BOUYER. Distributors: Douglas A. Lyons and Associates Ltd., 32 Grenville Court, Dulwich, London, S.E.19. Tel: 01-670 2833. Daliona, London, S.E.19.

709. Moving coil microphone with marked cardioid response. Rear to front attenuation 20 dB. FR 150 Hz-14 KHz ±3 dB. Sensitivity −63 dB reference 1V/dyne/cm². Impedance 20 ohms. Rec load 20-150 ohms. Robust construction. Stand fitting with flexible stem. Hand grip available. Price: (cardioid head) £12 10s. Fittings extra as required.

710. Similar to 709 but with extended bass response and super cardioid response pattern. Suitable for close-talking applications. Impedance 200 ohms. Price: (cardioid head) £25 10s. Fittings extra as required.

★

S. G. BROWN LTD., King George's Avenue, Watford, Herts. Tel: 92-23301. Cables: Radiolink, Watford.

Dual Function (IC.600/1). Stick type dynamic microphone suitable for hand or stand use. Operation of a shutter mechanism changes characteristic from a conventional pressure-operated configuration to differential operation. This renders the microphone sensitive only to sounds originating close to it. Designed to deal with all types of programme situation. Directional pattern figure-of-eight. Response: 50 Hz-12 KHz. Output: 0·6 mV. Impedance 150K. Price: £6 6s.

★

FI-CORD INTERNATIONAL, Charlwoods Road, East Grinstead, Sussex. Tel: East Grinstead 21351. Telex: 95120.

FC600. Omni-directional condenser microphone. FR 40 Hz-16 KHz ±3 dB. Sensitivity −56·5 dB. Imp. 200 ohms maximum. Rec load imp 500 ohms minimum. Stick type, hand or stand. Adaptors for all threads. Bright nickel case. Price: £20 3s.

FC650. Condenser microphone with similar specification to FC600 but with cardioid response. Price: £26 16s.

FC700. Omni-directional condenser microphone. FR 40 Hz-16 KHz ±3 dB. Sensitivity −56·5 dB. Imp 200 ohms maximum. Rec load imp 500 ohms minimum. Stick type, hand or stand. Adaptors for all threads. Bright nickel case. Price: £30.

FC750. Condenser microphone with similar specification to FC700 but with cardioid response. Price: £32 3s.

FC800. Omni-directional condenser microphone. FR 30 Hz-18 KHz ±2 dB. Sensitivity −74 dB. Imp 50 and 10 ohms. Rec load imp 200 or 50 ohms. Stick type, hand or stand. Adaptors for threads. Windshield available. Bright nickel case. Price: £38 12s.

FC850. Condenser microphone with similar specification to FC800 but with cardioid response. Price: £42 18s.

FC900. Omni-directional condenser microphone. FR 30 Hz-18 KHz ±2 dB. Sensitivity −62 dB. Imp 50 ohms. Rec load imp 200 ohms. Stick type, hand or stand. Adaptors for all threads. Windshield available. Bright nickel case. Price: £51 9s.

FC950. Condenser microphone with similar specification to FC900 but with cardioid response. Price: £55 15s.

FC1200. Condenser microphone with changeable capsules giving omni-directional or cardioid response. FR 30 Hz-18 KHz ±2 dB. Sensitivity −56·5 dB. Imp 60/6 ohms. Rec load imp 300/30 ohms. Stick type, hand or stand. Windshield. Price: £40 15s.

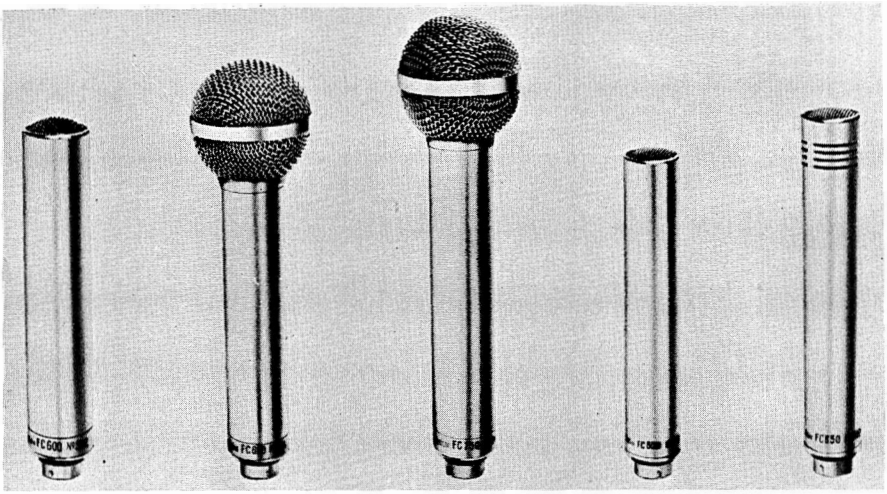
FC1200A. Cardioid condenser microphone. FR 40 Hz-16 KHz ±3 dB. Sensitivity −56·5 dB. Imp 60/6 ohms. Rec load imp 300 or 30 ohms. Stick type, hand or stand. Windshield. Price: £36 9s.

★

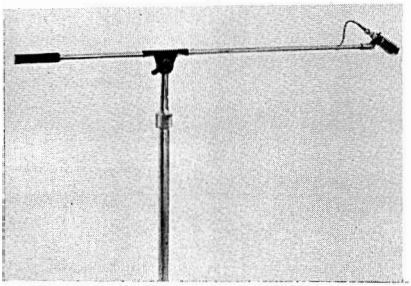
FILM INDUSTRIES LTD., Station Avenue, Kew Gardens, Surrey. Tel: 01-940 8078.

M7. Moving coil. Response: 60 Hz-9 KHz. Imp 20 ohms. 12 ft twin screened cable standard, other lengths if required. Table, desk and floor stands available. Price: £8 15s. (with on/off switch): £10 7s. 6d.

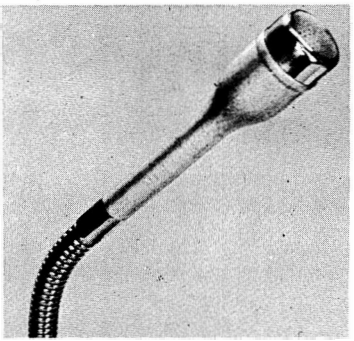
M8. Ribbon. Response: 50 Hz-13 KHz. Figure-of-eight polar diagram. Available matched to all impedances up to 57K. Plug and socket joint between microphone head and flexible. Fitted with 12 ft screened cable, other lengths to order. Table, desk and floor stands available. Price (all impedances): £9 9s. (with on/off switch): £11 11s.



Fi-Cord condenser mics

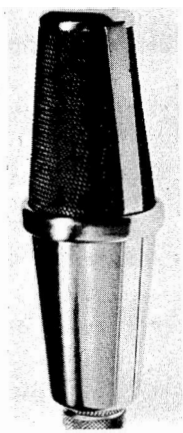


Grampian boom arm

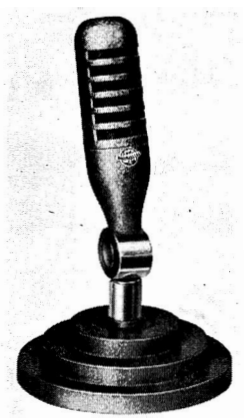


Lustraphone LFV/59 moving coil

Grampian cardioid



Lustraphone LD/66
moving coil



Lustraphone VR64

M8A. Ribbon. Similar unit to M8 but without plug and socket connection between head and flexible. Small detachable desk stand provided. Other stands available. Available in all impedances up to 57K. Price: £9 (with on/off switch): £10 12s. 6d.

M8S. Ribbon. Similar unit to M8 but with angled base in place of flexible. Small detachable desk stand provided. Other stands are available. Available in all impedances up to 57K. Price: £8 15s. (with on/off switch): £10 7s. 6d.

Microphone stands. Desk, table and floor stands. Grey hammer finish with cast iron bases. Stems in satin chrome. Prices from £1 5s.

Matching transformer. In mu-metal screened case for fitting into microphone lead. Impedance ratio: 30 ohms to 60K. Price: £3 10s.

Microphone switch assembly. Suitable for use with M7 and M8 microphones. Price on request.

★

GRAMPIAN REPRODUCERS LTD., Hanworth Trading Estate, Feltham, Middx. Tel: 01-894-9141. Cables: Reamp, Feltham.

DP4/H. Moving coil. Response: 50-15,000 Hz. Sensitivity −52 dB, −70 dB, −86 dB, for high, medium and low impedance. 50,000, 600 and 25 ohms. Tubular case. Price including lead: high or medium impedance: £10 5s.; low impedance £9.

DP6. Moving coil. Omni-directional. Response 200 Hz-15 KHz. Sensitivity −87 dB (25 ohms), −75 dB (200 ohms), −50 dB (600 ohms), −52 dB (50K). Built-in transformer fitted to all but low impedance model. Price (low impedance): £9; (other three models): £10 5s.

GR1. Ribbon. Unequal figure-of-eight. Response 40 Hz-15 KHz. Sensitivity −90 dB (25 ohms), −81 dB (200 ohms), −76 dB (600 ohms), −58 dB (50K). Imp 25, 200, 600 ohms, 50K. Built-in transformer. Easily replaceable ribbon. Price (including lead, swivel holder, case): £13.

GR2. Details as for GR1, but equal figure-of-eight response.

GCI series. Moving coil cardioid microphones. Response: 40 Hz-12 KHz ±5 dB. Metallic diaphragms. Interchangeable leads. Various stands and accessories. Imp GC1/L 25 ohms, rec load 15-50 ohms; GC1/X 200 ohms, rec load 150-300 ohms; GC1/M 600 ohms, rec load 500-1,000 ohms; GC1/50K, rec load 50K and upwards. Sensitivities: GC1/L −86 dB, GC1/X −75 dB, GC1/M −70 dB, GC1/H −52 dB. Prices: GC1/L £14; GC1/X, GC1/M, GC1/H £15.

DP8 series. Moving coil omni-directional microphones. Response: 50 Hz-15 KHz ±5 dB. Built-in on/off switch. Interchangeable leads. Hand type with swivel holder for stand use. Sensitivities, impedances and rec loads as for DP4 series. Prices: DP8/L £10 10s.; DP8/X, DP8/M, DP8/H £11 15s.

Boom arm. Suitable for use with various types of mics and stands. The clamp, locked by a single lever, allows the reach and angle to be readily adjusted as required. Length: 34 in. Weight: 1¾ lb. Thread termination for mic $\frac{5}{16}$ in. BSF male, thread termination for stand $\frac{5}{8}$ in. × 27 tpi female. Supplied with adaptor to $\frac{5}{16}$ in. BSF female. Adaptors for other sizes available. Price: £5.

Windshields. For use with DP4, DP6 and DP8 mics. Pressure moulded cage with an inner lining and acoustic resistance network to reduce air turbulence to a low value. Size: 2¾ in. diameter. Weight: ¾ oz. Price: 17s. 6d.

★

GRUNDIG (GREAT BRITAIN) LTD., Newlands Park, Sydenham, London, S.E.26. Tel: 01-778 2211.

GDM317. High quality directional moving coil microphone with cardioid response. Recommended for acoustically unfavourable conditions. Rejects unwanted sounds. Output impedance: 200 ohms and 22K (dual). FR 50 Hz-12·5 KHz. Supplied with tripod table stand. Price: £10 10s.

S15 stand. General-purpose folding stand. Opens to 5 ft. Folded size: 16 × 2¼ in. Price: £4 14s. 6d.

★

HAMMOND & CO. LTD., 90 High Street, Eton, Windsor, Berks. Tel: Windsor 63388. Telex: 84316.

Hammond M.100. Condenser microphone with omni-directional response. Mono version

M.100 +SU1. Stereo version M.100 +SU2. FR 50 Hz-20 KHz ±3 dB. Impedance 60 ohms. Replaceable capsules. Cannon connectors. Transistorised power supply. Price: £30 9s. (mono), £51 9s. (stereo).

★

KEF ELECTRONICS LTD., Tovil, Maidstone, Kent. Tel: Maidstone 57258.

Electro-Voice 642. Moving coil. Cardiline uni-directional. FR 30 Hz-10 KHz. Sensitivity −48 dB. Imp 50, 150, 250 ohms. Transformer fitted. Cardioid up to 500 Hz, sharply directional above. Price on application.

Electro-Voice 655C. Moving coil. Omni-directional. FR 40 Hz-20 KHz. Sensitivity −55 dB Impedance 50, 150, 250 ohms. Transformer fitted. Very slim design with non-reflecting finish for TV work. Price on application.

Electro-Voice 635A. Moving coil. Omni-directional. FR 80 Hz-13 KHz. Sensitivity −55 dB. Imp 150 ohms or high Z. Transformer fitted. Price on application.

Electro-Voice 649B. Moving coil. Omni-directional. FR 100 Hz-9 KHz ±3 dB. Sensitivity −61 dB. Imp 20-250 ohms. Transformer fitted. Weight only 1½ oz (less cable). Price on application.

Electro-Voice 668. Moving coil. Cardioid. FR 40 Hz-10 KHz. Sensitivity −51 dB. Imp 50, 150, 250 ohms. Transformer fitted. Integral equaliser. Windshield and shockmount included. Designed specially for boom operation. Price on application.

Electro-Voice 652. Moving coil. Omni-directional. FR 100 Hz-7 KHz. Sensitivity −60 dB. Imp 50, 150, 250 ohms. Transformer fitted. Semi-rigid tube microphone. Price on application.

Electro-Voice 643. Moving coil. Super cardioid. FR 30 Hz-10 KHz. Sensitivity −48 dB. Imp 50, 150, 250 ohms. Transformer fitted. Super directional with in-built 100 Hz high-pass filter. Long range pickup. Windshield and shockmount included. Price on application.

Electro-Voice RE15. Cardioid microphone. Full details and price on application.

LEM. Distributors: Douglas A. Lyons and Associates Ltd., 32 Grenville Court, Dulwich, London S.E.19. Tel: 01-670 2833. Cables: Daliona, London, S.E.19.

DH80. Miniature moving coil. Omni-directional. FR 70 Hz-14 KHz ±4 dB. Imp 50 ohms or 80K. Sensitivity (low imp) −82 dB, (high imp) −52 dB. May be used as hand microphone, desk stand, or attached to floor stand. Price: (low imp) £6 5s.; (high imp) £7 18s. 6d.

DO35. Miniature Lavalier moving coil microphone. Omni-directional. FR 80 Hz-12 KHz. ±3 dB. Sensitivity −80 dB. Imp 200 ohms. Can also be used as hand or stand microphone. Size: 2½ in. long, ⅞ in. diameter. Weight: 1¾ oz. Price: £18 10s

DO21B. Studio-quality omni-directional moving coil microphone. FR 30 Hz-16 KHz. ±3 dB. Imp 50 ohms or 200 ohms. Sensitivity (200 ohms) −77 dB. Individually calibrated response curves. Suitable for hand or stand use. Price: £18 15s.

DO20. Hand or stand type moving coil microphone. Omni-directional. FR 40 Hz-15 KHz. Impedance 50 ohms, 200 ohms or 80K. Sensitivity 50 ohms −82 dB, 200 ohms −76 dB, 80K −50 dB. Internal element resiliently mounted to avoid mechanical shock. Price: £12 10s.

★

LUSTRAPHONE LTD., St Georges Works, Regent's Park Road, N.W.1. Tel: 01-722 8844. Cables: Lustraphon, London.

Hand Pencil LFV/H59. Moving coil. Response 70 Hz-14 KHz. Source imp low, line and high. Built-in trans for line and high. 20 ft cable for low and line. 9 ft for high. Price: £8 18s. 6d. (low), £9 9s. (line and high).

Full-Vision LFV/59. Moving coil. Response 70 Hz-14 KHz. Source imp low, line and high. Built-in trans for line and high. 20 ft cable with low and line. 9 ft with high. Stand as required. Price: £9 9s. (low), £9 19s. 6d. (line and high).

Lavalier LV/59. Neck halter moving coil. Response 70 Hz-14 KHz. Low, line and high imp. Price: £9 9s. (low), £9 19s. 6d. (line and high)

Tubular Hand TH59/SB. Moving coil with switch. Response 70 Hz-14 KHz. Sensitivity −88 dB at 25 ohms, −75 dB at 600 ohms, and −54 dB at 50,000 ohms. Transformer as required. Price: £10 10s. (low), £11 11s. (high).

Ribbonette VR/64. Ribbon. Response substantially flat 50 Hz-13 KHz. Source imp low, line and high. Built-in transformer. 20 ft cable for low and line. 9 ft for high. Table base. Price £8 18s. 6d.

●**Stereolus VR/65NS.** Dual head ribbon. Response 50 Hz-13 KHz. Sensitivity stereo 90 dB at 20 ohms. Price: £17 17s.

Chest Harness D59/BS. Moving coil. Response, substantially flat from 70 Hz-14 KHz. Source imp, low, line, high. 6 ft cable. Price: £15 15s.

Velodyne VC52/THSB. Noise cancelling moving coil with switch. Response rising to 1·7 KHz, flat to 3·5 KHz then falling. Source imp 25 ohms or as required. Transformer as necessary. Price: £10 10s.

LT/59. Tubular hand model with P/1467 flexible tube support and table base. Price: £9 9s. (low), £9 19s. 6d. (high Z).

4-20. Omni-directional moving coil FR 70 Hz-14 KHz substantially flat. Impedance: 30, 200, 600, 50K multi-impedance. Sensitivity: −54 dB at 50K. Stick type suitable for hand or stand. Quick release fitting. $\frac{1}{2}$ in. × 26 tpi standard, $\frac{5}{8}$ in × 27 tpi to order. Finish: anodised aluminium. Price: £13 13s.

4-30. Moving coil hyper-cardioid. FR 70 Hz-14 KHz substantially flat. Impedance: 30, 200, 600, 50K multi-impedance. Sensitivity: −54 dB at 50K. Stick type suitable for hand or stand. Quick release fitting. $\frac{1}{2}$ in. × 26 tpi standard, $\frac{5}{8}$ in. × 27 tpi to order. Finish: black and silver anodised aluminium. Price: £18 18s.

4-40. Ribbon figure-of-eight. FR 40 Hz-14 KHz substantially flat. Impedance: 30, 200, 600, 50K multi-impedance. Full details and price on application.

4-50. Ribbon figure-of-eight. FR 50 Hz-16 KHz substantially flat. Impedance: 30, 200, 600, 50K multi-impedance. Sensitivity: −46 dB with preamp, −65 dB at 50K. Stick type suitable for hand or stand use. Quick release fitting. $\frac{1}{2}$ in. × 26 tpi standard, $\frac{5}{8}$ in. × 27 tpi to order. Full details and price on application.

MB ELECTRONIC. Distributors: Denham and Morley Ltd., Denmore House, 173/5 Cleveland Street, London, W.1. Tel: 01-387 3656. Cables: Denmorl, London, W.1.

MB101. Moving coil. Omni-directional. Imp 200 ohms. FR 40 Hz-18 KHz. Sensitivity −74 dB. Size: cap $1\frac{1}{8}$ in. dia, shaft $\frac{7}{8}$ in. dia, $5\frac{1}{2}$ in. long. Weight: 4 oz. Price: £14 14s.

MB201. Moving coil. Cardioid. Imp 200 ohms. FR 50 Hz-18 KHz. Front to back ratio 15-18 dB. Sensitivity −76 dB. Size and weight as for MB101. Price: £15 15s.

MB215. Moving coil. Cardioid. Imp 200 ohms. Response 50 Hz-18 KHz ±2·5 dB. Front to back ratio 15-18 dB. Sensitivity −76 dB. Size: head $1\frac{1}{2}$ in. dia, shaft $\frac{7}{8}$ in. dia. length 6 in. Weight: 5 oz. Price: £16 16s.

MB301. Cardioid. Studio quality ribbon stick microphone. 200 ohms. Complete with blast screen and MB-TSK mounting clamp. Price: £22 1s.

MB-190. Miniature moving coil pen microphone. Impedance 500 ohms. Price. £12 12s.

MB-270S. Moving coil directional microphone. Price: £15 15s

MB-270. Similar to MB-270S but without on/off switch. Price: £14 14s.

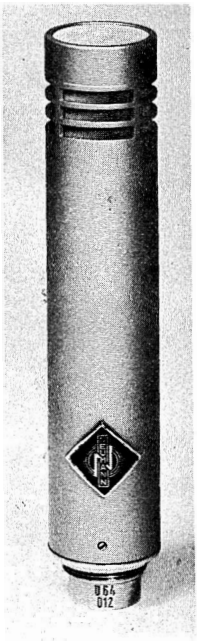
MB-270TR. As MB-270S but with line transformer. Price: £16 16s.

●**MB-220.** Twin moving coil microphone system. Directional pattern. Price: (standard) £12 12s.; (with line transformers) £14 14s.

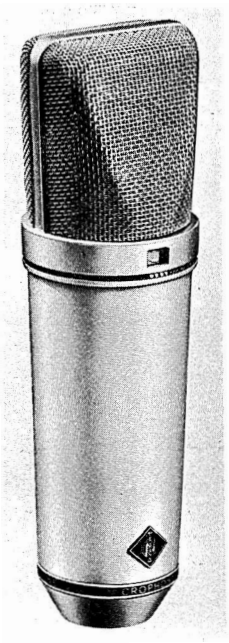
★

NEUMANN GMBH. Sole U.K. Agents: F. W. O. Bauch Ltd., Holbrook House, Cockfosters, Herts. Tel: 01-440-3277.

U67. Condenser. Switchable: omni-directional, cardioid, figure-of-eight. Response: 30 Hz-16 KHz ±2 dB. Sensitivity across 1K: 2mV dyne/cm² in cardioid, 1·1 mV/dyne/cm² in omni-directional, 1·4 mV/dyne/cm² in figure-of-eight. Impedance 50 and 200 ohms. Built-in transformer. Special sensitivity and bass cut switches. Printed circuit. Pressure gradient mic. Price on application.



Neumann U64



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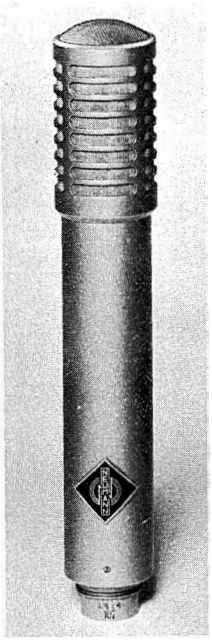
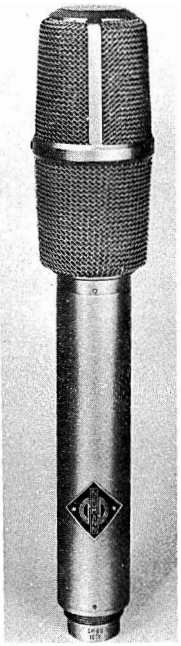
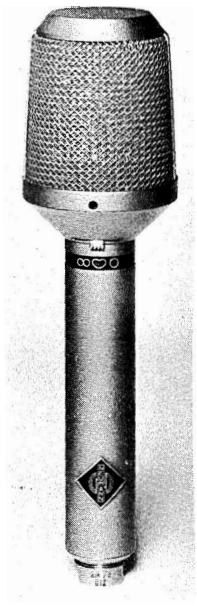


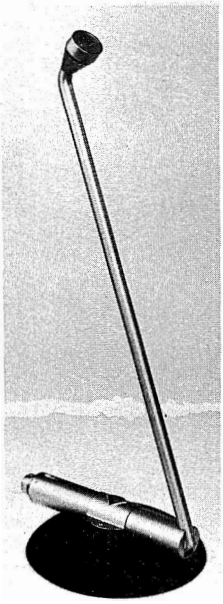
Neumann KM74



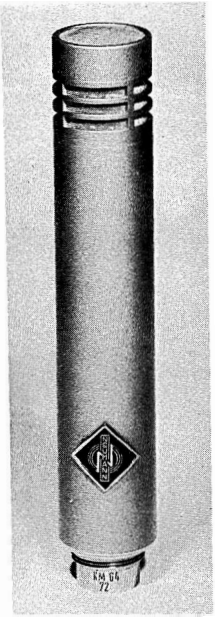
Neumann SM69



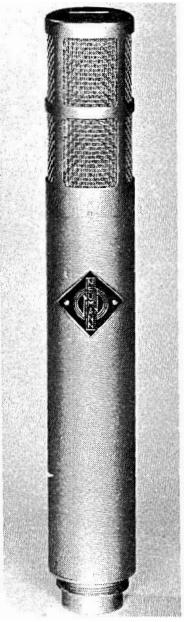
Neumann KM76



Neumann KM64P



Neumann KM64



Neumann SM2c

M269c. Condenser. Remote controlled: omni-directional, cardioid, figure-of-eight (continuously variable). Response 30 Hz-16 KHz ±2 dB. Sensitivity across 1K: 0·9 mV/dyne/cm² in omni-directional, 1·0 (1·55) mV/dyne/cm² in cardioid, 1·1 mV/dyne/cm² in figure-of-eight. Impedance 50 and 200 ohms. Built-in transformer. Special sensitivity and bass cut switches. Printed circuit. Remote controlled pressure-gradient mic. Price on application.

M49c. Condenser. Remote-controlled: omni-directional, cardioid, figure-of-eight (continuously variable). Response 35 Hz-15 KHz ±2 dB. Sensitivity across 1K: 0·7 mV/dyne/cm². Imp 50 and 200 ohms. Built-in transformer. Remote-controlled pressure-gradient mic. Price on application.

M50c. Condenser. Omni-directional. Response 40 Hz-16 KHz ±2 dB. Sensitivity across 1K: 1·5 mV/dyne/cm². Imp 50 and 200 ohms. Built-in transformer. Pressure mic. Price on application.

KM53c. Condenser. Omni-directional. Response 40 Hz-15 KHz ±2 dB. Sensitivity across 1K: 1·5 mV/dyne/cm². Impedance 50 and 200 ohms. Built-in transformer. Printed circuit. Miniature pressure mic. Price on application.

KM54c. Condenser. Cardioid. Response 40 Hz-15 KHz ±2 dB. Sensitivity across 1K: 1·2 mV/dyne/cm². Impedance 50 and 200 ohms. Built-in transformer. Printed circuit. Miniature pressure-gradient type mic. Price on application.

KM56c. Condenser. Switchable: omni-directional, cardioid, figure-of-eight. Response 40 Hz-15 KHz ±2 dB. Sensitivity across 1K: 0·8 mV/dyne/cm². Imp 50 and 200 ohms. Built-in transformer. Printed circuit. Miniature pressure-gradient mic. Price on application.

KM253, KM254, KM256. Condenser mics. RF-proof miniature microphones, otherwise specification as for KM53, KM54, KM56c.

KM63. Condenser. Omni-directional. Response 40 Hz-18 KHz ±2 dB. Sensitivity across 1K: 0·9 mV/dyne/cm². Impedance 50 and 200 ohms. Built-in transformer. Special sensitivity switch (−10 dB). Printed circuit. Miniature pressure mic. Price on application.

KM64. Condenser. Cardioid. Response 40 Hz-18 KHz ±2 dB. Sensitivity across 1K: 0·9 mV/dyne/cm². Imp 50 and 200 ohms. Built-in transformer. Special sensitivity switch (−10 dB). Printed circuit. Miniature pressure-gradient mic. Price on application.

KM64P. Announcer desk condenser microphone. Cardioid. Response up to 18 KHz with bass cut for better intelligibility. Sensitivity across 1K: 0·9 mV/dyne/cm². Impedance 50 and 200 ohms. Built-in transformer. Special sensitivity switch (− 10 dB). Printed circuit. Presure-gradient mic. Price on application.

SRM64. Condenser. Cardioid. Response 40 Hz-18 KHz ±2 dB. Sensitivity across 1K: 0·8 mV/dyne/cm². Impedance 50 and 200 ohms. Built-in transformer. Special sensitivity switch (−10 dB). Printed circuit. Miniature pressure-gradient mic. Adjustable-height stand. Price on application.

KM66. Condenser. Switchable: omni-directional, cardioid, figure-of-eight. Response 40 Hz-16 KHz ±2 dB. Sensitivity across 1K: 2·6 mV/dyne/cm². Impedance 50 and 200 ohms. Built-in transformer. Printed circuit. Miniature pressure-gradient mic. Price on application.

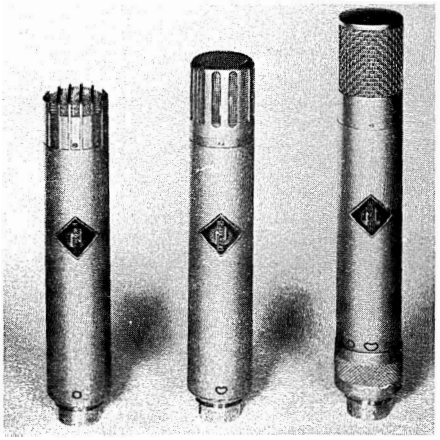
U64. Condenser. Cardioid. Response 40 Hz-18 KHz ±2 dB. Sensitivity across 1K: 1·1 mV/dyne/cm². Imp 50 and 200 ohms. Built-in transformer. Special sensitivity switch (− 10 dB). Printed circuit. Miniature pressure-gradient mic. Available with combined power units for two or six microphones. Price on application.

●**SM69.** Double or stereo condenser. Both systems separately remote-controlled: omni-directional, cardioid, figure-of-eight. Response 30 Hz-16 KHz ±2 dB. Sensitivity across 1K: 1·5 mV/dyne/cm². Imp 50 and 200 ohms. Built-in transformers. Printed circuit. Pressure-gradient mics. Price on application.

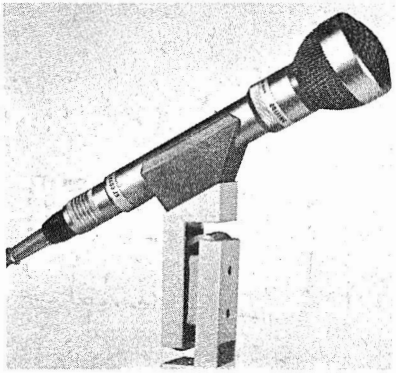
KM73. Transistor (FET) condenser. Omni-directional. Response 40 Hz-16 KHz ±2 dB. Sensitivity across 1K: 2·5 mV/dyne/cm². Impedance 200 ohms without transformer. Printed circuit. Miniature pressure mic. Price on application.

KM74. Transistor (FET) condenser. Cardioid. Response 40 Hz-16 KHz ±2 dB. Sensitivity across 1K: 2·5 mV/dyne/cm². Impedance 200 ohms without transformer. Printed circuit. Miniature pressure-gradient mic. Price on application.

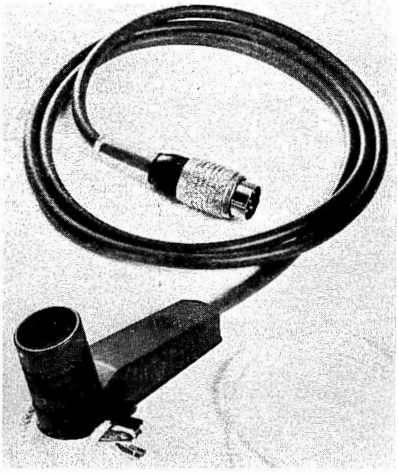
KM76. Transistor (FET) condenser. Switchable: omni-directional, cardioid, figure-of-eight.



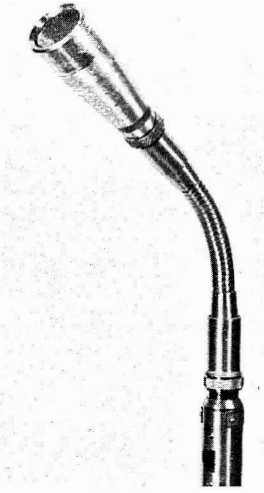
(left to right) Neumann KM53c. KM54c, KM56c



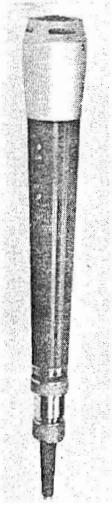
Philips EL.6033 studio moving coil



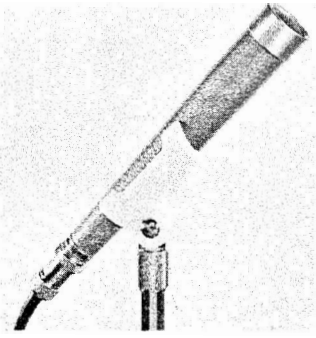
Neumann KML



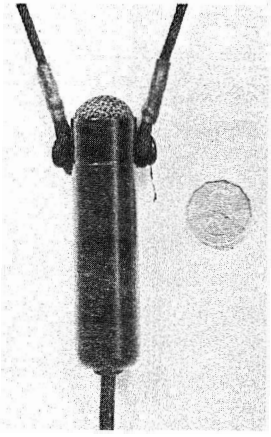
Reslo type MPD



Reslo CPD cardioid pencil dynamic



Reslo PD/L moving coil



Reslo MMD.1

Response 40 Hz-16 KHz ±2 dB. Sensitivity across 1K: 2·6 mV/dyne/cm². Impedance 200 ohms without transformer. Printed circuit. Miniature pressure-gradient mic. Price on application.

KML. Lavalier transistor (FET) condenser. Cardioid. Response 40 Hz-16 KHz ±2 dB. Sensitivity across 1K: 0·5 mV (18V) or 1·8 mV (45V) per dyne/cm². Impedance 50 or 200 ohms. Built-in transformer. Printed circuit. Battery driven (18V or 45V). Miniature pressure-gradient mic. Price on application.

U77. Condenser FET. Switchable omni-directional or cardioid or figure-of-eight. Response 40 Hz-16 KHz. Sensitivity across 1K: 2·6 mV/microbar (omni), 5 mV/microbar (figure-of-eight), 3 mV/microbar (cardioid). Impedance 200 ohms. Pressure gradient mic. Bass cut and sensitivity switch of −10 dB. Price on application.

KM83. FET condenser. Omni-directional. Response 40 Hz-16 KHz. Sensitivity 0·5 mV/microbar. Impedance 50 or 200 ohms. Built-in transformer. Price on application.

KM84. FET condenser. Cardioid. Response 40 Hz-16 KHz. Sensitivity 0·5 mV/microbar. Impedance 50 or 200 ohms. Built-in transformer. Price on application.

KM86. FET condenser. Switchable to omni-directional, cardioid or figure-of-eight. Response 40 Hz-16 KHz. Impedance 50 or 200 ohms. Built-in transformer. Price on application.

U87. FET condenser. Switchable to omni-directional, cardioid or figure-of-eight. Response 40 Hz-16 KHz. Impedance 50 or 200 ohms. Built-in transformer. Bass cut and sensitivity switch of −10 dB. Price on application.

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PEARL. Distributors: C. E. Hammond & Co. Ltd., 90 High Street, Eton, Windsor, Berks. Tel: Windsor 63388. Telex: 84316.

RD16. Moving coil. Cardioid. Polyester film diaphragm. FR 40 Hz-16 KHz. Sensitivity: −70 dB. Impedance: 200 ohms balanced. Size: $2\frac{3}{4} \times 1\frac{1}{4}$ in. Weight: $4\frac{7}{8}$ oz. Finish: black and silver grey. Complete with Cannon plug and adaptor. Price: £15.

RD34. Moving coil. Cardioid. Recommended where feedback and noise cause problems. FR 40 Hz-16 KHz. Sensitivity: −74 dB. Impedance: 200 ohms balanced. Size: $4\frac{1}{8} \times 1\frac{1}{4}$ in. Weight: $5\frac{1}{8}$ oz. Finish: black and silver grey. Complete with Cannon plug and stand adaptor. Price: £17 7s.

RD36. Moving coil. Cardioid. Recommended where feedback and noise cause problems. FR 40 Hz-16 KHz Sensitivity −74 dB at 200 ohms, −54 dB at high impedance. Size: $4\frac{1}{8} \times 1\frac{1}{4}$ in. Weight: $5\frac{1}{4}$ oz. Finish: black and silver grey. Complete with Cannon plug and stand adaptor. Price: £20 7s.

RD34WS. Specification as for RD34 but fitted with windshield. Price: £20 16s.

RD36WS. Specification as for RD36 but fitted with windshield. Price: £26 11s.

EC71. Miniature condenser microphone. Uses field effect transistors and printed circuit. Can be used as lavalier mic. Cardioid pattern. FR 40 Hz-18 KHz ±3 dB. Impedance 50 200, 600 ohms or high impedance. Sensitivity: −58 dB at 200 ohms. Size: $2\frac{3}{4} \times \frac{3}{4}$ in. Finish: anodised satin. Various accessories. Price: (microphone, 12 ft cable and battery power unit) £33 10s.

EK71. Similar specification to EC71 except omni-directional.

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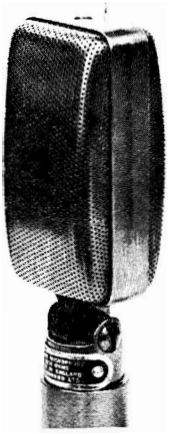
PHILIPS SOUND DIVISION. Pye TVT Ltd., Weybridge, Surrey. Tel: Weybridge 45511. Cables: Megacycle, Weybridge. Telex: London 262319.

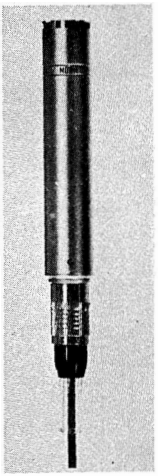
Philips EL.6015/10. Moving coil cardioid microphone. FR 90 Hz-16 KHz. Impedance 500 ohms. Sensitivity: −71 dB. On-off switch. Quick-release holder for stands with $\frac{3}{8}$, $\frac{1}{2}$ or $\frac{5}{8}$ in. Whit threads. 16 ft twin screened lead. Price: £15 10s.

Philips EL.6016/10. Moving coil omni-directional microphone. FR 60 Hz-18 KHz. Impedance 500 ohms. Sensitivity: −71 dB. On-off switch. Quick-release holder for stands with $\frac{3}{8}$, $\frac{1}{2}$ or $\frac{5}{8}$ in. Whit threads. 16 ft twin screened lead. Price: £12.

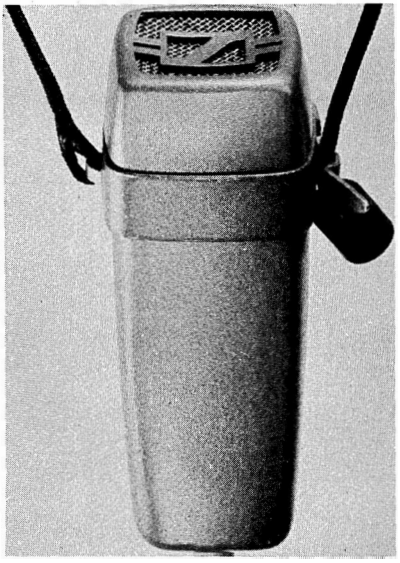
Philips EL.6025/00. Moving coil cardioid microphone. FR 125 Hz-16 KHz. Impedance 500 ohms and 25K. Sensitivity: 500 ohms −71 dB, 25K −54 dB. Combined on-off and imped-



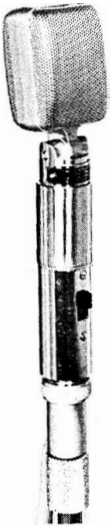
Reslo Studios SR1 ribbon



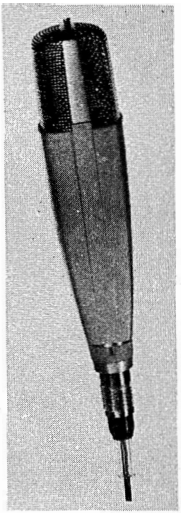
Sennheiser MD211



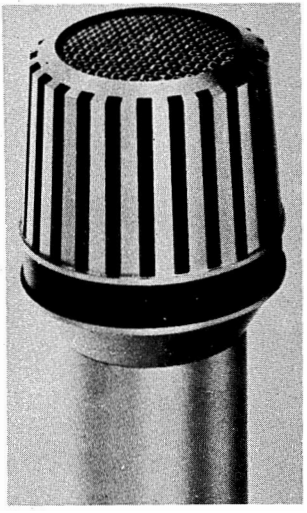
Sennheiser MD214



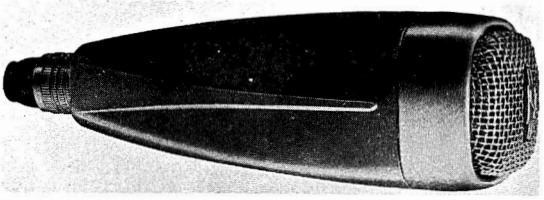
Reslo RBTS/L



Sennheiser MD421HN



Sennheiser MD420N



Sennheiser MD21HN

ance selector switch. Fitted flexible shaft and 16 ft twin screened lead. Finish: brushed satin stainless steel head and chromium plated shaft. Fits stand with $\frac{3}{8}$, $\frac{1}{2}$ or $\frac{5}{8}$ in. Whit threads. Price: £20.

Philips EL.6026/10. Moving coil cardioid microphone. Similar specification to EL.6025/00 except for panel mounting (or stand mounting with LBC.1201 adaptor) and single impedance (500 ohms). No on-off switch. Price: £16 10s.

Philips EL.6033/10. Moving coil. Studio quality. Switchable cardioid or omni-directional. Response 80 Hz-15 KHz. Sensitivity −72 dB. Source impedance 500 ohms (EL.6033/00 50 ohms). Special vibration damper optional extra. Supplied with cable and stand adaptor. Price: £26, vibration damper £3 10s.

Philips EL.6035/10. High quality moving coil cardioid microphone. FR 60 Hz-17 KHz. Impedance 500 ohms. Sensitivity: −71 dB. On-off switch. Quick-release holder for stands $\frac{3}{8}$, $\frac{1}{2}$ or $\frac{5}{8}$ in. Whit threads. Three-pole plug (Tuchel T3261/1) for detachable cable. Price: £26.

Philips EL.6036/10. High quality omni-directional moving coil. FR 50 Hz-19 KHz. Impedance 500 ohms. Sensitivity: −71 dB. On-off switch. Quick-release holder for stands with $\frac{3}{8}$, $\frac{1}{2}$ or $\frac{5}{8}$ in. Whit threads. Three-pole plug (Tuchel T3261/1) for detachable cable. Price: £20.

Philips EL.6042/05. Professional quality omni-directional moving coil. 40 Hz-20 KHz. Impedance 200 ohms. Sensitivity: −79 dB at 1 KHz reference 1 V/μbar. Size: $5\frac{3}{8} \times \frac{3}{4}$ in. Finish: matt chrome plate. Quick-release holder-clamp for stands with $\frac{3}{8}$, $\frac{1}{2}$ or $\frac{5}{8}$ in. Whit threads. Three-pole plug for twin screened cable. Individually calibrated frequency response. Price: £32 10s.

Philips EL.6061/02. Moving coil, noise cancelling. On/off and control switch. Response 200 Hz-10 KHz. Source impedance 500 ohms. Mounting bracket. Price: £10.

Philips P.33. Moving coil. Switched cardioid or omni-directional pattern. Response 80 Hz-15 KHz. Impedance 500 ohms. Sensitivity −72 dB relative to 1V/μbar. In cardioid position sensitivity 17 dB more to the front compared with the rear. Quick release holder for stands with $\frac{3}{8}$ in., $\frac{1}{2}$ in., or $\frac{5}{8}$ in. Whit threads. 16 ft detachable twin screened lead. Vibration-

Philips LBB9001/05. Moving coil omni-directional lavalier microphone. FR 50 Hz-15 KHz. Impedance 200 ohms. Sensitivity: −78 dB. Suitable also for hand use. Complete with neck cord and 33 ft cable. Price: £12.

Philips EL.6037. High quality moving coil. Cardioid. FR 40 Hz-18 KHz. Impedance 500 ohms and 25K. Sensitivity: −71 dB (500 ohms): −54 dB (25K). Rosewood body. Supplied with 10 ft cable. Quick release adaptor. Price: £28.

Philips EL.6204. Universal microphone table stand. Provided with $\frac{3}{8}$ in. Whit thread and possibility of mounting signal lamps or switches, etc. Price: £3.

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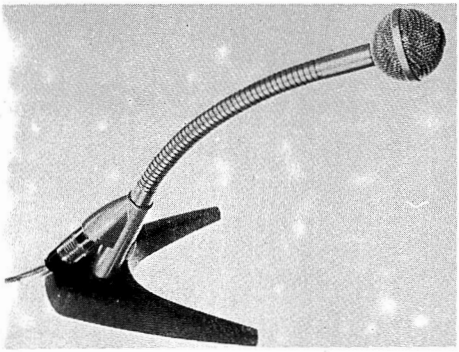
RESLOSOUND LTD., Spring Gardens, London Road, Romford, Essex. Tel: 70-61926 (three lines).

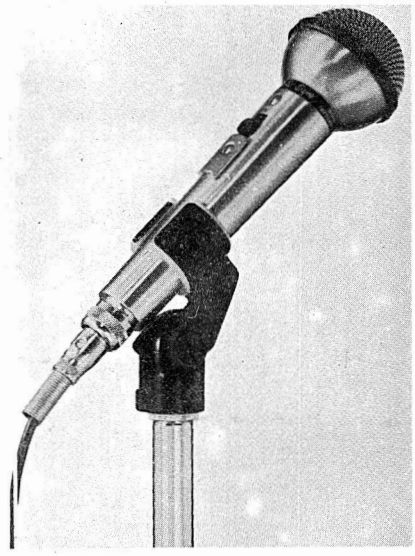
RBT Series. High quality miniature ribbon. FR 40 Hz-14 KHz ±3 dB. Figure-of-eight, modified as required by filter pads. Sensitivity 58 dB below at 40K. Imp RBT/L 30-50 ohms; RBT/M 250 or 600 ohms; RBT/H 30-50 ohms or 40K. A switched model also available with the switch included in a slightly longer body (RBTS/L, RBTS/M, RBTS/H). Finish: Satin chrome or silver grey hammertone enamel. Acoustic filter pad for close-talking use. Prices: RBT/L £12 10s., RBT/M and RBT/H £12 15s. For switched models add £2 15s.

CR2 Series. High quality miniature ribbon. FR 40 Hz-16 KHz (−2 dB at 60 Hz, +10 dB at 16 KHz). Cardioid, figure-of-eight partially suppressed at the rear. Sensitivity 58 dB below for high-Z model. Imp: L, M and H as for RBT Series. Flexible swan neck stem. Finish: satin chrome perforated front, diecast case, silver grey hammertone enamel. Prices: CR2/L £13 15s., CR2/M and CR2/H £13 10s.

SR1 Series. Professional studio ribbon. FR 30 Hz-20 KHz ±2 dB. Nominal figure-of-eight. Damping pads available. Sensitivity 73 dB at 300 ohms. Imp: SR1/L 30-50 ohms, SR1/M 250 or 300 ohms. Developed for use by broadcasting authorities and recording studios. Finish: Florentine bronze or satin chrome. Other finishes to quantity order. Price: (both models) £29 10s.



Sennheiser MD408

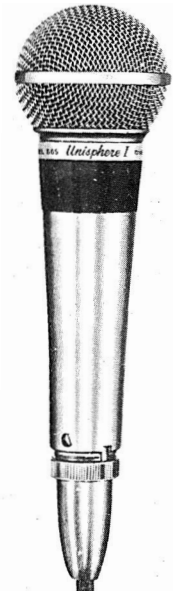


Shure 533SA Spher-o-dyne

Shure 585SA Unisphere

Shure 581SA Unidyne A

Shure 55S small Unidyne



Shure 565 Unisphere I

VRT Series. Special miniature ribbon. FR 30 Hz-16 KHz (−2 dB at 40 Hz, +2 dB at 16 KHz). Nominal figure-of-eight. Damping pads available. Sensitivity 81 dB below at 300 ohms. Impedance: VRT/L 30/50 ohms, VRT/M 300 ohms. Developed for broadcast and recording studios. Satin chrome finish. Price: (both models) £18.

PD Series. Pencil moving coil with lightweight tapered housing. FR 50 Hz-15 KHz (−4 dB at 100 Hz, +4 dB at 14 KHz). Omni-directional with microphone vertical. With microphone horizontal rear response −18 dB at 11 KHz. Sensitivity 88 dB below at 30-50 ohms. Imp: PDL 30-50 ohms, PDM Dual 250 or 600 ohms, PDH Dual 30-50 ohms or 40K. Switched version available; PDS/L, PDS/M, PDS/H. Finish: Silver grey hammer or black crackle. Prices: PDL £8 15s., PDM and PDH £9 15s. For switched versions add 10s.

MPD Series. Miniature pencil moving coil. FR 50 Hz-15 KHz (−12 dB at 100 Hz, +4 dB at 14 KHz). Omni-directional with microphone vertical. Rear response −18 dB at 11 KHz with microphone horizontal. Sensitivity 88 dB. MPD/H high impedance (comprises MPD head, LTU1 line transformer, A922 flexible stem and C930 cable set). Suitable close-talking applications without additional filters. Finish: Satin tint lacquer. Other finishes to quantity order. Prices: MPD/H £14 14s., MPD head only £6 17s. 6d.

MPD/2. A special hand held version of MPD Series with direct feed cable. Price: (low impedance) £5 10s., (high impedance) £6 10s.

MMD.1. Miniature dynamic lavalier lightweight microphone. FR 50 Hz-17 KHz +4 dB. Presence hump between 2-5 KHz. Omni-directional. Sensitivity: −89 dB at 30-50 ohms. Dimensions: 3¼ in. long, ¾ in. diameter. Weight: 2 oz including cord clip and one yard cable. Finish: matt black stove lacquered. Impedance 30-50 ohms only. 18 ft miniature extension cable complete with DIN plug supplied. Price: £10 10s.

CPD Series. Cardioid pencil dynamic microphone. FR 15 Hz-17 KHz. Uni-directional partly suppressed at rear. Rear pick up −10-20 dB over range 200 Hz-15 KHz. Sensitivity −88 dB at 30-50 ohms. Size: 8½ in. overall length, 1½ in. maximum diameter (head). Impedances (switched model): L = 30-50 ohms, M = dual 250 or 600 ohms, H = dual 30-50 ohms or 40K. Unswitched model in low impedance only. Finish: black sheen main case, matt silver head and cap. Supplied with cable set and plastic stand holder. Prices: CPD/L £15 15s., CPD/M and CPD/H £16 16s. Unswitched low impedance model £14.

UD.1. Unidirectional hand or stand microphone. FR 50 Hz-17 KHz (−4 dB at 100 Hz, +8 dB at 16 KHz). Rear pick up −10 to −20 dB between 200 Hz-15 KHz. Sensitivity −88 dB at 30-50 ohms. Output: average voice 6 in. from front of mic 150 μV (low imp), 250-450 μV (medium imp), 2-4 mV (high imp). Output increases approximately 10 times at one inch from microphone. Impedances: UD.1/L 30-50 ohms, UD.1/H 40K. Finish: main case beige enamel, top case satin silver. Price not yet finalised but expected to be in region of £18 to £20.

VMC2. High output moving coil. Rugged construction. FR 50 Hz-16 KHz ±5 dB. Impedance 15 ohms. On/off switch. Price: £9 14s.

HM Series. THM.1 moving coil insert in high-impact off-white plastic case for hand use. THM.1/L 30-50 ohms, THM.1/M 600-2,000 ohms. Price: (THM.1/L) £6 11s., (THM.1/M) £7 7s.

Coupler unit GE1. Suitable for use with any impedance microphone. Designed for external use adjacent to the tape recorder or amplifier. Gain 35-40 dB. Response 50 Hz-20 KHz +1 dB. Fitted 36 in. screened lead and jack plug. Self-contained PP4 battery with average life of 1,500 hours. Price: £8 8s.

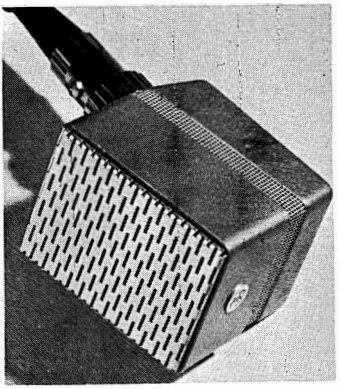
Coupler unit GE2. Similar to GE1 but with addition of a 30-50 ohm input transformer for balanced-to-earth input. Permits use of long microphone lines with low noise and hum. Price: £12 12s.

Coupler transformer LTU1. Designed for use between a low impedance microphone (15-50 ohms) and a high impedance microphone-input socket. Nominal input 40 ohms, nominal output 100K for valve grid circuit. Response 50 Hz-15 KHz ±1 dB. Price: £4 12s.

Microphone transformers MT101, MT102. Designed for internal mounting in equipment having only high impedance inputs. Input imp: MT101 15-50 ohms, MT102 300-600 ohms. Nominal output imp 100K. Response 50 Hz-15 KHz ±2 dB. Price: MT101 £2 18s., MT102 £3 3s.

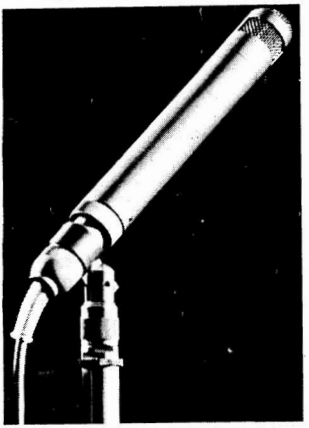
Shure 545 Unidyne III

STC 4033 moving coil and ribbon



STC type 4113 ribbon

STC 4037-A moving coil



STC 4108 condenser

STC 4126 capacitor mic

STC 4038 A ribbon

MS. 100A. Adjustable floor stand. Minimum height 3 ft 4 in., maximum height 5 ft 2 in. Grey hammertone base and outer stem, chrome inner extension piece. Price: £7 18s.

MS. 110A. Similar to the MS. 100A but with chrome stem. Price: £7 18s.

MS. 111. Lightweight folding floor stand. Finish: legs and lower outer tube black stove enamel, inner tube polished chrome. Price: £6 15s.

MS. 175. Boom arm fitting available for use with Reslo floor stands. Price: £7 7s.

MS. 200. Adjustable table stand. Minimum height 1 ft 4 in., maximum height 2 ft 2 in. Grey hammertone base with chrome stem and extension piece. Price: £4 9s.

MS. 300. Circular desk stand. Grey hammertone base fitted with 3 in. chrome stem. Price: £2 7s.

MS. 400. Rectangular desk base. Fitted foam pads. Finished in silver grey hammertone. Muting switch optional extra. Price: £2 2s.; with switch £2 18s.

MS. 500. Rectangular desk base. Similar to MS.400 but fitted with rubber feet. Price: £2, with switch £2 16s.

RM18/19. Transistorised battery operated radio microphone system. GPO approved. Full details and prices on request.

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SENNHEISER ELECTRONIC. Distributors: Audio Engineering Ltd., 33 Endell Street, London, W.C.2. Tel: 01-836 0033.

MD.21HN. Omni-directional moving coil hand or stand microphone. 50 Hz-15 KHz ±3 dB. Sensitivity −53 dB. Impedance 200 ohms and 30K. Rec load 200 ohms or 100K. Light alloy case finished hammer stove enamel. Windshield MZW22 optional extra. Price (microphone): £26 10s. 9d.; (windshield MZW22): £3 18s.; (desk stand MZT21): £2 19s.

MD.211. Omni-directional moving coil miniature studio microphone. Hand or stand use. FR 40 Hz-20 KHz ±2·5 dB. Sensitivity −57 dB. Impedance 200 ohms. Rec load 200 ohms. Metal case with satin chrome finish. Windshield MZW211 optional extra. Price (microphone): £41 12s. 6d.; (windshield MZW211): £4 15s.; (small tripod desk stand MZT102): £4 18s.

MD.214. Omni-directional moving coil lavalier microphone. Built-in "natural voice" equaliser to studio standards. FR specially designed for lavalier operation. Sensitivity −59 dB. Impedance 200 ohms. Rec load 200 ohms. Metal case finished special "non-glare" enamel. Price: £34 17s. 6d.

MD.408. Super cardioid moving coil microphone with flexible shaft. FR 100 Hz-14 KHz ±3 dB. Impedance 200 ohms. Sensitivity −55 dB. Case of light gauze woven wire cloth. Price: £22 5s. 6d.

MD.411HLM. Super-cardioid moving coil mono microphone. FR 50 Hz-14 KHz ±4 dB. Impedance: (low) 200 ohms, (medium) 800 ohms, (high) 25K. Sensitivity: 0·12 mV/μbar, 0·25 mV/μbar, 1·25 mV/μbar. Rec load: (low) 50-200 ohms, (medium) 1-2K, (high) 80K. Hand and stand microphone with base fitting clip. Sound from sides and rear heavily attenuated. Case of hardened plastic round metal sleeve. Finish: matt silver. Price: £15 14s.

MD.420N. Super-cardioid noise cancelling moving coil mono microphone. FR 200 Hz-10 KHz (special response curve for noise cancellation). Impedance 200 ohms. Sensitivity 0·18 mV/μbar. Hand or stand microphone with goose neck and large Tuchel plug. Metal case with silver finish. Model MD.420NT has built-in switch. Price: (unswitched) £18 18s. 6d.

MD.421HN. Cardioid moving coil hand or stand microphone. Special frequency response with built-in variable bass attenuator. Impedance 200 ohms or 24K. Rec load 200 ohms or >50K. $\frac{3}{8}$ in. thread adaptor supplied. Light grey die-cast case. Windshield MZW22 and heavy desk stand MZT421 optional extras. Price (microphone): £37 18s.; (windshield MZW22): £3 18s.; (desk stand MZT421): £2 19s.

●**MDS.1.** Cardioid stereo moving coil stand microphone. FR 60 Hz-15 KHz ±5 dB. Sensitivity −57 dB. Impedance 200 ohms. $\frac{3}{8}$ in. female thread. Microphones can be removed from their respective arms. Grey moulded plastic case. Price: £30 11s. 9d.

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SHURE ELECTRONICS LTD., 84 Blackfriars Road, London, S.E.1. Tel: 01-928 6361.

55S Small Unidyne. Cardioid moving coil. FR 50 Hz-15 KHz. Sensitivity −57 dB at high impedance. Source imps 35-50, 150-250 ohms, and high. Switched transformer built-in. Price: £27 13s. 4d.

545 Unidyne III. Cardioid moving coil. FR 50 Hz-15 KHz. Sensitivity —55 dB. Source impedance 25-250 ohms and high. Built-in transformer. Price: £28 6s. 8d.

533SA Sphero-dyne. Moving coil omni-directional microphone. FR 40 Hz-11 KHz. Sensitivity —54·5 dB. High impedance (a low 25 ohms version is available). Hand or stand. Built-in wind/breath filter. On-off switch with lock-plate. Finish: satin chrome body with plated steel grille. Size: $6\frac{5}{8}$ in. long, $2\frac{1}{8}$ in. diameter over head. Price: (533SA high impedance) £16 13s. 4d.; (533SF low impedance) £15 16s. 8d.

565 Unisphere I. Moving coil. Cardioid (with polar diagram uniform with frequency, symmetrical about axis). FR 50 Hz-15 KHz. Dual impedance (50-250 ohms and high). Sensitivity: (low Z) —78 dB, (high Z) —55 dB. Hand or stand. Built-in wind/breath filter. Available with or without switch. Detachable 18 ft three-core screened lead. Finish: satin chrome body with plated steel grille. Size: $6\frac{1}{8}$ in. long, 2 in. diameter over head. Price: (565 less switch) £31 13s. 4d.; (565S with switch) £33 6s. 8d.

581SA Unidyne. Moving coil. Cardioid. FR 50 Hz-12 KHz. Impedance: High Z (a low 25 ohms version available). Sensitivity: (high Z) —56·5 dB, (low Z) —87 dB. Hand or stand. Built-in on-off switch with provision for locking on. Matched pairs available for stereo recording. Size: $6\frac{7}{8}$ in. long, $1\frac{3}{4}$ in. diameter. Finish: satin chrome and grey, diecast zinc and "Armodur" case. Price: (581SA high Z) £19 13s. 4d.; (581SF low Z) £18 13s. 4d.

585SA Unisphere A. Moving coil. Cardioid. FR 50 Hz-12 KHz. Impedance: high Z (a low 150-250 ohms version available). Sensitivity: (high Z) —56·5 dB, (low Z) —79·5 dB. Hand or stand microphone supplied with swivel stand adaptor. Built-in switch with provision for locking on. Wind/breath filter. Detachable 18 ft cable. Finish: satin chrome with steel mesh grille. Size: $6\frac{3}{4}$ in. long, $2\frac{1}{8}$ in. diameter. Price: (585SA high Z) £21 13s. 4d.; (585SB low Z) £19 6s. 8d.

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STC LTD., Acoustic Sub-Division, West Road, Harlow, Essex. Tel: Harlow 26811.

4021-J. Spherical omni-directional moving coil. Flat response 30-15,000 Hz. Impedance 30 ohms. Sensitivity —80 dB. Price: £16 10s.

4033-A. Cardioid microphone. Moving coil and ribbon element which can be used individually or in combination. Flat response 30-10,000 Hz. Impedance 50 ohms. Sensitivity —80 dB. Front to back ratio 15-20 dB. Price: £65.

4037-A. Moving coil unobtrusive pencil microphone. Flat response 30-15,000 Hz. Impedance 30 ohms. Sensitivity —84 dB. Price (long or short model): £22.

4038-A. Studio ribbon microphone. Accurate figure-of-eight response. Flat frequency response 30-15,000 Hz. Impedance 30 ohms. Sensitivity —85 dB. Non-linear distortion 0·1 %. Controlled transient response. Price: £50.

4104-B&C. Commentator's lip microphone. High degree of noise cancellation. Flat response 70-10,000 Hz. Impedance 30 ohms. Output: —82 dB ref 1V for 10 dyne/cm. Price: £70.

4105-A. Cardioid moving coil microphone specially designed for speech. Flat response 60-10,000 Hz. Impedance 30 ohms. Sensitivity —82 dB. Front to back ratio 15-20 dB. Price: £22 10s.

4108. Cardioid condenser microphone. Response 30-16,000 Hz. Sensitivity —60 dB. Impedance 30 or 300 ohms. Transformer fitted. Small size directional studio microphone. Price: £96.

4113. Ribbon cardioid microphone. 60-15,000 Hz. Specially suitable for speech and music recording. Two versions available. 4113-A: 30 ohms impedance. Output: —87 dB. 4113-B: 50K impedance. Output: —54 dB. Suitable most domestic recorders. Price: £11 11s. (both models).

4119. Double ribbon (for improved sensitivity) hand-held or stand-mounted microphone. High quality suitable for studio and domestic hi-fi, speech and music. Available 30-300 ohms or 50K. Complete with nine feet cable and zip case. Price: £26 (both models). 30-300 ohms model with switch. Price: £27.

4126. Cardioid condenser microphone using field effect transistor head amplifier. Very high quality. Response 30-16,000 Hz. Sensitivity —84 dB. Impedance 30 or 300 ohms. Complete kit comprising transit cases, mains power pack, 30 ft cable, and outlet plug. Price: £108 6s. 6d. With battery power pack instead of mains unit, £94 16s.

TURNER. Distributors: Auriema Ltd., 23-31 King Street, London, W.3. Tel: 01-992 5388.

SR90D. Robust hand type pressure-operated dynamic unit. Response 200 Hz-10 KHz. Imp 200 ohms or 25K. Built-in switch with spare contacts. Die-cast case finished brushed chrome. Weight: 1 lb 6 oz including self-coiling lead. Price: £14 8s. 10d.

58. Miniature dynamic designed for lavalier use. Omni-directional. Response 60 Hz-13 KHz. Imp interchangeable 150 ohms and 30K. Size: 4 in. long, 1 in. diameter. Weight: 3½ oz. Desk stand optional extra. Price: £19 7s. 4d.

500. Hand or stand dynamic unit with cardioid response. Frequency response 40 Hz-15 KHz. Imp 150 ohms and 40K. Die-cast alloy case finished satin chrome. Size: 6¾ in. long, 1½ in. diameter. Weight: 12 oz (excluding cable). Price: £29 14s. 4d.

510. Hand or stand dynamic unit with cardioid response. Frequency response 40 Hz-15 KHz. Imp 50 ohms and 200 ohms. Designed for broadcast use. Shock mounted. Die-cast alloy case finished matt blue-grey. Size: 6¾ in. long, 1½ in. diameter. Weight: 12 oz (excluding cable). Price: £50 19s. 4d.

UHER. Distributors: Bosch Ltd., Rhodes Way, Radlett Road, Watford, Herts. Tel: 92 44233.

M153. Dynamic microphone with remote control switch providing: record, stop, start, rewind. FR 50 Hz-10 KHz. Impedance 200 ohms. Price: £9 3s. 7d.

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VITAVOX LTD., Westmoreland Road, London. N.W.9. Tel: 01-205 8671. Cables: Vitavox, London, N.W.9.

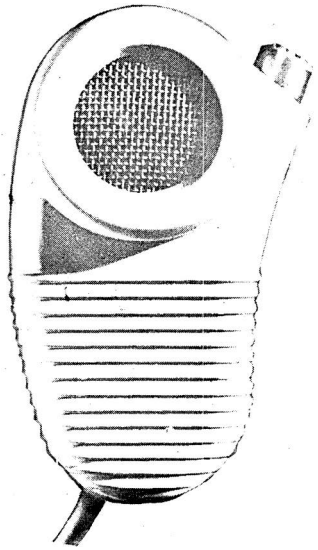
B50. Moving coil. Response 60 Hz-8 KHz. Sensitivity −85 dB. Source imp 25 ohms. 6 ft cable. Built-in control switch. Price on application.

B54. Moving coil incorporating built-in transformer. Response 60 Hz-8 KHz. Sensitivity −85 dB (excluding transformer). Source imp 200, 500, 10K, 100K ohms according to transformer. Built-in control switch. Price on application.

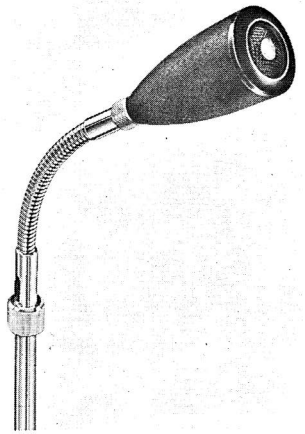
B60. Similar specification to B50 but weatherproof version. Price on application.

B64. Similar specification to B54 but weatherproof version. Price on application.

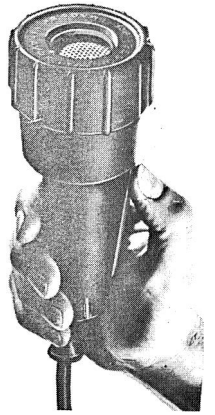
M100. Moving coil incorporating tapped transformer giving choice of 25, 200, 10K ohms and high impedance. Response 50 Hz-15 KHz ±3 dB. Sensitivity −80 dB, −71 dB, −54 dB, −44 dB according to impedance. 9 ft cable and flexible support. Price on application.



Vitavox B50 moving coil

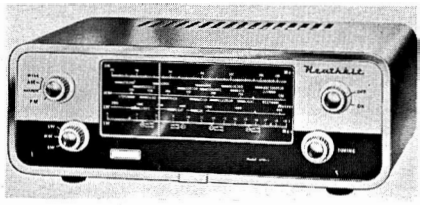


Vitavox M100

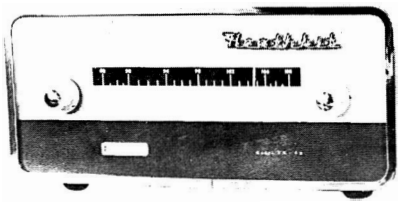


Vitavox B64 moving coil

Heathkit TS-23

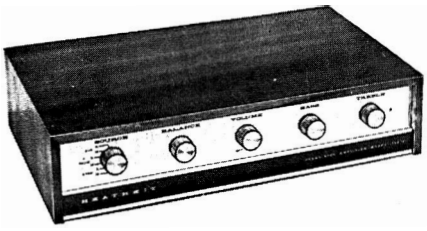


Heathkit AFM/1 AM/FM tuner

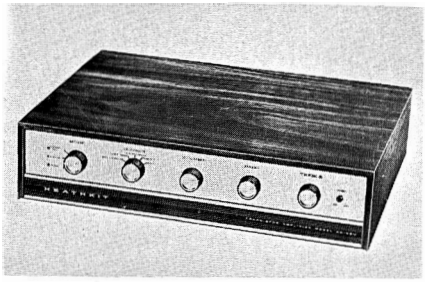


Heathkit FM tuner

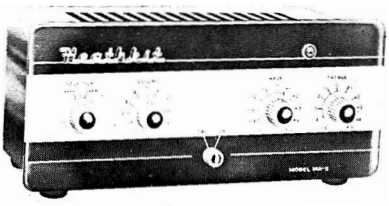
Heathkit AFM-2



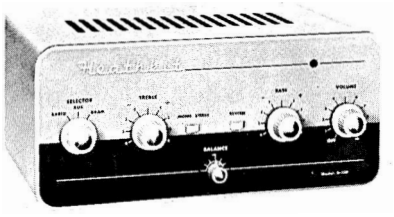
Heathkit TSA-12



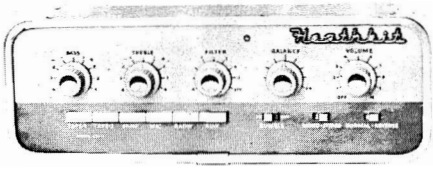
Heathkit AA-22U stereo amplifier



Heathkit MA-5 monaural amplifier



Heathkit S-33H stereo amplifier



Heathkit USC-1 stereo control unit

Heathkit S-99 stereo amplifier

DIRECTORY OF CONSTRUCTIONAL KITS

DYNACO. See amplifier and radio tuner sections for details of Dynaco models available in kit form.

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FERRANTI AUDIO KITS. See Wellbrook Engineering and Electronics Ltd.

★

HART ELECTRONICS, 321 Great Western Street, Manchester, 14. Tel: Rusholme 2212/3.

●**Bailey 20W amplifier.** Power amplifier: 20W with total HD 0·1% at 1 KHz. H and N −80 dB. Proof against damage by short circuits. Four transistors. Pre-amplifier: five-transistor circuit with feedback triple front end giving 23 dB overload capacity with HD less than 0·02%. Described in "Wireless World" Nov and Dec 1966. Price: (kit for power amplifier) £7 5s.; (kit for mono pre-amp) £7 4s. 6d.; (kit for stereo pre-amp) £14 10s.; (kit for power supply) £5 10s. 6d.

●**Dinsdale 10W amplifier.** Output: 10W per channel into 15 ohms. Printed circuit construction, six transistors per power amplifier, three transistors per pre-amp. Described in "Wireless World" Jan and Feb 1965 (reprints available from Hart Electronics, price 5s. 6d. post paid). Price: (kit for mono pre-amp and amplifier) £9 18s.; (kit for stereo pre-amp and amplifier) £20 8s.; (kit for power supply unit) mono £4 10s. 6d., stereo £5 8s.

Mullard 10W Pi-mode amplifier. Printed circuit boards for power amplifier 7s. a pair, printed circuit board and components (excluding controls) for pre-amp £3 15s., all other parts available. Full details on request.

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HEATHKIT. Manufactured by Daystrom Ltd., Bristol Road, Gloucester. Tel: Gloucester 29451.

●**TS-23.** Integrated stereo transistor amplifier, complete with case. Inputs: PU 50 mV high impedance, radio 300 mV at 200K, aux 170 mV at 100K. Controls: selector, balance ±30 dB, bass +10 dB at 100 Hz, treble −10 dB at 10 KHz, volume. Output: 3·5W RMS per channel into 15 ohm load. FR 15 Hz-18 KHz −3 dB at 1W 1 KHz reference. Noise level −58 dB. Mains: 100-125, 200-210, 220-230, 240-250V 50-60 Hz. Consumption: 15W. Size (with cabinet): 13 × 8 × 3⅞ in. Weight: 9 lb. Price: (kit) £18 19s.

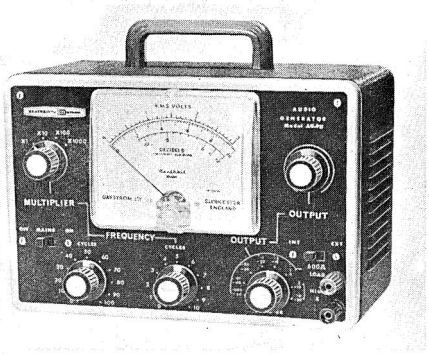
●**TSA-12.** Integrated stereo transistor amplifier. Inputs: PU 5 mV 47K, radio 300 mV 180K, aux 300 mV 180K. Controls: selector, balance, volume, bass −15 dB +14 dB at 20 Hz, treble −12 dB and +14 dB at 20 KHz. Output: 12W RMS per channel (8 ohm load), 8W RMS per channel (15 ohm load). HD 1% or less, 20 Hz-20 KHz at rated output. Noise level: −50 dB (PU), −60 dB (radio and aux). Mains: 100-125, 200-250V 50-60 Hz. Size: 15½ × 10 × 3⅞ in. Weight: 11 lb. Price (kit): £30 10s.; (ready assembled) £38.

●**AA-22U.** Transistorised stereo integrated amplifier. Inputs: PU 6 mV, radio 250 mV, tape 250 mV, aux.1. 250 mV, aux.2. 250 mV. Controls: Balance, selector switch, mode switch, volume, bass, treble, filter, filter (3-position; flat, 4 KHz, 8 KHz, 12 dB/octave). Noise −50 dB on PU, −65 dB all other inputs. Output: 20W per channel RMS. Distortion 0·3% at 20W. FR 15 Hz-30 KHz 1 dB. Feedback 35 dB. Output: imp 4, 8 or 16 ohms. Pre-set gain controls accessible from the front. Mains 110, 200-250V 50-60 Hz. Size: 15½ × 3⅞ × 12⅛ in. Price (kit): less cabinet £39 10s.; cabinet £2 5s. extra; (assembled including cabinet) £59 15s.

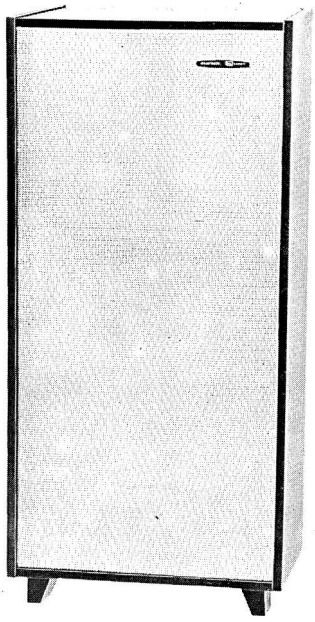
●**S-99.** Stereo amplifier kit. Output: 9W, 3 or 15 ohms, per channel. Distortion: 0·2% at 1 KHz, 0·35% at 4 KHz, 0·42% at 40 Hz. FR 30 Hz-20 KHz ±0·5 dB. Feedback 26 dB. H and N pickup 1 (magnetic) −55 dB; pickup 2 (crystal) −55 dB; Aux (microphone, etc) −60 dB; radio, tape −65 dB. Inputs: pickup 1, 4 mV, 100K continuously variable; pickup 2, 180 mV, 47K continuously variable; Aux 20 mV, 500K linear; radio, tape 100 mV 350K linear. Psn 100-125, 200-210, 220-230, 240-250V, 50-60 Hz 100W. Printed circuit boards for easy assembly. High sensitivity to suit all types of pickups. Variable filter. Price (kit): £28 9s. 6d.; (assembled): £38 9s. 6d.

●**S-33H.** Stereo/mono amplifier. Output: 3·5W. Distortion, less than 0·6% at 1 KHz for 3W. H and N gram −55 dB, radio −60 dB (referred to 3W). Sensitivity: gram 50 mV (high imp), aux 150 mV, radio 100 mV. Psn 100-125, 200-210, 220-230, 240-250V AC 40-60 Hz. Size:

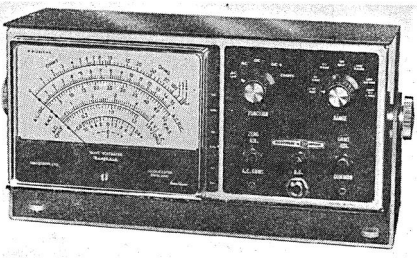
Heathkit Malvern



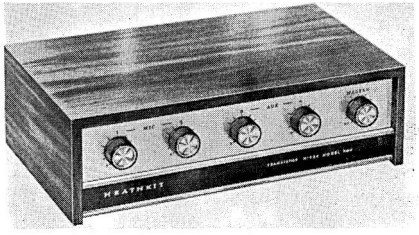
Heathkit AG-9U audio signal generator



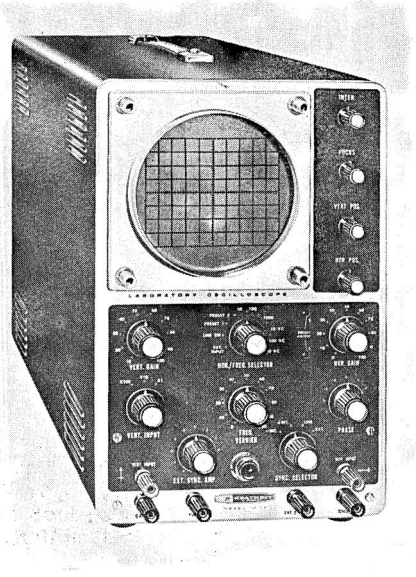
Heathkit Cotswold MFS



Heathkit IM-13U valve voltmeter



Heathkit TM-1 four-channel mixer



Heathkit 10-12U oscilloscope

$11\frac{3}{4} \times 5\frac{1}{4} \times 10$ in. Based on Model S-33, but an extra stage is incorporated to increase the sensitivity required for the new high quality Ceramic pickups. Choice of three inputs provided, and close matched twin-ganged potentiometers used for volume and tone controls. Price (kit): £15 17s. 6d.; (assembled): £21 7s. 6d.

MA-5. Monaural amplifier. Output: 5W. Distortion less than 0·5% at 1 KHz; less than 1% at 5 KHz. Sensitivity: radio 200 mV, 0·5 megohms; gram 200 mV, 0·5 megohms. Rec imp 2-4 and 14-16 ohms. H and N less than −60 dB referred to 5W. Output stages: ECC83, EZ81, 2×EL84. Psn 100-110, 200-210, 220-230, 240-250V AC 40-60 Hz. Size: $11 \times 6\frac{5}{8} \times 4\frac{3}{4}$ in. Panel $11\frac{3}{4} \times 5\frac{1}{4}$ in. Suitable for most crystal pick-ups. Provision for connection of radio tuner or tape recorder. Price (kit): £11 9s. 6d.; (assembled) £15 15s.

MA-12. Mono amplifier. Output: 10W RMS (12W max) between 30 Hz and 10 KHz. Distortion: <0·1% at 10W, 1 KHz; <0·2% at 10W, 5 KHz, <0·4% at 10W, 40 Hz. FR 20 Hz-30 KHz ±1 dB. Feedback: main loop 26 dB, subsidiary loop 6 dB. H and N −85 dB at 10W. Input: 120 mV for 10W output. Output: imp 2-4, 8-11, 14-16 ohms. Valves, EF86, ECC83, EL84 (2), GZ34. Psn 100-117V, 200-250V AC, 40-60 Hz. 100W. Size: $11\frac{1}{8} \times 6\frac{3}{4} \times 5\frac{3}{4}$ in. Weight: $12\frac{1}{2}$ lb. Price (kit): £12 18s.; (assembled) £16 18s.

●**USC-1.** Stereo pre-amplifier. Inputs: pickup 1, 3-4 mV 50K; pickup 2, 150 mV 1 megohm; tape 1, 2·5 mV 80K CCIR, tape 2, 150 mV 100K; radio 150 mV; mic 3 mV, 1 megohm; aux, 4-150 mV, 1 megohm. Controls: bass, treble, rumble filter, variable low pass filter, balance, volume, function, channel reverse. Power required, 250V 10 mA, 6·3V 1·5 amps. Output voltage: 1·3V RMS. Price (kit): £19 19s.; (assembled) £27 5s.

UMC-1. Mono control unit. Inputs: mag pu 9 mV, 100K, RIAA; crystal pu 50 mV variable, 1 megohm linear: Aux 120 mV, 500K linear; mic 4 mV, 130K linear; radio 100 mV variable, 330K linear. Output up to 0·25V. Controls: sel, bass, treble, filter, volume on/off. Low pass filter. H and N −65 dB. Psn 180-300V, 3 mA DC, 6·3V, 0·6 amps AC. Suitable for free standing or cabinet installation. Price (kit): £9 2s. 6d.; (assembled) £14 2s. 6d.

TM-1. Four-channel mixer. Two high imp inputs with sensitivity 1·5 mV and two aux inputs with sensitivity 180 mV. Output: 200 mV at approximately 600 ohms. Individual and master volume controls. Walnut veneered cabinet. Size: $11\frac{3}{4} \times 3\frac{3}{4} \times 7\frac{1}{2}$ in. Price (kit): £11 16s. 6d.; (assembled) £16 17s. 6d.

V-7A. Valve voltmeter kit. Printed circuit. Measures AC volts (0-1·5, 5, 50, 150, 500, 1,500) RMS, AC volts (0-4, 14, 40, 140, 400, 1,400, 4,000). Peak-to-peak, DC volts (0-1·5, 5, 15, 50, 150, 500, 1,500). Ohms (with 10 ohms centre) × 1, 10, 100, 1,000, 10K, 100K, 1 megohm 0·1 ohms to 1,000 megohms with internal battery. Input resistance: 11 megohms. 200 μA meter movement. Price (kit): £13 18s. 6d.; (assembled) £19 18s. 6d.

1M-13U. Laboratory valve-voltmeter kit. Printed circuit. Gimbal mounting, for viewing from any angle. Measures AC volts (0-1·5, 5, 15, 50, 150, 500, 1,500 RMS); AC volts (0·4, 14, 40, 140, 400, 1,400, 4,000 peak-to-peak). DC volts (0-1·5, 5, 15, 50, 150, 500, 1,500). Ohms (with 10 ohms centre) X1, X10, X100, X1000, 10K, 100K, 1 megohm. 0·1 ohms to 1,000 megohms with internal battery. Input resistance: 11 megohms. 200 μA meter movement. Price (kit): £18 18s.; (assembled) £26 18s.

MGP-1. Power supply unit. 200, 250, 270V, 120 mA; 6·3V, 2·5 amps. Price (kit): £5 2s. 6d.; (assembled) £6 12s. 6d.

OS-2. Service oscilloscope. $2\frac{3}{4}$ in. tube. Vertical bandwidth 2 Hz to 3 MHz. Automatic lock-in sync. Mu-metal CRT shield. Printed circuit. Switched ext/int Y plate connections. Vertical amplifier: sensitivity 100 mV/cm, input impedance: 3·3 megohms shunted by 20 pF, response 2 Hz-3 MHz ±3 dB. Horizontal amplifier: sensitivity 100 mV/cm, input impedance: 10 megohms shunted by 20 pF, response 2 Hz-3 MHz. Timebase: 20 Hz-200 KHz in four steps. Size: $5 \times 7\frac{3}{8} \times 12$ in. Weight: $9\frac{3}{4}$ lb. Price (kit): £23 18s.; (assembled) £31 8s.

IO-12U. General purpose oscilloscope kit. 5 in. flat face CR tube. Printed circuits. Vertical band-width 3 Hz to 4·5 MHz. Built-in 1V calibrator. Y-sensitivity 10 mV RMS per cm at 1 KHz, X-sensitivity 50 mV RMS per cm at 1 KHz. Price (kit): £35 17s. 6d.; (assembled) £45 15s.

S-3U. Electronic Switch (oscilloscope trace doubler). Converts a single beam oscilloscope to double beam. Switching rates 150, 500, 1,500, 5,000 and 15,000 Hz. Signal frequency response 0-100 KHz ±1 dB. Signal input range 0·1 to 1·8V RMS Price (kit): £13 10s.; (assembled) £19 10s.

C-3U. Resistance-capacitance bridge. Self-contained and powered. Capacitance range 0·00001 to 1,000 microfarads. Resistance range 100 ohms to 5 megohms. Power factor and leakage also indicated. Polarising voltages available from 5 to 450V. Price (kit): £11 5s.; (assembled) £16 15s.

AV-3U. Audio valve millivoltmeter. Measure voltages as low as 1 mV to a maximum of 300V at high impedances in 10 ranges. Frequency range 10-400,000 Hz. Uses a 4½ in. meter. Cathode follower output. Price (kit): £17 15s.; (assembled) £24 5s.

309-CU. RF probe. Extends the range of a valve voltmeter to 100 MHz. Uses a printed circuit board. Price (kit): £2 3s. 6d.; (assembled) £2 15s. 6d.

AW-1U. Audio wattmeter. Uses external loads or the following internal loads: 3, 8, 15 and 600 ohms. 5 power ranges from 0-5 mW to 50 watts. 4½ in. meter calibrated in watts and dB. Price (kit): £18 15s.; (assembled) £25 8s.

AO-1U. Inexpensive audio generator covering 20 Hz-150 KHz sine wave, 20 Hz-25 KHz square wave. Output up to 10V RMS sine wave or 80V peak-to-peak square wave. Size: 9½ × 6½ × 5 in. Price (kit): £14 15s.; (assembled) £21 5s.

IM-12U. Low-priced audio distortion meter. Simple to use. Measures distortion at frequencies between 20 Hz and 20 KHz. Size: 13 × 7 × 8½ in. Price (kit): £26 15s.; (assembled) £36.

IG-82U. Audio generator covering 20 Hz-1 MHz. Sine and square wave available simultaneously. Sine wave output up to 10V RMS, square wave output up to 10V peak-to-peak. Rise time 0·15 μSec. Size: 13 × 8½ × 7 in. Price (kit): £25 15s.; (assembled) £37 15s.

AG-9U. Audio signal generator. Range: 10 Hz-100 KHz. Distortion less than 0·1% from 20 Hz to 20 KHz. Decade switching over 8 voltage ranges from 3 mV to 10V monitored. Uses 4½ in. meter. Price (kit): £23 15s.; (assembled) £31 15s.

●**AFM-2.** Transistor AM/FM stereo-mono tuner. Range: VHF 88-108 MHz, MW 192-555 m, LW 1,000-1,800 m. Variable tuning. Ratio detector. AFC. AGC. 18 transistors, 7 diodes. Sensitivity: 2 μV for 20 dB quieting. Aerial input (VHF): 75 ohms coaxial. Output: 300 mV with 30% modulation. Stereo multiplex decoder fitted. Automatic stereo indicator light. Edge-lit slide rule scale and flywheel tuning. Internal AM ferrite rod aerial. Pre-assembled and aligned front-end. Separate AM and FM printed boards. Walnut veneered cabinet optional extra. Mains: 105-125V, 210-250V 50-60 Hz. Consumption: 10W. Size: 15½ × 10¼ × 3⅞ in. Weight (less cabinet): 8 lb. Price (kit): £32 13s.

AFM/1. AM/FM tuner. Variable tuning. FM frequency range 88-108 MHz. AM frequency range 16-50, 200-550, 900-2,000 metres. Wide band ratio discriminator plus two limiters. Magic eye tuning indicator. Self-powered. Size: 10¾ × 11⅛ × 4½ in. Price (kit): £27 8s. 6d.

FM-4U. FM tuner. Comprises model FMT-4U tuner unit and FMA-4U IF strip and power supply. Flywheel tuning, thermometer tuning indicator, three IF stages with two limiters, printed circuit board and prealigned coils. Tuning range 88-108 MHz. Sensitivity 2·5 μV for 20 dB quieting. Price (kit): £16 8s. (for both units).

●**TFM-1.** Tuner. Comprises TFM-T1 tuner unit, TFM-1M (mono) IF strip and power supply, or, TFM-1S (stereo) IF strip and power supply. TFM-1C stereo conversion unit available separately. Range: 88-108 MHz. Variable tuning. Ratio detector. Sensitivity: 2 μV for 20 dB quieting. Aerial input 75 ohms coaxial. Output: 250 mV. Multiplex decoder fitted. All transistor. Mains: 200-250V 50-60 Hz. Size: 15⅝ × 3⅞ × 10¼ in. Price (kit): mono, less cabinet £21 3s. 6d. for both units; stereo, less cabinet £25 2s. 6d. for both units. Cabinet £2 5s. Also available ready assembled.

●**SD.1.** Multiplex stereo decoder. Self-contained mains-operated unit for free-standing use. Size: 3¼ × 3¼ × 9 in. Price (kit): £8 10s.

SSU-1. Speaker system kit. Comprises 8 in. and 4 in. matched drive units, and ducted-port bass reflex cabinet. Response 40 Hz-16 KHz ±5 dB. Crossover frequency 3 KHz. Impedance 15 ohms. Size: 23 × 11½ × 11¾ in. Available for horizontal or vertical mounting. Price complete (kit): £12 14s. 6d.; (without legs) £12.

Cotswold. High fidelity three speaker system. Drive units are 12 in. bass, 8 × 5 in. elliptical, and pressure tweeter. Range 30 Hz-20 KHz. Two volume controls. Celotex lined enclosure. In white wood ready cut and drilled. Dimensions: 26 × 23 × 14½ in. Price complete with crossover unit, etc (kit): £25 12s.

Cotswold MFS. Almost identical to the Cotswold, but specially designed to occupy minimum floor space. Slight reduction in output below 40 Hz with smaller source area. Recommended for small rooms. Dimensions: 36 × 16½ × 14 in. plus two legs. Price (kit): £25 12s.

Gloucester. Cabinet for hi-fi equipment. Space available to house records, tapes, etc. Mk 1 accommodates tape deck or record player, FM tuner, and stereo amplifier. Mk II accommodates both tape deck and record player, FM tuner and stereo amplifier. Dimensions: 46⅛ × 30 × 21 in. Price (kit): £18 14s.

Malvern. Cabinet for hi-fi equipment. Space available for transcription record player, tape deck, radio tuner, audio amplifier (or control unit and separate power amplifiers) and tape record/replay amplifier. Price (kit): £18 5s.

Berkeley. Infinite baffle hi-fi enclosure with speakers and cross-overs. One 12 in. low-resonance bass unit, one 4 in. middle and top unit. Inductance/capacitance cross-over at 900 Hz. Handling capacity 15W RMS. Kit includes ready finished cabinet shell. Finish: oiled walnut veneer. Size: 26 in. high, 17 in. wide, 7¾ in. deep. Price (kit): £19 10s.; (assembled) £24.

Avon. Infinite baffle bookcase enclosure with two units. One 6 in. high compliance bass driver, one 3 in. tweeter. Fully finished walnut veneered cabinet. Size: 7¾ × 13¼ × 8¾ in. Price (kit): £14.

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HENRY'S RADIO LTD., 303 Edgware Road, London, W.2. Tel: 01-723 1008.

Hi-fi 12/25. Transistorised amplifier kits. Nine models: MPA12/3, MPA12/15, MPA25, MPA 12+12, MP3, SP6-2, PS24/40, MU24/40, MU60.

MP3. Mono pre-amplifier. All silicon transistor low-noise zener stabilised circuit. Full range of controls. Inputs for crystal PU, crystal or dynamic microphone, tuner, tape head and pre-amp replay. Output: 250 mV. Supply: 12-60V DC. Consumption: 3 mA. Size: 9⅜ × 1⅜ × 1⅞ in. Supplied ready-built on metal chassis with silver/grey front panel and matching knobs. Price: £6 19s. 6d. (post and packing 3s. extra).

●**SP6-2.** Mono/stereo pre-amplifier. Eight silicon/germanium devices. Zener stabilised. New low-noise circuit. Full range of controls and filters. Inputs: magnetic, crystal or ceramic cartridge, tuner, tape pre-amp, microphone, tape head. Input sensitivity: 3 mV. Tape record outlet socket. Output: 250 mV per channel. Supply: 9-60V DC. Consumption: 4 mA. Supplied ready-built on metal chassis with silver/grey front panel and matching knobs. Size: 12 × 3½ × 3¼ in. Price: £14 19s. 6d. (post and packing 5s. extra).

MPA12/3 and MPA12/15. 12W low-distortion power amplifiers for use with MP3 and SP6-2 pre-amplifiers. Silicon and germanium semiconductors. Input: 100 mV for 12W output. FR 30 Hz-20 KHz ±1 dB. HD 0·2% at 12W RMS. High-gain stable push-pull output stage. MPA12/3 for 3-5 ohms speakers and 24-28V supply. MPA12/15 for 10-16 ohm speakers and 40-45V supply. Ready-built on metal chassis. Size: 5 × 2 × 3¼ in. Price: MPA12/3 £4 10s.; MPA12/15 £5 5s. (post and packing 2s. 6d. extra in either case).

●**MPA12+12.** Twin amplifier for mono or stereo. Designed for use with MP3 or SP6-2 pre-amplifiers. Consists of two MPA12/15 amplifiers on single chassis. Output: 10-16 ohms. Supply: 40-45V DC. Other details as for separate amplifiers. Size: 10 × 2 × 3¼ in. Price: £9 19s. 6d. (post and packing 4s.).

MPA25. 25W power amplifier. 10 silicon and germanium semiconductors. Output impedance: 7·5-16 ohms. Input sensitivity: 180 mV for 25W output. Supply: 50-60V DC. Size: 8 × 2 × 3¼ in. Price: £7 10s.

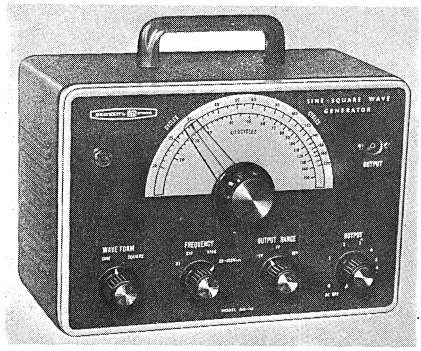
PS24/40. Mains power supply unit. Input: 110/240V 40-60 Hz. Fully smoothed and isolated output. AC and DC fused. Output: 24V and 45V at 1A. Suitable for one MPA12+12 or one or two MPA12. Mounted on metal chassis. Price: £3 10s. (post and packing 3s.).

MU24/40. Mains power supply unit. Similar to PS24/40 but with additional choke/capacitor filtering and panel voltage selectors. Price: £4 7s. 6d. (post and packing 3s. 6d.).

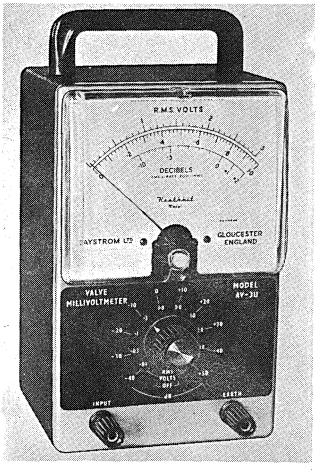
MU60. Mains power supply unit. Choke smoothed output 50V 1A. Suitable for use with one or two MPA25 amplifiers. Price: £4 15s. (post and packing 4s.).

Transistorised FM Tuner. Geared slow motion full tuning. Range 87-105 MHz. AGC, AFC. Ratio detector. Multiplex adaptor. Aerial imp 75 ohms. Output: max 80 mV for 100 μV aerial; min 2½ mV for 1μV aerial. Psn 9V. 9 mA. Size: 3½ × 2¼ × 4 in. Price (kit): £7 19s. 6d.

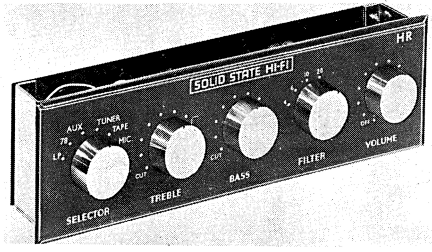
Heathkit OS-2 service oscilloscope



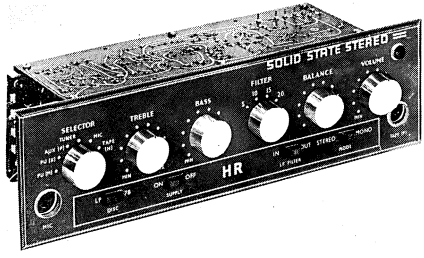
Heathkit AO-1U audio generator



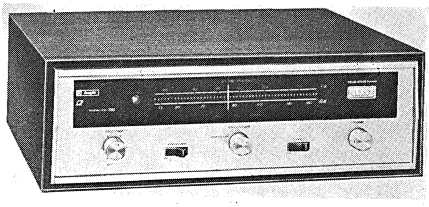
Heathkit AV-3U audio millivoltmeter



Henry's SP6-2



Henry's MP3



Knight Kit KG790

Knight Kit KG-765A

KNIGHT-KITS. Electroniques (Prop S.T.C.) Ltd., Edinburgh Way, Harlow, Essex. Tel: 0279-6 26811.

Knight-kit KG765A. AM/FM tuner. Ranges: VHF 88-108 MHz, MW 195-550 m. Variable tuning. Ratio detector. Meter tuning indicator. Sensitivity: 1·25 μV for 20 dB quieting, 2·5 μV for 30 dB quieting. Aerial input: 300 ohms balanced. Output: 500 mV low impedance. Multiplex decoder included. Switchable AFC. Mains: 230-250V 50 Hz. Size: $13 \times 11 \times 2\frac{3}{4}$ in. AM whistle filter. Automatic mono/stereo switching. Stereo indicator light. Price: £55 16s. 10d. (plus £2 3s. 4d. PT); teak case £5 3s. (plus 13s. 9d. PT).

Knight-kit KG790. AM/FM tuner. Ranges: 87·5-108·5 MHz, 188-570 m. Variable tuning. Ratio detector. Meter tuning indicator. Sensitivity: 1·25 μV for 20 dB quieting, 2·5 μV for 30 dB quieting. Aerial input: 300 ohms balanced. Output: 500 mV low impedance. Multiplex decoder included. AM whistle filter. Automatic mono/stereo switching. Stereo indicator light. Four IF stages. Mains: 230-250V 50 Hz. Size: $5 \times 16\frac{3}{4} \times 15$ in. Price: £1000s. 3d. (plus £37s. 11d. PT); teak case £7 14s. 6d. (plus £1 0s. 7d. PT).

Knight-kit KG795. FM/VHF tuner. Range: 88-108 MHz. Variable tuning. Ratio detector. Meter tuning indicator. Sensitivity: 3 μV for 20 dB quieting. Aerial input: 300 ohms balanced. Stereo multiplex decoder included. Switchable AFC. Automatic mono/stereo switching. Stereo indicator light. Two tuned RF stages. Mains: 230-250V 50 Hz. Size: $13 \times 10 \times 3\frac{3}{8}$ in. Price: £37 12s. 2d. (plus £1 12s. 8d. PT); teak case £4 18s. 6d. (plus 13s. 1d. PT).

Knight-kit KG980. Stereo tuner amplifier. Range: 88-108 MHz. Variable tuning. Ratio detector. Meter tuning indicator. Sensitivity: 3 μV for 30 dB quieting. Aerial impedance 300 ohms balanced. Multiplex decoder included. AFC. Inputs: PU 2·5 mV, aux 250 mV. Controls: bass, treble, volume, balance, selector, mono/stereo, tape/source, on/off. Output: 34W. HD $<1\%$ at full output. FR 20 Hz-20 KHz ± 1 dB at full power. Noise level: -65 dB. Output impedance: 4-16 ohms. Automatic mono/stereo switching. Stereo indicator light. Channel separation 30 dB. Mains: 230-250V 50 Hz. Size: $16 \times 13\frac{1}{2} \times 4$ in. Price: £75 6s. 1d. (plus £1 18s. 6d. PT); teak case £5 6s.

Knight-kit KG964. AM/FM stereo tuner amplifier. Ranges: VHF 88-108 MHz, 188-570 m. Variable tuning. Ratio detector. Meter tuning indicator. Sensitivity: 1·25 μV for 20 dB quieting on FM, 3 μV for 10 dB quieting on AM. Aerial input 300 ohms balanced. Multiplex decoder included. AFC. Inputs: tape 2·5 mV, PU 2·5 mV, aux 250 mV. Noise level: -60 dB. Controls: bass, treble, volume, balance, selector, plus eight switches. Transistors. Output 36W RMS. HD $<1\%$ at full power. FR 20 Hz-35 KHz ± 1 dB at full power. Output impedance: 4, 8, 16 ohms. Mains: 220-240V 50 Hz. Automatic mono/stereo switching. Stereo indicator lamp. Size: $16\frac{3}{4} \times 15 \times 5$ in. Price: £109 18s. 9d. (plus £2 16s. PT); teak case £8 11s. 5d.

Knight-kit KG240. Integrated stereo amplifier. Valves. Inputs: PU 500 mV, radio 500 mV. Noise level -60 dB. Controls: two volume, treble, on/off, bass, selector. Output: 16W RMS. HD $<1{\cdot}5\%$ at rated output. Output impedance: 8, 16 ohms. Size: $10 \times 7 \times 5$ in. Mains: 230-250V 50 Hz. Price: £23 17s. 5d.; metal cover £2 15s. 9d.

Knight-kit KG854. Integrated stereo transistor amplifier. Inputs: tape 2·5 mV, PU 3 mV, radio 500 mV, aux(1) 250 mV, aux(2) 1V. Controls: bass, volume, balance, treble, selector, stereo reverse, loudness, bass and treble filters, mode switch. Output: 34W RMS. HD $<1\%$ at rated output. FR 20 Hz-25 KHz ± 1 dB. Output impedance: 8, 16 ohms. Mains: 230-250V 50 Hz. Size: $13 \times 11 \times 2\frac{3}{4}$ in. Price: £51 18s. 6d.; teak case £5 14s. 4d.

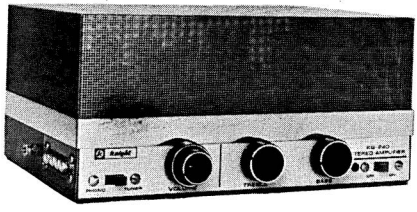
Knight-kit KG865. Integrated stereo transistor amplifier. Inputs: PU 5 mV, radio 500 mV, aux 500 mV. Noise level -65 dB. Controls: selector, balance, bass, volume, treble, mode, phones/speaker. Output: 34W RMS. HD $<0{\cdot}7\%$ at rated output. FR 18 Hz-30 KHz ± 1 dB. Output impedance: 4-16 ohms, plus stereo headphone socket. Size: $13 \times 10 \times 3\frac{3}{8}$ in. Mains: 230-250V 50 Hz. Price: £39 2s. 6d.; teak case £5 11s. 7d.

Knight-kit KG870. Integrated stereo transistor amplifier. Inputs: radio, mag PU, tape head, aux(1), aux(2). Noise level -68 dB. Controls: selector, two bass, balance, volume, two treble, bass and treble filter, monitor, mode, speaker/phones. Output: 28W RMS. HD $<0{\cdot}5\%$. FR 20 Hz-25 KHz ± 1 dB. Output impedance: 8, 16 ohms. Size: $13 \times 11 \times 2\frac{3}{4}$ in. Mains: 230-250V 50 Hz. Price: £56 12s. 5d.; teak case £5 16s. 9d.

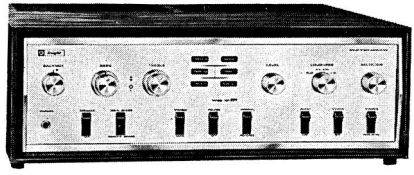
Knight Kit KG-795 (top), KG865 (bottom)

Knight Kit KG-870

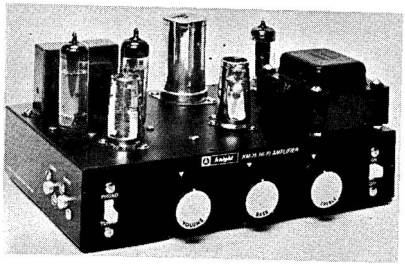
Knight Kit KG-980



Knight Kit KG-240

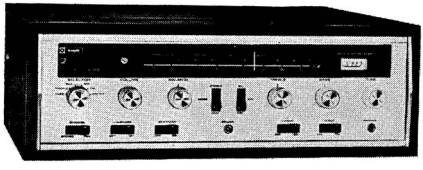


Knight Kit KG-895

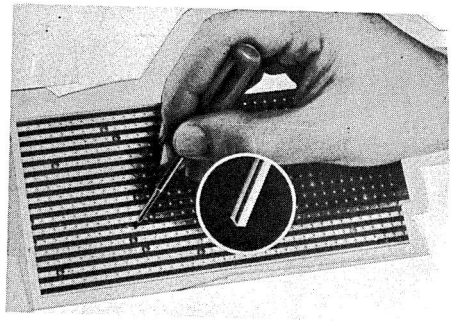


Knight Kit KM15

Knight Kit KG-854



Knight Kit KG-964



Veroboard and Vero spot face cutter

●**Knight-kit KG895.** Integrated stereo transistor amplifier. Inputs: radio 250 mV, PU 2·5 mV, tape head 2 mV, tape monitor 500 mV, aux(1) 250 mV, aux(2) 250 mV. Output: 80W RMS into 8 ohms. HD <0·7% at rated output. FR 18 Hz-30 KHz. Output impedance: 8-16 ohms. Mains: 230-250V 50 Hz. Size: $16\frac{3}{4} \times 15 \times 5$ in. Price: £94 18s. 10d.; teak case £8 15s. 1d.

Knight-kit KM15. Mono integrated valve amplifier. Inputs: PU 5 mV, radio 500 mV. Controls: bass, treble, volume, selector, on/off. Output: 12W RMS. HD <1% at rated output. FR 30 Hz-15 KHz ±1·5 dB. Noise level: >65 dB down. Output impedance: 4, 8, 16 ohms. Output valves: two EL84. Mains: 230-250V 50 Hz. Size: $9\frac{1}{2} \times 6 \times 5$ in. Price: £17 18s.; metal case £2 17s. 2d.

★

MARTIN ELECTRONICS LTD., 154-155 High Street, Brentford, Middx. Tel: 01-560 1161.

Audiokit 1/4. Transistorised mono control unit. Inputs: from 3 mV according to signal input requirements; RIAA correction on PU input. Output: 200 mV. Controls: sel. switch (tape head, mag pu, crystal pu, radio, aux, mic). Filters: bass cut and lift, treble cut and lift, low pass 20 KHz. FR 45 Hz-20 KHz. H and N −70 dB. Psn 9-15V DC. Easily adapted to stereo. To operate with Audiokit 5. Size: $8 \times 3\frac{1}{4} \times 1\frac{3}{4}$ in. Price: £7 2s. 6d.

●**Audiokit 1/4/S.** Transistorised stereo control unit. Details as for 1/4. Size: $8 \times 3\frac{1}{4} \times 3\frac{3}{4}$ in. Price: £13.

Audiokit 5. Transistorised mono amplifier. 10W. HD 0·25%. Response 40 Hz-20 KHz. Feedback 60 dB. NL −85 dB. Input: 100 mV. LS matching 3 ohms. Psn 24V DC, 0·8 amps. To operate with Audiokits 1/2, 1/4, 2/3, 3/4. Size: $4\frac{1}{2} \times 4 \times 3\frac{1}{2}$ in. Price: £6 5s.

Audiokit 7. Similar to Audiokit 5 but for 15 ohms speaker. Operates from 40V. Price: £6 19s. 6d.

Audiokit 15, 16 and 17. FM/VHF tuner. Variable tuning 88-108 MHz. Ratio detector. Sensitivity 2 μV for 20 dB quieting. Aerial input: 75 ohms balanced or coaxial. Output: 100 mV 100K. Multiplex decoder will be available when service starts. AFC. Power supply 9V battery. Consumption 12 mA. Size: $9\frac{1}{2} \times 3\frac{1}{2} \times 4$ in. behind panel. Supplied as three units for home assembly into cabinet. Price: £13 17s. 4d. (plus £1 2s. 2d. PT).

Several new kits being finalised but details of specifications and prices not available at time of going to press.

★

SINCLAIR RADIONICS LTD. See Amplifiers and Control Units Section.

★

WELLBROOK ENGINEERING AND ELECTRONICS LTD., Brooks Street, Stockport, Cheshire.

Ferranti tuners and amplifiers. Kits of parts and constructional data available for Ferranti six-input preamplifier, 30W stereo transistor amplifier and FM tuner. Full details on request.

★

VERO ELECTRONICS LIMITED, Industrial Estate, Chandler's Ford, Hants. Tel: 2921. Cables: Vero Chandlersford. Telex: 47551.

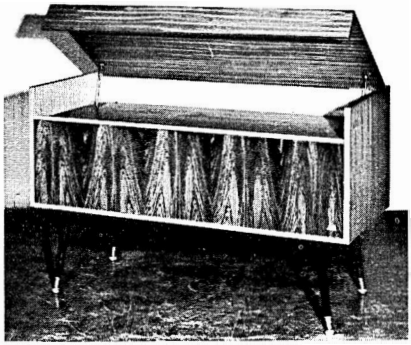
VEROBOARD *(Registered Trademark)*. Internationally used Universal Wiring Board.

AMK 1. Introductory kit containing: 1 Spot face cutter, 2 Veroboards $2\frac{1}{2}$ in. wide by $3\frac{3}{4}$ in. long and 2 Veroboards $2\frac{1}{2}$ in. wide by 5 in. long. Price: £1 1s. 6d.

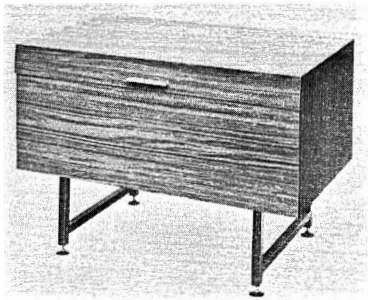
AMK 2. Pack of 5 Veroboards, $2\frac{1}{2} \times 3\frac{3}{4}$ in. Price: 16s. 3d.

AMK 3. Pack of 5 Veroboards, $2\frac{1}{2} \times 5$ in. Price: 19s. 8d.

Please add 2s. 6d. for postage and packing to each order.

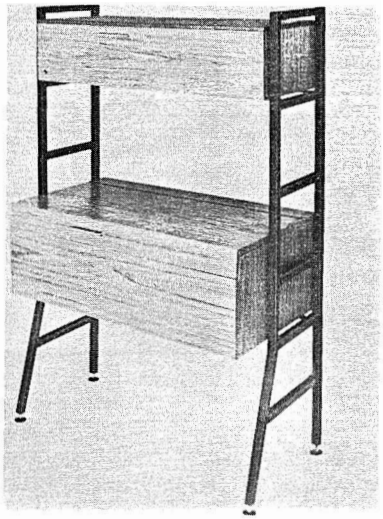


A. Davies contemporary horizontal

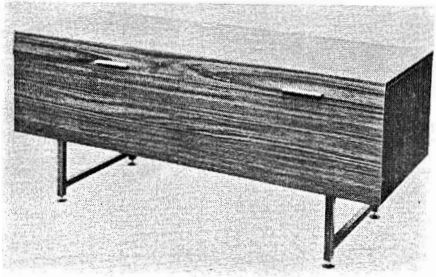


GKD Huntingdon Mk. II

Hampstead High Fidelity



GKD Duette



GKD Anglian Mk. II

Franklin Queen Anne-style chest

HI-FI CABINETS

BARZILAY CO. Distributors: Howland-West Ltd., 2 Park End, South Hill Park, London, N.W.3. Tel: 01-794 6666.

Design 1B. Complete hi-fi cabinet assembly comprising contemporary upright style equipment cabinet and two speaker enclosures. Speakers can be placed at each end of main cabinet to form single unit, or placed separately in the room. Main cabinet has one-piece lift-up lid and three front sliding doors. Accommodation for all types of equipment plus record and tape storage. Size: 81 in. wide, 18¾ in. deep, 28¾ in. high. Finish: American walnut. Price: £189 10s. 10d. (plus £15 15s. 1d. PT).

Design 2B. Complete hi-fi cabinet incorporating reflex enclosures for 12 in. or 15 in. units at each end. Lift-up lid to centre portion giving access to accommodation for tuner, amplifier, control unit and record deck or tape deck. Front sliding doors conceal storage space for records and tapes. Distinctive grille to speaker enclosures. Size: 102 in. wide, 18½ in. deep, 28¾ in. high. Finish: American walnut. Price: £133 (plus £11 1s. 1d. PT).

Design 5. Contemporary hi-fi cabinet available with matching speaker enclosures, the whole plinth mounted. Supplied ready built or in kit form. Front-opening sliding tambour panelled doors. Accommodation for all equipment and speaker units up to 15 in. Size: 96 in. wide, 18 in. deep, 29 in. high. Speaker cabinets 24 in. wide, main cabinet 48 in. wide. Finish: American walnut. Price: £180 10s. (plus £15 0s. 1d. PT).

K.89. Contemporary low-line hi-fi cabinet for stereo equipment or record storage. Sliding front tambour doors. Accommodation for all units or records. Designed to permit stacking of one unit on top of another. Size: 72 in. wide, 18 in. deep, 17½ in. high. Finish: American walnut. Price: £82 (plus £6 11s. 7d. PT).

★

CENTRE OF SOUND. V. J. Monk Ltd., 140-141 Plumstead Road, London, S.E.18. Tel: 01-854 2369.

Monk Lowline. Designed to take the majority of modern equipment. Can be custom built to suit customer's requirements. Standard size: 41 × 17 × 8 in. (plus legs and Perspex lid). Finish: teak or mahogany. Price: £12 12s.

Individual speaker cabinets and equipment cabinets designed and made at competitive prices. Enquiries welcomed.

★

CONNOISSEUR. See A. R. Sugden and Co. Ltd.

★

A. DAVIES & COMPANY, 3 Parkhill Place, off Parkhill Road, Hampstead, London, N.W.3. Tel: 01-485 5775.

Contemporary horizontal. Horizontal style cabinet with full-width lift-up lid in choice of sapele, oak, walnut, or teak. Rosewood front if desired. Pneumatic lid stay. Overall size: 29 in. high (including 12 in. legs), 20 in. deep, and in widths of 25½ in., 36 in., 48 in., 60 in. and 72 in. Prices: (25½ in.) £19 5s.; (36 in) £23 2s.; (48 in.) £28 17s.; (60 in.) £36 17s.; (72 in.) £46 4s. Extra for rosewood front.

★

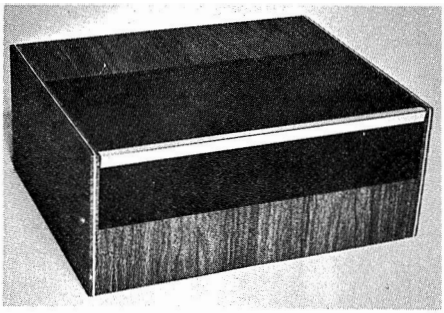
EATON AUDIO FITMENTS, Leopold Street, Long Eaton, Nottingham. Tel: Long Eaton 2662/2818.

Speaker, amplifier, tuner and record cabinets made to customers' requirements. Submit full details for quotation. See also Speaker Enclosure Section.

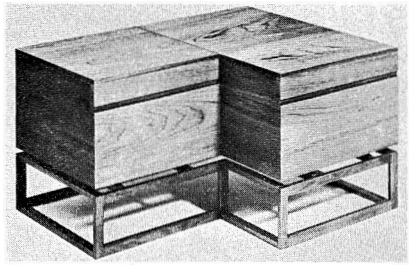
★

EXPERT GRAMOPHONES (SERVICES) LTD., 30 Vincent Road, Kingston-upon-Thames, Surrey. Tel: 01-546 6011.

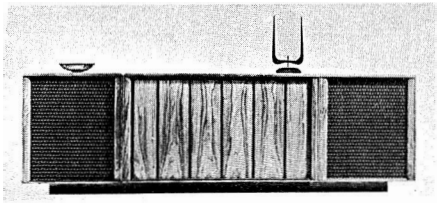
Specialists in top quality tailor-made high-fidelity installations. Special control units, etc., designed and made to customers' exact requirements. Commissions undertaken to design and manufacture modern furniture and/or built-in units for high-fidelity housing.



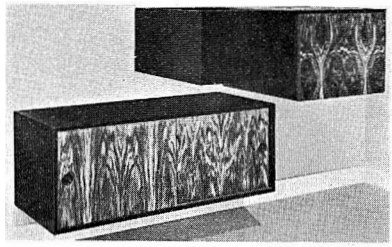
Franklin transcription box



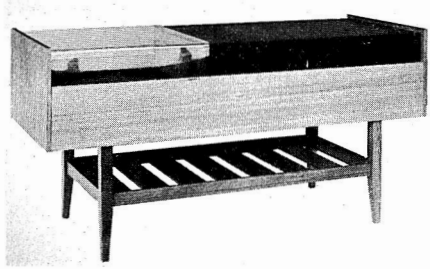
Handmade Cabinets Arundel



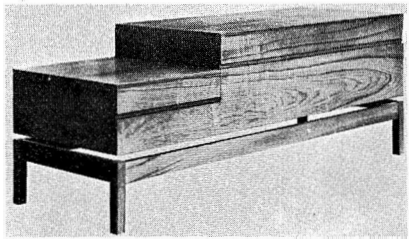
Barzilay Design 5



Handmade Cabinets Gloucester



Howland-West Viking Major



Handmade Cabinets Avon

Imhofs HFU/18 Jacobean

Holder Pearce free-standing assembly

G.K.D. LTD., 45 Crawley Green Road, Luton, Beds. Tel: Luton 26661/2.

Leak shelf cabinet. Shelf-mounting cabinet to take Leak pre-amplifier or tuner. Finish: selected teak or walnut. Size: $12\frac{1}{8} \times 9\frac{1}{2} \times 5$ in. Price on request.

Leak Stereo 30 shelf cabinet. Shelf-mounting cabinet to take Leak Stereo 30 integrated amplifier. Finish: selected teak or walnut. Size: $13\frac{5}{8} \times 9\frac{1}{2} \times 5$ in. Price on request.

Southdown Mk II. Lowline cabinet designed exclusively for all current Leak equipment (including Stereo 30), gram unit or tape deck. Finish: selected teak or walnut. Lift-up lid. Sprung motor board. Concealed spring-loaded drawer houses equipment and control knobs. Amplifier section free for storage when Stereo 30 used. Size: $34 \times 21 \times 25$ in. (including legs). Motor board $18\frac{1}{4}$ in. wide, $19\frac{1}{4}$ in. deep, 4 in. above, $8\frac{1}{4}$ in. below. Price on request.

Huntingdon Mk II. Lowline cabinet suitable for most equipment including Quad, Leak, Rogers, Armstrong, Truvox, Chapman, etc. Finish: selected teak or walnut. Lift-up lid giving easy access to controls, gram unit and tape deck. Size: $35\frac{3}{4} \times 21\frac{1}{8} \times 25\frac{1}{4}$ in. (including legs). Motor board $17\frac{3}{4}$ in. wide, $19\frac{3}{4}$ in. deep, 4 in. above, $8\frac{1}{4}$ in. below. Price on request.

Chiltern Mk II. Lowline cabinet designed exclusively for all current Leak equipment including Stereo 30. Finish: selected teak or walnut. Lift-up lid. Spring-loaded drawer houses equipment and controls. Top compartment takes gram unit, tape deck, or complete recorder in its case. Size: $54 \times 21 \times 25$ in. (including legs). Motor board $18\frac{1}{4}$ in. wide, $19\frac{1}{4}$ in. deep, 4 in. above, $8\frac{1}{4}$ in. below. Price on request.

Anglian Mk II. Lowline cabinet suitable for most equipment including Quad, Leak, Rogers, Armstrong, Truvox, Chapman, etc. Finish: selected teak or walnut. Lift-up lid giving easy access to controls, gram unit and tape deck. Size: $55\frac{1}{8} \times 21\frac{1}{8} \times 25\frac{1}{4}$ in. (including legs). Combined motor board and tape section 37 in. wide, $19\frac{3}{4}$ in. deep, 4 in. above, $8\frac{3}{4}$ in. below. Price on request.

Duette. Wall or free-standing cabinet assembly. Can be used as room divider. Comprises two units: upper cabinet for control units, tuner or integrated amplifier; lower cabinet for gram unit, tape deck and main amplifiers. Suitable for Leak Stereo 30 or other similar integrated amplifiers. Top cabinet has drop-down lid, lower cabinet has lift-up lid. Finish: Formica, natural teak or dark Australian walnut. Size: $38 \times 21 \times 58$ in. Lower cabinet 34 in. wide, 19 in. deep, 11 in. high (motor board height adjustable). Upper cabinet (internal) $33\frac{7}{8}$ in. wide, $13\frac{1}{4}$ in. deep, $7\frac{1}{4}$ in. high. Fascia panel $34 \times 7\frac{1}{4}$ in. Price on request.

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HAMPSTEAD HIGH FIDELITY, 91a/91b Heath Street, Hampstead, London, N.W.3. Tel: 01-435-6377.

Hampstead. Low upright cabinet with lift-up lid for gram unit and tape deck. Split lid available at small extra charge. Pull-out front hopper for tuner and control unit or integrated amplifier. Will accommodate gram unit, tape deck, tuner, control unit and amplifier. Takes any pre-amplifier or integrated amplifier not exceeding 14 in. in depth. Available with tape section made into well to hold complete recorder up to 9 in. in height. Special version 2 in. longer for Ferrograph and Revox with professional size spools. Size (standard model): $36 \times 26 \times 20$ in. Prices: (mahogany, walnut or teak) £44. Special model for Revox and Ferrograph £46 (all finishes).

Special cabinets and fitments made to order. Designs and drawings prepared for complete room or house hi-fi schemes.

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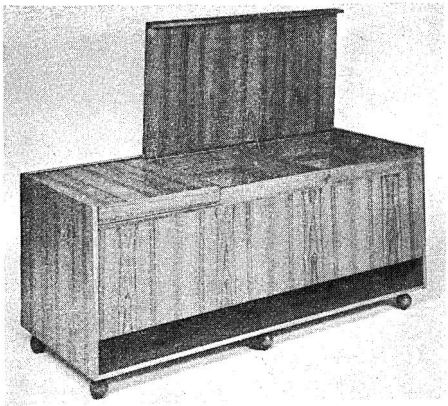
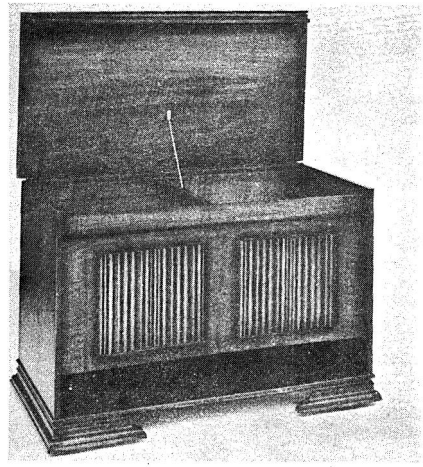
HANDMADE CABINETS LTD., 1 De Crespigny Park, Denmark Hill, London, S.E.5. Tel: 01-703 4567.

Gloucester. Two wall-hung contemporary units, one for equipment, matching one for records. Two sliding lids on top, drop-down lid giving access to controls on equipment cabinet. Accommodates any turntable unit plus amplifier/tuner. Space for about 250 records. Equipment cabinet: $38\frac{1}{2} \times 19\frac{1}{8} \times 14\frac{3}{4}$ in. Record cabinet: 39 in. long, $14\frac{1}{2}$ in. high, 15 in. deep, divided into four equal sections. Finish: Rosewood/ebony on high-grade $\frac{3}{4}$ in. ply. Other finishes to order. Designed for enthusiast not requiring space for tape but desiring compact contemporary equipment housing. Price: £53 complete.

Arundel. Lowline "L" shaped contemporary design on boxframe legs. Arrangement gives modern "floating look." Two lift-up lids. Accommodation for turntable unit, transistor

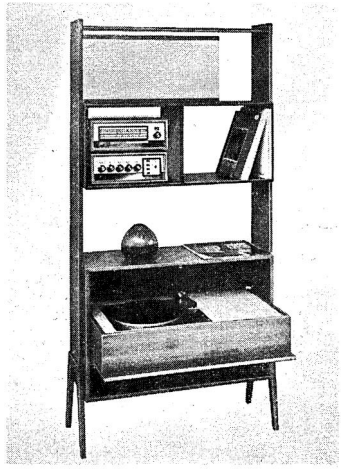


Imhofs Trolley type 10

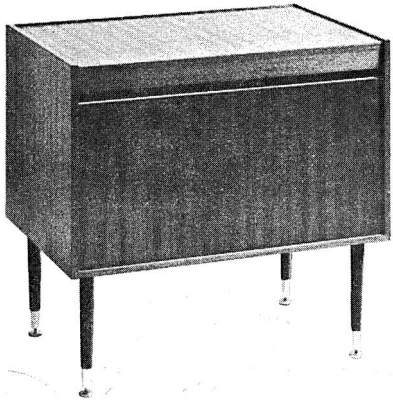


Imhofs Trolley L (Jacobean)

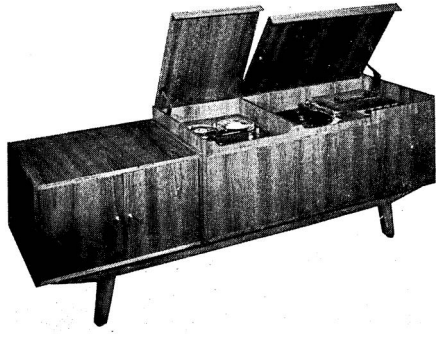
Imhofs W.S.1



Imhofs wall unit



Imhof HFU/IL



Largs Caithness

tuner and amplifier, tape recorder (including Ferrograph) in its case. Size: 42 in. wide, 32 in. deep, 14 in. high (plus 11 in. for boxframe). Turntable section $19\frac{3}{8} \times 18\frac{3}{4}$ in. Amplifier/tape section $20\frac{3}{4} \times 32$ in. Finish: Crowncut teak veneers on $\frac{3}{4}$ in. lipped chipboard. Solid teak legs and frame. Other finishes to order. Novel and practicable solution to accommodate large quantity of equipment in very small space. Price: £55.

Avon. Lowline contemporary split-level design on legs. Incorporates "floating look." Two lift-up lids. Accommodates almost any combination of turntable unit, tape deck, tuner and amplifier. Size: 64 in. long, 21 in. deep, 14 in. high (plus 9 in. legs). Turntable section: $18\frac{3}{8}$ in. wide, $19\frac{3}{4}$ in. deep. Amplifier section: 24 in. wide, $19\frac{3}{4}$ in. deep. Tape section: $19\frac{3}{4}$ in. wide, $19\frac{3}{4}$ in. deep. Finish: Crowncut teak veneers on $\frac{3}{4}$ in. lipped chipboard. Legs and underframe in solid teak. Other finishes to order. Price: £65.

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HEATHKIT. Manufactured by Daystrom Ltd., Bristol Road, Gloucester. Tel: Gloucester 29451.

Malvern. Horizontal cabinet. Available in kit form or assembled "in the white." Takes gram unit, tape deck, tuner and amplifier. Lift-up lid, sliding doors. Overall size: $39\frac{1}{8} \times 21\frac{3}{4} \times 32$ in. Price: £18 5s. in kit form.

Gloucester. Horizontal cabinet. Available in kit form or assembled "in the white". Takes gram unit or tapedeck, tuner and amplifier. Lift-up lid. Overall size: $46\frac{1}{8} \times 21 \times 30$ in. Price: £18 14s. in kit form.

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HOLDER PEARCE LTD., 66 Grove Road, Eastbourne, Sussex. Tel: Eastbourne 26565.

Built-in or free-standing equipment cabinets designed and built to meet customers' exact requirements. Lift-up or drop-down lids, accommodation to suit any equipment, all standard finishes and also special finishes to blend with furnishings. Details and prices on application.

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HOWLAND-WEST LTD., 2 Park End, South Hill Park, London, N.W.3. Tel: 01-794 6666.

Malmo II. Horizontal cabinet in teak or walnut. Takes all combinations of equipment. Lift-up lid and front opening doors. Overall size: 36 in. wide, 22 in. deep, 26 in. high (inc. 9 in. legs). Motor board $34\frac{3}{4} \times 20$ in. Front panel $35 \times 8\frac{1}{4}$ in. Front panel is recessed 2 in. Magnetic door catches. Motor board adjustable to maximum clearance of 6 in. above. Price (both finishes): £30 (plus £2 9s. 10d. PT).

Tromso II. Lowline cabinet in teak, walnut or teak with rosewood front panel. Takes gram unit or tape deck, tuner and amplifier. Two lift-up lids. Overall size: $48 \times 20 \times 14$ in. less plinth. Price (teak or walnut): £35 (plus £2 18s. 2d. PT); (teak/rosewood): £36 (plus £2 19s. 10d. PT).

Viking Standard. Lowline shelf-mounting equipment cabinet. Sliding perspex lid to record or tape deck compartment. Accommodation for amplifier, control unit, record unit or tape deck. Size: 39 in. wide, $19\frac{1}{4}$ in. deep, 12 in. high (14 in. plinth optional extra). Amplifier compartment: $18\frac{1}{2} \times 16\frac{3}{4} \times 10\frac{1}{2}$ in. Motor board: 18×19 in. Control panel: $17\frac{1}{2} \times 6$ in. Finish: teak and matt black. Price: £23 10s. (plus £1 19s. 1d. PT); plinth £7 (plus 11s. 8d. PT).

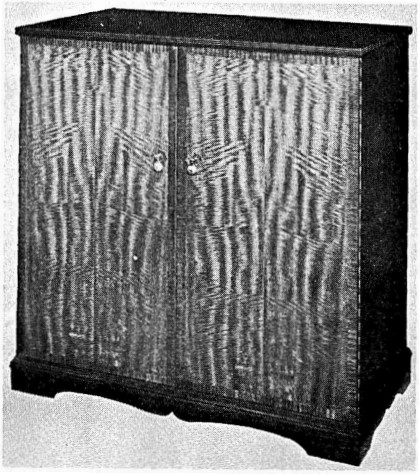
Viking Major. Lowline shelf- or plinth-mounting equipment cabinet. Sliding perspex lid to record or tape deck compartment. Accommodation for amplifier, control unit, tuner, record unit or tape deck. Size: 51 in. wide, $19\frac{1}{4}$ in. deep, 12 in. high (14 in. plinth optional extra). Amplifier compartment: $30\frac{1}{2} \times 16\frac{3}{4} \times 10\frac{1}{2}$ in. Motor board: 18×19 in. Control panel: $29\frac{1}{2}$ in. wide, 6 in. high. Finish: teak and matt black. Price: £27 10s. (plus £2 5s. 9d. PT); plinth £7 (plus 11s. 8d. PT).

Clearview H.W.1. Cabinet in teak, walnut or rosewood. Takes gram unit or tape deck. Lift-off perspex lid. Overall size: $18\frac{1}{4} \times 16\frac{1}{2} \times 8\frac{1}{2}$ in. Clearance above board $3\frac{3}{4}$ in., below board $4\frac{1}{2}$ in. Price: £9 15s. (plus 16s. 2d. PT).

Extra high top. Special version of H.W.1 provides 6 in. clearance above motor board. Additional cost: 16s. 1d.

Clearview H.W.7. Shelf- or table-mounting gram unit cabinet. Perspex lid. Motor board cut for Garrard SP25, AT60 etc. Size: $15\frac{3}{4}$ in. wide, $14\frac{1}{2}$ in. deep, $7\frac{1}{2}$ in. high at edges rising to $8\frac{1}{4}$ in. at the centre. Finish: teak. Price: £6 11s. (plus £1 9s. PT).

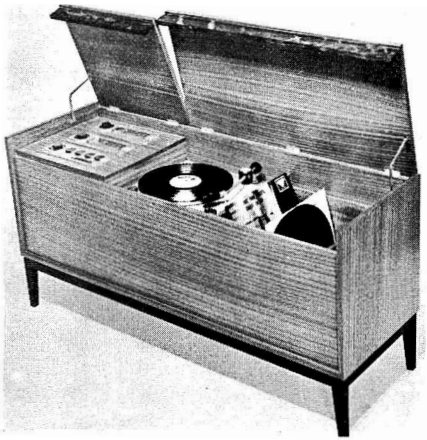
Clearview H.W.8. Similar to H.W.7 but with uncut motor board. Height available above motor board $3\frac{1}{4}$-$4\frac{1}{4}$ in.; depth below top of motor board 3 in. Price: £7 7s. 8d. (plus 12s. 4d. PT).



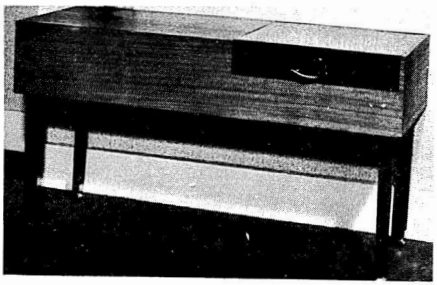
Largs Classic

Largs Argyll

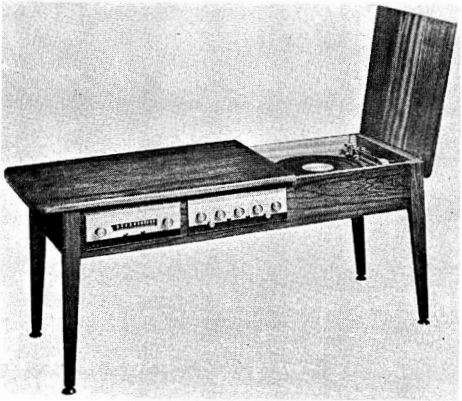
Largs Clarendon



PWB model A2



Monk Equipment cabinet



Largs Lanark

Clearview H.W.12. Cabinet in teak. Takes gram unit or tape deck. Lift-off perspex lid. Overall size: $23\frac{1}{2} \times 19 \times 8\frac{1}{2}$ in. Clearance above board $3\frac{3}{4}$ in., below board $4\frac{1}{2}$ in. Price: £12 15s. (plus £1 1s. 2d. PT).

Clearview H.W.13. Similar to H.W.1, but dimensions $18 \times 18\frac{1}{2} \times 8\frac{1}{2}$ in. Price: £10 10s. (plus 17s. 5d. PT).

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IMHOFS. 112-116 New Oxford Street, London, W.C.1. Tel: 01-636 7878. Cables: Imcase, London, W.C.1.

HFU/10. Control cabinet with three compartments. Will house the largest of control equipment including tape decks. Finish: Light or dark sapele mahogany, walnut, bleached pine or teak. Separate lift-up lid to each of the three compartments. Size: $52 \times 27 \times 21$ in. (including legs). Compartments 15 in., 18 in. and $16\frac{1}{2}$ in. wide, all $19\frac{1}{8}$ in. deep. Prices: £37 10s. 9d. (plus PT).

Type L Jacobean. Similar to Type L but in Jacobean style. Size: $36\frac{1}{2}$ in. wide, 19 in. deep, 24 in. high (including 3 in. concealed castors). Internal sizes as trolley L. Price: £33 14s. 11d. (plus PT).

Type 10. Trolley equipment cabinet. A larger version of the trolley L cabinet. A third compartment has been added to accommodate a tape recorder or to provide storage space for records. Three separate lids, each with a stay, give access to the compartments. Size: $54\frac{1}{4}$ in. wide, 21 in. deep, 24 in. high (including 3 in. castors). Motor boards: left 17 in. wide, centre $18\frac{3}{4}$ in. wide, right 16 in. wide, all 19 in. deep. Finish: light or dark sapele mahogany, two-tone mahogany or walnut. Teak or Jacobean styling at slight extra cost. Price: £41 7s. (plus PT).

HFU/18 Mk II. Compact upright style cabinet with lift-up lid and two front opening doors concealing control panel. Designed to house the average small hi-fi system. Ideal unit for modern homes. Size: 24 in. wide, 19 in. deep, 28 in. high (including 6 in. legs). Motor board $21\frac{3}{4}$ in. wide, 17 in. deep. Control panel $21\frac{3}{4}$ in. wide, 14 in. high. Finish: mahogany, teak or walnut. Price: £18 17s. (plus PT).

Imhof W.S.1. Wall or shelf mounting unit suitable for transistorised or smaller type valve equipment. Size: 24 in. high, 16 in. wide, 15 in. deep. Motor board: 15 in. wide, $13\frac{3}{4}$ in. deep, 3 in. below. Maximum amplifier size: $15 \times 12\frac{1}{2} \times 6$ in. Finish: oiled teak (to match BS/4 speaker), walnut or sapele mahogany. Price: £13 9s. 2d. (plus PT); cut-outs to suit motor and control units, as selected, £2 2s. extra.

Imhof Wall Unit. Two upper shelves for speaker, tuner, amplifier, etc. Lower swivel-front compartment for motor unit. Size (overall): 34 in. wide, 12 in. deep, 72 in. high. Finish: mahogany or walnut. Price: £35 7s. 8d. (plus PT).

IMIII/AT6. Designed to house the Garrard AT6 motor. Finish: walnut or mahogany. Lift-up lid. Size: $17 \times 9\frac{1}{2} \times 15\frac{1}{2}$ in. Price: £8 18s. (plus PT).

IMIIIB. Similar to above but measuring $19 \times 8 \times 18\frac{1}{4}$ in. Price: £8 18s. (plus PT).

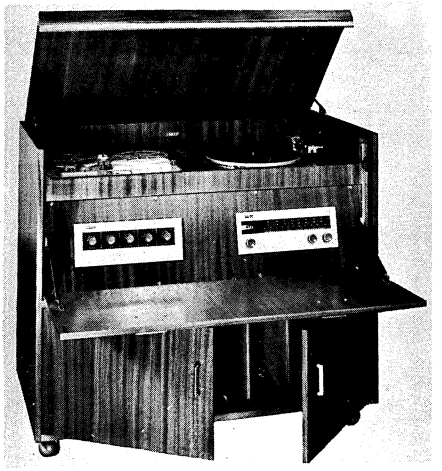
HFU/12. Modern sideboard style equipment cabinet with accommodation for tape deck, transcription motor, amplifier, tuner and over 250 records. Centre sliding section conceals instrument panel and two other panels give access to storage space. Centre portion of top surface hinges up to provide access to turntable or tape deck. Size: 60 in. wide, 22 in. deep, 30 in. high (including 6 in. base). Two 19×19 in. motor boards. Control panel 19 in. wide, $15\frac{1}{2}$ in. high. Left-hand compartment 19 in. wide, 19 in deep, 11 in. high. Right-hand compartment 19 in. wide, 19 in. deep, 18 in. high. Finish: teak, walnut, sapele. Price: £53 19s. 2d. (plus PT).

HFU/12 Regency. Similar to HFU/12 but in Regency styling. Size: 61 in. wide, 24 in. deep, 30 in. high (including 6 in. legs). Price: £74 14s. 10d. (plus PT).

HFU/16M. Two compartment cabinet with drawer for tape recorder. Either side will accommodate any transcription motor (or autochanger) and is large enough for the SME3012 arm. Finish: Teak and rosewood; two-tone sapele mahogany; walnut. Single lift-up lid at top. Right-hand side has drop-down panel with withdrawable deck. Size: $41\frac{1}{4} \times 22 \times 28$ in. (including $7\frac{1}{2}$ in. legs). Compartments all 19 in. wide, 20 in. deep. Height above tape recorder deck is 12 in. Price: £38 8s. 5d. (plus PT).

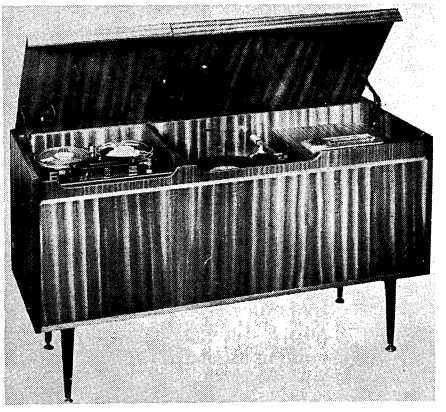
HFU/16M Jacobean. Similar to HFU/16M but in Jacobean styling. Size: 42 in. wide, $22\frac{1}{2}$ in. deep, 27 in. high (including legs). Price: £41 5s. (plus PT).

HFU/1L. Control cabinet. Designed to allow a tuner to be fitted alongside a transcription



Largs Sutherland

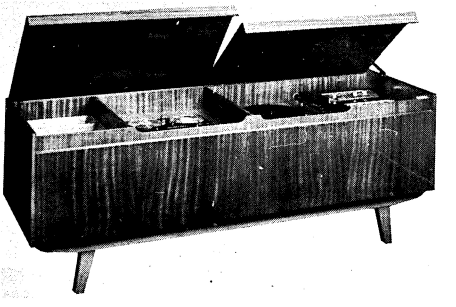
Largs Sheraton 'B'



Largs Trio

Largs Hepplewhite

Largs Olympic



Largs Quartette

motor. Finish: Walnut, mahogany, bleached pine, teak. Lift-up lid. Size: 28 × 19 × 26 in. (including 10 in. legs). Price: £23 2s. (plus PT).

Type L. Trolley cabinet with two compartments. Easy-running finger-tip movement. Finish: Light or dark sapele mahogany, two-tone mahogany, walnut, teak. Two lift-up lids. Size: 35¾ × 18 × 24 in. (including castors). Compartments 17½ in. and 15½ in. wide, both 16 in. deep. Price: £31 11s. 4d. (plus PT).

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KIRKMAN (CRAWLEY) LTD., 40 The Broadway, Crawley, Sussex. Tel: OCY3-26670.

Sussex. Lowline cabinet on legs to match Broadway equipment cabinet. One lift-up lid. Accommodation for over 100 12 in. records, plus 14 8¼ in. tapes. Overall dimensions: 19½ in. wide, 20 in. deep, 25½ in. high. Internal dimensions: (rear section) 18 in. wide, 12½ in. deep, 13½ in. high; (front section) 18 in. wide, 5½ in. deep, 9 in. high. Finish: teak. Price to be announced.

Broadway. Lowline equipment cabinet on legs. Two lift-up lids. Accommodates turntable, tape unit, any tuner/amplifier combination. Overall dimensions: 57 in. wide, 20 in. deep, 21 in. high (including legs). Two compartments with lids each 18 in. wide, 18½ in. deep, 9 in. high (internal). One central enclosed compartment with sloping front: 9 in. high, 18 in. wide, 18½ in. deep (max), 17 in. deep (min). Gram and tape compartments acoustically sealed to prevent acoustic feedback and noise from tape motors. Finish: teak. Price to be announced.

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LARGS OF HOLBORN, 76-77 High Holborn, London, W.C.1. Tel: 01-242 2626 (PBX).

Olympic. Upright cabinet with pull-out control panel in oiled teak, satin mahogany, walnut. Takes gram unit, tape deck, tuner and amplifiers. Lift-up lid with tensioned lid stays. Fitted with Shepherd castors. Overall size: 40 × 22 × 29 in. Particularly suitable for Quad, Leak and Ferrograph equipment. Price: £55.

Small Olympic. Similar in style and appearance to Olympic but slightly smaller. Size: 37½ in. long, 18 in. deep, 26 in. high (plus 3 in. castors). Finish: oiled teak, satin mahogany/walnut. Price: £48.

Quartette. Lowline cabinet in oiled teak or mahogany/walnut satin. Two lift-up lids with tension stays. Takes gram unit, tape deck, tuner, control unit and records. Size: 66 in. long, 18 in. deep, 26 in. high. Price: £45.

Large Quartette. Similar in style and appearance to Quartette but especially suitable for larger equipment, i.e. Ferrograph, SME, etc. Size: 70 in. long, 26 in. high, 22 in. deep. Price: £52.

Classic. Traditional style upright equipment cabinet with top lid for gram or tape unit and two front opening doors giving access to front panel with record storage below. Overall size: 26 in. wide, 19½ in. deep, 39 in. high including plinth. Motor board 23½ in. wide, 16½ in. deep, 4 in. below lid. Control panel 23 in. wide, 9½ in. high. Finish: Walnut, sapele or mahogany veneer. Price: £48.

Sheraton B. Reproduction style cabinet in walnut or mahogany. Two front-opening doors with record storage. Lift-up lid. Space for tuner, control unit and turntable. Size: 38¾ in. long, 18¾ in. deep, 32 in. high including legs. Price: £85.

Hepplewhite A. Reproduction chest of drawers in curled mahogany or walnut. Lift-up lid with two stays. Dummy drawers. Will accommodate tuner, control unit and turntable. Size: 38 in. long, 20¼ in. deep, 31½ in. high including legs. Price: £115.

Caithness. Modern lowline cabinet made in three sections: main equipment cabinet, record and tape storage cabinet, plinth. Main cabinet will accommodate tuner, control unit, turntable and tape deck. Two lift-up lids. Storage cabinet has fixed top and being slightly lower than main cabinet provides ideal setting for ornament or flowers. Size: 78 in. long, 22 in. deep, 26 in. high including 9 in. plinth. Price: £78 15s.

Sutherland. Designed to take large amount of big equipment together with comprehensive record library. Lift-up lid with two stays covers space for turntable and tape deck, drop-down front conceals panel for tuner and control unit. Two front-opening doors at bottom give access to record storage. Size: 40 in. long, 21½ in. deep, 35 in. high. Finish: oiled teak or satin mahogany/walnut. Price: £60 18s.

Stirling. Compact-looking modern cabinet with room for tuner, control unit, turntable and smaller types of tape unit, also space for record

storage. Lift-up lid with two stays and sliding doors at front. Size: 40 in. long, 20 in. deep, 27 in. high including 2 in. castors. Finish: oiled teak or satin mahogany/walnut. Price: £59.

Trio. Two lift-up lids cover three compartments, the third compartment being fitted for tape deck or record storage whilst first two accommodate turntable, tuner and control unit. Modern clean style cabinet finished in oiled teak, or satin mahogany/walnut. Size: 48 in. long, 18 in. deep, 26 in. high including 9 in. legs. Price: £42.

Large Trio. Similar in style and appearance to Trio but designed for larger equipment, i.e. Ferrograph, SME, etc. Size: 54 in. long, 18 in. deep, 26 in. high including 9 in. legs. Price: £49.

Lanark. Coffee table with lift-up lid concealing compartment for record unit. Accommodation for transistor tuner and amplifier. Specially designed for Leak equipment. Length 54 in., height 22¾ in., front to back 19¾ in. Price: £35 10s.

Argyll. Miniature cabinet designed for transistor equipment. Right-hand section will accept all but the largest turntables. Removable transparent plastic dust cover. Left-hand section accommodates tuner and integrated amplifier. Open storage space for records. Price to be announced.

Clarendon. Elegant reproduction cabinet with accommodation for record unit, tape deck, tuner, amplifier and record storage. Single lift-up lid. Two front-opening doors. Size (overall): 38 in. wide, 40¾ in. high (including 9½ in. legs), 19 in. deep. Motor and tape deck board: 36½ in. wide, 17 in. deep, 4 in. clearance below lid. Control panel: 17 in. wide, 15 in. high. Record storage: 18 in. wide, 15 in. high. Price: £98.

The high-fidelity equipment cabinets listed and illustrated represent only a small selection of Largs' tailor-made products. Largs operates its own cabinet factory and invites enquiries for cabinets to customers' own specifications.

Prices quoted include delivery within 20 miles of High Holborn.

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MEDLEY MUSICAL LTD., 4 Felltram Way, Charlton, London, S.E.7. Tel: 01-858 3426/7.

TP1. Teak plinth with vacuum-formed tinted perspex dust cover. Suitable for BSR tape deck or other similar equipment. Base size: 14½ × 15¼ × 3½ in. Overall height: 7½ in. Price: £6 6s. (plus 10s. PT).

TP2. Large teak plinth with vacuum-formed tinted Perspex dust cover. Suitable for Sony TC250A tape deck or other similar equipment. Base size: 16½ × 19 × 4 in. Overall height: 7½ in. Price: £8 8s. (plus 14s. PT).

Teak cases. Shelf mounting teak cases in various sizes. Perspex cover will hinge or can be removed completely when desired. Will accommodate most tape decks and other similar equipment. TP8: 18 × 16 × 8½ in. Price: £8 8s. (plus 14s. PT); TP9: 16 × 15 × 8½ in. Price: £7 15s. (plus 12s. 11d. PT); TP10: 18 × 16 × 10 in. Price: £9 9s. (plus 15s. 9d. PT); TP12: 24 × 18 × 8¾ in. Price: £10 10s. (plus 17s. 7d. PT).

Perspex covers. Dust covers in tinted Perspex for small tape recorders or Garrard bases. Small: 13½ × 14½ × 3½ in. Price: £3 5s.; Large: 15¼ × 14¼ × 3½ in. Price: £3 15s.

Leak Case. Teak case to accommodate Leak Stereo 30 amplifier. Price: £3 3s. (plus 5s. 10d.

Medley Fidelio. Lowline cabinet on legs. Designed to accommodate Leak, Rogers, Armstrong, etc. Amplifier mounts behind drop-down wooden panel which conceals knobs and is fitted with magnetic catch. Fitted Perspex lid will hinge and is removable. All-wood version available. Finish: teak (other finishes to order). Size: 39 in. wide, 16½ in. deep, 24½ in. high (including 12½ in. legs). Price: (with Perspex cover) £18 18s. (plus £1 1s. 10d. PT); (with wooden lid) £19 19s. (plus £1 2s. 10d. PT).

Medley M.M. Unit. Compact wall mounting shelf and player cabinet unit. Shelves (three) can be arranged as desired. Turntable housed in cabinet which folds up when not in use. Shelves rebated for leads. Ideal space saver. Finish: medium teak. Shelves available in 2 ft 6 in., 3 ft, 4 ft lengths. Illustrated leaflet on request. Price: (with 13 ft 6 in. shelf length, gram unit cabinet, bearers, screws, etc) £22 1s.

Medley Table Cabinet. Equipment is set into recessed teak panel. Knobs discreetly covered by wooden panel held by magnetic catch. Accommodates most makes of equipment including Rogers, Leak, Fisher, Armstrong, etc. Front edge bevelled to take off the square look. Finish: teak. Size: 26 in. wide, 14 in. deep, 6½ in. high. Full details on request. Price: £10 12s. 6d. (including PT).

NICHOLS ACOUSTICAL FITMENTS, Church Street, Bubwith, Nr Selby, Yorks. Tel: Bubwith 206.

Equipment cabinets. Standard and custom-built hi-fi cabinets to customers' requirements.

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P.W.B. AUDIO LTD., 33 Call Lane, Leeds 1, Yorkshire. Tel: 0532 28559.

Model A1. Lowline style with single lift-up lid. Takes gram unit, tuner and amplifier. Finish: Teak, walnut, mahogany or oak. Matching or black legs. Rosewood drop on front of lid optional extra. Size: 36 × 16½ × 27 in. Motor board 17½ × 15 in. deep. Amplifier section 17½ × 15 in. deep. Price: £25.

Model A2. Lowline style with twin lift-up lids, smaller left-hand lid over amplifier and tuner section, larger right-hand lid over gram unit and record storage section. Finish: Teak, walnut, mahogany, oak. Matching or black legs. Rosewood drop on front of lids optional extra. Takes gram unit, tuner, amplifier, and has provision for record storage. Record storage section lifts out to permit tape deck to be fitted. Size: 52 × 16 × 27 in. Internal sections dimensioned as required. Price: £35.

★

POLY-SOUND LTD., A. R. Franklin (audio engineer), 34 Surrey Street, Croydon, Surrey.

Special cabinets. Individually styled cabinets to customers' requirements. Equipment built-in to existing furniture. Cabinets or shelves built-in, any shape or size. Matching Period style equipment cabinets and speaker enclosures made to individual requirements. Quotations on request.

★

RECORD HOUSING, Brook Road, Wood Green, London, N.22. Tel: 01-888 7487.

Longfellow. Lowline cabinet in teak. Takes gram unit, tape deck, tuner, amplifier. Record storage (150). One central lift-up lid plus two drop flaps. Overall size: 76½ × 21 × 14 in. (plus 9 in. for legs). Will take complete tape-recorder and largest players, transcription or autochange. Price: £54 12s.

Lowflex. Lowline cabinet in teak. Takes gram unit, tape deck, tuner, amplifier, etc. Lift-up lids, one with pneumatic stay. Overall size: 59 × 21 × 14 in. (plus 9 in. for legs). Record storage on left. Partition removable if not required. Price: £38 17s.

Schubert. Upright cabinet in walnut, mahogany or teak. Takes gram unit, tape deck or complete recorder, tuner, amplifier and record storage. Lift-up lids, fold-back doors, right-hand compartment for storage. Overall size: 42 × 21 × 25 in. (plus 6 in. for legs). Price (walnut, mahogany or teak): £46 4s.

Scan Equipment Cabinet. For use as shelf unit or with optional legs. One lift-up lid. Accommodation for gram unit (or tape deck), tuner and amplifier. Size: 19¾ in. wide, 16½ in. deep, 15 in. high. Finish: teak, walnut or mahogany. Price: (without legs) £9 19s.; (with legs) £11.

Lowline Two. Lowline equipment cabinet. Single lift-up lid controlled by pneumatic stay. Accommodation for (1): gram unit, tuner, amplifier and records, or (2): complete tape recorder, gram unit, tuner, amplifier. Space for complete Ferrograph recorder or turntable unit with SME 12 in. arm. Size: 42 in. wide, 21 in. deep, 15 in. high (plus 6 in. legs). Finish: teak, walnut. Price: £29 8s.

Britten. Upright style equipment cabinet with record storage. One lift-up lid. Accommodation for gram unit (or tape deck), tuner and amplifier plus 150 records. Size: 20 in. wide, 19½ in. deep, 36 in. high. Finish: teak, walnut or mahogany. Price: £28 7s.

Playview. Shelf unit to accommodate gram turntable. Patented hinge or lift-off lid. Size: 19 in. wide, 19 in. deep, 8 in. high. Price: £9 9s.

Andante. Long lowline equipment cabinet comprising three sections. Lift-up lids to right- and left-hand sections, drop front to centre section. Accommodation for turntable and pick-up, including 12 in. SME arm; largest tape recorders, e.g. Ferrograph or Revox with 10 in. spools; tuner, amplifier and control unit. Size: 63 in. wide, 21 in. deep, 14 in. high (plus 11 in. legs). Finish: teak. Adjustable glides to legs provide firm level standing even on irregular floors. Price: £40 19s.

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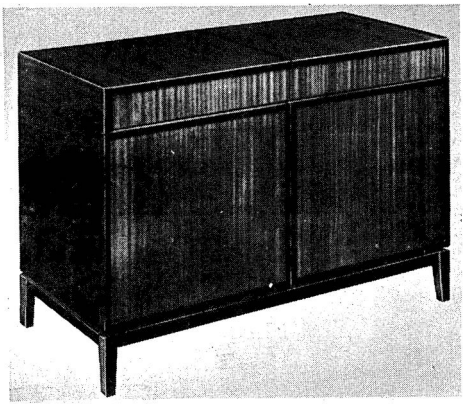
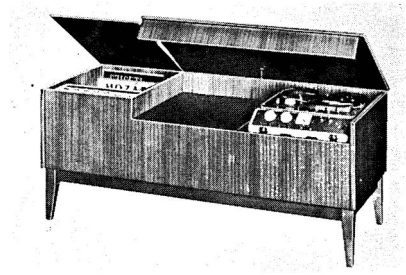
MONK. See Centre of Sound.



Record Housing Schubert



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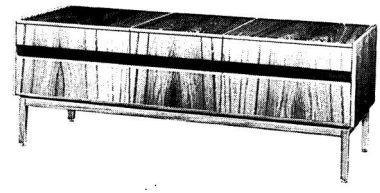

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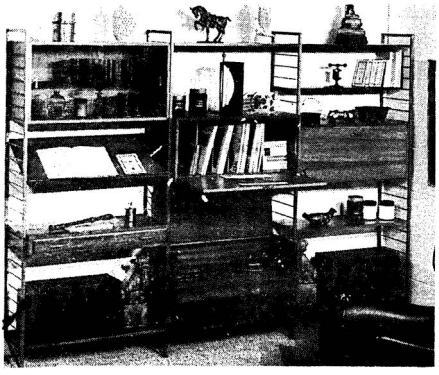

Staples Ladderax Hi-Fi

STAPLES & CO. LTD., Staples Corner, Junction Edgware Road and North Circular Road, London, N.W.2. Tel: 01-452 1144/7.

Ladderax. Unit system hi-fi cabinet designed to fit Staples Ladderax assembly. Lift-up main lid giving access to space for tuner, control unit and record or tape deck. Front panel removable to facilitate installation. Will accept most modern equipment. Size: 35 in. wide, 17 in. deep, $18\frac{3}{4}$ in. high. Motor board: $33\frac{3}{4} \times 16 \times \frac{1}{2}$ in., height above $5\frac{3}{4}$ in. Finish: teak veneered only. Full details of other matching units on request. Prices from about £24 10s.

★

A. R. SUGDEN & CO. (ENGINEERING) LTD., Market Street, Brighouse, Yorkshire. Tel: Brighouse 2142. Cables: Connoiseur, Yorkshire.

Connoisseur. Shelf mounting equipment cabinet with lift-off transparent lid. Accommodates turntable and equipment. Overall size: $16 \times 14 \times 7$ in. Depth below top board: 4 in. Headroom inside cover: $2\frac{5}{8}$ in. Finish: Afrormosia wood with light grey top and black base. Fitted four rubber feet. Price: £8 10s.

★

TYSONS, 41 Russell Street, Leamington Spa. Tel: Leamington Spa 24935.

Tysonic Dower Chest. Lowline style in oak. Suitable for gram unit, tape deck, tuner, amplifier. Lift-up lid. Generally 36 in. to 48 in. long. Prices: £35 to £50.

Equipment installed in antique or reproduction furniture to customers' requirements. Dower chests a speciality.

★

WHITELEY ELECTRICAL RADIO CO. LTD., Victoria Street, Mansfield, Nottinghamshire. Tel: 24762-5. Cables: Whitebon, Mansfield.

C16 Thoresby Equipment Console. Upright style equipment cabinet with lift-up lid. Takes most makes of gram unit or tape deck, amplifier, control unit and tuner. Available in mahogany or walnut. Supplied packed flat and easily assembled in a few minutes with a screwdriver only. Size: $19\frac{3}{8} \times 18 \times 31$ in. Price: (mahogany) £19 10s. 3d. (plus £1 15s. 3d. PT); (walnut) £20 3s. 2d. (plus £1 16s. 5d. PT).

DIRECTORY OF FM/VHF AERIALS

AERIALITE LTD., Hargreaves Works, Congleton, Cheshire. Tel: Congleton 2471/3.

Aerloft. Band II loft mounting dipole with rigid elements. Light, easily fitted, adjustable base. Price: (86A three-element) £1 4s.; (86B two-element) £1.

Aerpole 900/MU. Band II outdoor dipole with stand-off arm and universal bracket to fit up to 2 in. diameter masts. Price: £1 12s.

Aeraitch 901/XU. Band II wide-spaced H array with attachment to fit masts up to 2 in. diameter. Price: £2.

Aerfringe 902/XU. Band II three-element array comprising director, folded dipole and director. Bracket for mast attachment up to 2 in. diameter. Price: £2 17s. 6d.

FM adaptors 616. Comprises two add-on units for clamping to existing Band I dipole with $\frac{1}{2}$ in. diameter vertical elements. Price: 12s. 6d.

★

ANTIFERENCE LTD., Bicester Road, Aylesbury, Bucks. Tel: Aylesbury 2511.

Loft 233. Band II three-element loft aerial with folded dipole. Universal mounting clamp with stand-off arm. Fully adjustable for angle and direction. Price: £2 1s.

214/1A. Band II single dipole array with 7 in. stand-off arm and universal "grip-on" clamp to fit masts up to 2 in. diameter. Price: £1 13s. 6d.

214/2B. Band II wall mounting single dipole array. 15 in. × 1 in. stand-off arm and universal fitting bracket. Price: £1 17s. 6d.

214/9C. Band II chimney mounting single dipole array. 3 ft × 1 in. swan-neck arm and single lashing. Price: £3 0s. 9d.

224. Band II dipole and reflector array with universal clamp to fit masts up to 2 in. diameter. Price: £2 4s.

224/9M. Band II dipole and reflector array with 5 ft × 1 in. cranked mast and single chimney lashing. Price: £4 6s.

234. Band II three-element array comprising folded dipole, director and reflector with universal clamp for masts up to 2 in. diameter. Price: £3 2s. 6d.

234/9M. Band II three-element array with 5 ft × 1 in. cranked mast and single lashing. Price: £5 4s. 6d.

Addex-FM. Adaptor stubs for adding to vertical Band I, III or Band I/III arrays with $\frac{3}{8}$ in. or $\frac{1}{2}$ in. diameter elements. Price: 11s. 6d. pair.

★

J. BEAM ENGINEERING LTD., Rothersthorpe Crescent, Northampton. Tel: Northampton 62147.

FM1. Band II dipole with screw connection for attachment to any diameter mast. Tunes whole FM Band. $\frac{3}{8}$ in. dia aluminium elements. Price: 13s.

FMG.1. Band II dipole with 7 in. stand-off aluminium arm with universal grip to fit any mast up to 2 in. diameter. $\frac{3}{8}$ in. aluminium elements with heavily plated universal clamp. Price: £1 1s. 6d.

FM2. Band II dipole with reflector, 1 in. diameter aluminium boom, heavily plated universal clamp to fit any mast up to 2 in. diameter. $\frac{3}{8}$ in. aluminium elements. Rustproof precision-cast fittings and waterproof junction box. Price: £1 12s.

FM3. Band II dipole, reflector and director mounted on 1 in. diameter aluminium boom. Heavily plated universal clamp for fitting to any mast up to 2 in. diameter. $\frac{3}{8}$ in. diameter aluminium elements. Rustproof precision-cast fittings and waterproof junction box. Price: £2 4s.

●**FM4.S.** Band II folded dipole, two directors and folded reflector. Specially designed for stereo radio which calls for a larger signal input to overcome the drop in signal-to-noise ratio due to the multiplex stereo system. Each array is peaked on local stereo frequency. High front-to-back ratio and clean polar diagram. 1 in. diameter aluminium crossbar. $\frac{1}{2}$ in. diameter elements. Waterproof junction box. Die-cast

element clamps with aluminium securing bolts. Heavily plated universal clamp for masts 1 in.-2 in. diameter. For extreme range two FM4.S can be stacked one above the other (6 or 7 ft apart) and connected together by PM/3 phasing and matching harness. Price: FM4.S aerial array £4 7s., PM/3 harness £1 10s.

●**FM6.S.** Band II broad-band long-range six-element aerial covering 88-98 MHz. Array comprises dipole, reflector and four directors. Careful design of director chain provides clean polar diagram. For stacked arrays two FM6.S aerials can be connected together by PM/3 harness. Price: FM6.S aerial array £6, PM/3 harness £1 10s.

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BELLING-LEE AERIALS LTD., Heysham Road, Netherton, Bootle 10, Liverpool, Lancs. Tel: Aintree 1736.

At time of going to press Belling-Lee aerials are available from address above but from a date to be announced production and marketing will be undertaken by Antiference Ltd., Aylesbury,

1F/FM. Band II dipole for indoor use. Two-element array with elements adjustable to form V if required. Swivel base. Vertical or horizontal mounting. Suitable for room or loft use. Price: £1 1s.

1A/FM. Band II dipole array for outside use. Price: £1 3s. 3d.

2A/FM. Band II H aerial comprising dipole and reflector mounted on boom. Universal clamp to fit all masts. Price: £2 2s.

3A/FM. Band II three-element array comprising director, dipole and reflector with feeder matching link. Universal clamp to fit all masts. Price: £3.

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BEN NEVIS AERIALS, Belmont Works, Belmont Site, Lewis Street, Stranraer, Scotland. Tel: Stranraer 2677/8.

Ben Nevis V1. Band II single dipole with stand-off arm and universal mast clamp for 1-2 in. masts. Price: £1 6s. 6d.

Ben Nevis V2. Band II dipole and reflector with boom and stand-off arm and universal mast clamp. Price: £1 16s.

Ben Nevis V3. Band II three-element array comprising director, folded dipole and reflector, with stand-off arm and universal mast clamp. Price: £2 10s.

Ben Nevis V4. Band II four-element array comprising two directors, folded dipole and reflector, with stand-off arm and universal mast clamp. Price: £3.

Regal RV1. Similar to V1 but aerial array plastic-coated by Plastalux process and fitted anti-vibration insulators. Ideal for exposed locations or where subject to corrosion. Price: £1 16s.

Regal RV2. Similar to V2 but array plastic-coated and fitted anti-vibration insulators. Price: £3.

Regal RV3. Similar to V3 but array plastic-coated and fitted anti-vibration insulators. Price: £4 11s.

Regal RV4. Similar to V4 but array plastic-coated and fitted anti-vibration insulators. Price: £5 11s.

V.H.F. aerials custom-built to individual customer's specification.

★

K.V.A. ELECTRONICS, 27 Central Parade. New Addington, Surrey. Tel: Lodge Hill 2266.

FML. Band II loft dipole. Two-screw fixing bracket, rotatable base, arms of dipole adjustable to V for optimum results or to clear obstructions. Price: 15s.

FM.SD/W. Band II wall-mounting single dipole with fixing bracket, stand-off arm and provision for swivelling aerial for optimum results. Price: £1 10s.

FML/H. Band II loft-type H aerial comprising dipole, reflector, mounting boom and stand-off arm. Fixing bracket permits aerial to be orientated for best results. Price: £1 12s. 6d.

FML/Y3. Band II three-element loft array comprising director, folded dipole and reflector with stand-off arm and fixing bracket. Particularly suitable in areas where signal strength is poor or where "ghosting" causes distortion. Price: £2 15s.

FML/Y4. Similar to FML/Y3 but with two directors. Price: £3 2s. 6d.

FM/HC. Band II horizontally polarised outside H aerial comprising dipole, reflector, boom, cranked arm mast and chimney lashing equipment. Price: £3 10s.

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LABGEAR LTD., Cromwell Road, Cambridge. Tel: Cambridge 47301.

Labgear 202. Band II dipole with single reflector. Price: £1 14s.

Labgear 203. Band II three-element array comprising director, folded dipole and reflector. Price: £2 17s. 6d.

Labgear 205/W. Band II dipole with cranked arm and wall bracket. Price: 18s.

Labgear 205/L. Band II dipole for loft mounting. Price: 14s.

Alloy masts from 6 ft × 1½ in. to 16 ft × 2 in., cranked arms and single and double chimney lashings.

Labgear 202/Z2. Band II dipole with single reflector. Supplied complete with cranked arm and lashing. Price: £3 7s.

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MAXVIEW AERIALS LTD., Maxview Works. Setch, Kings Lynn, Norfolk. Tel: Watlington (Norfolk) 376.

Maxview D/DW. Band II wall-mounting dipole with stand-off arm and adjustable swivel fitting. Price: £1 12s.

Maxview D/DM. Band II dipole array with bracket for mast fitting. Price: £1 6s. 4d.

Maxview D/HM. Band II array comprising dipole and reflector on boom. Bracket for mast mounting. Price: £1 16s. 8d.

Maxview D/S3. Band II three-element array comprising director, dipole and reflector. Bracket for mast mounting. Price: £2 4s.

Maxview D/FD3. Band II three-element array comprising director, folded dipole and reflector. Bracket for mast mounting. Price: £2 12s. 6d.

Maxview D/STB. Band II Twig stub add-on units for TV aerials to boost Band II reception. Price: 10s. 8d.

TELECRAFT LTD., Quadrant Works, Wortley Road, Croydon, Surrey. Tel: 01-684 1191/3.

Telecraft FM1. Band II single dipole with stand-off arm and wall mounting swivel bracket. Price: approx £1 2s. 6d.

Telecraft FM2. Band II array comprising dipole and reflector with universal mast-head fixing bracket. Price: approx £1 10s.

Telecraft FM2-MB. Similar to FM2 but supplied with mast and chimney bracket. Price: approx £2 5s.

Telecraft FM3. Band II yagi array comprising dipole, reflector and director. Price: approx £2 2s.

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TELEFIELD MANUFACTURING CO. LTD., 2 Tucker Street, Bristol 2. Tel: 0272 28339.

Telefield D2/FM. Band II outdoor single dipole with stand-off arm for wall, eaves or fascia mounting. Price: £1 3s. 9d.

Telefield D2.U. Band II outdoor single dipole with universal clamp for mast attachment. Price: £1 6s.

Telefield S2. Band II stub adaptors for attaching to existing Band I or Band III aerial. Price: 9s.

Telefield H2/FM. Band II dipole and reflector array. Price: £1 15s.

Telefield 3FD2/FM. Band II three-element array comprising director, folded dipole and reflector. Complete with clamp for mast attachment. Price: £2 10s.

Telefield 4FD2/FM. Band II four-element array comprising two directors, folded dipole and reflector. Complete with mast fixing clamp. Price: £3 2s. 6d.

★

VISTA GAIN SALES CO., St Mary-le-bow House, 54 Bow Lane, London, E.C.4. Tel: 01-248 3376 and 1878.

Vista Gain K.2. Band II indoor dipole. Heavily-plated three-step telescopic dipoles adjustable for optimum results. Capacity coupled elements for complete safety. Heavy base. Supplied with three yards low-loss coaxial cable. Price: £2 5s.

COMPLETE-SYSTEM HI-FI

This section of the book gives a selection of "complete-system hi-fi" with technical details. As many of the units are available also as separate items more comprehensive specifications will be found under the appropriate headings.

The list is not necessarily fully comprehensive and other makers who offer equipment which meets the requirements are invited to submit details for inclusion in future editions.

The minimum requirements qualifying a system for mention in this section are:—

1. Sound quality of hi-fi standard.
2. Fully stereophonic record reproduction and/or tape playback.
3. FM or AM/FM radio tuner.
4. Record turntable or tape deck (or both).
5. Matched units (electronically and aesthetically).
6. Marketed as a complete system by one manufacturer.
7. Ready for use by purchaser without fitting parts or wiring up (apart from plugging in mains supply and connecting speakers).
8. Speakers in separate acoustic enclosures. Make and type of speakers can be optional but must be recommended.

ARENA. Distributed by: Highgate Acoustics Ltd., 184-188 Great Portland Street, London, W.1. Tel: 01-636 2901/4.

Arena Audio Plan 1. Comprises F211 tuner, SP25 Mk II with ceramic cartridge, F210 stereo amplifier, two HT14 or HT17 speakers. Price: £115 10s. (including PT); Multiplex stereo decoder £7 7s. extra.

Arena Audio Plan 1a. As for Plan 1 but with magnetic cartridge. Price: £123 18s. (including PT).

Arena Audio Plan II. GF1225 stereo player with amplifier, F211 tuner, two HT14 or HT17 speakers. Price: £134 8s. (including PT); multiplex stereo decoder £7 7s. extra.

Arena Audio Plan III. T2400 tuner/amplifier, LAB80 with magnetic cartridge, two HT20 speakers. Price: £191 2s. (including PT); multiplex stereo decoder £7 7s. extra.

Arena Audio Plan IIIA. As for Plan III but with HT18 speakers in place of HT20. Price: £206 17s.

Arena Audio Plan IV. T2500F tuner/amplifier, LAB80 with magnetic cartridge and two HT20 speakers. Price: £201 12s. (including PT); multiplex stereo decoder £7 7s. extra.

Arena Audio Plan IVA. As for Plan IV but with HT18 speakers in place of HT20. Price: £215 5s. (including PT).

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BRAUN. Fi-Cord Ltd., Charlwoods Road, East Grinstead, Sussex. Tel: East Grinstead 21351.

Audio 250 and TC20. System comprises neat shelf-mounting cabinet containing record deck and tuner/amplifier. Designed for use with any Braun speaker enclosures.

System TC20. All-transistor tuner/amplifier covering VHF, LW and MW. Output: 4·5W per channel. Stereo decoder incorporated. Three-speed PS2 record deck. Adjustable playing weight. Price: £121 16s. 2d. (including PT).

Recommended speakers. L25, L250 (see Speaker Enclosure Section).

Audio 250. Comprises PS410 turntable unit, tuner and amplifier. Fully transistorised. Output: 15W RMS per channel. FR 30 Hz-30 KHz. Distortion: 0·5% at rated output. Tuner: FM, FM-stereo, SW, MW and LW. Stereo beacon. Internal ferrite aerial, pushbutton selected. Record player with fine speed control. Cueing device. Shure M75-6 cartridge. Base in white or

charcoal lacquer with wrinkle finish. Plexiglass lid. Cover plates aluminium colour. Size: 25½ × 6⅝ × 9 in. (with lid 11 in.). Price: £284 17s. 4d.

Recommended speakers. L450, L40, L300, L700 (4 ohms).

★

DUAL. Dual Electronics Ltd., Radnor House, London Road, Norbury, London, S.W.16. Tel: 01-764 9465/6.

DUAL HS-31. System comprises radio tuner, amplifier, tape unit and record deck in cabinet. Designed for use with Dual speaker enclosures. All-transistor. AM/FM tuner covering VHF, LW, MW, SW and 49m band. Variable tuning. AFC. Meter tuning indicator. Stereo decoder fitted. Output: 8W RMS per channel. Dual 1009SK and 1015 record equipment. Shure pickup cartridge. Dual TG-27-CV tape unit. Cabinets finished in teak, rosewood or walnut. Price of complete system. From £115; with CT.12 radio tuner from £185.

★

DYNATRON. Dynatron Radio Ltd., St Peter's Road, Furze Platt, Maidenhead, Berks. Tel: 0628 23331.

DYNATRON AUDIO SEPARATES. System consists of tuner/amplifier, record deck, tape deck and choice of speakers and cabinets.

●**Tuner/amplifier TRV17.** AM/FM stereo tuner covering VHF, MW, LW. Variable tuning. AM and FM tuning meter. Multiplex decoder fitted. Output: 10W RMS per channel. Output impedance 3-15 ohms. FR 30 Hz-24 KHz. HD less than 1% at rated output. 30 transistors and 17 diodes. Stereo indicator. AFC. Price: £74 15s. 1d. (including PT).

Record player P80. Garrard LAB80 Mk II record deck available in separate shelf-mounting case or in cabinet with tuner/amplifier. Two-speed unit (33⅓ and 45 rpm) with manual and auto-change facility. Pickering stereo cartridge with diamond stylus. Price: £53 3s. 1d. (including PT).

Tape unit STR.1. ¼-track stereo mains recorder. Speeds: 7½, 3¾, 1⅞ i/s. Max spool 7 in. Two level meters. Built-in monitoring speaker. Tape position indicator. Pause. Input mixing. 16 transistors and 4 diodes. Price: £100 13s. 10d. (including PT).

K.L.H. Model "Twenty Four"

Dual HS31

Dynatron HFC3 and ST16 stand

Speaker LS.100. Wall or shelf-mounting. $6\frac{1}{2}$ in. bass driver and $3\frac{7}{8}$ in. tweeter. FR 20 Hz-40 KHz. Impedance: 3 ohms. Size: $13\frac{3}{4} \times 7\frac{1}{2} \times 10\frac{1}{4}$ in. Price: £13 5s. 9d. (including PT).

Speaker LS.200. Floor-standing reflex enclosure incorporating 8 in. bass driver and $3\frac{1}{2}$ in. tweeter. FR 20 Hz-40 KHz. Impedance: 3 ohms. Size: $26\frac{3}{4} \times 10\frac{1}{4} \times 10\frac{1}{2}$ in. Price: £20 10s. 1d. (including PT).

Price of complete system. From £150 approx

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FERGUSON. British Radio Corporation Ltd., 284 Southbury Road, Enfield, Middlesex. Tel: 01-366 1155.

FERGUSON UNIT AUDIO. System offers choice of FM or AM/FM tuner/amplifier, record unit and/or tape unit, bookshelf or floor-standing speaker enclosures. All units in teak.

Tuner/amplifier 206STA. FM/VHF tuner with five preset tuning buttons. Incorporates stereo decoder and stereo indicator. 27 transistors and 12 diodes. Output: 7W per channel. FR 30 Hz-20 KHz. Output impedance 8 ohms. HD <1%. Price: £44 3s. 11d. (plus £9 9s. 1d.

Tuner/amplifier 205STA. AM/FM tuner amplifier covering VHF, LW, MW and SW. Incorporates stereo decoder and stereo indicator. 26 transistors and 16 diodes. Output: 7W per channel. FR 30 Hz-20 KHz. Output impedance: 8 ohms. HD <1%. Price: £48 0s. 7d. (plus £10 5s. 5d. PT).

Playing deck 202RP. Shelf-mounting cabinet with Perspex lid and incorporating Garrard SP25 deck with Sonotone 9TA ceramic cartridge. Diamond LP and sapphire 78 styli. Price: £25 5s. 10d. (plus £5 8s. 2d. PT).

Tape unit 3216. $\frac{1}{4}$-track recorder in matching furniture style cabinet. Speeds: $7\frac{1}{2}$, $3\frac{3}{4}$, $1\frac{7}{8}$ i/s. Max spool 7 in. Piano key operation. Pause. Meter indicator. Auto-stop. Input mixing. Price: £53 10s. 2d. (plus £11 8s. 10d. PT).

Speaker 204SS. Compact shelf-mounting enclosure. $6\frac{1}{2}$ in. bass driver and $3\frac{1}{2}$ in. tweeter. FR 30 Hz-15 KHz. Crossover: 3 KHz. Size: $16\frac{3}{4} \times 7\frac{1}{2} \times 8\frac{1}{2}$ in. Can be used horizontally or vertically. Price: £11 9s. 11d. (plus £2 9s. 1d.

Price of complete system. From £112 5s. to £177 5s. approximately.

●**Unit Audio 3400.** Comprises tuner/amplifier and playing desk in coffee table style cabinet. FM 87·5-108 MHz. Stereo decoder and beacon. Preset tuning. Garrard SP25 Mk II deck. Inputs for PU, radio, tape. Transistors. 7W RMS per channel. FR 30 Hz-20 KHz. Output impedance 8 ohms. Mains 200-250V AC. Size: $36\frac{1}{4} \times 14\frac{3}{4} \times 7\frac{1}{2}$ in. (21 in. high on stand). Price: £72 0s. 10d. (plus £15 8s. 2d. PT).

★

GOODMANS. Goodmans Loudspeakers Ltd., Axiom Works, Wembley, Middlesex. Tel: 01-902 1200.

GOODMANS AUDIO SUITE. System comprises AM/FM stereo tuner, record unit, stereo integrated amplifier and choice of three Goodmans speakers.

Stereomax tuner. All-silicon transistor AM/FM tuner covering VHF and MW. Separate tuning systems for AM and FM. Stereo decoder available. AFC switchable and operative on both bands. 20 transistors and 21 diodes. Tuning meter. Quiet tuning. Automatic stereo indicator. Price: £65 5s. (plus £15 14s. PT).

Maxamp 30 amplifier. All-silicon transistor stereo amplifier. Output: 15W RMS per channel. HD <0·3% at 15W. FR 20 Hz-20 KHz $\pm\frac{1}{2}$ dB. Output impedance: 4-8-15 ohms. Price: £54.

Record unit MT1000. Teak or walnut cabinet with lift-up lid incorporating inspection window. Thorens TD150A two-speed turntable and Shure M75-MB cartridge. Pickup lowering device. Mono and stereo diamond stylus. FR 20 Hz-20 KHz. Price: £58 6s. 6d. (plus £14 0s. 8d. PT).

Recommended speakers. Goodmans Maxim, Mezzo II or Magnum K.

Price of complete system. From £240 17s. 4d. to £282 6s. 2d.

★

GRUNDIG (GREAT BRITAIN) LTD., 15 Orchard Street, London, W.1. Tel: 01-935 4898.

Grundig Studio system comprises radio tuner, amplifier and record deck in neat cabinet on metal stand. Designed for use with Grundig speaker enclosures.

Studio 80M. RT40 tuner covering VHF, MW, LW and two SW bands. Stereo decoder with

indicator. Duplex AM and FM tuning. Tuning meter. Switched AFC. 27 transistors and 19 diodes. Variable selectivity. Dual 1019 four-speed record deck. Fine speed control. Shure M75 cartridge with diamond stylus. SV80M amplifier. Output 30W per channel. Output impedance: 4-16 ohms. 29 transistors, 15 diodes. Teak cabinet. Wooden or black metal legs. Size: $35 \times 17\frac{3}{4} \times 24\frac{1}{2}$ in. Price: (walnut) £378; (teak) £387 9s.

Recommended speakers: Box 412, Box 425, Box 30A, Box 40A, Box 80.

★

K.L.H. Distributed by: P. J. N. Collaro Electronics Ltd., 1 Regent Street, London, S.W.1. Tel: 01-839 7571.

●**Twenty.** Compact stereo FM tuner/amplifier system with separate speakers. Range: FM/VHF. Variable tuning. Multiplex decoder. Aerial input 300 ohms. Centre-zero tuning meter. Stereo beacon. Aux inputs. Controls: input selector, bass, treble, balance, slow-motion tuning, volume, mono/stereo, on/off. Output: 40W music. All transistor. Garrard record unit. Pickering cartridge. Two infinite baffle enclosures. 10 in. bass driver, $1\frac{3}{4}$ in. tweeter. Size: (amplifier/player/tuner unit) $18\frac{1}{4} \times 4 \times 14$ in.; (speakers) $23\frac{1}{8} \times 11\frac{3}{4} \times 9$ in. Finish: oiled walnut veneer. Price on application.

●**Twenty-four.** Compact stereo AM/FM tuner/amplifier system with separate speakers. Range: FM/VHF and MW. Variable tuning, separate dials for AM and FM. Aerial input 300 ohms. Multiplex decoder fitted. All transistor. Directly-coupled 30W music power amplifier. Garrard record deck. Pickering cartridge. Two infinite baffle enclosures. Bass driver and tweeter in each. Snap-on grille cloth panels. Size: (amplifier/player/tuner unit) $18\frac{1}{4} \times 14 \times 4$ in.; (speakers) $18 \times 7\frac{1}{4} \times 10\frac{1}{4}$ in. Finish: oiled walnut veneer. Price on application.

●**Twenty-four (FM only).** Similar to Twenty-four except with FM/VHF tuner only. Price on application.

★

MUSICRAFT AUDIO PRODUCTS LTD., 63 High Street, Hounslow, Middlesex. Tel: 01-570 4640.

Musicraft 10.10. All transistor. Waveband: 88-108 MHz. Variable tuning. Controls: tuning, bass, treble, volume, balance, selector and on/off. Output: 10W per channel. FR 40 Hz-18 KHz. Record unit: Garrard SP25. Pickup cartridge: Shure M3D with diamond stylus. Size: 27 in. wide, $17\frac{3}{4}$ in. deep, $24\frac{3}{4}$ in. high. Finish: oiled teak.

Recommended speakers. Radford BCS3 or Jordan-Watts Jumbo.

Complete system. Complete system with Jordan-Watts Jumbo speakers approximately £141 6s., with Radford BCS3 bookcase speakers approximately £166.

★

PHILIPS. Philips Electrical Ltd., Century House, Shaftesbury Avenue, London, W.C.2. Tel: 01-437 7777. Cables: Phillamps, London.

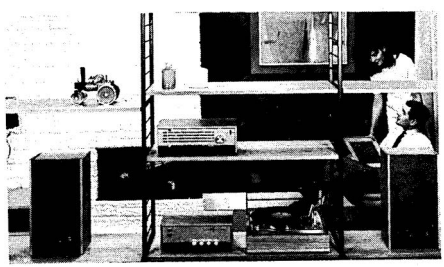
PHILIPS AUDIO PLAN. System offers choice of three tuners, one tuner/amplifier, three stereo amplifiers, three record players and four speaker enclosures.

Tuner GH.926. Mono VHF tuner with variable tuning and three preset stations. Switchable AFC. Transistors. Price: £21 5s. 2d. (plus £4 15s. 6d. PT).

Tuner GH.927. Stereo FM tuner with variable tuning. Stereo decoder incorporated. Switchable AFC. Transistors. Price: £34 10s. 11d. (plus £7 15s. 2d. PT).

Tuner GH.924. Stereo AM/FM tuner covering VHF, LW, MW and SW. Variable tuning. Stereo decoder incorporated. Tuning indicator. AFC on FM. Quiet tuning. Automatic stereo indicator. Price: £53 0s. 4d. (plus £11 18s. 2d. PT).

Amplifier GH.925. Output: 4W RMS per channel. Output impedance: 4-8 ohms. FR 40 Hz-20 KHz. HD $<10\%$. 14 transistors and diodes. Price: £24 3s.



Philips Audio Plan units

Amplifier GH.923. Output: 7W RMS per channel. Output impedance: 4-8 ohms. FR 35 Hz-20 KHz. HD <0·8%. 10 transistors and diodes. Price: £39 18s.

Amplifier GH.919. Output: 20W RMS per channel. Output impedance: 4-8 ohms. FR 25 Hz-20 KHz. HD <0·25%. 22 transistors and diodes. Price: £59 17s.

Record player GA.230. Philips GC.030 record deck in shelf-mounting case with Perspex lid. Four speed. Plug-in magneto-dynamic stereo and LP head. 78 head available. Single player. Price: £47 16s. 8d. (plus £10 14s. 11d. PT).

Record player GA.145. Philips GC.045 four-speed auto-change record deck on plinth. Stereo crystal head. Price: £22 2s. 11d. (plus £4 19s. 6d. PT).

Record player GA.228. Philips GC.028 four-speed single player deck on plinth with clear plastic lid. Stereo crystal head. Price: £15 10s. (plus £3 9s. 8d. PT).

Speaker enclosure GL.559. Compact shelf-mounting enclosure. One 5 in. unit. FR 90 Hz-20 KHz. HC 6W. Impedance: 8 ohms. Size: $10\frac{1}{4} \times 7\frac{1}{2} \times 7\frac{1}{2}$ in. Price: £11 0s. 1d. (including PT).

Speaker enclosure GL.564. Shelf- or floor-mounting enclosure. One 7 in. bass driver and one 4 in. tweeter. FR 60 Hz-20 KHz. HC 15W. Impedance: 8 ohms. Size: $17\frac{3}{4} \times 9\frac{7}{8} \times 7\frac{1}{2}$ in. Price: £21 10s. (including PT).

Speaker enclosure GL.561. Floor-standing enclosure. One $8\frac{1}{2}$ dual-cone unit. FR 70 Hz-17 KHz. HC 15W. Impedance: 7 ohms. Size: $23\frac{5}{8} \times 11\frac{3}{4} \times 8\frac{5}{8}$ in. Price: £19 9s. 9d. (plus £4 7s. 7d. PT).

Speaker enclosure GL.562. Floor standing enclosure. One 12 in. dual-cone bass driver and two 7×5 in. HF units. FR 40 Hz-20 KHz. HC 20W. Impedance: 8 ohms. Size: $26 \times 14\frac{1}{2} \times 11\frac{3}{8}$ in. Price: £39 18s.

Price of complete system. From £70 to £270 approximately.

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SHARP. Sharp Sales and Service, 16/18 Worsley Road, Swinton, Manchester. Tel: 061-794 3232.

●**GS-5500.** Combined stereo tuner/amplifier with record deck and two separate speaker enclosures. AM/FM tuner. Multiplex decoder fitted. Automatic stereo switching. Transcription turntable. Tubular arm. High compliance cartridge with diamond stylus. Output: 12W RMS per channel. FR 30 Hz-17 KHz. All transistor. Infinite baffle compact enclosures. Full specification on request. Price: £154 17s. 1d. (including PT).

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STEREOSOUND PRODUCTIONS LTD., Capital Works, Wakefield Road, Brighouse, Yorkshire. Tel: Brighouse 1755.

●**System 88.** Comprises 88 AM/FM stereo multiplex tuner, integrated amplifier in cabinet with Garrard SP25 player and pair of matching speaker enclosures. Full specification on request. Price: £97 13s. Optional tape system £45 3s. extra.

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TRUVOX LTD., The Hythe, Southampton, Hants. Tel: Hythe 3265 (0421-24-3265).

TRUVOX SERIES 100. System comprises radio tuner, integrated stereo amplifier, stereo tape unit and two enclosures.

Radio tuner FM100. FM/VHF tuner with variable tuning. Decoder available. Switched AFC. Price: £28 15s. 1d. (plus £6 9s. 2d. PT).

Amplifier TSA100. Output 10-18W RMS per channel. Output impedance 4-15 ohms. FR 20 Hz-20 KHz. HD <0·25%. Price: £51 9s.

Tape unit PD104. $\frac{1}{4}$-track ($\frac{1}{2}$-track available). Speeds: $7\frac{1}{2}$, $3\frac{3}{4}$, $1\frac{7}{8}$ i/s. Max spool 7 in. Piano key operation. Auto-stop. Cue control. VU meters. Price: £110 5s. (plus £24 15s. 2d. PT).

Speaker LS120. Compact infinite baffle enclosure. Special 5 in. bass unit, $1\frac{1}{2}$ in. tweeter. FR 35 Hz-15 KHz. Size: $13 \times 8 \times 7$ in. Price: £17 1s. 6d. (plus £3 16s. 8d. PT).

Price of complete system. Approximately £241 (mono), £262 (stereo).

Truvox Series 200. Complete system comprising tape recorder, FM tuner, integrated amplifier and two speakers. For full specification see individual entries. Price from £260 complete including PT.

DIRECTORY OF HI-FI DEALERS

IMPORTANT NOTE: The following list is of shops where stocks of equipment are kept, and where facilities for demonstration exist. It is not necessarily a complete list, and we invite new dealers to submit details for future publications.

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BERKELEY ACOUSTICS, 31 Crawford Street, W.1
BERRY'S RADIO LTD, 25 High Holborn, W.C.1
BOWMAN BROS. LTD, Camden High Street, N.W.1
CHELSEA RECORD CENTRE, 203 King's Road, S.W.3
CUSTOM HIGH FIDELITY, 371 Green Lanes, Palmers Green, N.13
DAVENSET RADIO, 2 Burnt Ash Parade, Lee Green, S.E.12
DAVIS & KAYS LTD, 115 Kingsway, London, W.C.2; 5 Turnpike Parade, London, N.15; 857 High Road, Finchley, London, N.12; 4 High Street, Walthamstow, London, E.17; 152, Rye Lane, Peckham, London, S.E.15; 21 London Road, Barking, Essex
H. NORMAN DAVIS LTD, 91 The Broadway, Mill Hill, N.W.7
DAYSTROM LTD, 233 Tottenham Court Road, W.1
DYNAMIC STORES (SOUND) LTD, 118 Edgware Road, W.2
J. J. FRANCIS (WOOD GREEN) LTD, 123 Alexandra Road, Hornsey, N.8
FRANCIS OF STREATHAM, 169-173 Streatham High Road, S.W.16
C. C. GOODWIN (SALES) LTD, 7 The Broadway, Wood Green, N.22
HAMPSTEAD HIGH FIDELITY, 91 Heath Street, Hampstead, N.W.3
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HAVEN HI-FI (EALING) LTD, 196-8 South Ealing Road, W.5
THOMAS HEINITZ, 35 Moscow Road, W.2
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ALFRED IMHOF, 112-116 New Oxford Street, W.C.1
LARGS OF HOLBRON, 76-77 High Holborn, W.C.1
LASKY'S RADIO, 207 Edgware Road, W.2; 152-153 Fleet Street, E.C.4; 33 Tottenham Court Road, W.1
LEE ELECTRONICS, 400 Edgware Road, W.2
LEWIS RADIO, 100 Chaseside, Southgate, N.14
MAC'S CAMERA SHOPS LTD, 250-252 Kings Street, Hammersmith, W.6
MASSEYS CENTRE OF SOUND, 121-123 High Road, W.4
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V. J. MONK LTD, 140-141 Plumstead Road, S.E.18
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NEWBURY RADIO (FOREST GATE) LTD, 272 and 305 Romford Road, Forest Gate, E.7
NORTHERN RADIO SERVICES, 16 Kings College Road, N.W.3
NUSOUND, 93 Mortimer Street, W.1; 242-244 Pentonville Road, N.1; 228 Bishopsgate, E.C.2; 36 Lewisham High Street, S.E.13; 2 Maryland Station, E.15; 205 High Street North, E.6; 82 High Holborn, W.C.1
THE PARKFIELD STUDIO, 20 Parkfield Road, New Cross, S.E.14
THE RECORDER CO, 188 West End Lane, West Hampstead, N.W.6
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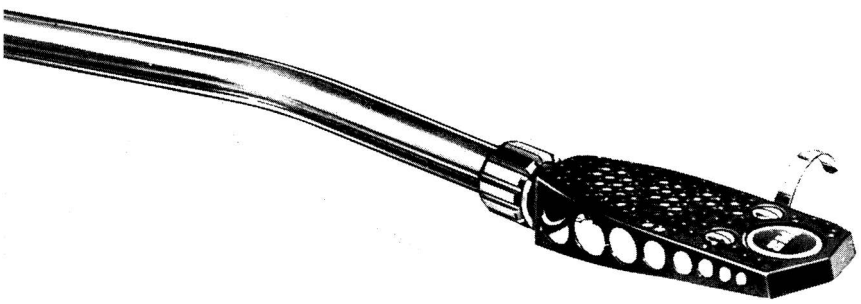

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'It has added a further half-dozen musicians to my hi-fi equipment'

wrote one of our many customers upon purchasing a ffss Decca Mk4

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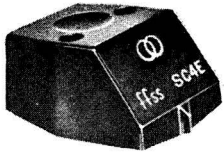
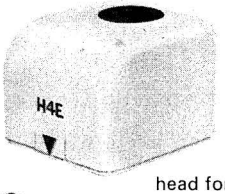
The Decca range of ffss Mk4 magnetic heads and cartridges

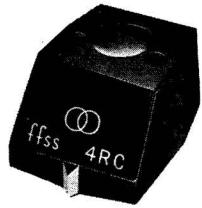


super cartridge with elliptical stylus

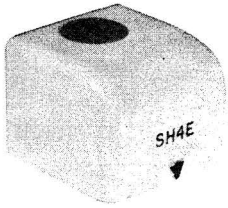
cartridge with elliptical stylus for use in head shells fitted to arms other than the Decca ffss range



head for use with Decca ffss arms



cartridge with spherical stylus ideal for those who do not require the increased sophistication of an elliptical stylus



super head

DECCA

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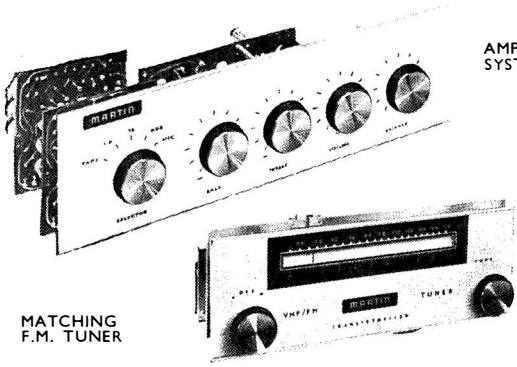

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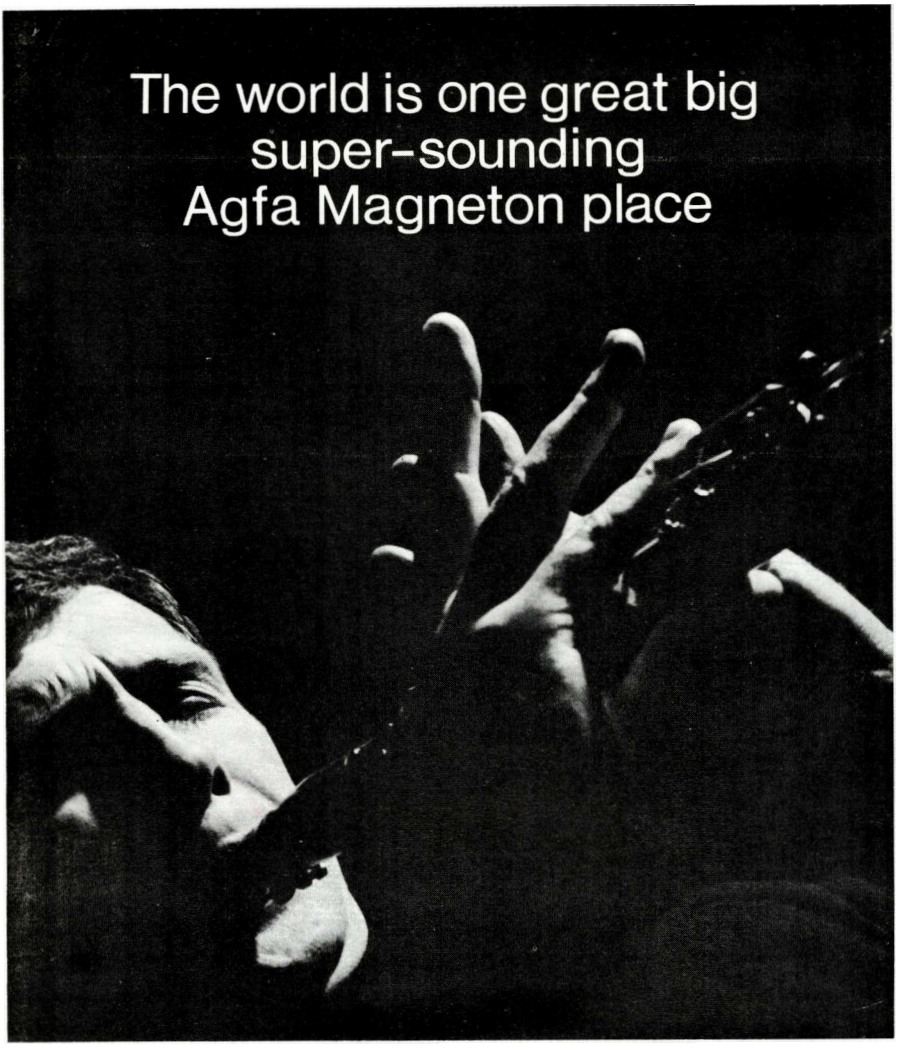

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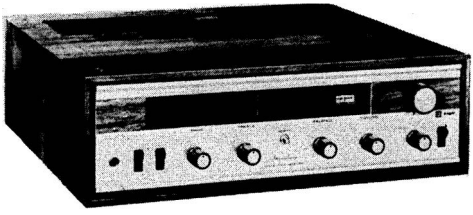

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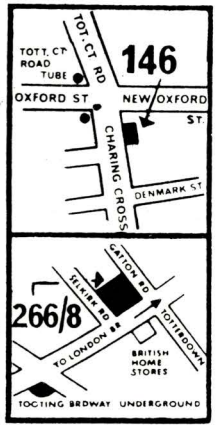

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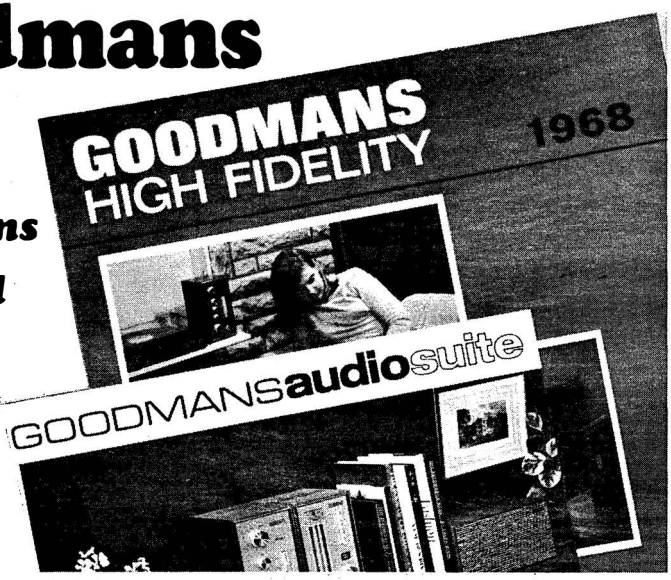

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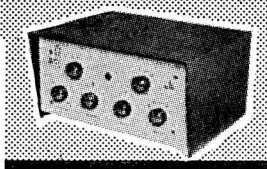

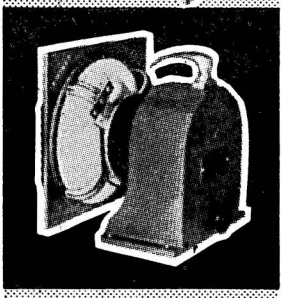

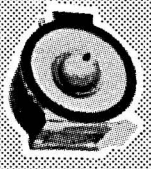

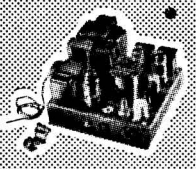

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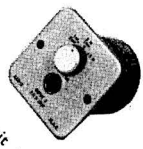
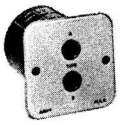
AAU-2 79/6d
Provides switching between 2 pairs of speakers connected at the rear, with Headphones which can be connected to the front DIN socket. 3 way switching, gives various combinations, 4 core cable fitted for connection to the amplifier terminals.



AAU-3 82/6d
A general purpose unit providing switching between 3 stereo inputs to a common amplifier input. Suitable for Pickups, Mics, Tuners, Tape etc., 2 inputs at rear via Phono sockets, 1 input at front panel via DIN socket. Fitted with 24" DIN terminating audio leads either PHONO or DIN plugs. Rear inputs switched to front socket.



AAU-1 72/6d
Provides Record/Replay connections from a cabinet mounted Hi-Fi system to an external stereo/mono Tape Recorder. Fitted with 24" audio leads terminated in either colour coded PHONO plugs or 5-pin DIN plug for connection to the amplifier.

AAU-4 87/6d
Provides facilities for connecting 2 Tape Recorders to 1 amplifier for Record and Replay. Internally mounted recorder connects to rear PHONO sockets. External recorder to front DIN socket. 3 way switching various combinations for Tape Copying, etc. 24" audio leads terminating in either PHONO or DIN plugs.

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AAU SPECIALS
These are modified versions of the standard models.

AAU-2S 99/6d
Fitted with 2 output cables for connecting either of 2 stereo Amplifiers to 2 pairs of Speakers, via changeover switch on front panel (in place of DIN SKT).

AAU-2X 122/6d
As AAU-2 but fitted in Teak Case with preset volume controls on front panel to match each Headphone earpiece separately. Incorporates internal load resistors, to fully protect the amplifier.

AAU-4M 127/6d
Fitted with an extra pair of Replay leads and special switching for use with amplifiers incorporating Tape Monitor circuits that do not permit the Replay signal to be made available at the Record Sockets for Tape Copying, etc.
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AAU-TV
Provides a ready means of connecting external equipment to a Television Receiver WITH COMPLETE SAFETY.
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3 way switch giving various combinations marked as follows:

TV L/S ONLY	AMPLIFY RECORD	EXT. L/S ONLY

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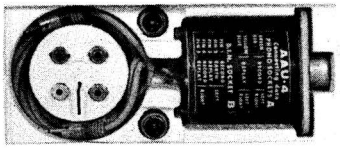

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available to enable any unit to be used freestanding. **22/6d**
Each AAU supplied in a Polystyrene Pack to ensure complete safety in transit.

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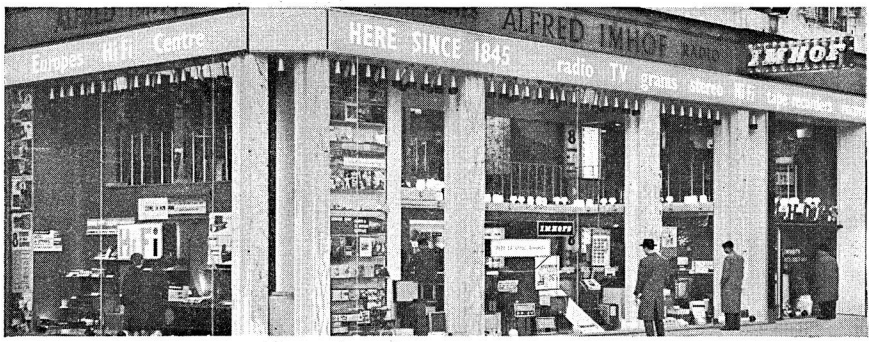

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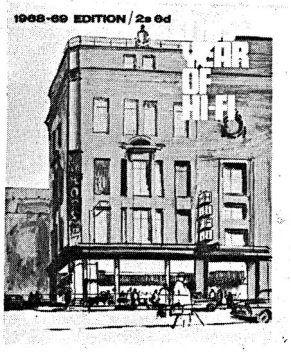
The whole of the fourth floor at Imhof House is devoted to hi-fi. Here there are special listening rooms which are air conditioned, acoustically treated and sound proofed to enable you to select the latest equipment under the best possible conditions. Each hi-fi listening room is equipped with a unique Imhof mono/stereo comparator which is connected to every worthwhile player, tuner, amplifier and speaker so that you may compare any alternative combination at the click of a dial. Then, of course, for housing your equipment you can choose from the famous Imhof range of exclusive cabinets. Choose your records from the largest stocks in Europe—classical, popular, jazz. You will find nearly every record currently pressed in this country in addition to Continental, American and other foreign records—many of which are only available in this country from Imhofs. Records galore are arranged for quick reference and simple selection and the most experienced staff in the business is there to help you find exactly what you want.



Send 2/6d. today for your copy of the 1968/69 edition of "This Year of Hi-Fi." Essential reading for anyone contemplating Hi-Fi—whether it be a whole system or just a single piece of equipment. Contains helpful notes on choosing Hi-Fi and lists all the worthwhile equipment that is currently available. Contains £1 voucher valid against any purchase of equipment over £20. "This Year of Hi-Fi" is free and post free to people living overseas but the voucher is not included.

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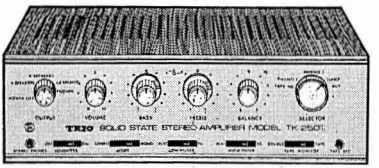
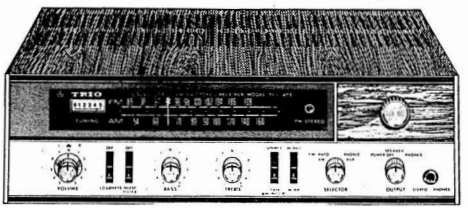
The range of Stereo Amplifiers and Tuner Amplifiers covers units with power ratings of 10+10 to 50 + 50 watts RMS per channel, with input sensitivities of only 2mV on pick-up and tape inputs, suitable for all the new generation of low output cartridges and tape heads, are standard on all models.
Let TRIO speak for itself—ask for a demonstration at your leading High Fidelity Showroom, it will be a rewarding experience and by buying TRIO you will almost certainly pay less—and get more!





Illustrated above: the new outstanding value TK-150T 13.5+13.5 watts Stereo Amplifier—*recommended retail price* 32 gns., shown with HS-3 Stereo Headphones—*recommended retail price* £6. 10. 0.
Right—top to bottom: compact model TK-250T 20+20 watts Stereo Amplifier—*recommended retail price* £49.10.0; TK-350T AM-FM Stereo Tuner—*recommended retail price* 55 gns.; TK-40E AM-FM Stereo Tuner/10 + 10 watts Stereo Amplifier—*recommended retail price* 85 gns.

Illustrated leaflets giving full technical details of these and other TRIO models are available on request with the name and address of your nearest appointed TRIO dealer.

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AT ½ GRAM

World famous for its design techniques and for its superlative performance.
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1. Tubular metal/low mass tonearm dynamically balanced in all effective planes, and designed with precision low-friction bearings.
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8. Continuous-Pole motor with low stray field and radially elastic suspension.
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11. Full manual play with single records.
12. Simple installation from the top, without tools, due to unique top/mount spring screws.

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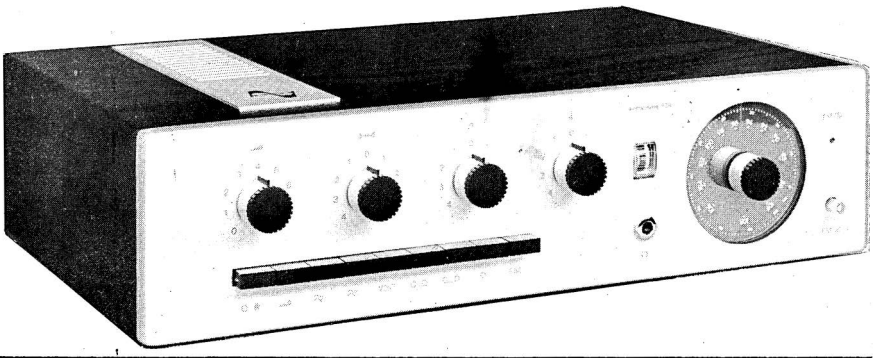
Armstrong
the high fidelity sound

series 400 Tuner-amplifiers



Look at these top ten features of the Armstrong series 400 Tuner-amplifiers and then try to find another Tuner-amplifier which offers you all these (at anything like a comparable price, of course).

1 At least 15 watts RMS power output each channel into all impedances of between 4 and 16 ohms

2 A power response which is maintained throughout the audio frequency range

3 High sensitivity and top performance FM which, with the optional stereo decoder added, gives wonderful results on stereo radio

4 Good coverage of the medium and long wavebands (426 only)

5 Inputs for ceramic and magnetic pickups

6 Tape recording outputs, tape playback inputs and tape monitor switching

7 Rumble and treble filters with a second filter for AM listening on 426

8 A uniquely designed loudness control giving you both compensation and the use of the whole volume control for low level listening

9 Stabilised power supply

10 Headphone jack suitable for virtually all stereo phones

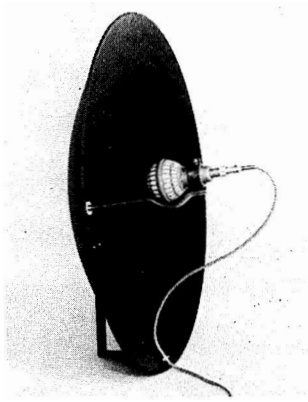
425 FM Stereo Tuner-amplifier (illustrated) £78 5s. 9d.

426 AM-FM Stereo Tuner-amplifier £87 6s. 9d.

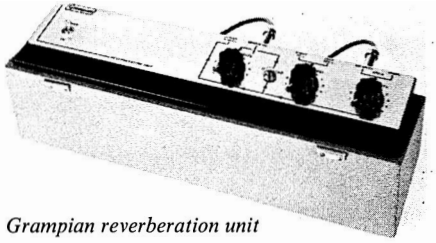
M4 Stereo Decoder £9 10s.

Armstrong Audio Limited, Warlters Road, London, N7. Telephone 01-607 3213

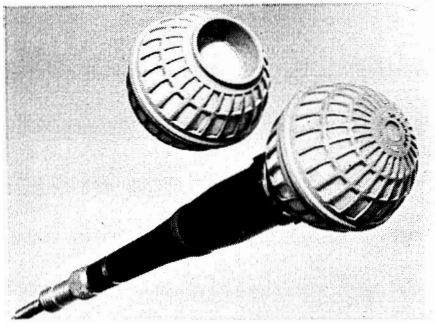
Grampian for sound sound equipment



Grampian Parabolic reflector



Grampian reverberation unit



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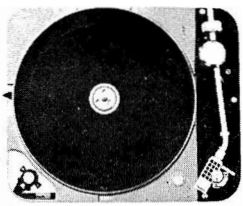

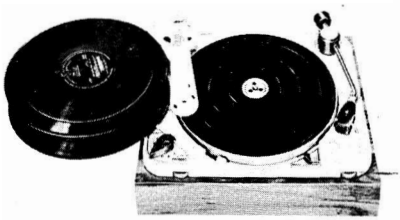

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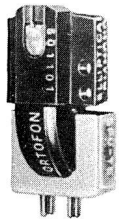

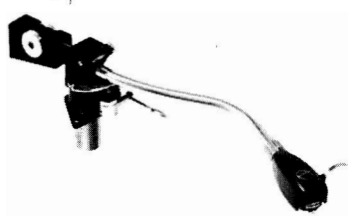

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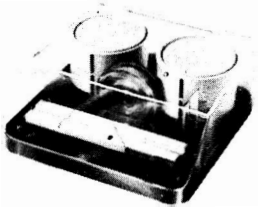

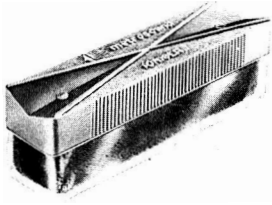

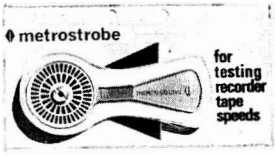

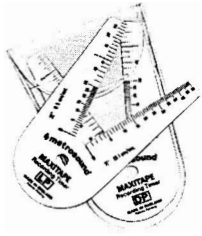

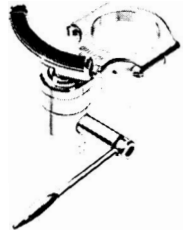

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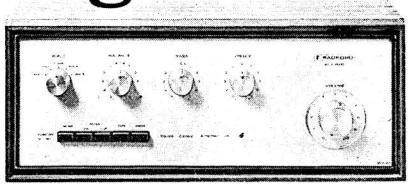

Conventional solid state circuitry with its attendant problems of stability and lack of power at high frequencies has resulted at best in an amplifier having a distinct 'transistor sound'. The reason for this is not always obvious under normal test conditions and sometimes not easy to see on the oscilloscope, but its presence may be heard, and after a short period results in listening fatigue, an effect not experienced with good valve amplifiers. Using devices recently developed, Radford have produced an amplifier having outstanding power output characteristics with the introduction of a complementary-symmetry circuit completely eliminating cross-over distortion and the 'transistor sound.'

Specification

Mains input: 110V. 125V. 140V. 220V. 230V. 250V. 50/60 c/s
Output matching impedance: 3·5–16 Ohms
Output power: 30 Volt-amperes nominal at less than 0·1% distortion. (30 watts r.m.s. into any reactive load)
Input facilities: Disc. 2mV sensitivity (RIAA) Aux. 1. 3mV sensitivity (flat). Tuner 250mV sensitivity (flat). Aux. 2. 250mV sensitivity (flat) Aux. 3. 250mV sensitivity (flat). Tape monitor 250mV sensitivity (flat).
Output facilities: Tape recording · Headphones
Mains power, switched · Mains power, unswitched
Functions:
Switched: Stereo/Mono · Low frequency (rumble) filter
High frequency filter · Tape monitoring · Mains on/off · Input selection–Aux. 1, Disc, Tuner, Aux. 2, Aux. 3
Variable: Bass lift/cut · Treble lift/cut · Volume ·
Pre-set gain on each channel (rear panel).
Size: Overall in Cabinet 16½"x 5"x 14½"
Weight: 25 lb.
Recommended retail price £106 (incl. cabinet)

Radford Marketing Division, Eastbrook Road, Gloucester, Telephone: 0452 21591
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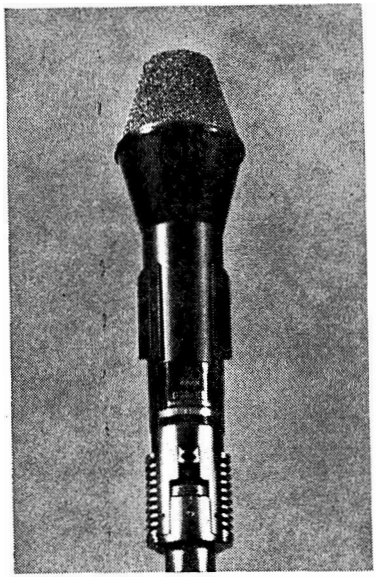
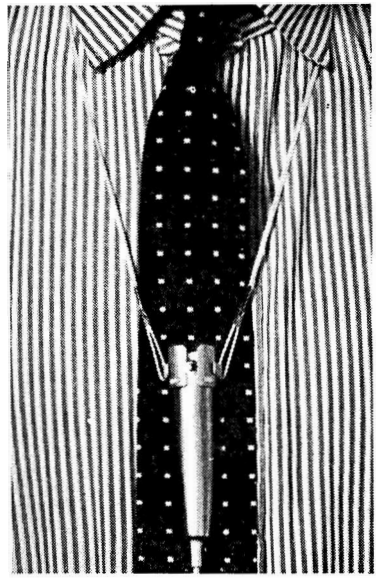
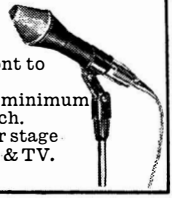




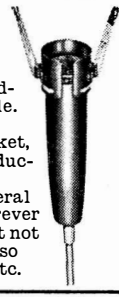
AKG D-202

New. Dynamic. Two-way cardioid design — separate high- and low-frequency systems in a single housing for powerful, directional performance; level frequency response. Front to back ratio 20db at all frequencies ensuring minimum feedback. On-off switch. Good appearance. For stage work, recording, film & TV.



AKG D-109

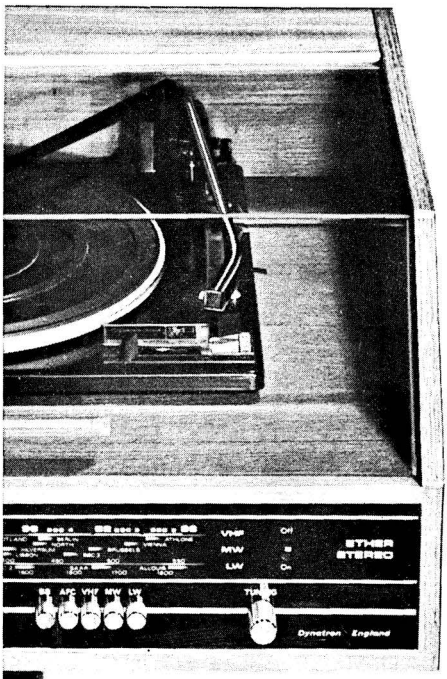
New. Dynamic. Lavalier. Available with 60 or 200 Ohm impedance. With 3 metres cable. The smallest Lavalier microphone on the market, plus high-quality reproduction that compares well with others costing several times more. Use it wherever a mike is to be heard but not seen—mainly for TV, also for films, conferences, etc.



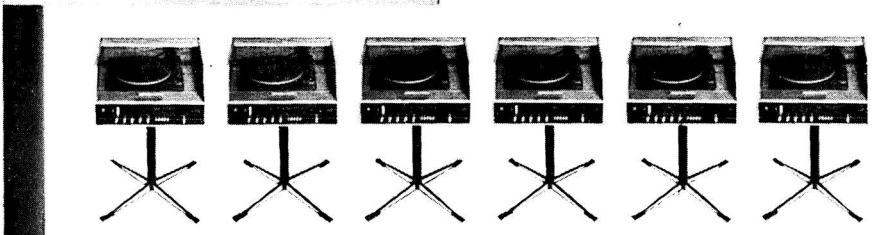
Find out more about mikes from AKG.
See your supplier, or ask us.

AKG microphones

Politechna (London) Ltd. 182-184 Campden Hill Road, London W8
Telephone: Park 0711. Telex: 23894



The latest in a long line of distinguished Audio Separates ....the HFC 8



Brand new and only now available, Dynatron announce the arrival of their new record playing deck . . . the HFC8 which, with its accompanying SRX24 tuner amplifier, reaches a new peak of perfection in sound reproduction. Subtly re-styled and improved this new successor to our enormously popular HFC3 record playing deck offers, with loudspeakers LS100, LS150, LS200 or LS300, a complete high fidelity radio and record audio combination in three units. Dynatron provide a choice of playing decks: the HFC8A with the latest Garrard autochanger using a high quality ceramic cartridge and diamond stylus or the HFC8M utilizing the Garrard SP25 Mk.II single playing deck with diamond stylus.

It's the distinguishing sound of Dynatron equipment that sets you aside from the crowd!

The HFC8A £92.0.0. and HFC8M £94.10.0. Loudspeakers: LS100 £13.5.9. LS150 £17.0.0. LS200 £20.10.1. LS300 £29.10. Pedestal Stand ST16 £5.13.6. . . . . optional extra.

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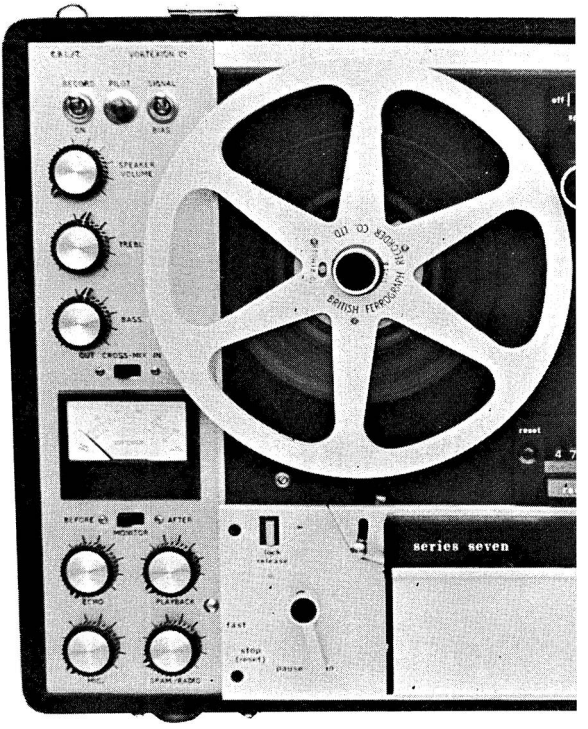
DYNATRON

Dynatron Radio Ltd., St. Peter's Road, Maidenhead, Berks Tel:23331

Vortexion Quality Equipment



Here is a versatile stereophonic recorde

The C.B.L./7T solid state version uses 8 low noise Field Effects Tra
low intermodulation distortion, and the 10 watt sine wave 15 wat
distortion and less than 0.1% intermodulation distortion at 10 w

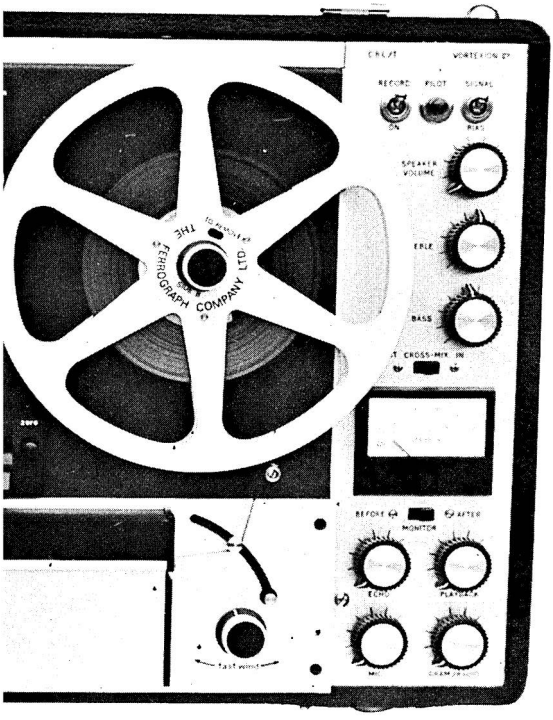
" Before and After " monitoring on phones and by internal or
volume controls allow the speakers to be independently control
P.U. inputs can be mixed with the other channel via a crossmix a

All the facilities of the valve model C.B.L. are provided, plus a fe
direction, solenoid operation, provision for an external switch f
and flutter figures.

Mono and full track versions of this will also be available.

VORTEXION LIMITED, 257-263 Th

Telephone: 01-542 2814 & 6242/3/4



TYPE C.B.L./7T TAPE RECORDER

which has no equal in its price group.

istors on its twin channel Mic. P.U. and Playback inputs to give peech and music amplifiers each have less than 0.05% harmonic s output.

xternal speakers is catered for, and separate power amplifier l from the headphones. 30/50Ω balanced line Microphone and l an echo control.

extras . . . The series 7 deck has variable speed wind in either remote run or voice operated accessory, and still lower wow

Broadway, Wimbledon, S.W.19

Telegrams: "Vortexion London S.W.19"

In a corner of Soho Square
LONDON'S MOST INTERESTING RECORD SHOP

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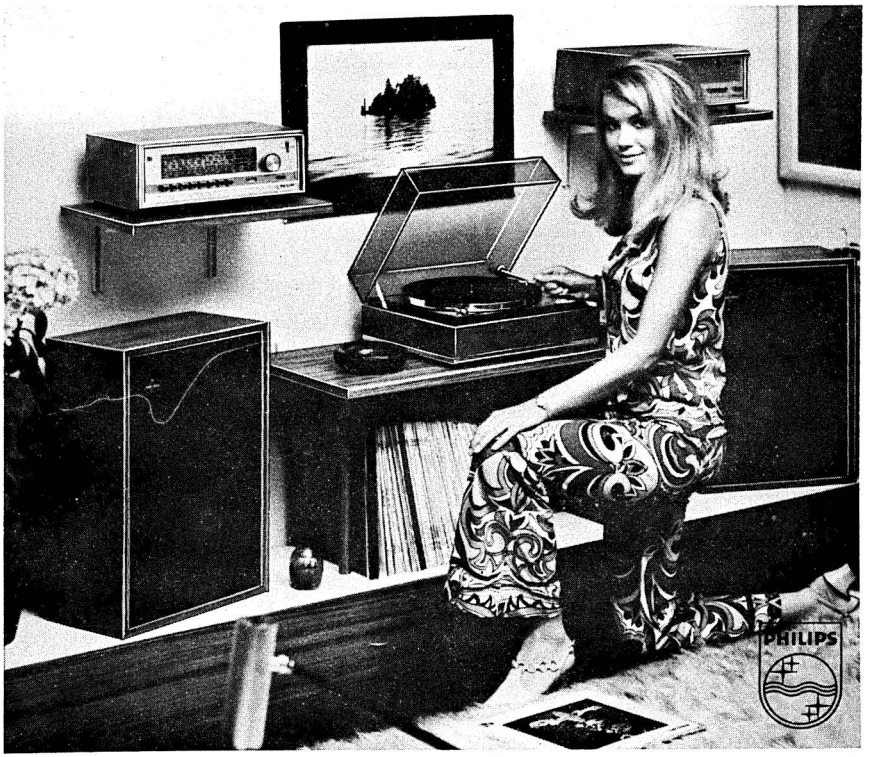
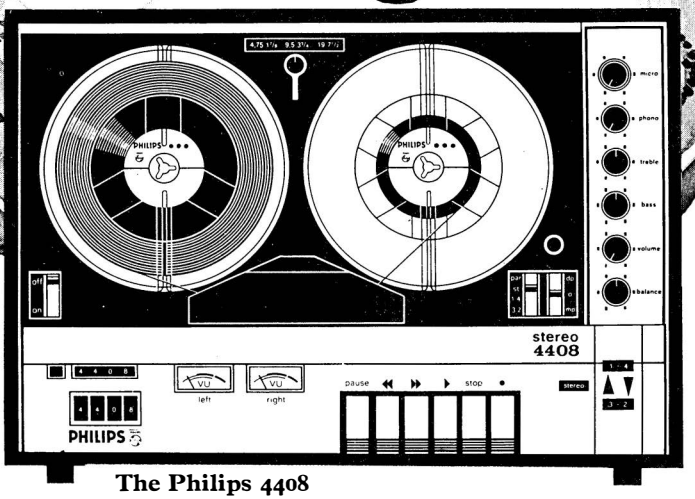
PHILIPS AUDIO PLAN

Philips Audio Plan range includes amplifiers, record players, radio tuners, tuner/amplifiers and loudspeakers. There are Philips Audio Plan Systems to meet a wide range of different requirements—and a number of different pockets! Each system is built up from matched units, beautifully designed to complement each other in looks as well as performance. Send for details now.

PHILIPS ELECTRICAL LTD.
CENTURY HOUSE, SHAFTESBURY AVENUE, LONDON, W.C.2.



The HI-fidelity for stereo electronic tape recording dream



The Philips 4408

- Four-track mono and stereo recording/playback at three tape speeds—1⅞, 3¾ and 7½ ips.
- Deck designed for horizontal or vertical operation—special reel hub locks hold the reels captive when used vertically.
- Automatic tape-positioning device enables speedy location of the desired programme.
- Each loudspeaker is detachable and is provided with over 12 ft. of cable for full stereo realism.
- Two illuminated calibrated VU type meters.
- Frequency response within 6 dB at 7½ ips is 40–16,000 c/s.
- Full 6-watt output per channel.
- Signal to noise ratio better than 45 dB.
- Wow and flutter within +0.2% (DIN standards).
- Independent bass and treble controls.
- Supplied complete with stereophonic demonstration tape, 7″ take-up spool, and direct recording/playback lead.

PHILIPS

Price £133.16.8.

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SHAFTESBURY AVENUE, LONDON W.C.2

PHILIPS

Dial 01 836 0033

Ask for 'Susan'

We did think of filling this page with technical blurb, but most of this appears in the Year Book.

You probably have questions not covered by this book.

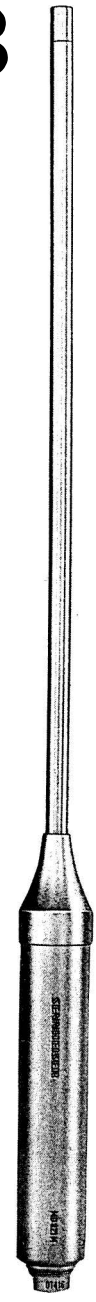
We find most people have.

For instance, what do you know about the Sennheiser microphone in this ad?

What do you know about Sennheiser audio test equipment?

What do you know about P.P.M's?

We will answer your questions about anything, anytime.

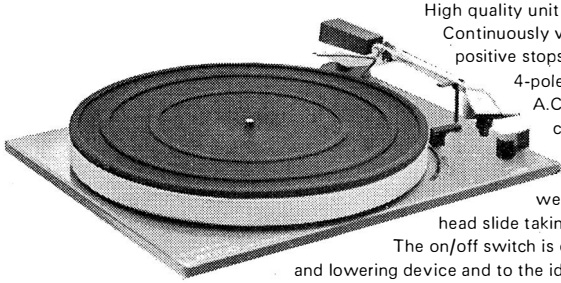


Audio Engineering Ltd

33 Endell St. London WC2

GOLDRING AUDIO EQUIPMENT

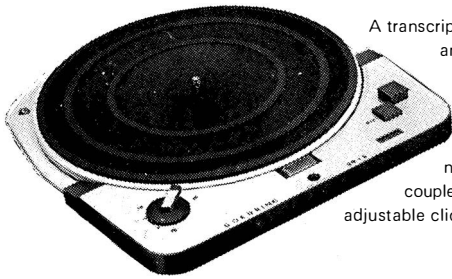
GOLDRING-LENCO GL 68 TRANSCRIPTION UNIT



High quality unit with integrally mounted pick-up arm. Continuously variable speed control, with adjustable positive stops for the four standard playing speeds. 4-pole constant velocity motor (200/250 V. A.C., 50 Hz, 15 VA). Less than 1% speed change for 13% mains voltage change. Wow and flutter less than 0·2%. Pick-up arm has adjustable counter-weight and is fitted with interchangeable head slide taking all modern cartridges on $\frac{1}{2}$'' centres. The on/off switch is coupled to a hydraulic pick-up raising and lowering device and to the idler wheel disengagement mechanism. Dimensions: 13″ x 15″. Clearance above motor plate 3″. Below motor plate $2\frac{3}{8}$″.

Price: £18. 7. 6. plus £3. 19. 8. P.T.

GOLDRING G 99 TRANSCRIPTION UNIT



A transcription unit for those who prefer to mount, separately, an arm of their own choice. Incorporating the unique Goldring-Lenco continuously variable speed and vertical drive features, with less than 1% speed change for 13% mains voltage variation, this unit has an 8 lb. non-magnetic turntable and built-in neon-lit stroboscope. It is switched by push-buttons coupled to the idler disengagement mechanism. There are adjustable click-in positions for the four standard playing speeds. 200/250 V.A.C. 50 Hz, 15 VA. Dimensions: $14\frac{1}{4}$″ x $13\frac{1}{4}$″

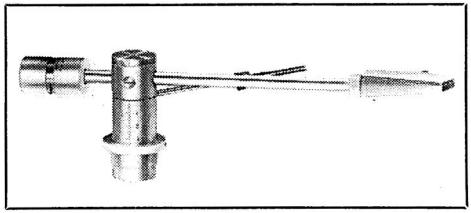
Price: £19. 19. 0. plus £4. 6. 5. P.T.

GOLDRING-LENCO GL 75 TRANSCRIPTION UNIT

Constant velocity 4-pole motor (200/250 V.A.C., 50 Hz, 15 VA) with less than 1% speed variation for 13% mains voltage change. Vertical drive to 8 lb. non-magnetic turntable, with continuously variable speed control and positive (adjustable) settings for the four standard speeds. Wow and flutter—max. 0·2%. The on/off switch is coupled to the idler disengage-ment mechanism. This unit incorporates an entirely new Goldring-Lenco transcription arm which is fully adjustable for stylus pressure, includes a bias compensator ("anti-skating" device) and is raised and lowered hydraulically by a conveniently placed lever. The head shell is interchangeable, with positive fixing, and allows $\frac{1}{2}$″ movement of any standard cartridge to achieve accurate position of stylus. (The arm fitted to this unit is also available as a separate item.)

Price for Complete GL 75 unit £29. 8. 0. plus £6. 7. 5. P.T.
For L. 75 arm only £10. 2. 6. plus £2. 3. 11. P.T.

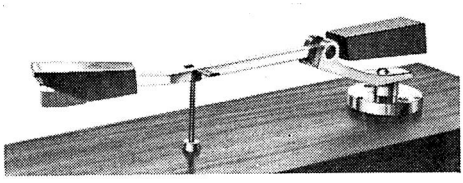
GOLDRING-LENCO P 77 TRANSCRIPTION ARM



Precision-engineered transcription arm with provision for balancing in every plane. Interchangeable head shell with locking collar takes all modern cartridges and allows $\frac{1}{2}$" for accurate positioning of stylus. Height, balance and stylus pressure adjustments are all calibrated to simplify use of alternative cartridges. Hydraulically damped positioning and lowering device. A bias compensator is available as an extra.

Price for arm £30. 0. 0. plus £6. 10. 0. P.T.

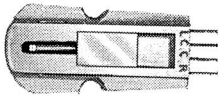
A complete transcription unit (GL 77) basically similar to the GL 75 but with the P 77 arm fitted, is available. Price: £51. 10. 0. plus £11. 3. 2. P.T.



GOLDRING G 65 TRANSCRIPTION ARM

Low mass tubular construction. Miniature ball-race bearings. Stylus pressure adjustment by sliding counterweight. Full height adjustment. Interchangeable head slide, with self-cleaning wiper contacts, takes all standard fitting cartridges.

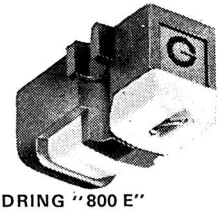
Price: £6. 6. 0. plus £1. 7. 4. P.T.



GOLDRING CS 90 and CS 91E CARTRIDGES

These are stereo ceramic cartridges with excellent frequency response and cross-talk separation. Low tip mass, replaceable diamond stylus (CS 90–0·0005" or 0·0007" tip radius; CS 91E–elliptical) coupled with high compliance enables these cartridges to be played at light tracking weights.

Price:
CS 90 £4.4.0. plus 18/2 P.T.
CS 91E £6.6.0. plus £1.7.4. P.T.



GOLDRING "800 E" FREE-FIELD CARTRIDGE

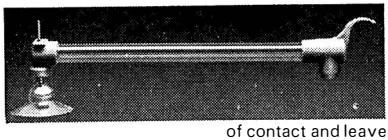
A new Goldring magnetic cartridge employing the Free-Field principle. Frequency Response: 10 Hz–25 kHz. Sensitivity: 1 mv. per cm/sec. Separation: 25 dB at 1 kHz. Load: 100 k–47 k/ohms. Compliance: 30 x 10^{-6} cm/dyne. Stylus: 0.0008" x 0.0003" diamond replaceable. Effective Tip Mass: Less than 1 mg. Tracking Weight: 0.75–2 grms. Head Weight: 8 grms. Vertical Tracking Angle: 15°. Mu Metal Shield for hum protection.

Price: £15. 4. 6. plus £3. 6. 0. P.T.

GOLDRING-LENCO STYLUS BALANCE STB 2

An extremely accurate device, simple to use, without springs or complicated mechanism. Clearly graduated in grams (0–4 grams occupies $\frac{3}{4}$ in. of scale length, and the scale extends well beyond the pressures specified for modern cartridges).

Price: 13/9 plus 3/0 P.T.



LENCOCLEAN RECORD CLEANING SYSTEM

Free-swinging arm with easily mounted adjustable pivot and fine brush which automatically dispenses special non-antistatic fluid in a narrow band in the stylus path on the record. Removes dust, eliminates electrostatic charges, reduces stylus/groove friction, cools the point of contact and leaves no hard deposits on record surfaces, supplied with a large bottle of fluid.

Price: £2. 2. 0. plus 9/1 P.T.

GOLDRING DIAMOND and SAPPHIRE STYLI

The range consists of hundreds of styli to fit virtually any known cartridge. Full information on the system, identification charts and dispensers is free for the asking.

GOLDRING REPLACEMENT CARTRIDGES

There are Goldring replacement cartridges for a large number of popular record players.

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NEW HI-FI PARASTAT

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Gramophone Record Maintenance and Stylus Cleaning kit.

Designed for use on NEW records or records in new condition which are to be played with pick-ups requiring very low tracking pressures.
Supplied complete with instructions, Watts Stylus Cleaner, 1 oz. New Formula dispenser, Distilled Water dispenser, spare pad cover and ribbons.

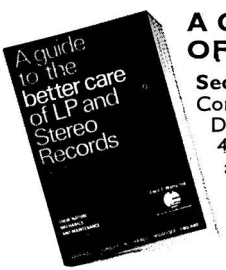
PRICE 42/6.

OTHER WATTS PRODUCTS

- **DISC PREENER 6/9**
- **DUST BUG 18/9 plus 4/- P.T.**
- **MANUAL PARASTAT 45/-**
- **HUMID MOP 4/6**
- **NEW FORMULA DISPENSER 2/6 and 4/6.**

Replacements and spare parts available

NEW STYLUS CLEANER
An integral part of the Hi-Fi Parastat also available separately complete with instructions.
PRICE 5/-



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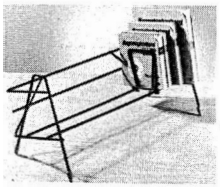

"BOOK RACK" Approx. capacity 21 tapes. **22/10** each

"PLASTICOVERS" for record sleeve protection. 7" **1/3** per pkt. 12" **3/1** per pkt.

"PLASTISLEEVES" Protect records from dust. 7" **2/4** per pkt. 12" **5/-** per pkt.

"ANTISTATIMAT" Drains static from reoords instantly. **16/4** each

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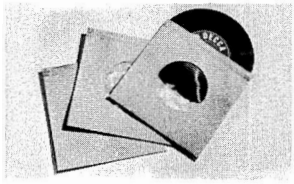
"REPLACEMENT STYLI" for most cartridges. Sapphires from **6/-** Diamonds from **32/3**



"POLYLINED PAPER SLEEVES" with see-through centre. **7d.** each

"TIMES-FIFTY POCKET MICROSCOPE" An aid to checking stylus wear. **17/6** each

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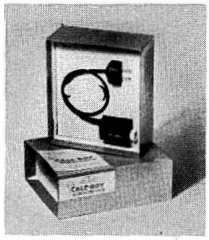

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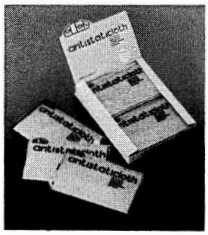

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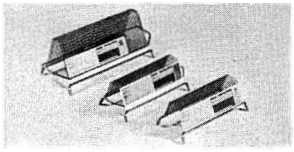
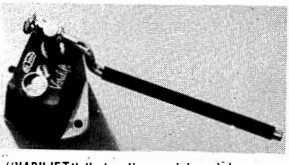


"COLTONIAN RECORD RACKS" for safe record storage. From **8/11** each

"RECORD CENTRES" adapt records from large to standard spindle size. **3/8** per box



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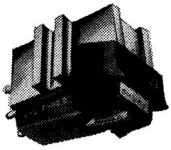
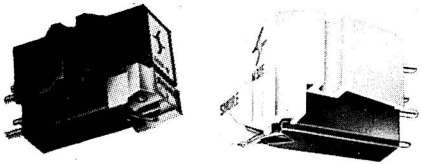


The Shure V15-Type II Super-Track
An impeccable new cartridge with a new and meaningful specification of total performance – TRACKABILITY.
For the connoisseur of recorded sound

TRUE ELLIPTICAL STYLUS PERFORMANCE AT AN ECONOMICAL PRICE



Shure M55E and M44E Stereo Dynetic
"Can be recommended to the most fastidious enthusiast without reservation for mono, as well as stereo use" – Audio and Record Review.
M55E–¾–1½ grammes
M44E–1¾–4 grammes
NEW Model M31E– 1–2 grammes
Model 32E–2½–5 grammes

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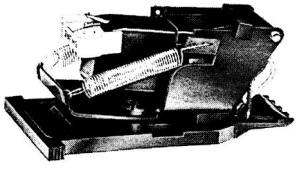
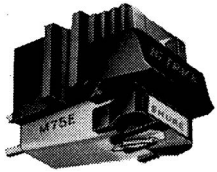


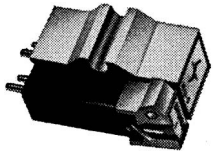
Shure M75E Series GARD-A-MATIC
High quality Bi-Radial elliptical stylus cartridges in retractile safety suspension systems for use with automatic turntables.
M75E-95G–For Garrard SL95
M75E–D19–For Dual 1019

HIGH TRACKABILITY AT COMPETITIVE COST



Shure M75 Series Hi-Track
From the new generation of cartridges providing high TRACKABILITY at minimum tracking pressures.
M75E–Elliptical Stylus, ¾–1½ grammes
M75G–Conical Stylus, ¾–1½ grammes
M75-6–Conical Stylus, 1½–3 grammes

CONICAL STYLUS CARTRIDGES COMBINING QUALITY AND ECONOMY



Shure M44 Series Stereo Dynetic
All feature 15° tracking: all have received widespread critical acclaim.
M44-5 ¾–1½ grammes
M44-7 1½–3 grammes
M44C 3–5 grammes

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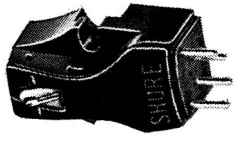

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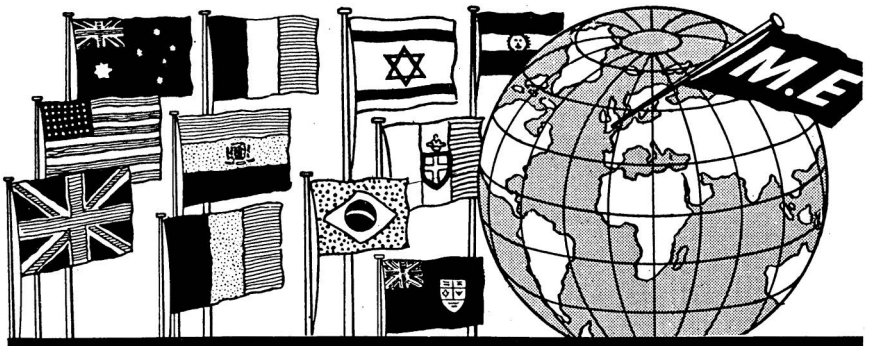

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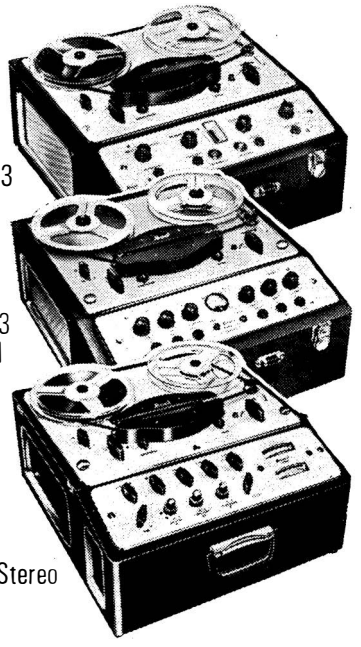

Mk. 5 Series 3

Mk. 5 Series 3 Type M

STB2 Mono/Stereo

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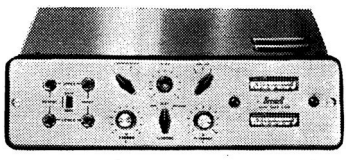
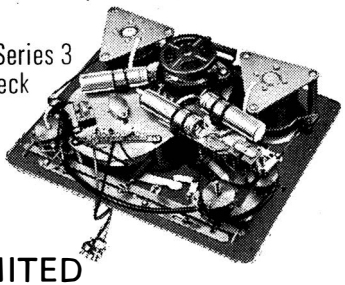


Mono/Stereo Hi Fi Tape Link

Full specifications available from Department HYB



Mk. 5 Series 3 Tape Deck

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BRENELL ENGINEERING CO. LIMITED
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Richard Allan — the name on the first CLASS A transistorised amplifiers, and acclaimed by many as being the finest amplifiers now available.

Model A41 (illustrated)—a 20 watts per channel stereophonic power amplifier of imposing specification and superb performance.

Price **£59/10/-.**

The control unit to match this amplifier is the Model C41, a highly sophisticated unit of advanced specification and control facilities.

Price **£35.**

Also available is the 10 watts per channel integrated amplifier, Model A21, utilising Class A output stages and complete in handsome Teak case.

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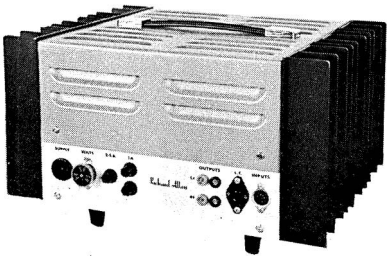
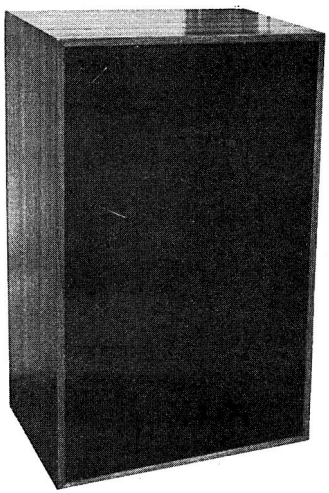
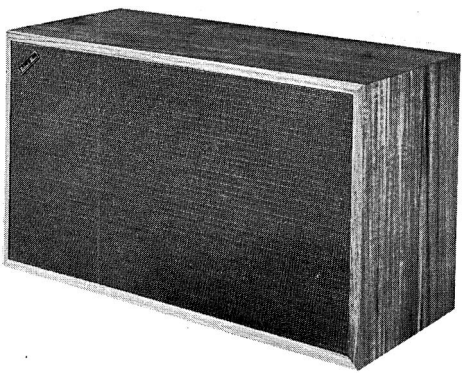




A new loudspeaker to the range and ideally matched to the above amplifiers is the PAVANE —a superb 3 unit system housing 12″ bass, 8″ midrange and 4″ tweeter units and measuring 25″× 15½″× 12″ deep. This loudspeaker offers quite exceptional value at **£32.**



A full range of High Fidelity Loudspeaker units is available, every one craftsman built, and full constructional details are published for the home constructor.

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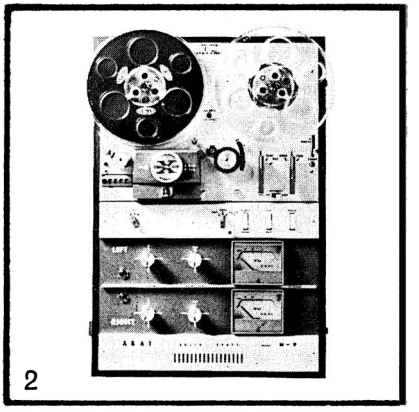
2

3

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The Akai X 300 is a 4 track stereo/mono studio-type tape recorder. It has 4 heads – erase, record, playback/monitor, and Crossfield; and 3 motors - one hysteresis synchronous direct drive capstan, two torque for fast forward and rewind. It has two speeds – 3¾ ips which will give you 30 to 18,000 cps ± 3db; and 7½ ips which will give you 30 to 24,000 cps ± 3 db. The X 300 also has Akai's unique Crossfield Head. On conventional recording heads the bias current tends to erase the higher frequencies. On the Akai Crossfield however the bias current is fed into a separate head opposite the recording head, in such a way that it can't interfere with the higher frequencies. This makes possible true high fidelity recording at much slower tape speeds than normal. Add to these features – piano key controls, tape cleaner, sound over sound, 10½" reel space, automatic stop and shut off, 4 digit index counter with reset button, vertical or horizontal operation. And all Akai stereo tape recorders are already biased to receive FM Multiplex Stereo broadcasts. So we hope you'll agree that the Akai X 300 gives you quite a lot of equipment for 190 gns. For further details on the Akai X 300, write to Pullin Photographic Ltd., 11, Aintree Road, Perivale Middlesex.

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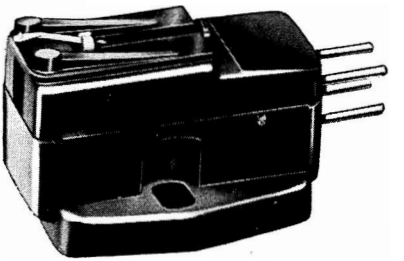

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With the introduction of the CONNOISSEUR range of Belt Drive turntables, the ultimate in performance is now available to the person of limited budget.
The B.D.1. is a virtually silent two speed unit which can be supplied either in chassis form or plinth mounted with one of our pick-up arms.
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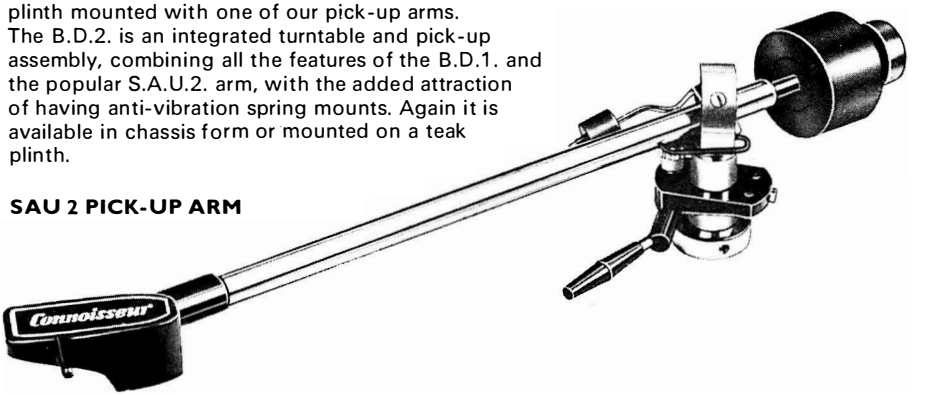
SAU 2 PICK-UP ARM



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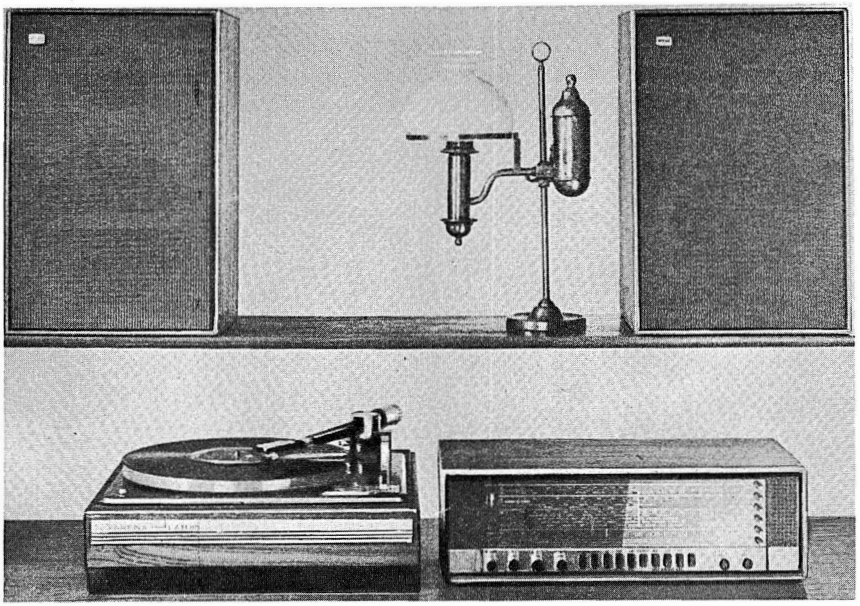

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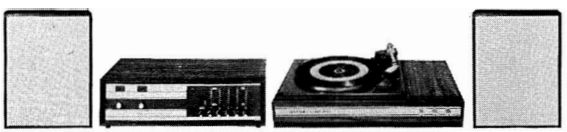

AUDIO PLAN 2 (2 x 8 watts). GF1225 stereo player with amplifier, F211 VHF (less MXP) and two HT14 or HT17 pressure speakers.

AUDIO PLAN 1 (2 x 10 watts). F210 amplifier, F211 VHF Tuner (less MPX) SP25 Mk. II mounted with magnetic cartridge and two HT14 or HT17 pressure speakers.

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amplify (am-pli-fi) *r.t.* to extend; to enlarge:— **amplification** *n.* —**amplifier** *n.* an apparatus which increases the volume of sound.

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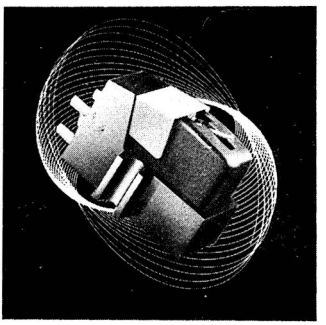
... and you take an important step towards perfection in stereo reproduction



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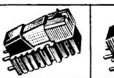
The Audio-Technica is an outstanding stereophonic cartridge featuring a series of unique concepts which are considered to be the key to good performance in high fidelity cartridges. Among its many features is the fact that stylus replacement is extremely simple. It provides superb frequency response and extremely low cross-talk, while due to its light mass and high compliance, perfect tracking is maintained even at very low stylus pressure.

				
Model	AT.66	AT.33	AT.21	AT.35
Frequency Response ± 2 db Hz.	20-20000	20-20000	20-25000	20-25000
Channel Separation at 1 KHz.	25 db	27 db	30 db	30 db
Output Voltage at 1 KHz. 5 cm/sec.	4 mV	5 mV	4 mV	5 mV
Static Compliance cm/dyne	30 x 10⁻⁶	23 x 10⁻⁶	30 x 10⁻⁶	23 x 10⁻⁶
Tracking Force–gms.	0.5-2.0	0.5-2.5	0.5-2.0	0.5-2.5
Tracking Angle	15°	15°	15°	15°
Principle of Operation	Duexciting	V-magnet	Duexciting	V-magnet
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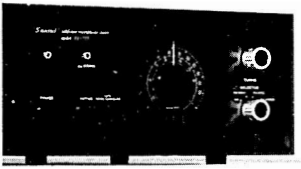
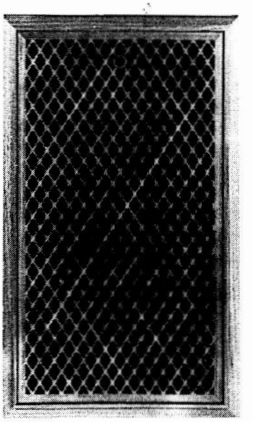
keep our distortion levels lower, and tailor our models for all powers and all budgets.
Satisfied stereo enthusiasts worldwide like our single-mindedness.
They're keeping us in a pretty sound business.

Model 5000. Solid State Tuner Amplifier. AM/FM Multiplex. Continuous power 55/55 watts. Fet front end tuner. Bandwidth: 15 to 39,000Hz. Distortion: Less than 0.8%. 3 speaker system.



Model TU777. Solid State (AM/FM Multiplex) tuner, Fet front end. 300 and 75 ohm aerial inputs. Special noise canceller, stabilised power supply. Sensitivity FM 1.8μ volts. Sensitivity AM 1.5μ volts.

Model SR4040. Two-speed Manual Turntable. Complete with magnetic cartridge. 4-pole synchronous capacitor start motor. Wow and flutter less than 0-0.8%.



Stereo Speakers Woofers designed to match pipe-ducted bass reflex type enclosures. Midranges designed with magnetic circuits. Tweeters feature horn-type speakers for a frequency response up to 20,000 Hz. Model SP-30: 20 watts. Model SP-50/SP-100: 25 watts. Model SP-200: 40 watts. Model SP-300: 50 watts.

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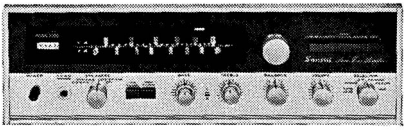
MODEL 400 *Solid-State*
AM/FM Multiplex Stereo Tuner Amplifier

RMS power: 20/20 W ±1 dB.
Music power: 50 W ± 1 dB (IHFM).
Harmonic distortion: less than 1% at 1000 Hz RMS rated output.
Frequency response: PA section—15 to 50,000 Hz ± 1dB;
FM sensitivity: 2.5 μV ±3 dB (IHFM).
Signal-to-noise ratio: 60 dB.

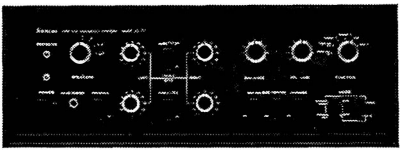


MODEL 2000 *Solid-State*
AM/FM Multiplex Stereo Tuner Amplifier

RMS power: 32/32 W ±1 dB.
Music power: 85 W ±1 dB (IHFM).
Harmonic distortion: less than 0.8% at 1000 Hz RMS rated output.
Frequency response at normal listening level: PA section—15 to 40,000 Hz ±1.5 dB; FM sensitivity: 1.8 μV ±3 dB (IHFM).

MODEL 3000A *Solid-State*
AM/FM Multiplex Stereo Tuner Amplifier

The highest-powered model in the Sansui range. RMS power: 48/48 W ±1 dB.
Music power: 130 W ±1 dB (IHFM).
Harmonic distortion: less than 0.8% at 1000 Hz 48 Watts rated output.
Frequency response at normal listening level: PA section—20 to 40,000 Hz (IHFM). FM usable sensitivity: 1.8 μV ±3 dB (IHFM).



MODEL AU-777 *Solid-State*
Stereo Control Amplifier

RMS power: 30/30 W ±1 dB.
Music power: 70 W ±1 dB (IHFM).
Harmonic distortion: less than 0.5% at 1000 Hz RMS rated output.
Frequency response at normal listening level: 20 to 100,000 Hz ±1 dB.

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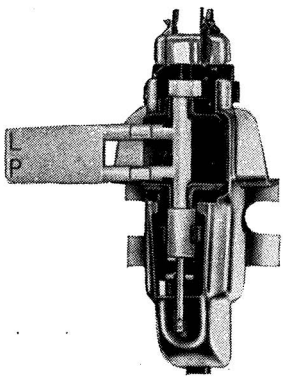
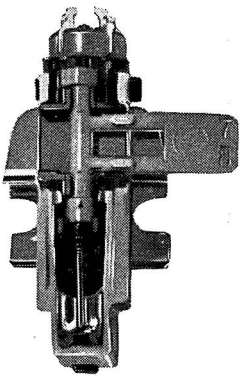


Type 9TA for high sensitivity

Typical response:	20 to 20,000 Hz.
Sensitivity:	80 mV/cm/sec rms at 1,000 Hz.
Lateral compliance:	4.0 x 10^{-6} cm/dyne.
Tracking weight:	2—4 gm.



Type 9TAHC for high compliance

Typical response:	20 to 20,000 Hz.
Sensitivity:	55 mV/cm/sec rms at 1,000 Hz.
Lateral compliance:	8.5 x 10^{-6} cm/dyne.
Tracking weight:	1.3 gm.

Sonotone

Technical Ceramics Limited,

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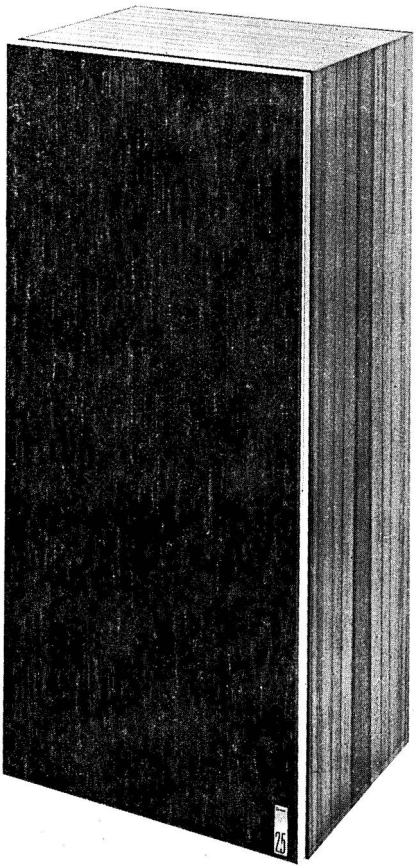
Celestion Studio Series

loudspeakers for the perfectionist



"DITTON 25"

The latest High Fidelity loudspeaker to be developed by Celestion. Free standing and of elegant slimline appearance it is designed for inclusion in luxury High Fidelity installations and for studio monitoring. The '25' will reproduce all musical frequencies with utmost realism. No less than five drive units are used to cover the range from 20 Hz to 40 kHz. The design utilizes the highly successful Auxiliary Bass Radiator to extend the low frequency response so that even organ pedal notes etc. are reproduced with superb realism. The ultra wide bandwidth and smooth response ensures the truest reproduction of all types of orchestral and vocal sounds.

Of the five units, two deal with the bass, there is the long throw 12" drive unit. This unit has an ultra linear excursion of up to ¾" enabling the unit to handle high power levels at very low frequencies. The Feroba II magnet has an extremely high flux density to ensure critical damping, high sensitivity and superb transient and power response. The diaphragm has been treated with a plastic coating to ensure optimum damping of any cone resonances and to afford smooth response.

The Bass drive unit is acoustically coupled to an Auxiliary Bass Radiator of 12" diameter. This unit having a twin roll suspension to ensure ultra linear operating conditions and complete stability at peak excursions.

The very important mid frequency range extending from 2 kHz to 9 kHz is handled by two moving coil pressure units of advanced design. The response of these mid range units is ± 1.5 dB.

A Special High Frequency unit has been developed by Celestion engineers to reproduce the upper frequency range. So good is this unit that it extends its response beyond the limits of human hearing ensuring the most precise reproduction of all audible sounds and transients.

The ultra wide sound spectrum of the "Ditton 25" system and the extreme smoothness of the response ensures a perfectly balanced reproduction of sound. The Specialist and connoisseur requiring the ultimate in sound reproduction will experience complete satisfaction with the Ditton 25 for many years to come.

Rola Celestion Ltd. FERRY WORKS, THAMES DITTON, SURREY. TELEPHONE: 01-398 3402

Celestion Studio Series

loudspeakers for the perfectionist

"DITTON 15"

The outstanding success of this superb High Fidelity Loudspeaker System is due to a combination of sophisticated design features exclusive to Celestion. One of these major features is the ABR (Auxiliary Bass Radiator).

In producing compact loudspeakers the designer is largely concerned with obtaining good bass reproduction. The amount of low frequency sound that can be radiated from a simple infinite baffle loudspeaker enclosure depends only on the volume of air that can be displaced by the bass cone during one cycle. This can be achieved by either a small light cone, capable of large excursions or a larger, much heavier cone with correspondingly smaller excursions. In either case a large magnet system is required to maintain efficiency. Also considerable care is needed in the design of both the mechanical suspension and the magnetic drive system if the harmonic distortion is to be kept to a minimum.

In the "Ditton 15" Celestion have perfected a different solution to this problem – ABR. The ABR is a rigid diaphragm with a linear air suspension capable of large excursions with very low distortion. In the cabinet it is pressure driven by the rear radiation from the 8" bass loudspeaker, which it loads down to 30 cycles, so that the ABR radiates the bass range from 30 – 60 cycles.

The mass of the ABR and the response of the bass unit are so matched that from 60 Hz down to 30 the ABR moves in phase with the bass loudspeaker cone. It progressively radiates more of the bass frequencies as the bass loudspeaker's own power output falls away. This sharing of the load results in a clarity of sound in the bass frequencies and permits a full 15 Watt power down to 30 Hz. This reduces the maximum excursion of the 8" speaker at low frequencies, resulting in lower harmonic and Doppler distortion and also gives higher power handling capacity. Above 60 Hz the ABR is stationary leaving the enclosure to act as a pure infinite baffle. In musical terms this means that ABR enhances reproduction of the lowest octave where conventional designs are weak.

Middle and bass frequencies are reproduced by the Special 8" drive unit. This has a massive Feroba II magnet structure for high efficiency and optimum magnetic damping. In order to effectively suppress cone resonances the surface has been treated with a viscous damping layer.

Above 3 kHz the excellent HF 1300 is employed. The three units are carefully integrated to ensure a smooth and balanced response and common to the Ditton Series all are flush mounted. This method of mounting ensures the absence of tunnel resonances and diffraction effects.

The grill cloth has been carefully selected because of its acoustically transparent properties coupled with discreet appearance to fit in with any setting.

For the enthusiast requiring a system of outstanding quality we unhesitatingly recommend the "Ditton 15".

Rola Celestion Ltd. FERRY WORKS, THAMES DITTON, SURREY. TELEPHONE: 01-398 3402

If you were a professional audio engineer your requirements for a transcription turntable unit would be critical, probably only satisfied by the specifications and features of the Sony 'ULTIMATE PRECISION' transcription unit, Type TTS3000, A D.C. servo motor system ensures that the turntable speed constancy is within .05%. The belt driven 12" diecast turntable weighs no less than 3lb. 5oz. and has an integrated neon illuminated and magnified strobe. Price £80. 10. 0.

Complementary to the Transcription unit are the 'ULTIMATE PRECISION' tone arms Types PUA237 (10") and PUA286 (12"). Most professional tone arms incorporate a number of compensating features but none have all the features incorporated in the Sony 'ULTIMATE PRECISION'. These include the gimbel mounting tone arm with an ultimate bias compensator cam device, independent balancing weights, integral cueing and precision hydraulic lowering device.

Price PUA237 (10") *£46. 10. 0.

PUA286 (12") *£53. 15. 0.

Finally to complete the 'ULTIMATE PRECISION' turntable system the VC8E cartridge. This is a high compliance moving coil magnetic cartridge fitted with an eliptical diamond stylus and designed to be fitted into head shells with standard ½" fixing centres. Price *£30. 10. 0.

Essential to this standard of disc reproduction equipment is a compatible amplifier. Recently developed techniques using the silicon transistor have enabled Sony research engineers to perfect the 'ULTIMATE PRECISION' amplifiers type TA1080 and TA1120. The output from these amplifiers is high – 30 and 50 watts RMS respectively with the very low distortion figure of less than 1% at full rated output. Comprehensive connection facilities are provided with variable input sensitivity. The presentation is functional yet aesthetically in keeping with today's requirements in styling.

Price TA1080 *£120. 0. 0.

TA1120 *£160. 0. 0.

Recent additions to the Sony audio range of equipment:

MODEL ST 5000W FM Stereo Tuner *£181. 0. 0.

MODEL SS 2800 Three-way Speaker System *£58. 2. 10 each

MODEL SS 3100 Three-way Speaker System *£86. 0. 0. each

MODEL SS 3300 Three-way Speaker System *£123. 10. 0. each

*Recommended retail price

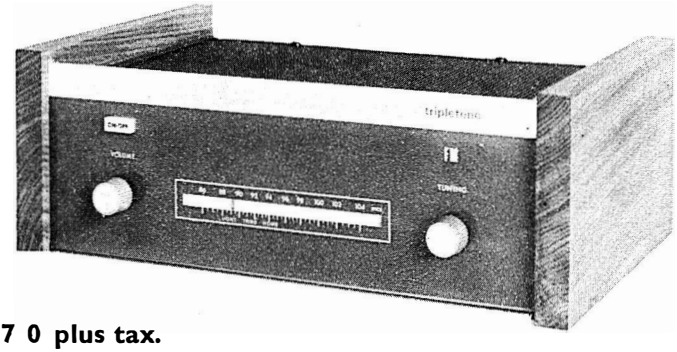
For comprehensive information see your Sony Dealer or write to :—

SONY (U.K.) LIMITED

36/40 Wigmore Street, London, W.1.

Ultimate Precision

tripletone SERIES 3



FM TUNER £16 7 0 plus tax.

"We have long admired the Tripletone amplifiers and tuners, as representing exceptional value for outlay".

Audio & Record Review

as selected for the DESIGN CENTRE LONDON

THE TRIPLETONE SOLID STATE INTEGRATED STEREO 8+8 **£29.19.6 COMPLETE**

tripletone

241A THE BROADWAY, LONDON S.W.19 Tel.: LIBerty 1189

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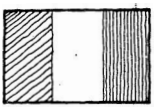
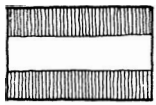
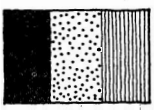


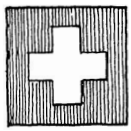
Audel S.A.S.
Ing G. Bertazzoni
& C.
MILANO
Italy



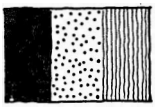
Messrs. H. Lurf
Reichsratstrasse 17
WIEN 1
Austria



Defotanghe S.A.
117, Noorderlaan
ANTWERPEN
Belgium



Sacom S.A.
3, Rue Hugi
2501 BIENNE
Switzerland



Syma S.A.
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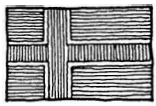
BRUXELLES 5
Belgium



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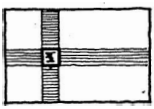

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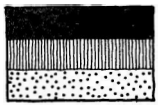
Finland



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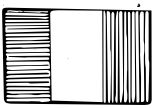
Schlachte 39-40
28 BREMEN 1
W/Germany



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International
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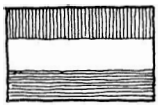
Marceaux
PARIS 17
France



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AMSTERDAM-
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Holland

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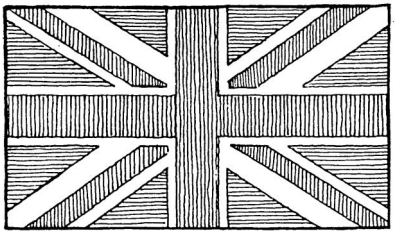
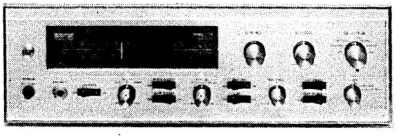


Faithful reproduction of sounds and music as close to the original as is electronically possible. This has always been Pioneer's guiding principle. To this end Pioneer manufacture a complete series of stereophonic sound systems. They include full size models for large areas and compact models for private enjoyment. The full range of Pioneer systems is available in the U.K. through the sole distributors.

Swisstone Ltd.

48a Station Road, Cobham, Surrey. Tel.: Cobham 4212

The PIONEER trademark was conceived by combining a tuning fork, that generates the standard waveform of sound, and the "Ω" sign, that is one of the electrical standards symbols.



PIONEER®

there's only one word for it

Wharfedale

(Precision built High Fidelity equipment)

WHARFEDALE

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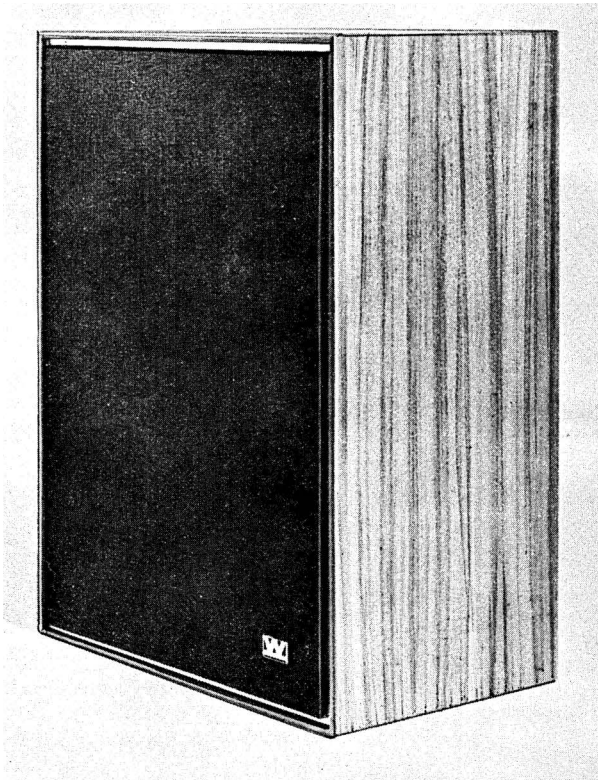


This year only 465* music enthusiasts will have their greatest wish fulfilled–the perfect High Fidelity system. The most thrilling system ever– and made by Bang and Olufsen.

BANG & OLUFSEN A/S BY APPOINTMENT TO THE ROYAL DANISH COURT

B&O Det danske kvalitetsmærke

1 Beolab 5000. 2 x 60 watts R.M.S. silicon transistor amplifier. Power available to reproduce full original volume at all frequencies in association with loudspeakers of normal efficiency (1-2%). Cursor type controls in place of knobs for slide-rule accuracy in setting. Comprehensive variable inputs and duplicated phono and Din outputs. Elegant long low free-standing cabinet in Teak or Rosewood. Price £140. ★

2 Beomaster 5000. Stereo F.M. Tuner with usable sensitivity of 1.5uV. Automatic Mono/stereo switching, 4 stage gang tuned R.F. section, 5 I.F. stages and A.F.C. Large radicator calibrated relative to signal strength. Cursor type tuning control with vernier adjustment. Variable muting and stereo levels. Aerial inputs for 75 ohm, 300 ohm and local. Identical in size and cabinet finish to match Beolab 5000. Price £103 5s. ★

3 Beovox 3000. Pressure chamber loudspeaker with separate bass, mid and high (x 2) frequency units. Variable attenuators to the mid and high frequency units. Provision for the connection of a separate high frequency diffuser unit (Beovox 2500). Maximum power handling capacity 500 watts music power, impedance 4 ohms. Teak or Rosewood finish. Price £49 10s. ★

4 Beovox 5000. Pressure chamber loudspeaker with one bass, two mid frequency and four high frequency units. Variable attenuators to mid and high frequency units. Provision for the connection of high frequency diffuser unit. Distortion at maximum power 2.2%. Maximum power handling 50 watts music power, impedance 4 ohms. Teak or Rosewood finish, free standing on elegant stainless steel legs. Price £59 10s. ★

5 Beogram 3000. Transcription turntable unit fitted with the world-famous B & O STL/15° tone arm, lowering device and a B & O SP7 stereo magnetic cartridge. Illuminated and magnified strobe. Mounted on Teak or Rosewood plinth and complete with Plexiglass cover. Price £82 15s. ★

6 Beovox 2500. High frequency sound diffuser unit. Six loudspeakers mounted one to each face of a cube for the omni-directional distribution of the high frequencies. Mounted on a stainless steel base or may be suspended. Power handling 50 watts music power over 2kHz. Price £59 10s. ★

Bang & Olufsen Beolab Series

* Only a limited number of Systems are being produced this year - so see and hear Beolab soon at your B & O dealer or write for detailed information to

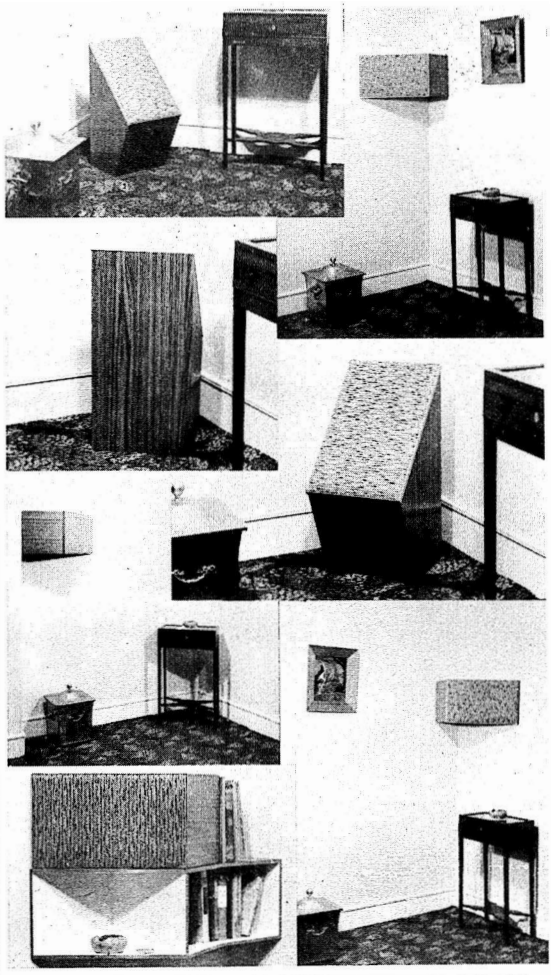
Bang & Olufsen United Kingdom Division, Eastbrook Road, Gloucester. Tel.:

London Showrooms: 70/71 Welbeck Street, W.1. Tel.: 01-486 2144. OGL2 21591.

B & O for those who consider design and quality before price.

★ **Recommended retail price.**

VARIATIONS



ON AN ORIGINAL THEME

BY THE MOST VERSATILE HI-FI LOUDSPEAKER IN THE WORLD

THE OMNI...

...BY RECTAVOX

THE RECTAVOX COMPANY

CENTRAL BUILDINGS, WALLSEND

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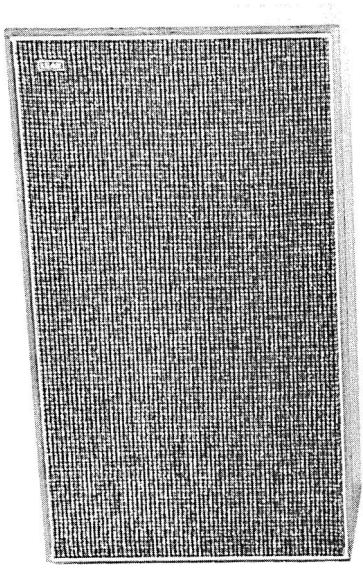
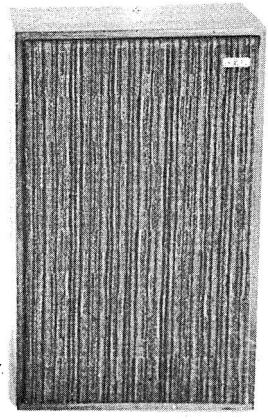
thoroughbreds



Sandwich
Loudspeaker
£43.10.0
Size 26" x 15" x 12"

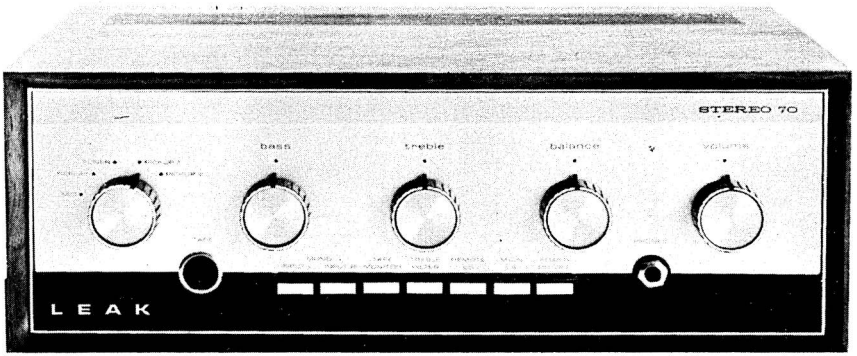


Mini-Sandwich
Loudspeaker
£29.15.0
Size 18½" x 11" x 7"

These two beauties are capable of reproducing any sound fed into them... faithfully and to perfection. The secret is the light and rigid cones, constructed from two skins of aluminium separated by expanded polystyrene. These rigid piston-action cones give a smooth response over the entire audio frequency range and are totally free from mechanical breakup and associated distortion. The cabinets are designed to blend harmoniously into any room setting, and are available in teak, walnut or mahogany.
For those with limited space, Leak have developed the Mini-Sandwich Loudspeaker, which is manufactured to the same exacting standards as its big brother.

LEAK HI-FI

stereo "70"



Chassis model £63.0.0
In teak case £69.10.0

The new big gun from Leak. The amplifier in which distortion dies of fright. The Leak Stereo 70 will thrill you with the clearest, most exciting sound ever reproduced by an amplifier.

It is full of latent power–up to 35 watts r.m.s. per channel. This is not power for power's sake, (though there may be times when you'll need it) but rather the means to perfect reproduction.

In addition, this extra output enables a pair of loudspeakers to be connected apart from the two in the main listening room. Other brand-new features are a stereo headphone socket for personal listening as an alternative to loudspeakers, a DIN record/replay socket for a portable tape recorder and facilities for the use of twopick-ups with front panel selection.

All this, backed by the famous Leak craftsmanship and reliability makes the Stereo 70 the most technically advanced amplifier available.

And it sounds it.

LEAK HI-FI

H. J. Leak & Co. Ltd., Brunel Road, London,W3. Tel: 01-743 1173.

Eleven Sanyo world class models

MR 929 Mk II Brilliant new mains stereo/mono tape recorder, 4 track, 2 speed. Max. output 4 watts each, 3 watts undistorted. With full and empty spool, 2 dynamic microphones and speakers

MR 800 Vertical stereo/mono deck for the connoisseur. 3 Speeds. 4 tracks. Erase rate less than 65 dB. Complete with accessories,

DC 60 Really beautiful solid state tuner/amplifier. FM/AM/FM stereo. 30 watts per channel. Noise filter, rumble filter, loudness, AFC. Frequency response 20 to 20,000 c/s. Range: AM 535 to 1605 Kc, FM 88 to 108 mc. FM distortion less than 1.0%.

MR 151 mains/battery stereo tape recorder, 4 track, 3 speeds. Sound on sound, sound with sound.

MR 999 A really magnificent mains stereo/mono tape recorder 6 watt x 2 output. 4 track. Sound on sound, sound with sound. (Speakers extra).

MR 801 Another excellent tape deck, 4 track, 3 speed. Sound with sound. With accessories.

DC 434 A wonderful solid state FM/AM/FM stereo tuner amplifier and transcription unit. 16 watts per channel. Response 20 to 20,000 c/s ± 1dB Range AM: 535 to 1605 Kc, FM 88 to 108 mc. Noise filter, rumble filter, loudness, AFC.

DC904 Stereo/tuner amplifier and record player with two built-in speakers. Optimum amplification and sensitivity on AM, FM/FM stereo. Response 60 to 6,000 c/s.

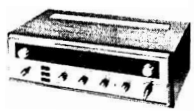
DC534 Stereo tuner/amplifier with record player. 12 watt per channel, optimum amplification and sensitivity on AM, FM/FM stereo:

MR 910 Stereo tape recorder with built-in speakers. Extraordinarily compact, yet with full fidelity. 4 track, 2 speed. Sound with sound. With accessories.

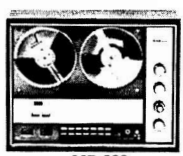
MR 939 Outstanding stereo tape recorder, 4 track, 3 speed. 7 watt per channel. Signal to noise ratio 45dB. Erase 65 dB. With accessories.

MR 929 Mk II

MR 800


DC 60

MR 151


MR 999

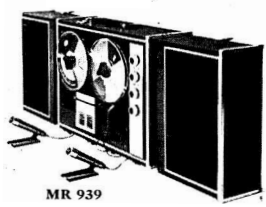
MR 801

DC 434

DC 904

DC 534

MR 910


MR 939

SANYO

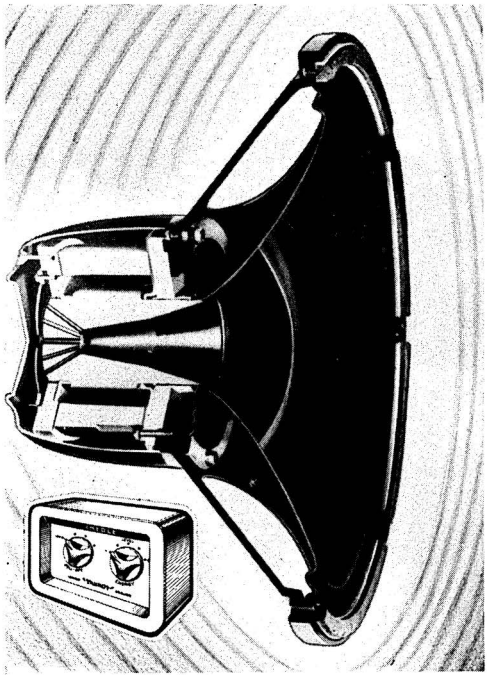
RELIABILITY IS BUILT IN

See Sanyo at any authorised dealer. For further information write to: J. W. Cowley, Sales Manager, Electronic Equipment Division, Marubeni-Iida Co. Ltd., 164 Clapham Park Road, London, S.W.4.

THE *Monitor* GOLD *

DUAL CONCENTRIC

Change should be made for improvement—not just for the sake of change. This is why the TANNOY 'Monitor' Dual Concentric loudspeaker — accepted as the 'quality standard' most specified for professional use — has remained unchanged in basic conception for the past 21 years and in detail design for the past seven years. NOW, the gradual evolution of a perfected technical specification has resulted in the refinement of this supreme 'quality' speaker into a new design — "The Monitor GOLD" — a design which again will remain intact until a change can be proved worthwhile. Send now for leaflet giving complete details and full technical specification.



The new Monitor Gold now incorporates a Treble Roll Off Control and Treble Energy Control enabling precise adjustments to be made for room acoustics and programme material.

Frequency Response
30 — 20,000 cps

Power Handling Capacity

15″	*50 watts*
12″	*30 watts*
III LZ	*15 watts*

Impedance

8Ω	*Nominal*
5Ω	*Minimum*

TANNOY® PRODUCTS LIMITED

West Norwood,
London, S.E.27, England.
Tel: 01-670-1131

A MEMBER OF THE TANNOY GROUP OF COMPANIES

PERFECTION IN SOUND WITH Garrard

You're looking at three of the finest turntable units available. Any one of these Garrard models will bring you closer than ever before to your ideal in sound reproduction — and at the price you want.

Garrard 401

With its heavily-shielded 4-pole induction motor, precise speed control, anti-static mat, non-magnetic diecast turntable, built-in stroboscopic light and contemporary styling, the 401 is the ultimate in transcription turntables. It meets the most exacting requirements of radio, television and recording studios throughout the world and of hi-fi enthusiasts everywhere. Each unit is supplied with its own individual test report.

Garrard AP 75

A new high-fidelity single record-playing unit with many advanced features. Diecast aluminium pick-up arm and slide-in cartridge carrier. Non-magnetic turntable. Calibrated fine stylus force adjustment and pick-up arm bias compensation. Cue and pause facility. As well as manual control, this unit offers the additional facility of automatic play of single records. A single operation starts the turntable, lifts the pick-up arm and lowers it on to the record, and when playing is finished, returns the pick-up arm to rest and stops the turntable. A single control lever selects both record size and turntable speed for 12″ records (78 rpm) 7″ (45 rpm) and 12″, 10″ and 7″ (33⅓ rpm). Optional extras: teak-finish base WB4; rigid, clear plastic cover SPC4.

Garrard SP 25 Mk. II

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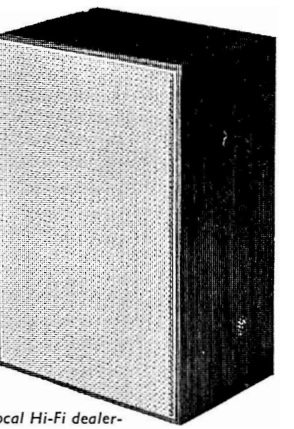

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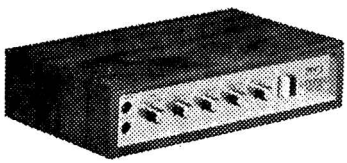

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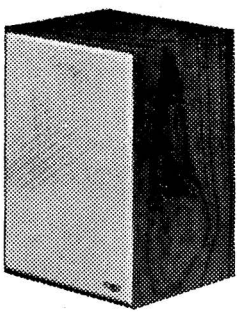

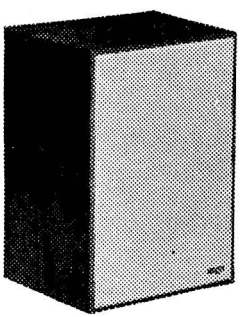

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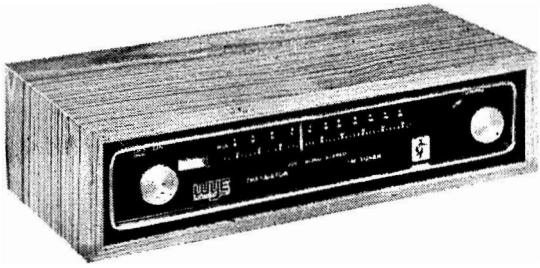

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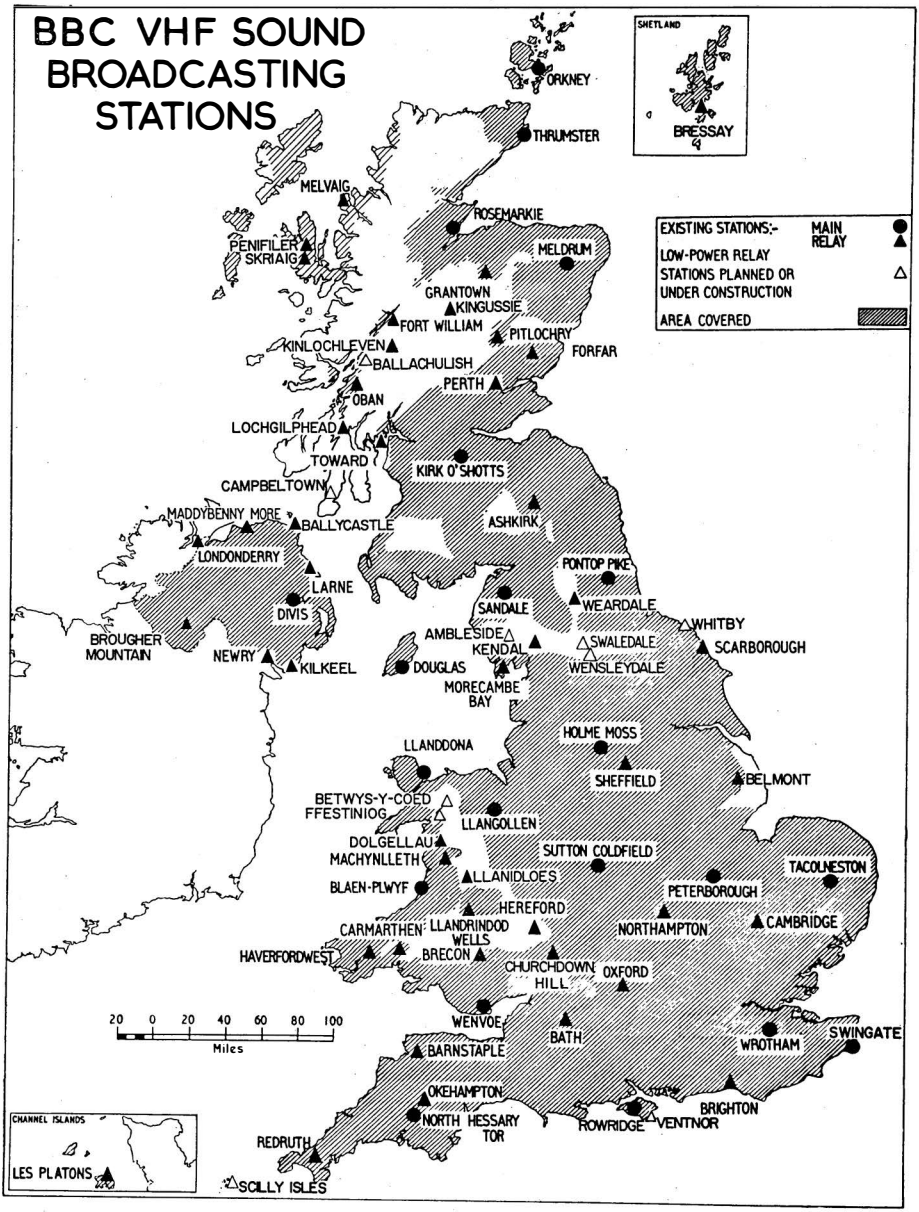
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